CiViTAS
Cleaner and better transport in cities

ELAN
BRNO • GENT • LJUBLJANA • PORTO • ZAGREB

Final Evaluation Plan

ELAN Deliverable No. 12.1

Project acronym: ELAN

Project full title: Mobilising citizens for vital cities

Grant Agreement No.: ELAN TREN/FP7TR/218954/"ELAN"

Workpackage:	WP12: Evaluation
Measure:	all
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Final Version

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

ELAN deliverable no.	12.1
Date / Version	15 November 2009
Dissemination level	Open to all
Work Package	WP12
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File Name	CIVITAS ELAN Evaluation Plan_final_09-11-15

Keywords

General			Work package links			
x	CIVITAS		x	WP1 Alternative fuels & clean vehicles	x	WP7 Energy-efficient freight logistics
x	ELAN Project		x	WP2 Collective transport & intermodal integration	x	WP8 Transport telematics
			x	WP3 Demand management	x	WP9 Project coordination
			x	WP4 Influencing travel behaviour	x	WP10 Project management
			x	WP5 Safety, security & health	x	WP11 Research and Technological Development
			x	WP6 Innovative mobility services	x	WP12 Impact and process evaluation
						WP13 Dissemination, citizens' engagement, training and knowledge transfer

Document history

Date	Person	Action	Status [1]	Circulation [2]
20/04/2009	SEM+PEM	First Version of the Draft evaluation plans (discussed in Evaluation Meeting in Zagreb)	Draft	PEM, SEM
15/06/09	SEM + PEM	Second version Draft evaluation Plans	Draft	PEM, SEM
30/06/2009	SEM+PEM	Third version Draft Evaluation plans sent to POINTER	Draft	PEM, SEM, PM, POINTER
31/08/2009	PEM +SEM	Restructured Draft Evaluation Plans sent to SEM's by TRITEL	Draft	PEM, SEM
15/10/2009	PEM +SEM	Final Draft Evaluation Plans	Draft	PEM, SEM
15/11/2009	PEM +SEM	Final Evaluation Plan	Final	PEM, SEM, PM

[1] *Status:* Draft, Final, Approved, Submitted

[2] *Circulation*: PC = Project Coordinator; PM = Project Manager; SC = Site Coordinators; PEM = Project Evaluation Manager; DM = Dissemination Manager; SEM = Site Evaluation Managers; SDM = Site Dissemination Managers; SCo = Scientific Coordinator, P = partners, ML = Measure Leaders

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CIVITAS ELAN approach for Evaluation

Introduction

1. Objectives of this Deliverable

This deliverable presents a structured and feasible evaluation approach for the CIVITAS-ELAN project: the CIVITAS-ELAN Evaluation Plan.

Next to a general approach for the evaluation tasks, followed and supported by all the CIVITAS-ELAN cities, the Evaluation Plan gives a detailed overview of all the evaluation tasks that will be performed throughout the life cycle of the CIVITAS- ELAN Project. It defines clear objectives of the measures that will be implemented in the CIVITAS-ELAN cities and how the impact of these measures will be evaluated. It also pays attention to the assessment of the implementation processes of the measures, in order to learn how these processes (can) shape the final results of the measures.

Also the methodology, how these evaluation tasks will be fulfilled, will be explained in a more detailed way in this Evaluation Plan. A good balance between scientific reliability and practical feasibility was the starting point for the CIVITAS- ELAN cities when defining the methodologies for the evaluation tasks.

Finally, also the persons/ organisations behind the evaluation tasks are included in the plan. Within CIVITAS- ELAN a lot of care and detail was paid to the appointment of responsibles for each evaluation task in order to guarantee full awareness and reliability of the evaluation tasks.

2. The CIVITAS Context

2.1. The CIVITAS Initiative

The CIVITAS (CIty-VITAlity-Sustainability) Initiative is a demonstration programme funded by the European Union. It is coordinated by the European Commission Directorate General for Energy and Transport (TREN) and started in 2002. CIVITAS is seen as contributing to the EC's Transport, Energy and Environmental agendas (in that order and in that combination) and also the overarching climate change agenda.

The aim of the CIVITAS Initiative is to test integrated strategies for clean urban transport, or more precisely, 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. In line with the initiative's objective to implement integrated packages of technology and policy measures in the field of energy and transport, measures promote energy-efficient, cost-effective and clean public and/or private vehicle fleets for passenger or freight transport using alternative fuels and the necessary energy infrastructure.

The **key elements** of CIVITAS are that:

- 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, and
- cities are living 'laboratories' for learning and evaluating.

The **objectives** of CIVITAS are:

- 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, and
- to build up critical mass and markets for innovation.

The CIVITAS Initiative is composed of three funding periods, CIVITAS I, CIVITAS II and CIVITAS Plus. The overall budget of the initiative is around 430 Million Euro with an EU funding of around 180 Million Euro.

2.2. CIVITAS I and II

In the first funding period from 2002-2006, CIVITAS I, 19 cities were involved in four demonstration projects funded under the 5th Framework Research Programme. These were:

- CIVITAS MIRACLES (Barcelona, Cork, Winchester, Roma)
- CIVITAS TELLUS (Rotterdam, Berlin, Göteborg, Gdynia, Bukaresti)
- CIVITAS VIVALDI (Bristol, Nantes, Bremen, Kaunas, Aalborg)
- CIVITAS TRENDSETTER (Lille, Praha, Graz, Stockholm, Pécs)

In the second funding period from 2005-2009, CIVITAS II, there are currently 17 cities involved in four demonstration projects funded under the 6th Framework Research Programme. These are:

- CIVITAS SUCCESS (Preston, La Rochelle, Ploiesti)
- CIVITAS CARAVEL (Genova, Kraków, Burgos, Stuttgart)

- CIVITAS MOBILIS (Toulouse, Debrecen, Venezia, Odense, Ljubljana)
- CIVITAS SMILE (Norwich, Suceava, Potenza, Malmö, Tallinn)

2.3. Civitas Plus

CIVITAS Plus is the third funding period of the CIVITAS Initiative running from 2008-2012. Funded by the 7th Framework Research Programme, there are now 26 cities involved in five demonstration projects. For the European Commission the expected impacts of the CIVITAS Plus projects are:

- Increased energy efficiency in urban transport
- Contribute to improving road safety in urban areas
- Increase share of biofuels and other alternative fuels
- Reduction of CO_2, pollutant emissions and noise
- Improving efficiency & effectiveness of urban transport & modal balance

Figure 1: The CIVITAS cities

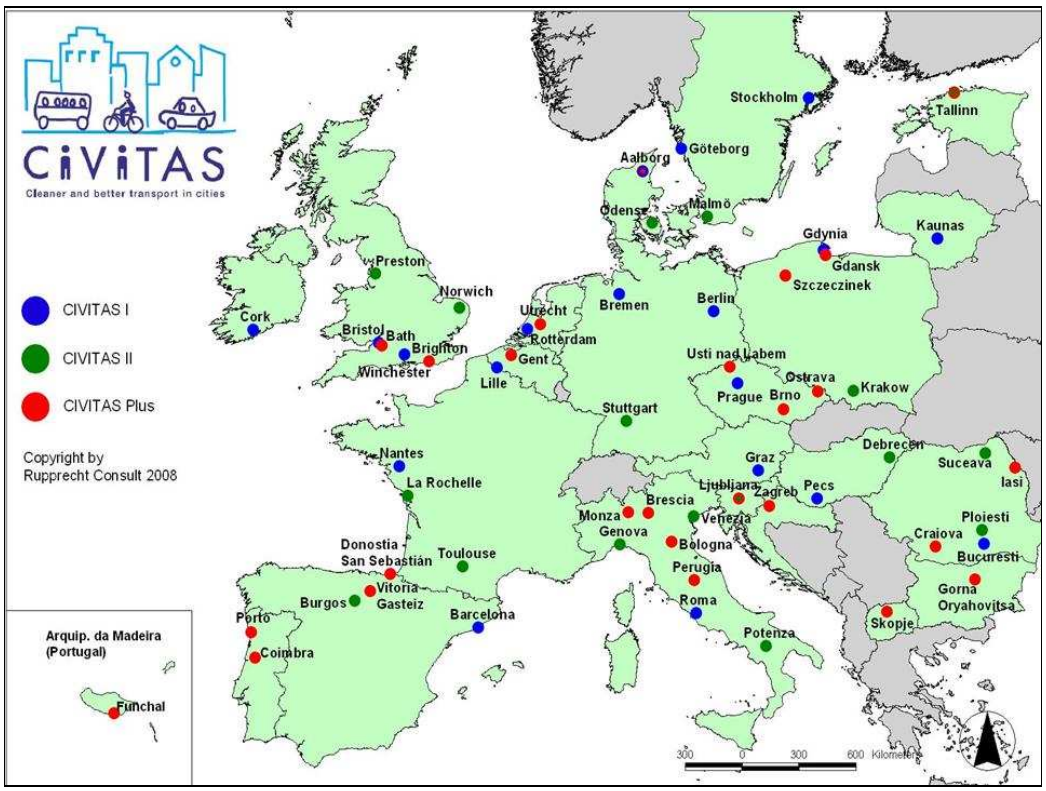
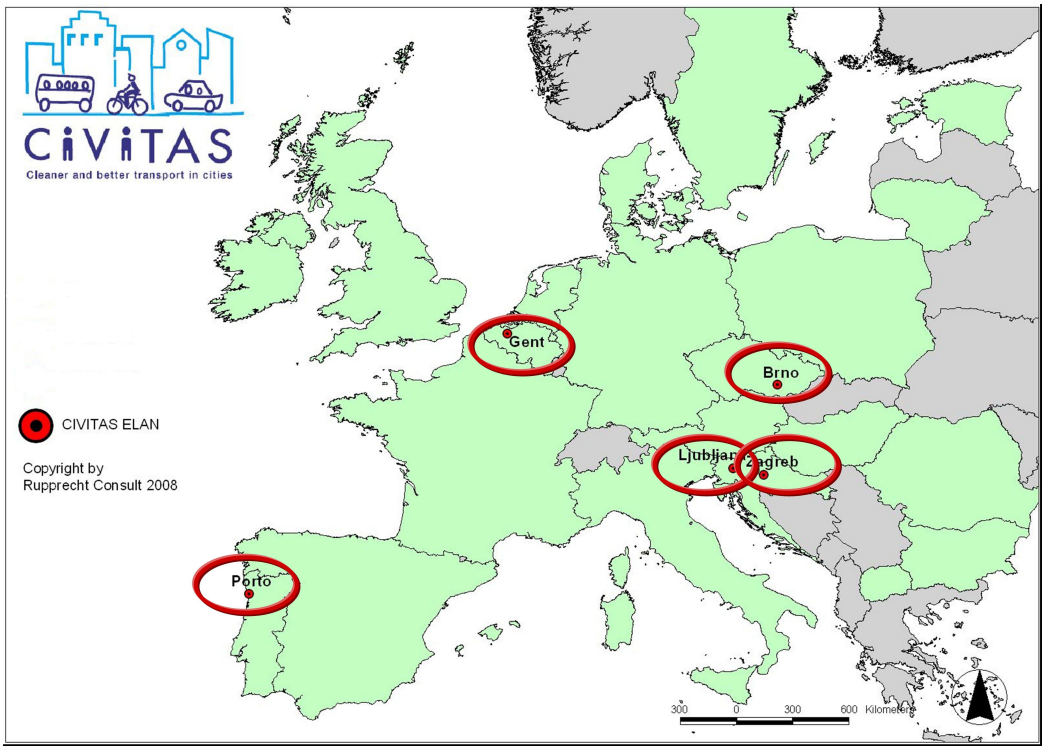


Figure 2: The CIVITAS-ELAN partner cities



2.4. CIVITAS Plus Projects

Next to ELAN, there are four other CIVITAS Plus collaborative projects funded by the European Commission and running in parallel to ELAN. These are:

ARCHIMEDES

ARCHIMEDES (Achieving Real Change with Innovative Transport Measures Demonstrating Energy Savings) is coordinated by the City of Aalborg. The project consortium consists of cities from six countries – next to Aalborg (DK), the partner cities are Brighton (UK), Iasi (RO), Monza (I), San Sebastian (ES) and Ústi nad Labem (CZ) – and comprises 16 partners altogether. While Aalborg, Brighton, Iasi and San Sebastian are leading cities, the remaining two are learning cities. ARCHIMEDES has a total project budget of 26.001.794 Euro and an EC contribution of 15.982.452 Euro and comprises 83 measures.

The main aim of ARCHIMEDES is to increase modal share towards more sustainable modes, while providing safer and more convenient travel services in medium-sized urban areas. The project's key objective is to demonstrate strong and coherent packages of measures, integrated within each site, to maximize the synergetic effects of safe and energy-efficient transport measures supported by appropriate policy tools and RTD, assessed through robust evaluation approaches.

Another a key objective of the ARCHIMEDES project is education. This will be achieved both through training and learning actions within the consortium, and through promotion, training events and educational exchanges between students, citizens and stakeholders in the project. In addition, the planned tools and measures target innovation areas selected with the location of schools and major educational establishments in mind.

The advancement of the learning cities within the Consortium is a major objective of the ARCHIMEDES project, with two learning cities participating fully in the decision-making processes and

organizational structures. The aim is to undertake Sustainable Urban Transport Planning activities in the framework of ARCHIMEDES, and develop plans during the project lifetime. Selected demonstrations and RTD activities will support the plan development, and make use of the learning opportunities that co-operation with experienced and pro-active lead Cities will provide.

New Member State representation is a key objective of ARCHIMEDES, with one lead city and one learning city based in such countries, and participating fully in the consortium. The specific requirements of clean and sustainable urban transport in Europe's countries and regions under rapid development will be a specific focus within the scope of the ARCHIMEDES project.

MIMOSA

The objectives of the MIMOSA (Making Innovation in Mobility and Sustainable Actions) project are to: improve the quality of life in the partner cities; to stimulate the healthier and more environmental conscious lifestyle of the citizens of these cities; to improve air quality and reduce congestion; and to increase security and safety. All this should be achieved without compromising, and possibly improving, the mobility of citizens. Within the project a special emphasis is placed on information technology systems; collective public transport; energy efficient and clean vehicles (public and private); communication and education involvement of the citizens of the partner cities.

Within the project, almost seventy demonstration measures will be implemented in five cities under one guiding concept: "Learn how to move better, to live in better cities." That concept seeks to ensure citizens find "reward" in their behaviours rather than sacrifice – thus citizen interaction is central to the project's success. The project aims at reducing pollutant emissions through investments in CNG, hybrid/electric, LPG and biofuels, besides an accent on car-sharing and cycling/walking. Moreover, network, service and security improvements will tempt new customers to public transport, and technological solutions will improve passenger and goods traffic management.

The coordinator of the MIMOSA project is the Municipality of Bologna. The partner cities are Funchal (PT), Gdansk (PO), Tallinn (EE) and Utrecht (NL). Altogether, the project consists of 70 measures. The project's total budget is 24.481.787 Euro with an EC contribution of 15.290.809 Euro.

MODERN

The mission of MODERN (Mobility, Development and Energy use Reduction) is "to increase the overall quality of life in the cities, through the reduction of pollution generated by transports, the implementation of energy-saving measures, the respect for the environment and the promotion of a less car-dependant life-style". The general objectives of the project are:

- to increase the quality and the effectiveness of the public transport system (from the environmental and from the service point of view) increasing the number of users, also through a series of side-measure capable of limiting the circulation of private cars,
- to limit the waste of energy and to support the diffusion of the use of clean fuels among the citizens,
- to give value at alternative "sweet" mobility modes (bicycle at first) improving safety and liveability for their users,
- to increase the technological endowment of the cities as a support to more intelligent mobility management policies and as a service to citizens, and
- to strongly operate to diffuse as much as possible the culture of an environmental sustainable mobility among citizens and to increase the social awareness of the vital importance of these themes.

The project consortium consists of five Central Southern European cities with the Municipality of Craiova (RO) coordinating the consortium and Brescia (I), Vitoria-Gasteiz (ES), Coimbra (PT) and Ostrava (CZ) as partner cities. Altogether there are 25 partners participating in the project – next to the five city authorities, five Public Transport operators, five public research and government agencies, three universities, three non-profit organisations, and four small and medium enterprises. MODERN's

total project budget is 15.008.364 Euro with an EC contribution of 9.310.450 Euro and comprises 49 measures.

RENAISSANCE

The aim of the RENAISSANCE (Testing Innovative Strategies for Clean Urban Transport for historic European cities) project is to design and demonstrate large-scale measures supporting urban quality, mobility, accessibility and the heritage of historic city centres

The objectives of RENAISSANCE are:

- to help achieve policy objectives to protect and improve quality of life, while enhancing economic performance and providing attractive tourist visits while preserving the heritage and operation capability of the city,
- to provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets,
- to promote the use of public transport and other alternatives to private cars,
- to demonstrate new ways to improve urban goods logistics,
- to increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology,
- to reduce NO_x emissions and particulate matter,
- to save energy (all cities combined),
- to reduce annual fossil CO_2 emissions in demonstrating cities,
- to reduce noise levels in demonstrating cities,
- to educate and inform residents and visitors so that they are more aware and supportive of the transportation systems and understand the reason behind their implementation and operation to help secure stakeholder support and compliance, and
- to provide input to European policy making and promote a sustainable transport future in Europe.

The project comprises five cities: Perugia (I) as the coordinator of the consortium, Bath (UK), Szczecinek (PO), Gorna Orjahovitsa (BG) and Skopje (MK) – the latter two are the learning cities, the others the leading cities. The partner cities face common problems: they are all historic cities with sensible layouts, and very valuable heritage to be preserved and enhanced (from Roman to Arabian, from Middle Ages to the Renaissance Age). The RENAISSANCE project faces the challenge of a local economic development that has to match with the residents, city users and tourist flows needs in terms of accessibility. The total budget of the RENAISSANCE project is 24.006.193 Euro and the EC contribution is 14.749.681 Euro and comprises 42 measures.

2.5. The CIVITAS Support Actions

The CIVITAS Support Actions are monitoring implementation, evaluate impacts of measures, and disseminate best practice. They both do have an emphasis on quantification.

VANGUARD: Support Action for Coordination and Dissemination

The role of the CIVITAS Plus Support Action VANGUARD (Advancing Sustainable Urban Transport in an Enlarged Europe through CIVITAS):

- Cost-effective ways to co-ordinate dissemination of knowledge and experience from collaborative projects
- Co-ordination of education and training
- Strong management of interface between dissemination support action and CIVITAS Plus collaborative projects

The overall goal of VANGUARD is to demonstrate between 2008-2012 that the CIVITAS programme and the corresponding measures cities adopt, are credible tools of long-lasting value for meeting pol-

icy targets (environment, transport, energy, social and/or economic), to achieve healthy, viable and competitive cities, as proven by 'CIVITAS' decision-makers, for European decision-makers yet to be 'converted'. VANGUARD is coordinated by REC – The Regional Environmental Center for Central and Eastern Europe with EUROCITIES, Mobiel 21, POLIS, ICLEI, Senter Novem, FGM-AMOR and MOSTRA as partners.

More specifically, CIVITAS VANGUARD is supporting the CIVITAS-Plus collaborative projects and disseminating the results of their activities to Europe as a whole. The contact persons for ELAN within VANGUARD are Silke Moschitz (Silke.Moschitz@eurocities.eu) and Peter Staelens (Peter.Staelens@eurocities.eu) from EUROCITIES.

CIVITAS VANGUARD consists of five workpackages:

- WP 1: Project Management
- Progress monitoring, Quality control, Project representation towards the EC and outside, Administrative management)
- WP 2: Needs Assessment
- What?: (a) identify the required assistance among the CIVITAS Plus cities and indirect (potential) beneficiaries and (b) provide a foundation for the project's support and dissemination activities;
- How?: (a) preliminary analysis, (b) needs assessment, and (c) continuous adaptation.
- WP 3: Demonstration cities support
- (Dissemination Liaison Group, Support strategy, Training and event coordination, CIVITAS VANGUARD project newsletter, Technical working groups and training events, Communications support to cities)
- WP 4: Awareness raising, dissemination and communication
- Awareness Raising, Dissemination and Communications Strategy, CIVITAS website, Promotional materials, CIVITAS newsletter, Communications and PR, Dissemination workshops, Results publications
- WP 5: CIVITAS Community Support
- CIVITAS secretariat, CIVITAS political advisory committee secretariat, CIVITAS Forum, CIVITAS Award

POINTER: Support Action for Monitoring and Evaluation

The CIVITAS Plus Support Action POINTER is responsible for the impact and process evaluation and the monitoring activities of the five collaborative projects funded within CIVITAS Plus. POINTER is coordinated by TNO – Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek.

The role of the POINTER as regards impact and process evaluation:

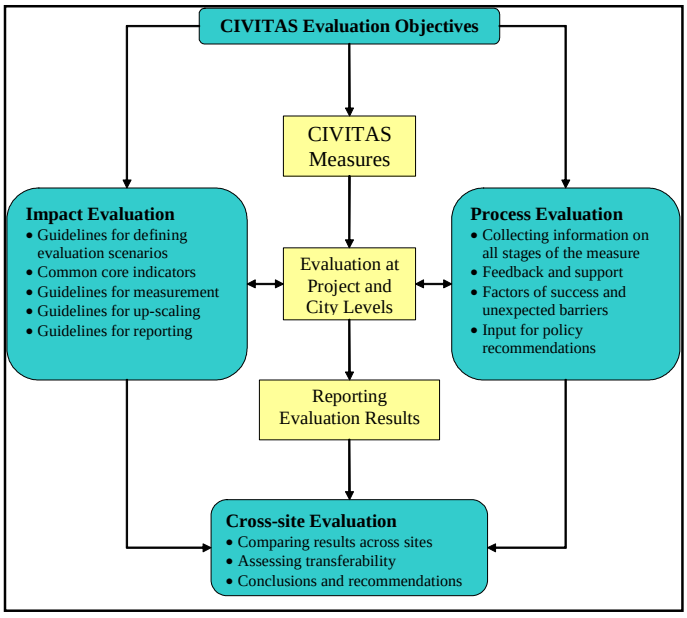
- Essential for knowledge capture, structuring and retention
- Identifying best practice, replication in new projects
- Cross site evaluation – enables assimilation of similar measures across projects
- Measuring the impact of integrated measures and extrapolation/ up-scaling
- Aim is for a robust evaluation framework, covering both the process (how measures are implemented) and the results

The objectives of POINTER as regards evaluation are to support city and project evaluations and to ensure that:

- impacts of individual measures or groups of measures are clearly understood enabling a clear interpretation of results,
- methods, approaches and outputs are co-ordinated across cities enabling coherent understandings across cities at European level,

- clear and supportable messages on the value of sustainable urban transport measures are determined,
- insight gained from the processes of planning and implementation are included as well as assessment of results and outcomes,
- policy recommendations are formulated from the evaluations, and
- work of CIVITAS I and II is built upon.

Figure 3: The CIVITAS-POINTER Evaluation Framework

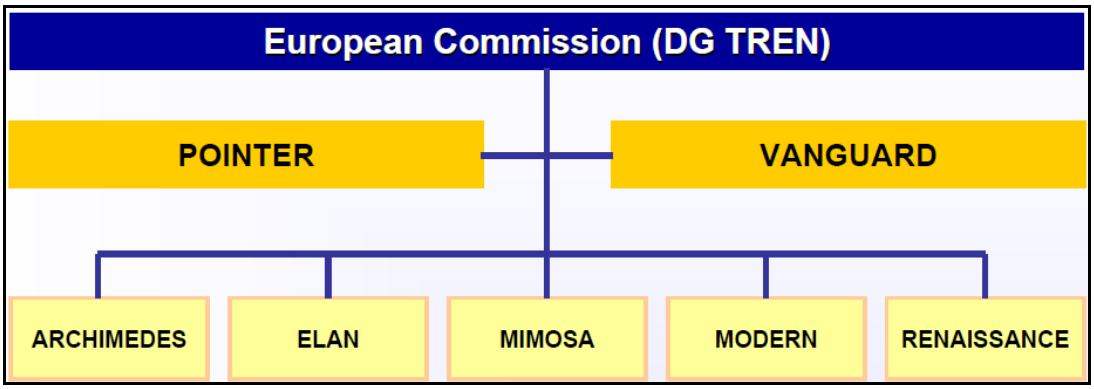


As regards monitoring the role of POINTER is to give support for Commission services to assure quality and timeliness of deliverables. The objectives of POINTER as regards monitoring are to:

- independently report on the progress of the CIVITAS Plus demonstration projects,
- to control the timeliness of reporting,
- to validate and analyse data,
- to provide comments and recommendations on how to improve data collection, analysis, and reporting, and
- to develop procedures, templates, and checklists.

More precisely, POINTER is monitoring the general compliance with contractual conditions, the timeliness of reporting, budget use, the progress of deliverables, reports of the measured indicators as they are defined in the collaborative project's contracts, and specific problems mentioned in the reports. Regarding confidentiality and independency, no part of cities' reports will be communicated to third parties, except with the cities' corresponding approval in writing. Moreover, POINTER will implement the monitoring activities exclusively and in strict accordance with the contractual conditions or subsequent requests from the European Commission.

Figure 4: The CIVITAS Plus structure



3. CIVITAS ELAN Project

3.1. Objectives

The CIVITAS-ELAN Project is the result of an intensive cooperation and exchange process during which the cities of Ljubljana, Gent, Zagreb (as leading cities), Brno and Porto (as learning cities) have developed a common workplan for the CIVITAS Programme. Based on the cooperation agreement signed by the mayors of the five cities, a common mission statement for CIVITAS-ELAN has been agreed:

The CIVITAS-ELAN mission is:

To "mobilise" our citizens by developing with their support clean mobility solutions for vital cities, ensuring health and access for all.

The starting point for CIVITAS-ELAN is to "put citizens first" in the dual sense of

- considering citizens not only to be "the problem" in creating a sustainable transport system, but to "mobilise" them by letting them become part of "the solution" through dedicated participation and consultation processes in many aspects of the project, and by
- giving priority to the needs and expectations of citizens in the "ELAN cities" - difficult to achieve or contradictory as they may sometimes appear to the transport practitioner.

Throughout the project this will be communicated with the citizens by using five characters, representing not only the five ELAN cities, but the citizens of Europe:[3]

3 This illustration has been prepared by Chris Schauer for CIVITAS ELAN. Other parts of this document contain artwork to be used exclusively use within the "CIVIT was de rtist.

The CIVITAS-ELAN cities intend to respond in a pro-active way to the policy challenges in European cities, which are substantial, especially in the New Member States:

Convincing the citizens, that clean mobility solutions are in their real interest, creating a dynamic development of the urban economy, despite lacking funds for overdue investments and maintenance, and at the same time creating a fair and inclusive society.

Responding also to national and European policy challenges, like security of energy supply, need for more efficient energy use, legal standards, like air quality, and the global challenge of climate change.

In response to these (and other) multi-faceted policy demands, CIVITAS-ELAN has defined an ambitious agenda of change. It is based on the conviction that, by "putting people first" we will not only contribute to better governance, we also transfer ownership of our policies into the hands of our citizens – and also reduce the political risk of failure. Most importantly, through enabling and encouraging policies, we win the minds and hearts of our people to initiate long-term change in the mobility patterns of our cities.

In responding to citizens' needs, CIVITAS-ELAN has identified headline objectives for each CIVITAS policy field:

Table 1: Headline objectives CIVITAS- ELAN

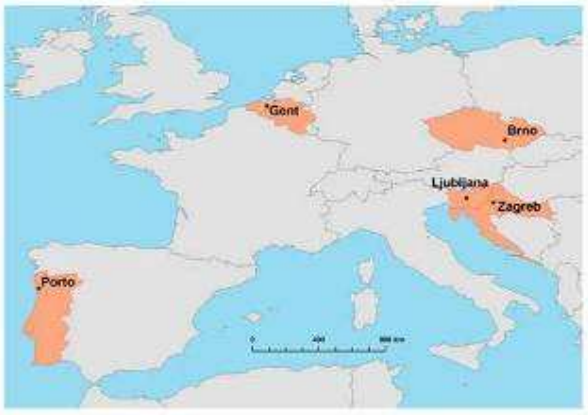
Mobilising citizens, creating vital cities, ensuring health and access for all by:	
Alternative fuels & clean energy efficient vehicles	▪ Increasing energy efficiency through comprehensive energy management and innovative energy recovery/ saving techniques
	▪ Reducing dependency on fossil fuels by increasing use and production of biofuels ▪ Increasing use of CNG
	▪ Cleaning up local vehicle fleets through a mix of technologies/ fuels ▪ Initiating local and European "green procurement" approaches
Collective transport services & intermodal integration	▪ Implementing effective, high quality mobility solutions ▪ Integrating transport modes and local-regional public transport ▪ Giving priority to PT on the road, at intersections and (P&R) interchanges
	▪ Planning intermodal infrastructure with active public involvement
Demand management	▪ Preparing for a sustainable congestion charging scheme ▪ Establishing a public dialogue on pricing
	▪ Returning public space to pedestrians ▪ Managing space to increase its quality and its use by sustainable modes
Influencing travel behaviour	▪ Adopting a targeted mobility marketing approach ▪ Providing mobility management plans to major institutions
	▪ Making walking and cycling more attractive
	▪ Establishing a mobility dialogue with the citizens ▪ Providing high-quality mobility information to the citizens
Safe & secure mobility	▪ Developing integrated & target-group specific safety and security strategies
	▪ Increasing road safety (especially for vulnerable road users)

Mobilising citizens, creating vital cities, ensuring health and access for all by:	
	▪ Improving security in Public Transport
Innovative mobility services	▪ Implementing flexible demand-responsive mobility services and agencies ▪ Developing car sharing concept further ▪ Providing a coordinated response to major events
Freight distribution	▪ Rationalising freight distribution ▪ Improving institutional cooperation on "freight"
Transport telematics	▪ Increasing the commercial speed of Public Transport by giving priority
	▪ Providing reliable traveller information ▪ Simplifying ticketing and integrating fares ▪ "Decongesting" corridors from polluting vehicles
	▪ Introducing telematics for clean modes

These high-level project objectives have been further translated into major project goals, the specific outputs to be produced, and will be implemented by 68 measures.

3.2. Cities and Consortium partners

The CIVITAS-ELAN project brings together five cities from five European countries.



Ljubljana (Slovenia), **Gent** (Belgium) and **Zagreb** (Croatia) are the so-called *leading cities* of which Ljubljana represents the New Member States and Zagreb a candidate country. **Porto** (Portugal) and **Brno** (Czech Republic) are the so-called *learning cities*. Each city is primarily represented and fully supported by the city council under the political authority of the elected mayors.

Although each with their own unique character the cities of Ljubljana, Gent, Zagreb, Brno and Porto share important characteristics:

- medium-sized cities with strong identities, rich cultural heritage and high quality public spaces which provide room for communication and identity,
- dynamic cities, with large student populations (300.000 in total) which have an enormous power of creativity and ability to answer future challenges – and a strong tradition of public dialogue and discussion,
- cities in critical phases of development with very large infrastructure projects at various stages of preparation (e.g. redevelopment of city-centre railways stations and old industrial areas)
- an openness of the political leaders to develop ambitious and innovative concepts in support of the European agenda for sustainable urban development – as recently expressed in the "Leipzig Charta".

In each city, the City Administration assumes the leading role of a local consortium comprised high qualified and carefully selected organisations which bring in the necessary skills and experience appropriate for reaching the ambitious objectives of CIVITAS-ELAN : public and private transport operators (including car sharing and rent-a-bike companies), parking operators, urban planners, environ-

mental agencies, user associations, IT specialists, research centres and universities (bio-energy, bio-fuels, traffic engineering, fleet and freight management, transport optimization calculations, geography, social science, risk assessment, economics) and consultancy firms (evaluation, dissemination, project management, training). The overall project consists of 37 partners. Subcontractors have been chosen for providing specialised skills. Subcontracting is used only in exceptional circumstances to support the measure implementation by providing specialised expertise and services complementary to those of the project partners such marketing campaign, engine maintenance, construction work, chemical analysis or GIS.

The overall consortium is lead and coordinated by Ljubljana which is currently partner city in the CIVITAS II MOBILIS project where they are gathering valuable experience in management of ambitious projects and complying with EU procedures: the other cities and partners will significantly benefit from this experience.

In the table below an overview of all the CIVITAS- ELAN partners can be found:

Table 2: Overview of the CIVITAS- ELAN Partners

Beneficiary short name	Beneficiary name	Beneficiary No.
COL	Mestna občina Ljubljana	1
LPP	Ljubljanski potniški promet	2
TELARGO	Telargo d.o.o. Informacijske rešitve v prometu in transportu	3
UIRS	Urban Planning Institute of the Republic of Slovenia	4
UL	Univerza v Ljubljani	5
PI	Prometni institut Ljubljana d.o.o.	6
AIS	Agricultural Institute of Slovenia	7
REC SLO	Regional Environmental Center, Country Office Slovenia	8
JSI	Inštitut Jožef Stefan	9
SZ	Slovenske železnice	11
RC	Rupprecht Consult	12
GCC	Gent City Council	13
DLN	De Lijn	14
AWV	Agency Roads and Traffic (new name and abbreviation)	15
MMB	Maxmobiel	16
SM	Student and Mobility	17
CAMBIO	Cambio	18

Beneficiary short name	Beneficiary name	Beneficiary No.
UGENT	Gent University	19
TRITEL	Transport, Infrastructure and Telematics	20
CMP	Câmara Municipal do Porto	21
FEUP	Faculadade de Engenharia da Universiade do Porto	22
STCP	Sociedade de Transportes Colectivos do Porto, SA	23
MP	Metro do Porto, SA	24
ANTROP	Associação Nacional de Transportadores Rodoviários de Pesados de Passageiros	25
OPT	Optimização e Planeamento de Transportes, S.A.	26
FCUP	Faculdade de Ciências da Universidade do Porto	27
UFP	Universidade Fernando Pessoa	28
SMB	Statutární město Brno	29
DPMB	Dopravní podnik města Brno	30
FGM-AMOR	Forschungsgesellschaft Mobilität - Austrian Mobility Research, FGM-AMOR, Gemeinnützige GmbH	32
ZAGREB	City of Zagreb	33
ZET	"Zagrebački Holding" Co., department "ZET"	34
HZ INFRA	HŽ Infrastruktura Development and Investment	35
CISTOCA	"Zagrebački Holding " Co., department "ČISTOĆA"	36
ODRAZ	Non governmental organisation ODRAZ	37
BICIKL	Non government organisation BICIKL	38
ZFOT	University of Zagreb, Faculty of Transport and Traffic Engineering	39

Further information on the city context of each city and their key characteristics can be found in the Site Evaluation Plans for each city.

3.3. List of Measures by CIVITAS ELAN City

Below a list of all the **implementation measures** within the CIVITAS ELAN cities is given:

Table 3: List of Implementation measures within CIVTAS ELAN

City/ IP/ Measure Number	Measure Title
City of Gent	
1.2-GEN	Energy efficient city fleet management
1.8-GEN	Extended biodiesel production
1.9-GEN	Semi-public clean car fleet
1.10-GEN	Introduction of hybrid vehicles
1.13-GEN	Clean public transport strategies (B30 & emission control)
2.2-GEN	Improved Public Transport service levels
2.4-GEN	Intelligent Park&Ride enforcement
2.9-GEN	Participatory re-development of main train station area
3.3-GEN	Parking and public space management around train station and ELAN corridor
3.4-GEN	Pedestrian area enforcement access restrictions
4.2-GEN	Mobility management for companies
4.3-GEN	Mobility management for schools
4.5-GEN	"The House of Bike" and bicycle activities
4.7-GEN	Walking promotion
4.10-GEN	Comprehensive mobility dialogue and marketing campaign
5.6-GEN	Safe cycling corridor
5.7-GEN	Security enforcement in public transport
6.2-GEN	Innovative car sharing
6.3-GEN	Holistic event management
7.3-GEN	Institutional platform for city freight management
8.6-GEN	Sustainable multi-modal traffic management
8.9-GEN	IT-based bicycle theft prevention
8.10-GEN	Route planner for bicycles
City of Ljubljana	
1.7- LJU	Pure plant oil for vehicle propulsion
1.11- LJU	Hybrid bus implementation
1.12- LJU	Green procurement for public fleets
2.1- LJU	Integrated high-quality mobility corridor
3.1- LJU	Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels
4.1- LJU	Individualised mobility marketing based on public involvement and inclusion in defining city transport policy
4.6- LJU	Comprehensive Cycling Strategy

City/ IP/ Measure Number	Measure Title
4.9- LJU	Update of the Sustainable Urban Transport Plan
5.2- LJU	Safety & security for seniors and PT users
5.4- LJU	Safe routes to school
5.5- LJU	Reduces speed zones
6.1- LJU	Demand responsive service
7.2- LJU	Sustainable Freight Logistics
8.1- LJU	Public Transport priority at intersections
8.4- LJU	LJU Real time information for staff and passengers
8.5- LJU	E-ticketing and fare integration
City of Zagreb	
1.3-ZAG	Energy recovery system for trams
1.14-ZAG	Clean public transport strategies (CNG, biofuel and emission control)
1.15-ZAG	Clean public fleet vehicles
2.5-ZAG	Intermodal high-quality mobility corridor
2.6-ZAG	Promotion of electronic PT tariff system
3.2-ZAG	Study of congestion charging and dialogue on pricing
4.4-ZAG	Mobility management for large institutions
4.8-ZAG	Improving cycling conditions
4.11-ZAG	Comprehensive mobility dialogue and marketing
5.3-ZAG	Safety and security for seniors
5.8-ZAG	Security improvement in PT
7.4-ZAG	Freight delivery restrictions
8.2-ZAG	Public transport priority and traveller information
City of Porto	
1.5-OPO	Light Weight Bus Shuttle
2.10-OPO	Participatory Planning for New Intermodal Interchange
3.5-OPO	Managing public space and access
4.14-OPO	The Mobility Agency
6.4-OPO	Flexible Mobility Agency
8.8-OPO	Mobile Mobility Information
City of Brno	
1.4-BRN	Optimised energy consumption in tram and trolley bus network
2.7-BRN	Improving bus services for disabled persons
4.12-BRN	Comprehensive mobility dialogue and marketing research – new transport services
4.13-BRN	Integrated Mobility Centre
8.7-BRN	Ticket vending machine diagnostics

The CIVITAS- ELAN approach for evaluation

1. Evaluation process

1.1. Objectives

In CIVITAS- ELAN 5 ambitious cities are introducing sustainable urban transport strategies by implementing integrated packages for a total of 67 measures. The Evaluation activities in the CIVITAS-ELAN project have the objective to give a clear view and understanding of the nature and extent of the impacts of these and of the processes involved in the implementation of them.

Evaluation consists of the following activities:

- Evaluation of the impact of the implemented measures on Measure level, on the level of Integrated Packages of Measures and on the level of the City or the CIVITAS-ELAN corridor/area in the city;
- In-depth analyses of the most important and significant (integrated packages of) measures with a strong focus on cost-benefit aspects;
- Evaluation of the process of implementation of the measures with a focus on the barriers and drivers in the implementation process that influence the impact of the measure;
- Providing data for the Cross-site Evaluation work on CIVITAS level performed by the POINTER project.

1.2. Roles and responsibilities

1.2.1. Measure Leaders (ML's)

Each measure leader is responsible for the basic evaluation activities within his measure. In each of the cities close cooperation between the SEM and the ML's made sure that all the evaluation activities presented in the Evaluation Plan, are in full agreement with the ML's. Next to the evaluation activities on measure level the ML's can also be responsible for the delivery of evaluation data for the integrated package level and city level according to what is agreed with the SEM's.

1.2.2. Site Evaluation Managers (SEM's)

Site Evaluation Managers (SEM's) will be the key responsible persons for the evaluation on the CIVITAS- ELAN site level. In each city they will coordinate the evaluation on local level and work closely with the Site Coordinators (SC's) and the Measure Leaders (ML's). The SEM's will also evaluate the CIVITAS-ELAN project on the level of the city and the CIVITAS-ELAN corridor and will draw conclusions on the level of integrated packages of measures.

1.2.3. Project Evaluation Management (PEM)

The Project Evaluation Manager will coordinate the evaluation activities on the project level of CIVITAS- ELAN by gathering the information, providing guidelines and assistance to the Site Evaluation Managers of each city in order to jointly develop a sound evaluation process. They work in close contact with the Project Coordinator and Project Manager of CIVITAS ELAN. On CIVITAS+ level the PEM works with POINTER to come to an efficient and consistent evaluation approach..

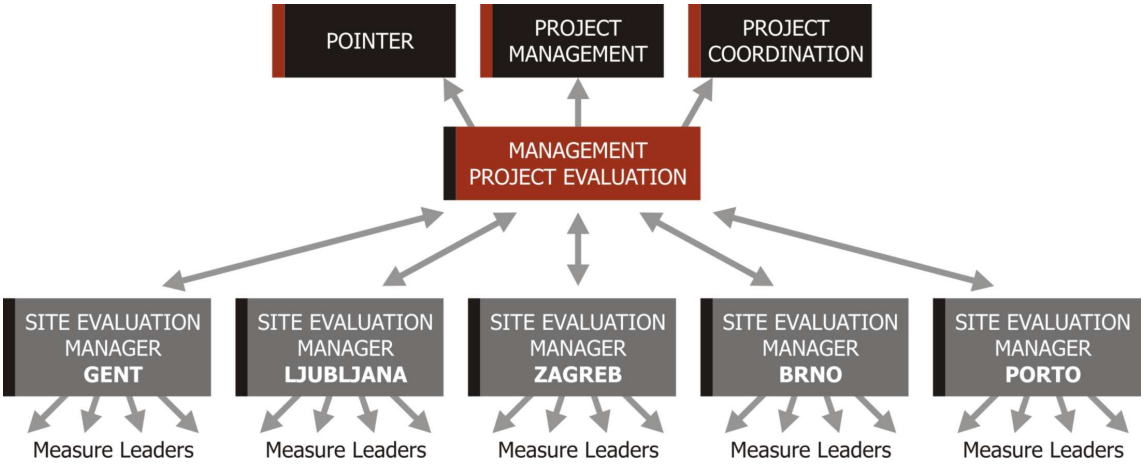
1.2.4. POINTER

POINTER coordinates the evaluation on the CIVITAS + level and reports to the EC. They will provide the guidelines and gather the information for all the CIVITAS + projects.

1.2.5. Organisational scheme

In the figure below an overview is given of the different partners involved in evaluation.

Figure 1: Organisational scheme Evaluation CIVITAS- ELAN.



1.3. Reporting

Evaluation will be carried out during the whole lifetime of the project.

The table below presents the agreed milestones, deliverables and working documents that will be produced during the project.

The timing of deliverables and working documents were already subject to some changes. Amendments of the DOW already include these changes. The purpose was to synchronize the delivery of all the CIVITAS plus Evaluation Plans. POINTER has agreed with the EC to change the delivery dates accordingly.

It was agreed that the CIVITAS- ELAN Evaluation Framework for the cities, which was produced in a first version based on previous CIVITAS approaches after 2 months, should be updated further in the first 8 months of the project. Changes in the approach after month 8, due to negotiation with POINTER and the Evaluation partners, have been taken up directly in the (Draft) Evaluation plans.

On the delivery of a Coherent set of before data it was agreed with POINTER that this Milestone would be fulfilled on the first level by providing the schemes of the data to be collected as before data. During the following periods the data itself will be collected in relation to the implementation planning of the measures and should be provided to POINTER in a way still to be agreed with POINTER.

Table 4: Deliverables List

Del. no.	Deliverable title	WP no.	Nature	Dissemination level	Delivery month
D10.7	Draft evaluation results to POINTER	10	R	CO	42
D10.8	Results for the programme-level analyses to POINTER	10	R	CO	42

Del. no.	Deliverable title	WP no.	Nature	Dissemination level	Delivery month
D10.10	CIVITAS-ELAN Intermediate Evaluation Report	10	R	PU	42
D10.11	CIVITAS-ELAN Final Evaluation Report	10	R	PU	47
D10.13	Final evaluation results to POINTER	10	R	CO	44
D12.1	CIVITAS-ELAN Final Evaluation Plan	12	R	PU	14[4]

Table 5: Deliverables List Working documents

Del. no.	Deliverable title	WP no.	Nature	Dissemination level	Delivery month
WD10.2/ WD 12.1	CIVITAS- ELAN Evaluation framework for the cities.	10	R	CO	2
WD12.2	CIVITAS- ELAN Draft Evaluation Plan	10	R	CO	9[5]

Table 6: Deliverables List Milestones

Del. no.	Deliverable title	WP no.	Nature	Dissemination level	Delivery month
M 12.1	Coherent set of before data	12	R	CO	10
M12.2	Evaluation Background data to POINTER	12	R	CO	36

[4] Result of the process to synchronize all the CIVITAS plus projects.

[5]Result of the process to synchronize all the CIVITAS plus projects.

2. Focus measures

2.1. Definition

It was a clear decision on CIVITAS+ level that the key objective of the evaluation work will not be to gather as much data as possible on all aspects of the implemented measures but to come to well motivated conclusions for the most important elements of the CIVITAS measures on sustainable mobility. This results in a clear focus in the evaluation activities where more detailed evaluation activities for a certain set of measures on the **impact and processes** are planned**.**. These measures are called '**focus measures'** as they will be the subject of a more in- depth evaluation.

Around 30% of the measures are selected as focus measures.. Next to the basic evaluation tasks these measures will also be subject to a more in- depth evaluation analyses.

For these focus measures in general **all** the basic evaluation activities will be done more in detail. Extra attention will be paid to the scientific value of these evaluation results (e.g. sample size, survey method, etc.), which will be less the case or the non- focus measures. Next to this also some extra in-depth analyses will be carried out for the focus measures. These analyses are:

- For **impact evaluation**:
  - Detailed Cost Benefit Analysis (CBA)
- For **Process Evaluation**:
  - In- depth Process Evaluation

In most cases the focus measures will be subject to the CBA as well as In-depth Process Evaluation. However for some measures, which do not imply a real implementation such as feasibility studies or mobility plans, only the In-depth Process Evaluation will be carried out.

2.2. Selection of the focus measures

A set of criteria to select the focus measures was proposed by POINTER:

Category A criteria:

- EU policy: according to the five pillars (more fluid, greener, smarter, safer, more accessible) of the EC Green Paper "Towards a new culture for urban mobility". Please try to make sure there is a balance of measures for the five pillars of the green paper.
- City policy on urban mobility: the measure should have a very good relation with the city policy on clean urban transport
- Expected impact (transport system, environment, economy and/ or society / people): the higher the expected impact, the higher the score for selection of the measure
- Cost Benefit Analysis / integrated system approach: possibilities to carry out a good CBA.
- Innovativeness of measure (technique, consortium, process, learning etc): is the measure innovative enough or not.
- Typical of a group of measures or of a specific context: if a set/package/bundle of measures is rather unique and interesting then such a set might be very interesting to select.

Category B criteria:

- Number and kind of stakeholders / risk of implementation: if there are more different stakeholders involved this might be an extra reason to select a measure.
- Manageability of the measure: if this is complex, this might be an extra reason to select the measure.
- Example measure from measure field, project or transition perspective, for example transferability

Within CIVITAS- ELAN it was decided that the selection of the focus measures was done based on a two step approach. First their relevance in relation to the five pillars was defined and secondly at least two key reasons were specified. Those two key reasons, in most cases, coincides with the other criteria selected by POINTER in the lists above.

In the table below an overview is given of the selection and motivation of the focus measures for the CIVITAS- ELAN project. Within each of the Site Evaluation Plans a more detailed motivation is described.

Figure 2: Motivation Focus Measures CIVITAS ELAN

MEASURE NUMBER	MEASURE TITLE	MOTIVATION					
		Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
1.2 GEN	Green fleet management	xxx		x	x	x	The measure is in line with the green city policy Possibility to carry out a good CBA
2.2 GEN	Improved Public Transport service levels		xxx		xx		The city of Gent and the public transport company have already worked out a plan to improve the commercial speed of trams and city buses with 10%
2.9 GEN	Participatory re-development of main train station area	x		xx	xxx		Strong commitment with stakeholders and citizens required. Focus on citizen engagement.
3.4 GEN	Pedestrian area enforcement with automatic number plate recognition	x	x	xxx			Innovative (on technique) and measure with high risks
4.5 GEN	"The House of Bike" and bicycle activities	xxx	xx	x	xx	x	Complex measure to improve the quality and image of bicycle services. CBA of different types of bicycle sheds will be done
5.7 GEN	Security enforcement in PT				x	xxx	New approach to improve security in PT by making the youth aware of their attitudes by close cooperation with the schools and youngsters in particular and by enhancement of second persons on the PT vehicles.
7.3 GEN	Institutional platform for city freight management	x	xxx	x	xxx	xx	Comparison of bottom-up approach with top-down approach of this measure
8.9 GEN	IT-based bicycle theft prevention			xxx		xxx	Innovative approach to reduce bicycle theft in the city of

MEASURE NUMBER	MEASURE TITLE	MOTIVATION					
		Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
							Gent
1.11 LJU	Hybrid bus implementation	xxx					To check whether cleaner buses contribute to higher PT- usage; to understand costs and benefits of introducing hybrid buses in PT and to compare their costs with costs of the regular buses.
2.1 LJU	Integrated high-quality mobility corridor	xx	xxx	xxx	xxx		To clearly understand and monitor/follow the implementation of such a complex measure; to assess its implication on land-use and urban planning - agreements and disagreements among stakeholders and citizens.
6.1 LJU	Demand responsive services				xxx	xx	Innovative measure; to monitor process and success of its implementation
7.2 LJU	Sustainable Freight Logistics	xxx		xxx			Innovative measure; to monitor process and success of its implementation
8.5 LJU	E-ticketing and fare integration		xxx	xxx	xxx		To monitor process and success of its implementation
1.3 ZAG	Energy recovery system for trams	xxx		xxx			Introducing smart solutions and saving energy. Innovative technology.
1.14 ZAG	Clean public transport strategies	xxx		xx			Stimulating production and usage of alternative fuels in Croatia.

MEASURE NUMBER	MEASURE TITLE	MOTIVATION					
		Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessi-ble urban trans-port	Towards safe and secure urban transport	Key Motivation
							Saving resources and protecting the environment.
1.15 ZAG	Clean public fleet vehicles	xxx					Stimulating production and usage of alternative fuels in Croatia.
							Saving resources and protecting the environment.
2.6 ZAG	Promotion of electronic PT tariff system			xxx	xx		Improving QoS of PT company.
							Innovative technology.
3.2 ZAG	Study of congestion charging and dialogue on pricing	xxx	xx				Comparative analysis of the existing and new models for congestion charging policy.
							Bringing ''life'' into old city core.
7.4 ZAG	Freight delivery restrictions	xxx	xx				Creating effective mobility management by encouraging stakeholders to an open dialogue.
							Decreasing congestion levels.
8.2 ZAG	Public transport priority and traveller information		xx	xxx	xxx		Possibility of significant improvement of QoS in PT. Innovative measure
1.5 OPO	Light Weight Bus	xx	x	x	x		Technological innovative measure New clean transport service
2.10 OPO	Participatory Planning for New Intermodal Interchange	xx	x		xxx	x	Strong commitment with stakeholders Economical viability
8.8 OPO	Mobile Mobility Information	x	x	xxx	xx		Innovative service with a range in the city Easy to transfer

MEASURE NUMBER	MEASURE TITLE	MOTIVATION					
		Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessi-ble urban trans-port	Towards safe and secure urban transport	Key Motivation
2.7 BRN	Improved bus service for disabled persons	xx		xx	xxx		Possibility to provide a detailed CBA Innovative measure “Green” measure Multiple positive outcomes for citizens
4.12 BRN	Comprehensive mobility dialogue and marketing re-search – new transport services	x		x	xx		Innovative measure Interesting for transferability
8.7 BRN	Ticket vending machine diagnostic			xx	x		Possibility to provide a detailed CBA Interesting for in-depth analysis Innovative technology.

2.3. Cost- Benefit Analysis

In order to meet the EC's request for a thoroughly economic assessment with quantifiable results, for most of the focus measures a CBA or financial analysis will be carried out. Detailed data for this analysis are collected during the project. **Preferably a CBA is carried out,** only in the cases where no social benefits or costs can be assessed in a reasonable way, but a comparison of financial factors is nonetheless useful, a financial analysis will be done.

Cost-Benefit Analysis: This analysis gives detailed information about all the costs and benefits relating to the implementation of a certain measure. This also includes social costs and benefits.

Financial Analysis: This analysis gives more detailed information of all the financial costs and revenues relating to the implementation of the measure. Design costs, investment costs, operational costs, revenues, …

The indicators for the CBA analysis will only be selected if the impact on these indicators is measurable and significant to take into account.

POINTER provided a list of indicators most relevant for the CBA analysis.

In general the key indicators are:

- Capital costs;
- Changes in operating and maintenance costs;
- Changes in transport demand (measured in terms of final outputs (passenger kms, freight ton kms) or intermediate outputs (vehicle km));
- Changes in transport costs (fares for public transport, operating costs and parking costs for private transport);
- Changes in transport journey times (including out of vehicle time, in-vehicle time and delay time).
- Changes in vehicle emissions;
- Changes in transport related accidents.

In the Site Evaluation Plans each city gives an overview of the measures they selected for doing a CBA. Also the indicators and an overview of the costs and benefits to there respective agents is given.

Below an overview is given of the CIVITAS-ELAN Measures selected for the CBA.

Figure 3: Selection of CIVITAS- ELAN measures subject to CBA

MEASURE NUMBER	MEASURE TITLE
1.2 GEN	Green Fleet Management
2.2 GEN	Improved Public Transport service levels
3.4 GEN	Pedestrian area enforcement with automatic number plate recognition
4.5 GEN	"The House of Bike" and bicycle activities
8.9 GEN	IT-based bicycle theft prevention
1.11 LJU	Hybrid bus implementation
2.1 LJU	Integrated high-quality mobility corridor
6.1 LJU	Demand responsive services
7.2 LJU	Sustainable Freight Logistics
8.5 LJU	E-ticketing and fare integration
1.3 ZAG	Energy recovery system for trams
1.14 ZAG	Clean public transport strategies
1.15 ZAG	Clean public fleet vehicles

MEASURE NUMBER	MEASURE TITLE
2.6 ZAG	Promotion of electronic PT tariff system
3.2 ZAG	Study of congestion charging and dialogue on pricing
1.5 OPO	Light Weight Bus
8.8 OPO	Mobile Mobility Information
2.7 BRN	Improvec service for disabled persons
4.12 BRN	Comprehensive mobility dialogue and marketing research – new transport services
8.7 BRN	Ticket vending machine diagnostic

2.4. In- depth Process Evaluation

For all the focus measures an In- Depth Process Evaluation will be carried out. The objective of this analysis is to give a clear view on the implementation process of these measures and how this process was influenced by different factors such as certain events, stakeholders, political contexts,… More important here than the result of the implementation itself, is the complete process of planning, implementation and operation that led to these results.

The aim of this in-depth process evaluation is to get insight in:

- drivers and barriers during the preparation, implementation and operation of the measures;
- role of information, communication & participation during the preparation, implementation and operation of the measures;
- the 'stories behind the figures'.

In this context and to come to comparable results POINTER provided a form that will be completed on a yearly basis and sent to POINTER. The information on the process of implementation will also provide suitable information to POINTER in order for them to carry out a transferability analysis.

Next to the general criteria defined by POINTER to select the focus measures some extra criteria were defined within CIVITAS- ELAN. Based on these criteria it was possible to pinpoint those measures for which in- depth process evaluation is particularly interesting.

The criteria are:

- Measures with a particularly high level of stakeholder involvement;
- Measures with a high risk of failure (in relation to risk assessment);
- Measures in relation to the "Common working fields" defined in CIVITAS- ELAN;
- Measures that consist of no real implementation but consist of (feasibility) studies or plans.

Different techniques will be used to collect the information requested in this form. Preferably the technique of **Learning history** is used. This technique allows discussion and structuring of the experiences of stakeholders and the consequences of their own learning and changes. Characteristic of a learning history is not only the lesson drawn from experience by telling, but also the experience itself and the context within which it was obtained. In this way the context-specific insights can be made transferable to another setting.

Other techniques can be:

Focus group interviews: This is qualitative research technique in which a group of persons are asked about their attitudes towards the implementation process of the focus measure. Also in this technique all the members will ventilate and discuss their opinions in an interactive way.

Face to face interviews with key stakeholders: Here each stakeholder is asked about his opinion on the complete implementation process of a certain measure based on a certain set of questions. Each

stakeholder is interviewed separately which can guarantee that each stakeholder has ventilated his opinion in an open way.

In the table below an overview is given of the CIVITAS- ELAN measures selected for the In-depth Process Evaluation. In each of the Site Evaluation Plans a detailed overview and description of these measures can be found.

Figure 4: Selection of CIVITAS- ELAN measure subject to In-depth Process Evaluation

MEASURE NUMBER	MEASURE TITLE
1.2 GEN	Green Fleet Management
2.2 GEN	Improved Public Transport service levels
2.9 GEN	Participatory re-development of main train station area
3.4 GEN	Pedestrian area enforcement with automatic number plate recognition
4.5 GEN	"The House of Bike" and bicycle activities
5.7 GEN	Security enforcement in PT
7.3 GEN	Institutional platform for city freight management
8.9 GEN	IT-based bicycle theft prevention
1.11 LJU	Hybrid bus implementation
2.1 LJU	Integrated high-quality mobility corridor
6.1 LJU	Demand responsive services
7.2 LJU	Sustainable Freight Logistics
8.5 LJU	E-ticketing and fare integration
1.3 ZAG	Energy recovery system for trams
1.14 ZAG	Clean public transport strategies
1.15 ZAG	Clean public fleet vehicles
2.6 ZAG	Promotion of electronic PT tariff system
3.2 ZAG	Study of congestion charging and dialogue on pricing
7.4 ZAG	Freight delivery restrictions
8.2 ZAG	Public transport priority and traveller information
2.10 OPO	Participatory Planning for New Intermodal Interchange
1.5 OPO	Light Weight Bus
8.8 OPO	Mobile Mobility Information
2.7 BRN	Improving bus service for disabled persons
4.12 BRN	Comprehensive mobility dialogue and marketing re-search – new transport services
8.7 BRN	Ticket vending machine diagnostic

2.5. Synthesis of the analyses of the focus measures

The table below gives an overview of the key elements why a more in-depth analysis is important. Also the main in-depth analyses are indicated.

Figure 5: Overview of the selection and motivation of the CIVITAS- ELAN focus Measures

MEASURE NUMBER	MEASURE TITLE	BASIC IMPACT AND PROCESS EVALUATION	IN-DEPTH ANALYSIS		MOTIVATION					
			Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
1.2 GEN	Green fleet management	x	x	x	xxx		x	x	x	The measure is in line with the green city policy Possibility to carry out a good CBA
2.2 GEN	Improved Public Transport service levels	X	X	x		xxx		xx		The city of Gent and the public transport company have already worked out a plan to improve the commercial speed of trams and city buses with 10%
2.9 GEN	Participatory re-development of main train station area	x		x	x		xx	xxx		Strong commitment with stakeholders and citizens required.

MEASURE NUMBER	MEASURE TITLE	BASIC IMPACT AND PROCESS EVALUATION	IN-DEPTH ANALYSIS		MOTIVATION					
			Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
										Focus on citizen engagement.
3.4 GEN	Pedestrian area enforcement with automatic number plate recognition	x	x	x	x	x	xxx			Innovative (on technique) and measure with high risks
4.5 GEN	"The House of Bike" and bicycle activities	x	x	x	xxx	xx	x	xx	x	Complex measure to improve the quality and image of bicycle services. CBA of different types of bicycle sheds will be done
5.7 GEN	Security enforcement in PT	x		x				x	xxx	New approach to improve security in PT by making the youth aware of their attitudes by close cooperation with the schools and youngsters in particular and by enhancement of second persons on the PT vehicles.
7.3 GEN	Institutional platform for city freight management		x	x	x	xxx	x	xxx	xx	Comparison of bottom-up approach with top-down approach of this

MEASURE NUMBER	MEASURE TITLE	BASIC IMPACT AND PROCESS EVALUATION	IN-DEPTH ANALYSIS		MOTIVATION					
			Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
										measure
8.9 GEN	IT-based bicycle theft prevention	x	x	x			xxx		xxx	Innovative approach to reduce bicycle theft in the city of Gent
1.11 LJU	Hybrid bus implementation	x	x	x	xxx					To check whether cleaner buses contribute to higher PT usage; to understand costs and benefits of introducing hybrid buses in PT and to compare their costs with costs of the regular buses
2.1 LJU	Integrated high-quality mobility corridor	x	x	x	xx	xxx		xxx		To clearly understand and monitor/follow the implementation of such a complex measure; to assess its implication on land-use and urban planning - agreements and disagreements among stakeholders

MEASURE NUMBER	MEASURE TITLE	BASIC IMPACT AND PROCESS EVALUATION	IN-DEPTH ANALYSIS		MOTIVATION					
			Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
										and citizens
6.1 LJU	Demand responsive services	x	x	x				xxx	xx	Innovative measure; to monitor process and success of its implementation
7.2 LJU	Sustainable Freight Logistics	x	x	x	xxx		xxx			Innovative measure; to monitor process and success of its implementation
8.5 LJU	E-ticketing and fare integration	x	x	x		xxx	xxx	xxx		To monitor process and success of its implementation
1.3 ZAG	Energy recovery system for trams	x	x	x	xxx		xxx		x	Introducing smart solutions and saving energy. Innovative technology.

MEASURE NUMBER	MEASURE TITLE	BASIC IMPACT AND PROCESS EVALUATION	IN-DEPTH ANALYSIS		MOTIVATION					
			Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
1.14 ZAG	Clean public transport strategies	x	x	x	xxx		xx			Stimulating production and usage of alternative fuels in Croatia. Saving resources and protecting the environment.
1.15 ZAG	Clean public fleet vehicles	x	x	x	xxx					Stimulating production and usage of alternative fuels in Croatia. Saving resources and protecting the environment.
2.6 ZAG	Promotion of electronic PT tariff system	x	x	x			xxx	xx		Improving QoS of PT company. Innovative technology.
3.2 ZAG	Study of congestion charging and dialogue on pricing	x	x	x	xxx	xx				Comparative analysis of the existing and new models for congestion charging policy. Bringing ''life'' into old city core.

MEASURE NUMBER	MEASURE TITLE	BASIC IMPACT AND PROC-ESS EVALUA TION	IN-DEPTH ANALY-SIS		MOTIVATION					
			Cost benefit analysis	In – depth Process Evalua-tion	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessi-ble urban trans-port	Towards safe and secure urban transport	Key Motivation
7.4 ZAG	Freight delivery restrictions	x		x	xxx	xx				Creating effective mo-bility management by encouraging stake-holders to an open dialogue. Decreasing congestion levels.
8.2 ZAG	Public transport priority and traveller information			x		xx	xxx	xxx		Possibility of significant improvement of QoS in PT. Innovative measure
1.5 OPO	Light Weight Bus	x	x	x	xx	x	x	x		Technological innova-tive measure New clean transport service
2.10 OPO	Participatory Planning for New Intermodal Interchange	x			xx	x		xxx	x	Strong commitment with stakeholders Economical viability
8.8 OPO	Mobile Mobility Information	x	x	x	x	x	xxx	xx		Innovative service with a range in the city

MEASURE NUMBER	MEASURE TITLE	BASIC IMPACT AND PROCESS EVALUATION	IN-DEPTH ANALYSIS		MOTIVATION					
			Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
2.7 BRN	Improved bus service for disabled persons	x	x	x	xx		xx	xxx		Possibility to provide a detailed CBA Innovative measure “Green” measure Multiple positive outcomes for citizens
4.12 BRN	Comprehensive mobility dialogue and marketing research – new transport services	x		x	x		x	xx		Innovative measure Interesting for transferability
8.7 BRN	Ticket vending machine diagnostic	x	x	x			xx	x		Possibility to provide a detailed CBA Interesting for in-depth analysis Innovative technology. Easy to transfer

x relevant, xx very relevant, xxx highly relevant

3. Common measures

3.1. Definition

The common measures are measures that do not consist of a real implementation but are a certain theme or topic around which the 5 CIVITAS – ELAN cities have decided to work closely together. This means that these themes are **common working fields** or shared challenges faced by all the CIVITAS- ELAN cities and therefore relevant to discuss and work around together. This cooperation will consist mostly in sharing their knowledge and experiences around this topic and interchange ideas and approaches to tackle the questions and problems related to these topics.

The following **common working fields** are selected in the CIVITAS- ELAN project:

MEASURE NUMBER	MEASURE TITLE
1.1 COM	Energy management for public fleets
2.8 COM	Participatory intermodal infrastructure planning
5.1 COM	Comprehensive safety and security strategies
7.1 COM	Intergrated freight policy development

3.2. Evaluating the common measures

For the common measures the evaluation will consist of the gathering and synthesizing the main evaluation results of the measures related to the theme or common working field. Also the outcomes of the meetings and workshops around these topics will be analysed and reported. This means that in most cases no extra data collection will be carried out. The Measure Leaders of the respective common working fields are responsible for this task and have described this extensively within the DoW. In some cases some extra data collection will take place within the 5 cities in order to provide enough data on this common working field.

Any additional data collection will be organized in such a way that it can be integrated in the main data collection activities for the cities. For instance: in the common measure 2.8 Participatory intermodal infrastructure planning, the questions for the sociological survey will be combined with other surveys carried out within the cities.

4. Impact Evaluation

4.1. Definition and objectives

In the CIVITAS guidelines Impact Evaluation is defined as followed:

"The impact evaluation includes the evaluation of a wide range of technical, social, economic and other impacts of the measures being implemented by Civitas.6"

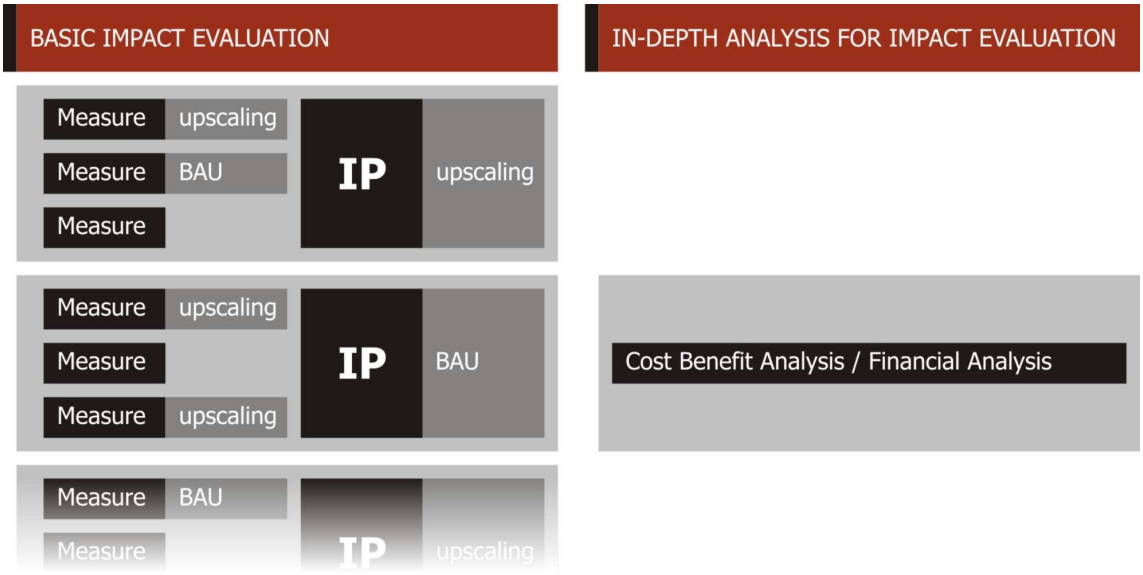
The aim of impact evaluation is to asses or estimate the impact or effectiveness of the implemented measure(s) for a particular target group or area. This impact should be related to the objective one wants to reach by implementing this measure.

4.2. General concept

CIVITAS – ELAN developed a concept for Impact Evaluation containing the following elements:

- **Basic impact evaluation for all measures or groups of measures** ("Integrated Packages of measures") for all relevant indicators. If relevant and important for the conclusions also the business-as-usual situation will be described and/or an up-scaling of the measure can be simulated.
- **In-depth analysis** for the **focus measures.** This in depth analysis for impact evaluation is a Cost-Benefit Analysis (CBA).
- Evaluation of the important **indicators on corridor/city level, e.g. modal-split and air quality**. These data will be also important as background statistical information for the interpretation of the other findings.

Figure 7: Approach impact evaluation



6 Guard, 2006, Framework for evaluation, p5

4.3. Elements of Impact Evaluation

4.3.1. Baseline situation

For all the measures a **baseline or before situation** will be described. This is the status of all relevant indicators prior to the implementation of a(n) (integrated package of) measure(s).

The description of this situation is necessary to enable subsequent changes resulting from CIVITAS-ELAN measures in order to measure the effectiveness of the measure .

The baseline situation is also the basis (of comparison) for the impact predictions of the business-as-usual scenarios. Predictions of the business as usual scenario will be based on the results collected in the baseline situation; it will also serve as the situation against which the business as usual scenario will be compared to.

The description of the baseline situation is considered to be the absolute minimum to asses the effectiveness of the CIVITAS- ELAN measures. Furthermore for plenty of measures one or more intermediate situations will be measured. This allows us to make comparisons of the changes throughout the life time cycles of the measure and to describe trends. If different measures with an impact on a specific indicator, are implemented on a different timescale some distinction can be made in the effects of the individual measures.

4.3.2. Ex- post Situation

The 'after' or ex-post situation provides a final set of measurements for evaluation which can be compared with the baseline and business-as-usual measurements to assess the effectiveness of the implemented measures. Many indicators will to be measured directly in real transport conditions. For some of the measures however modeling techniques will be used.

4.3.3. Business- as- usual- scenario

If relevant, a **business-as- usual scenario** is described for the measure. This scenario describes how the situation would be if the Measure would not be implemented.

Especially if the indicator is influenced strongly by other, "external" factors it is useful to compare the ex- post situation not merely with baseline situation but also with the business-as- usual scenario to avoid a misinterpretation of the CIVITAS impact. It could for instance be the case that the situation without the CIVITAS-ELAN measures would have deteriorated but thanks to the CIVITAS- ELAN measures the situation stabilized. In this case no real change in the value of the indicator is noticed when comparing the before- and after- situation. Nonetheless the CIVITAS- ELAN measure will have had a significant positive impact on the situation since it avoided that the situation deteriorated even more. A comparison between the after- situation and the business- as- usual scenario will illustrate this.

4.3.4. Up- scaling

The impact of some measures will only be significant if the measure would be implemented on a wider scale. For these measures an **up-scaling analysis** of the Measures will be done since it will help the interpretation of the results.

This analysis should give a clear estimation of the effects of a measure if it was implemented on the whole city rather then a certain zone/ area/ target group. It should answer the question: 'Which impacts can be expected if it were to be implemented in the whole city?'.

4.4. Levels of Impact Evaluation

4.4.1. Integrated package level

The evaluation work in the CIVITAS- ELAN project, and for each individual site, is structured around integrated packages. An Integrated Package of measures (IP) comprises a group of measures that share a (main) common objective and have (approximately) the same scope of implementation. This scope can be a certain area, zone, corridor, or the whole city. It can also be a certain target group, department …

It was decided to include this level in the CIVITAS ELAN evaluation as it soon came clear that carrying out evaluation tasks only on the measure level would be insufficient to grasp a complete view and understanding of the impact of the implemented measures. After all it is often the case that different measures serve the same objective and are part of a combined strategy for reaching this goal. This is for instance the case for the introduction of Clean Transport strategies where different measures (introduction of green fleets in the PT, in the city department, introduction eco- driving, etc) all form part of this combined strategy to decrease the negative impact of fossil fuels on the environment.

In many cases, even certain synergies arise between the different measures which cannot be fully comprehended (and measured) if not seen in the context of integrated packages. In some cases it is even impossible to separate the impact of one certain measure. An example of latter case is for instance the service level of the PT. A survey can be foreseen that asks the PT users what their perception is of the service level of the PT services. Different measures however will influence this service level and extracting the exact impact of only one measure might be difficult and even not desirable. Because of this it is important to gather certain impact evaluation results on this level as it allows us to reveal the overall impact of an integrated approach rather than measure by measure.

Concerning the data collection on this level two approaches were adopted:

- ***Combining results on measure level that lead to conclusions on IP level****:* This is for instance the case for the first example mentioned above. The collection of the different changes in, for instance, fuel consumption and emissions within each measure can give a combined result for the overall Clean Transport Strategy's impact on the environment.
- ***Data collection directly on the IP level:*** For the second example mentioned above it was illustrated that sometimes it is impossible or not desirable to separate or measure the impact of different measures individually. The improvement of the PT service level can be easily measured through one overall survey on the quality of the PT services with the PT users. Although the impact from the different measures separately can be questioned to some extend, the combination of all the measures that contribute to the improvement of the PT service is far more relevant and important.

Below an overview is given of all the integrated packages of measures with their corresponding measures for each of the cities. A further description of the packages for each of the cities, along with a description of their common objectives against which they will be evaluated, is described more in detail in the Site Evaluation Plans.

Figure 6: Overview of the CIVITAS- ELAN Integrated Packages

City/ IP/ Measure Number	Measure Title
City of Gent	
IP 1- GEN	**Promoting and enhancing the use of clean vehicles**
1.2-GEN	Energy efficient city fleet management
1.8-GEN	Extended biodiesel production
1.9-GEN	Semi-public clean car fleet
1.10-GEN	Introduction of hybrid vehicles
1.13-GEN	Clean public transport strategies (B30 & emission control)

City/ IP/ Measure Number	Measure Title
IP 2- GEN	**Citizen engagement leading to changing Mobility Behaviour**
2.9-GEN	Participatory re-development of main train station area
4.2-GEN	Mobility management for companies
4.3-GEN	Mobility management for schools
4.10-GEN	Comprehensive mobility dialogue and marketing campaign
6.2-GEN	Innovative car sharing
6.3-GEN	Holistic event management
IP 3- GEN	**Adjust car & freight traffic by Traffic Management**
2.4-GEN	Intelligent Park&Ride enforcement
3.3-GEN	Parking and public space management around train station and ELAN corridor
3.4-GEN	Pedestrian area enforcement with automatic number plate recognition
7.3-GEN	Institutional platform for city freight management
8.6-GEN	Sustainable multi-modal traffic management
IP 4- GEN	**Improving the Quality of collective transport**
2.2-GEN	Improved Public Transport service levels
5.7-GEN	Security enforcement in public transport
IP 5- GEN	**Stimulating Cycling and Walking conditions**
4.5-GEN	“The House of Bike” and bicycle activities
4.7-GEN	Walking promotion
5.6-GEN	Safe cycling corridor
8.9-GEN	IT-based bicycle theft prevention
8.10-GEN	Route planner for bicycles
City of Ljubljana	
IP 1- LJU	**Making PT in the corridor the most desirable transport mode**
1.11- LJU	Hybrid bus implementation
2.1- LJU	Integrated high-quality mobility corridor
3.1- LJU	Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels
4.1- LJU	Individualized mobility marketing based on public involvement and inclusion in defining city transport policy
8.1- LJU	Public Transport priority at intersections
8.4- LJU	LJU Real time information for staff and passengers
8.5- LJU	E-ticketing and fare integration
IP 2- LJU	**For vital, healthier and safer citizens in city transport**
4.6- LJU	Comprehensive Cycling Strategy
4.9- LJU	Update of the Sustainable Urban Transport Plan
5.2- LJU	Safety & security for seniors and PT users
5.4- LJU	Safe routes to school
5.5- LJU	Reduces speed zones
6.1- LJU	Demand responsive service
IP 3- LJU	**Improve freight strategy**
7.1- COM	Integrated freight policy development
7.2- LJU	Sustainable Freight Logistics
	Other measures
1.12- LJU	Green procurement for public fleets
1.7- LJU	Pure plant oil for vehicle propulsion

City/ IP/ Measure Number	Measure Title
City of Zagreb	
IP 1- ZAG	**Implementing the use of clean vehicles in public fleets**
1.3-ZAG	Energy recovery system for trams
1.14-ZAG	Clean public transport strategies
1.15-ZAG	Clean public fleet vehicles
IP 2- ZAG	**Stimulating intermodal journeys**
2.5-ZAG	Intermodal high-quality mobility corridor
4.8-ZAG	Improving cycling conditions
IP 3- ZAG	**Improving QoS of PT through innovative technologies**
2.6-ZAG	Promotion of electronic PT tariff system
8.2-ZAG	Public transport priority and traveller information
IP 4- ZAG	Traffic management in dialogue with stakeholders
3.2-ZAG	Study of congestion charging and dialogue on pricing
7.4-ZAG	Freight delivery restrictions
IP 5- ZAG	**Safe and secure public transport**
5.3-ZAG	Safety and security for seniors
5.8-ZAG	Security improvement in PT
IP 6- ZAG	**Changing travel behaviour**
4.4-ZAG	Mobility management for large institutions
4.8-ZAG	Improving cycling conditions
4.11-ZAG	Comprehensive mobility dialogue and marketing
City of Porto	
IP 1- OPO	**Developing an Efficient Transport System**
1.5-OPO	Light Weight Bus
3.5-OPO	Integrated accessibility planning in Asprela quarter
6.4-OPO	Flexible Mobility Agency
IP 2- OPO	**Promoting the Effective use of Sustainable Transport**
4.14-OPO	The Mobility Shop
8.8-OPO	Mobile Mobility Information
IP 3- OPO	**Participatory Planning for New Intermodal Interchange[1]**
2.10-OPO	Participatory Planning for New Intermodal Interchange
City of Brno	
IP1- BRN	**Decrease in the use of electricity and fuels**
1.4	Optimised energy consumption in tram and trolley bus network
2.7	Improved service for disabled persons
IP2- BRN	**Promoting and enhancing the use op public transport**
4.12	Comprehensive mobility dialogue and marketing research – new transport services
4.13	Integrated Mobility Centre
IP3- BRN	**Ticket vending machine diagnostic**
8.7	Ticket vending machine diagnostic

4.4.2. Measure level

For most of the measures some impact evaluation results can be be recorded on the measure level. On this level the direct impact of one measure is evaluated, starting from the direct outcome of the implementation of this particular measure. These results can both be used as input for the Integrated Package Level and as a basis for specific conclusions for the measure individually.

All the measures can have, next to the common objectives they share with other measures of the same IP, some specific measure related objectives. For example: the improvements of cycle lanes in terms of safety will contribute to the common objectives to increase safety within the corridor. This will be reflected in the accident rates for the corridor. Also other measures will contribute to this objective. On the measure level for this measure in particular it will be interesting to know the number of safe cycle path km, the amount of crossings that can be considered as safe crossings etc. Also a survey with the users of this path could give an idea on the safety perception of the cycle lanes etc.

If relevant and possible a well defined set of measure related objectives will be described and evaluated. A detailed description of these objectives can be found in the Site Evaluation Plans.

4.4.3. Corridor level

On the corridor level the evolution of certain important key indicators (modal split, air quality) are seen independently from the CIVITAS- ELAN measures within the CIVITAS- ELAN- corridor of each city. The aim is to describe some general trends within the CIVITAS- ELAN corridor.

The idea behind this is that some indicators e.g. modal split and air quality, will be influenced by almost all the CIVITAS- ELAN demonstration measures and their impact, on the corridor level, cannot be seen separately.

Furthermore the possibility exists that other non CIVITAS- ELAN measures or external factors will have an influence on these key indicators. Because these indicators will also be measured on a smaller scale in the other levels (IP and measure level) the proportion of the impact from a certain integrated package or measures in this general trend can be calculated by comparison with IP and measure level evaluation results. This way no false conclusions can be drawn based on influences of other (non) CIVITAS-ELAN measures. It also allows us to evaluate the impact of all CIVITAS-ELAN efforts on the CIVITAS- ELAN corridor and the influence of the CIVITAS-ELAN project on this general trend.

For the evaluation on this level a selection was made of some key indicators that are considered as crucial in relation to achieve objectives in the context of sustainable mobility:

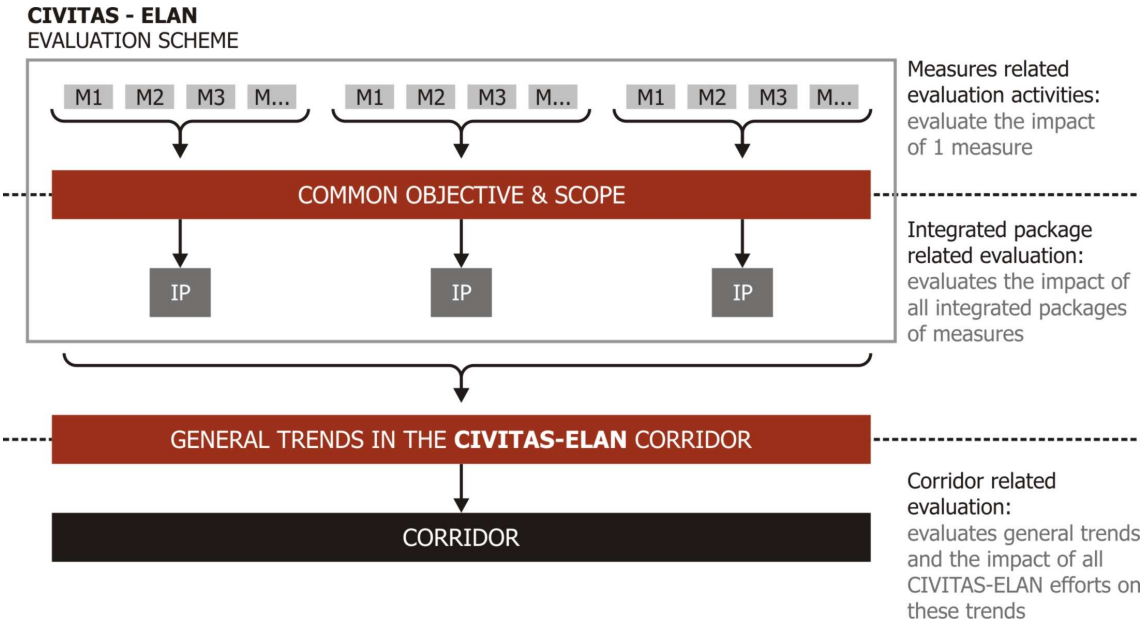
- Modal Split
- Air quality

Next to these two key indicators the different cities could add other indicators which they believed could be relevant for this level of evaluation in their city. This is described more in detail in the Site Evaluation Plans.

4.4.4. Summary of the levels of Impact Evaluation

In the table below a summary is given of the different levels of impact evaluation carried out in the CIVTAS- ELAN project. It summarizes the levels of impact evaluation explained in the paragraphs 4.4.1, 4.4.2 and 4.4.3.

Figure 7: Summary levels of evaluation CIVITAS-ELAN



4.5. Indicators and data collection

4.5.1. Indicators

An indicator is a certain measurable parameter of which the changes in its value express the impact that a certain Measure or Integrated Package of Measures has. The indicator should be selected in relation to the objective one wants to reach by implementing a(n) (integrated package of) measure(s).

In order to select the right indicators for measuring the impact of a certain measure first of all a selection was made of the expected impacts of a certain measure. These expected impacts are the most relevant and significant impacts one expects after the implementation of the measure. It was not always possible to measure all the expected impacts. Whenever this was considered impossible a good reason and explanation was given. In most cases this was based on practical restrictions such as the fact that the impact of one measure on this indicator could not be identified from the impact of other measures. In this case the impact was measured on a higher level. Based on this selection of impacts, indicators were chosen that could express these impacts and make it possible to draw relevant conclusions.

To define the indicators the list of **Common Core Indicators** by Guard (2006) is used by all the cities as a starting point. This list gives contains indicators within five evaluation categories:

- Economy ;
- Energy;
- Environment;
- Society;
- Transport .

Although in most cases this list could provide sufficient indicators to measure the CIVTAS ELAN impacts, in some cases there was the need to expand this list or make some adaptations towards local standards/ needs of the demonstration sites.

A comparison between the Common Core indicators and the CIVITAS – ELAN indicators was carried out. The result of this comparison was that most CIVTAS ELAN indicators coincide with the list of Common Core Indicators. There were however 3 types of deviations from the list that can be described in the following way:

Local translation of a common indicator: These indicators are a local translation of the existing common core indicators. They often are more concrete in the context of the local situation or represent a slightly different indicator to measure the same impact.

Intermediate Indicators: These are indicators that serve as building blocks to calculate a certain (common) indicator. In some cases it was important to specify these building blocks to make the data collection activities more transparent to all partners. Sometimes these intermediate indicators also give a view on the direct operational progress on the implementation or usage of a measure.

Local Indicators: These indicators where selected by the city in relation to the impact they wanted to measure. They are not taken up in the list of Common Indicators but nonetheless were considered crucial to measure the impact of the CIVITAS- ELAN measures.

The tables below give an overview of the indicators that were added within each CIVITAS- ELAN city:

Table 8: List of local indicators of the city of Gent

City	Meas No	Evaluation Category	Sub-category	Impact	Indicator (description)	Indicator type	part of	Data / units	remarks
GEN	3.4	Economy	Benefits	Fines	Fines	LT	1	euros	operating revenues through fines
GEN	3.4	Economy	Costs	Operating costs	Maintenance costs	LT	2b	euros	operating cost through maintenance
GEN	IP 1	Energy	Energy consumption	Fuel consumption	Fleet composition	LT	3	number of vehicles per type	measurement of changes in the fleet/ also used to calculate fuel consumption
GEN	IP1	Environment	Emissions	Emissions	Ecoscore	LI	L2	Number	method for measuring the cleanliness of a vehicle (www.ecoscore.be)
GEN	7.3	Environment	Nuisance	Nuisance	Freight nuisance	LI	L3	descriptive	Problems related to freight will be mapped.
GEN	8.9	Society	Security	Security	Bike thefts	LT	17	number	objective way to measure security
GEN	7.3	Transport	Quality of service	Availability	Number of loading spaces	LI	L4	number	parking demand/ occupancy
GEN	2.2	Transport	Quality of service	Availability	Number of PT stops	LT	19	number	objective way to measure quality of survey
GEN	2.4	Transport	Quality of service	Quality of service	Number of improper use	LI	L4	number/ %	parking demand/ occupancy
GEN	2.4	Transport	Quality of service	Quality of service	Improper use of P&R	LI	L4	number/ %	parking demand/ occupancy
GEN	2.4	Transport	Transport system	Parking	Average parking (garage) occupancy	LI	L4	%	parking demand/ occupancy
GEN	2.4	Transport	Transport system	Parking	Average P&R parking occupancy	LI	L4	%	parking demand/ occupancy
GEN	4.5	Transport	Transport system	Parking	Average bike shed occupancy	LI	L4	%	parking demand/ occupancy

II = Intermediate Indicator, LT = Local translation, LI local indicator

Table 9: List of local indicators Ljubljana

City	Meas No	Evaluation Category	Sub-category	Impact	Indicator (description)		part of	Data / units	remarks
LJB	IP2	Society	Security	Security	No. and cost of van-delism	LT	17	number/ euros	objective way to measure secu-rity

II = Intermediate Indicator, LT = Local translation, LI local indicator

Table 10: List of local indicators Zagreb

City	Meas No	Evaluation Category	Sub-category	Impact	Indicator (description)	Indicator type	part of	Data / units	remarks
ZAG	2.6	Economy	Operating revenues	Operating revenues	Number of electronic tickets sold	II	1	Number	intermediate indicator to come to operating revenues
ZAG	1.3	Environment	Pollution	Noise	Noise level of tram on straight line	LT	12	dB	not based on perception but real measurements
ZAG	1.3	Environment	Pollution	Noise	Noise level of tram on curves	LT	12	dB	not based on perception but real measurements
ZAG	1.14	Environment	Pollution	Noise	Noise level of buses	LT	12	dB	not based on perception but real measurements
ZAG	1.15	Environment	Pollution	Noise	Noise level of waste disposal fleet	LT	12	dB	not based on perception but real measurements
ZAG	city level	Environment	Pollution	Noise	Noise level in corridor	LT	12	dB	not based on perception but real measurements
ZAG	2.6	Society	Acceptance	Acceptance	Satisfaction with unified charging system	LT	14	Surveys	
ZAG	2.6	Society	Acceptance	Acceptance	Image of organisation		L13	Surveys	Will be measured through extensive survey
ZAG	4.11	Society	Acceptance	Acceptance	PT attractiveness	LT	14	Surveys	
ZAG	4.11	Society	Acceptance	Acceptance	cycling attractiveness	LT	14	Surveys	
ZAG	4.11	Society	Acceptance	Acceptance	Level of user involvement		new	surveys	will be measured in survey in cooperation with dissemination team/ also records of participants and training sessions will support this indicator
ZAG	5.3/8	Society	Security	Security	Damaged vehicles	LT	17	Numbers	
ZAG	5.3/8	Society	Security	Security	Number of attacks towards PT employees	LT	17	Number	

City	Meas No	Evaluation Category	Sub-category	Impact	Indicator (description)	Indicator type	part of	Data / units	remarks
ZAG	8.2	Transport	Quality of service	Service reliability	Running time	II	18	minutes	These indicators will give detailed information on the service reliability for PT based on new PT riority scheme.
ZAG	8.2	Transport	Quality of service	Service reliability	Intersection delay	II	18	minutes	
ZAG	8.2	Transport	Quality of service	Service reliability	Dwell time	II	18	minutes	
ZAG	8.2	Transport	Quality of service	Service reliability	Driving time	II	18	minutes	
ZAG	8.2	Transport	Quality of service	Service reliability	Operation time	II	18	minutes	
ZAG	4.4	Transport	Transport system	Infrastructure	Number of car pools in institutions	LT	14	survey	the number of users will be used as indication for acceptance of the service
ZAG	4.8	Transport	Transport system	Infrastructure	Length of cycling lanes	LI	L12	km	indication for improvements of the infrastructure for alternative modes
ZAG	2.5	Transport	Transport system	Parking	Capacity of cycle parking	LI	L4	recording	parking demand/ occupancy
ZAG	1.3	Transport	Transport system	Passenger flows	Number of tram users	LT	21	Number	
ZAG	city level	Transport	Transport system	Passenger flows	Number of PT users	LT	21	Number	
ZAG	2.5	Transport	Transport system	Pedestrians	Number of pedestrians	LT	21	Pedestrians/km2	
ZAG	2.5	Transport	Transport system	Transport safety	Number of pedestrian accidents	LT	20	Number	
ZAG	5.3	Transport	Transport system	Transport safety	Perception of PT safety	LT	20	survey	subjective measurement of safety feeling
ZAG	4.8	Transport	Transport system	Transport safety	Number of Cyclist accidents	LT	20	Number	
ZAG	4.8	Transport	Transport sys-	Transport safety	Perception of cycle	LT	20	survey	subjective measurement of

City	Meas No	Evaluation Category	Sub-category	Impact	Indicator (description)	Indicator type	part of	Data / units	remarks
			tem		safety				safety feeling
ZAG	1.3/14	Transport	Transport sys-tem	Vehicle km	Km driven per clean vehicle	II	3	km	Intermediate indicator to measure fuel efficiency
ZAG	4.8	Transport	Transport sys-tem	Vehicles	Number of cyclists	LT	21	Number	
ZAG	1.3/14	Transport	Transport sys-tem	Vehicles	Number of clean trams	II	3	Number, fleet	Intermediate indicator to measure fuel efficiency
ZAG	1.14	Transport	Transport sys-tem	Vehicles	Number of clean buses	II	3	Number, fleet	Intermediate indicator to measure fuel efficiency
ZAG	1.15	Transport	Transport sys-tem	Vehicles	Number of clean vehi-cles	II	3	Number, fleet	Intermediate indicator to measure fuel efficiency

II = Intermediate Indicator, LT = Local translation, LI local indicator

Table 11: List of local indicators Porto

City	Meas No	Evaluation Category	Sub-category	Impact	Indicator (de-scription)	Indi-cator type	part of	Data / units	remarks
OPO	1.5/4, 14	Economy	Operating revenues	Operating revenues	Revenues from ticket sale	LT	1	euros	
OPO	1.5/6. 4	Economy	Costs	Operating costs	Maintenance costs	LT	2b	euros	
OPO	IP1/IP 2/1.5/ 4.14/6 .4/8.8	Society	Acceptance	Acceptance	Patronage	LT	14	number	will be used to do cross reference with the acceptance survey (objective <--> subjective)
OPO	4.14	Society	Acceptance	Acceptance	Satisfaction level	II	14 & 19	survey	attitude survey
OPO	IP2	Transport	Quality of service	Quality of service	Service efficiency	LT	19	survey	
OPO	8.8	Transport	Quality of service	Quality of service	Usability of LCD system	LT	19	survey	
OPO	3.5	Transport	Quality of service	Quality of service	Comfort of PT stops	LT	19	numbers	Different aspects will be measured and described such as number of seats/ information provision
OPO	3.5	Transport	Quality of service	Quality of service	Dissatisfaction with PT time-keeping	II	18	number	number of complaints, intermediate indicator to meas-ure service reliability
OPO	3.5	Transport	Transport system	Capacity	PT capacity	LI	L5	number	measurement of capacity of PT to measure the supply of PT
OPO	IP1	Transport	Transport system	Congestion	Average journey time	LI	L6	sec/route	indicators used to measure congestion levels
OPO	IP1	Transport	Transport system	Congestion	Traffic queue	LI	L7	vehicles	
OPO	IP1	Transport	Transport system	Congestion	Delay	LI	L8	sec	
OPO	IP1	Transport	Transport system	Congestion	Number of stops	LI	L9	no.	

OPO	3.5	Transport	Transport system	Infrastructure	Extension of bus lane network	LI	L10	no., %	indication for improvements of the infra for alternative modes
OPO	3.5	Transport	Transport system	Infrastructure	Extension of sidewalk	LI	L11	%, metres, square metre	indication for improvements of the infra for alternative modes
OPO	3.5	Transport	Transport system	Infrastructure	Extension of bicycle lanes	LI	L12	%, metres	indication for improvements of the infrastructure for alternative modes
OPO	3.5	Transport	Transport system	Parking	Number of parking spaces (cars)	LI	L4	pers/ veh	parking demand/ occupancy
OPO	3.5	Transport	Transport system	Parking	Illegal parking (cars)	LI	L4	no., %	parking demand/ occupancy
OPO	3.5	Transport	Transport system	Parking	Number of parking spaces peak hour (cars)	LI	L4	number	parking demand/ occupancy
OPO	3.5	Transport	Transport system	Parking	Number of parking spaces (bikes)	LI	L4	number	parking demand/ occupancy

II = Intermediate Indicator, LT = Local translation, LI local indicator

Table 12: List of local indicators Brno

CITY	Meas No	Evaluation Category	Sub-category	Impact	Indicator (description)	Indicator Type	Part of	Data / units	remarks
BRN	4.13	Economy	Operating revenues	Operating revenues	Number of tickets sold	II	1	% or €	intermediate indicator to calculate operating revenue
BRN	4.13	Economy	Operating revenues	Operating revenues	Number of tickets sold by vending machine	II	1	% or €	intermediate indicator to calculate operating revenue
BRN	1.4	Energy	Energy consumption	Fuel consumption	Reserve capacity	LI	L1	%	to measure the amount of reserve capacity of electricity consumption, will reflect the power saving
BRN	8.7	Transport	Quality of service	Quality of service	Number of complaints	II	19	Number	intermediate indicators to measure the QoS of PT ticketing
BRN	8.7	Transport	Quality of service	Quality of service	Defects on vending machines	II	19	Number	intermediate indicators to measure the QoS of PT ticketing (objective not subjective)
BRN	8.7	Transport	Quality of service	Quality of service	Dead time of vending machine	II	19	Number	intermediate indicators to measure the QoS of PT ticketing (objective not subjective)
BRN	1.4	Transport	Quality of service	Quality of service	Temperature in vehicle	II	19	degrees C	intermediate indicators to measure the QoS of PT ticketing (objective not subjective)
BRN	2.7	Transport	Quality of service	Quality of service	Number of new connections	LT	19	Number	indicator to measure quality of service (objective)
BRN	2.7	Transport	Quality of service	Quality of service	Number of users	LT	19	Number	indicator to measure quality of service (objective)
BRN	IP 2	Transport	Transport system	Passengers	Number of PT passengers	LT	21	Number	increase in number of PT

II = Intermediate Indicator, LT = Local translation, LI local indicator

4.5.2. Data collection

A clear overview on how the data to determine the selected indicators will be collected, is described in the Site Evaluation Plans of each CIVITAS-ELAN city. An overview of all the data collected throughout the project lifecycle is gathered in a data collection inventories per Corridor and IP.

These inventories give information about:

- The type of data collected
- The level on which it will be collected; Measure level (M), Integrated Package level (IP), or Corridor level (C)
- The periodicity, when and how often it will be collected
- Collection Method
- The data unit
- An estimation of the sample size they plan to reach
- The timing
- The person/ partner responsible for carrying out the data collection activity

Special attention was paid to a fully understanding of the ML's responsible for carrying out great part of the data collection activities. A close communication between the SEM's and ML's made sure that all ML's are aware of the evaluation tasks they are responsible for.

5. Process Evaluation

5.1. Definition and objectives

Process evaluation – sometimes also referred to as formative evaluation – is a method for implementation assessment carried out while the measure activities are forming or happening.

The main objectives of process evaluation are:

- Getting insight to drivers and barriers during preparation, implementation and operation of the measures;
- Getting insight to roles of communication and participation;
- Getting at the stories behind the data;
- Contributing to cross-site evaluation and policy recommendations.

Process evaluation is hence supposed to directly benefit the ELAN project by identifying and handling factors which influence the sound measure implementation. It allows us to quickly detect and overcome unexpected barriers. If problems are detected early enough in the implementation period, process evaluation would allow correcting the design of a measure. In addition, the identification of drivers of the implementation could be used to further promote these drivers for an even more successful measure implementation.

Furthermore, the identification of work plan deviations / under-achievements / successes and the analyses of the respective reasons is another process evaluation objective. ELAN itself, but also future projects or cities interested in taking up ELAN-tested measures are expected to benefit from this process evaluation aspect.

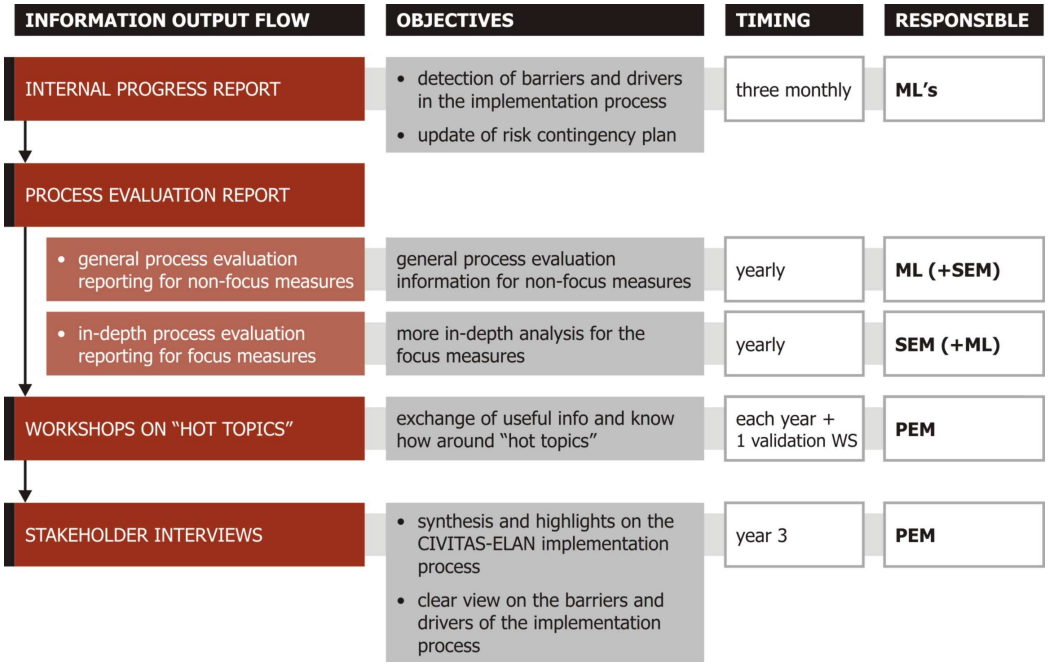
5.2. General concept

For the process evaluation, as for the impact evaluation, a difference is made between focus and non-focus measures. This results in the following concept:

For all the measures some **basic process evaluation** will be carried out;

For the focus measures a more detailed **in-depth process evaluation** will be carried out.

Figure 4: Approach process evaluation



- For all measures **Internal Progress Reporting** will take place. A half yearly reporting will be carried out on the measure, city and horizontal work package level. It will give information on the evolution of the risks, barriers and drivers influencing the implementation process the measures. This information will be subject to a first screening and can trigger a further analysis from the perspective of the Process Evaluation. This reporting can be seen as a kind of monitoring tool which allows the PEM and SEM to track valuable information on the implementation status of the measure.
- For all the measures a **Process Evaluation Report** will be made. This report, in the format proposed by POINTER will be made up on the measure level.. Depending on the status of the measure, being a focus measure or not, the form will only contain basic process information or more in- depth process information. Both reports will be provided once a year to POINTER.
- For certain interesting **themes or 'hot topics'** covering different measures, CIVITAS-ELAN will organise **CIVITAS-ELAN Workshops**. Knowledge transfer on practical approaches to tackle certain barriers or make optimal use of certain drivers will be the main objective of these workshops.
- In the 3rd year of the project a general **Intermediate Evaluation Validation Workshop** on the Evaluation Results (both Impact and Process) can be organised.
- At the end of the project the Project Evaluation Management will carry out **interviews with key stakeholders** involved in the most interesting CIVITAS-ELAN- measures (approx. 15 interviews spread over the CIVITAS-ELAN cities).

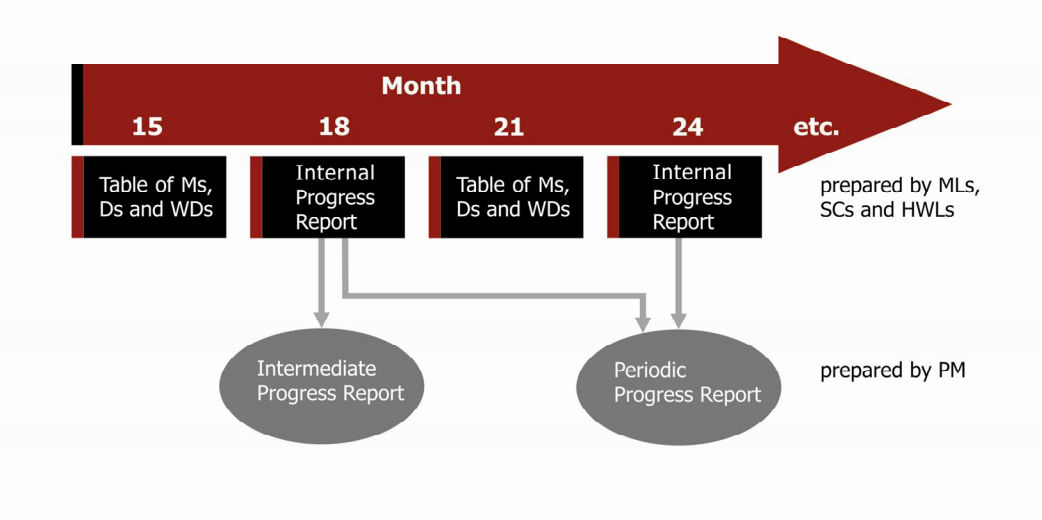
In general CIVITAS-ELAN will learn from CIVITAS II by analysing the CIVITAS II evaluation results and formulating some "lessons learned".

5.2.1. Internal Progress Reports (IPR)

Reporting on the progress of the implementation of ALL measures will be done through the Periodic Progress reports on a half yearly basis. Three months after or before these Internal progress reports also a status report on the milestones, deliverables and working documents will be send around in order to have a close monitoring on the progress of the implementation activities. The IPR's are developed and used by the Project Management as input for the Periodic Progress Reports. They will only be used internally within CIVITAS- ELAN. and are treated confidentially and provide basic information on the implementation status of the CIVITAS- ELAN measures such as risks, barriers and drivers of the implementation process. It should be seen as a monitoring tool which allows the PEM and SEM to track valuable information on the implementation process of the measure. Below a scheme is given that gives an overview on the reporting rules within the CIVITAS ELAN project.

Although this reporting is more based on monitoring the progress it gives valuable information about the evolution of the risks, barriers and drivers influencing the implementation process the measures.

Figure 8: Reporting rules CIVITAS ELAN



5.2.2. Process Evaluation Report (PER)

These reports will be produced according to the format proposed by POINTER. Two levels can be detected in these reports

- Basic Process evaluation for all the measures;
- In- depth Process Evaluation for the focus measures.

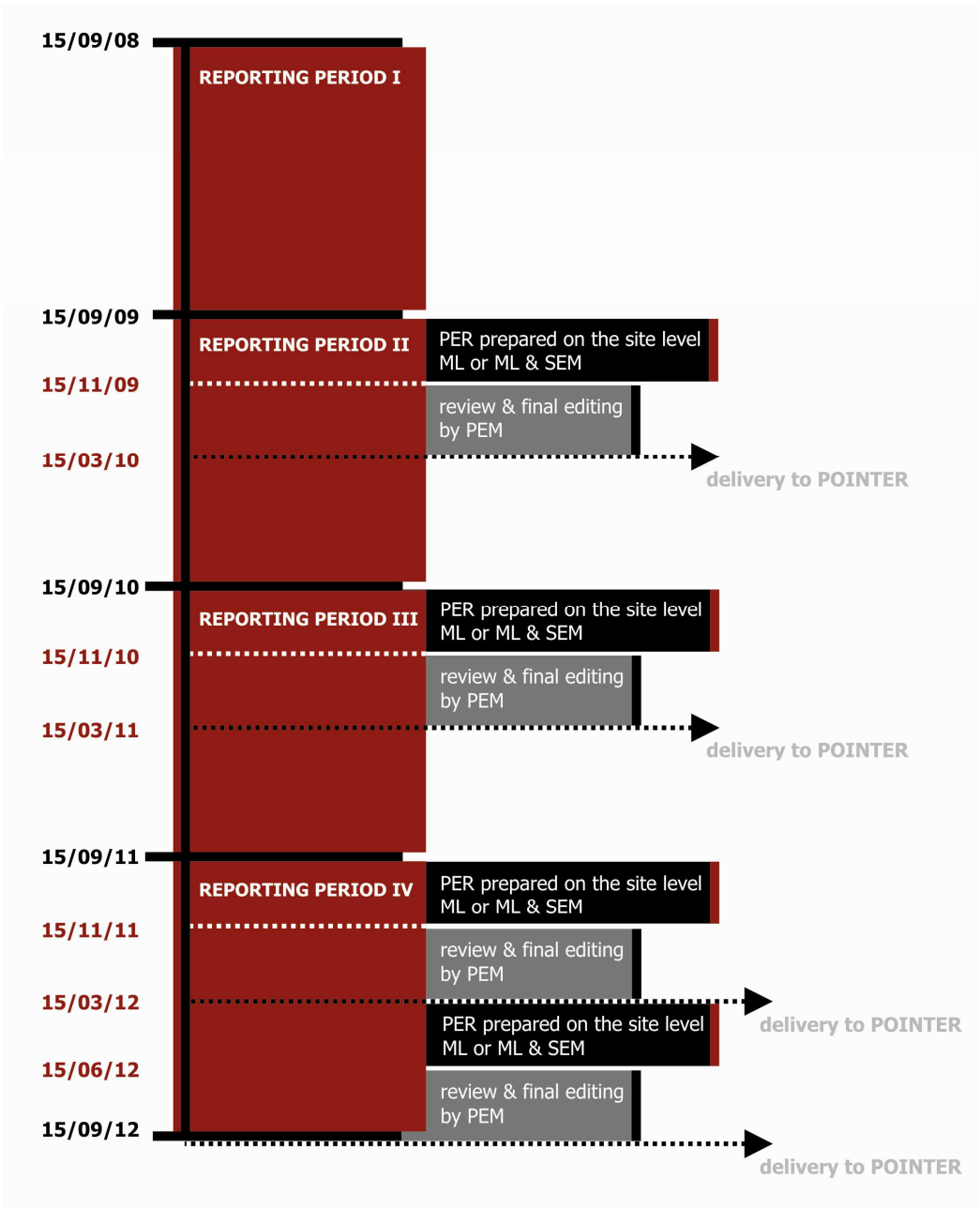
The difference between both reports will be that for the focus measures these reports will contain more detailed information than the reports for the non focus measures.

The forms, provided by POINTER, will be filled in once a year and send to POINTER. This will be the case for all the measures. Depending of the fact that a measure is a focus measure or not, more detailed forms will have to be filled in.

The reporting of this Process Evaluation Reports will be carried out by the Measure Leaders and the Site Evaluation Managers. They can gather this information through different techniques such as learning history, interviews, focus groups etc.

A provisional timeline for the delivery of these reports can be found below. Still a final revision of this timeline based on the practical requirements within the different cities is planned. Nonetheless the overall structure will stay the same:

Figure 9: Provisional timeline reporting process evaluation



5.2.3. Regular workshops on specific process evaluation topics and a mid-term validation workshop

These workshops have the objective to provide useful information on certain 'hot topics' or themes related to the implementation process. Typically this themes or 'hot topics' will be covering certain barriers/drivers of the implementation process. The target group for these workshops are mainly Site Evaluation Managers and Measure Leaders but also important stakeholders or other partners can be invited. This will be decided on a case-to-case basis.

ELAN will hold Process Evaluation Workshops at least on a yearly basis. Clearly, there is flexibility in choosing the appropriate workshop theme. In fact, the implementation process is often influenced by unexpected developments that take place, which makes process evaluation particularly interesting. Therefore it was agreed to keep some flexibility in choosing the Workshop themes and topics as it is expected that throughout the project more topics and themes will pop up spontaneously.

At this point, it is envisaged to hold workshops in specifically interesting thematic fields such as "urban goods distribution" or "promotion of walking and cycling". Workshop topics could also be derived from the process evaluation context itself. For example, a workshop on stakeholder involvement (meeting formats, tools, moderation techniques, etc.) or on economic planning of a measure can be organised.

A fifth workshop should be dedicated for a mid-term validation exercise. Such an event would be over two days and as all workshops could be split of into small and efficient groups (max 12 participants). Holding this mid-term validation workshop in combination with impact evaluation should be an efficient and worthwhile option.

Up until now the following topics are selected/ suggested:

- Stakeholder involvement/ citizen engagement
- Financial Planning

POINTER underlines the importance of the costs and benefits analysis. This is an issue that involves impact evaluation more than process evaluation, but CIVITAS-ELAN could support this aspect via a specific process evaluation workshop on economic/financial planning. In this way CIVITAS-ELAN can provide useful information to the overall CIVITAS evaluation support project.

The Project Evaluation Management will organise these workshops. In some cases however cooperation with the Project Management and the Scientific Coordinator can be established.

The project language is English and will be the language for all project-level workshops. When considered necessary local workshops can be organised in the local language to disseminate the information discussed in the Project level Workshops.

5.2.4. Stakeholder Interviews

The most in-depth information should be obtained from those who are actually involved in the implementation of a measure, i.e. the Measure leaders and/or stakeholders of a measure. For this reason, the Project Evaluation Management will organise interviews in all five CIVITAS-ELAN cities with such stakeholders.

Experience has shown that the information from such face-to-face interviews reveals partially new and unexpected information and can also serve as a tool to validate other results.. Depending on the practical choices of the measures the problem of the language barrier will be solved as neither Slovenian, Flemish, Portuguese, Czech, nor Croatian are widely spoken languages. Nonetheless it is important that the interview is carried out by a city-external interviewer to assure objectiveness and openness.

Stakeholder interviews can be carried out by the Site Evaluation Manager or the Project Evaluation Manager: they should have an independent view on the circumstances in the

ELAN cities. For sensitive issues the Project Evaluation Manager should carry out the interviews, supported by the Site Evaluation Manager for translation. Reason for this is the objective point view of the Project Evaluation Manager on the city context.

5.2.5. CIVITAS Initiative Process Evaluation Analysis[7]

CIVITAS-ELAN considers the analysis of previous CIVITAS process evaluation results as an important tool to improve its own process evaluation activities. It will allow us to understand better the possible conclusions and to optimise the approach. Cooperation with POINTER on this issue is needed and was discussed with POINTER. Possibilities to provide this data and analysis will be explored by them after the CIVITAS II Evaluation report is published.

[7] The analysis of previous CIVITAS process evaluation results can only reasonably been carried out once all CIVITAS II projects have released their evaluation reports. This is expected to happen before the summer of 2009. ELAN could hold a workshop for this purpose – and may suggest the involvement and support of POINTER representatives.

SITE EVALUATION PLANS CIVITAS ELAN CITIES

Part 1: Site Evaluation Plan for the City of Gent

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Site Evaluation Plan for the City of Gent

1. City context

Bustling Gent

Gent, sandwiched between Brussels, Bruges and Antwerp, is Belgium's third-largest city (in numbers of inhabitants) and offers everything you need to make life enjoyable! It's a bustling historic, yet contemporary city, with art and culture of the highest quality, an overflowing calendar of events, and a huge variety of shops, welcoming café terraces and numerous bars and restaurants – following the National Geographic Traveller Magazine, Gent is the third most authentic destinations worldwide!

Gent - City of Knowledge and Culture

The city's population is estimated at 239.000 inhabitants[1]. Gent is an important economic and cultural centre with a high centrality, which is expressed in an important harbour, ICT companies and medical facilities. The city calls itself 'City of Knowledge and Culture'. These elements make Gent very attractive, but also induce a lot of traffic.

Since 2007 Gent is the largest student city in Flanders. There are 56 000 university and college students registered in Gent[2]. According to educational experts, this concentration equips Gent for the future. Exchanges between the university and the colleges are likely to continue which will make Gent even more attractive. Despite its continuous growth, the university has managed to continue operations in the centre of the city. The various campuses flow through the historical city. Nearly all the buildings are at walking or cycling distance. In this way, the students maintain contact with the social and cultural life of the city which carries on even if the students have gone home. It is clear that Gent has a lot to offer in social, cultural and historical terms. An increasing number of people get to know this lively city by living the life of the student. However, the rise in the number of students has led to a number of consequences with regard to mobility and housing for which the City of Gent is trying to find solutions.

Gent was the first industrialised city in Flanders (late 18th Century), specialised in textiles. Since the rapid development of the port, it became specialised in steel making, electromechanical industries and car assembly. Gent increasingly becomes a city specialised in services, as the increase in the number of jobs experienced during the eighties and nineties is due to the rapid expansion of the service sector.

Mobility in Gent

Gent is the core city of a metropolitan area of about 515,000 inhabitants. Every day, about 35.000 people commute to Gent and 43.000 people commute from Gent. The city itself has 239.000 inhabitants and over 56.000 university and high school students.

Gent is situated at the junction of the motorways E17 and E40 and can easily be reached by car. National and international trains stop in Gent (stations Sint-Pieters and Dampoort). The city has an extensive public transport network serving the city centre and surrounding area. All these elements make Gent an attractive city and generate considerable levels of traffic from and to the city. Major highways that link Gent with all other important cities in Belgium surround the city. Some of these highways lead directly into the centre of Gent, making it very attractive to reach the city centre by car, and leading to excessive private vehicle usage.

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[1] City of Gent; 1 Jan 2009

[2] Student official 2009

2. Target Corridor

The CIVITAS-ELAN corridor in Gent stretches from The Loop (a developing large fair ground); over the main railway station Sint-Pieters towards the Korenmarkt in the pedestrian area the middle of the city centre. The corridor is about 4 kilometres long and runs along the main tram line 1 Evergem-Flanders Expo. The southern part (from The Loop to the Sint-Pieters station) is a main entrance road towards the city centre. Along this part there are an important number of high schools. From the Sint-Pieters train station towards the city centre, the corridor is characterised by a dense living area, private shops, schools and University buildings. The traffic between the station and the city centre has a high number of public transport users, pedestrians and cyclists. Together with cars, they share a narrow, congested entrance road towards the centre of the city.

Figure 1: concept corridor

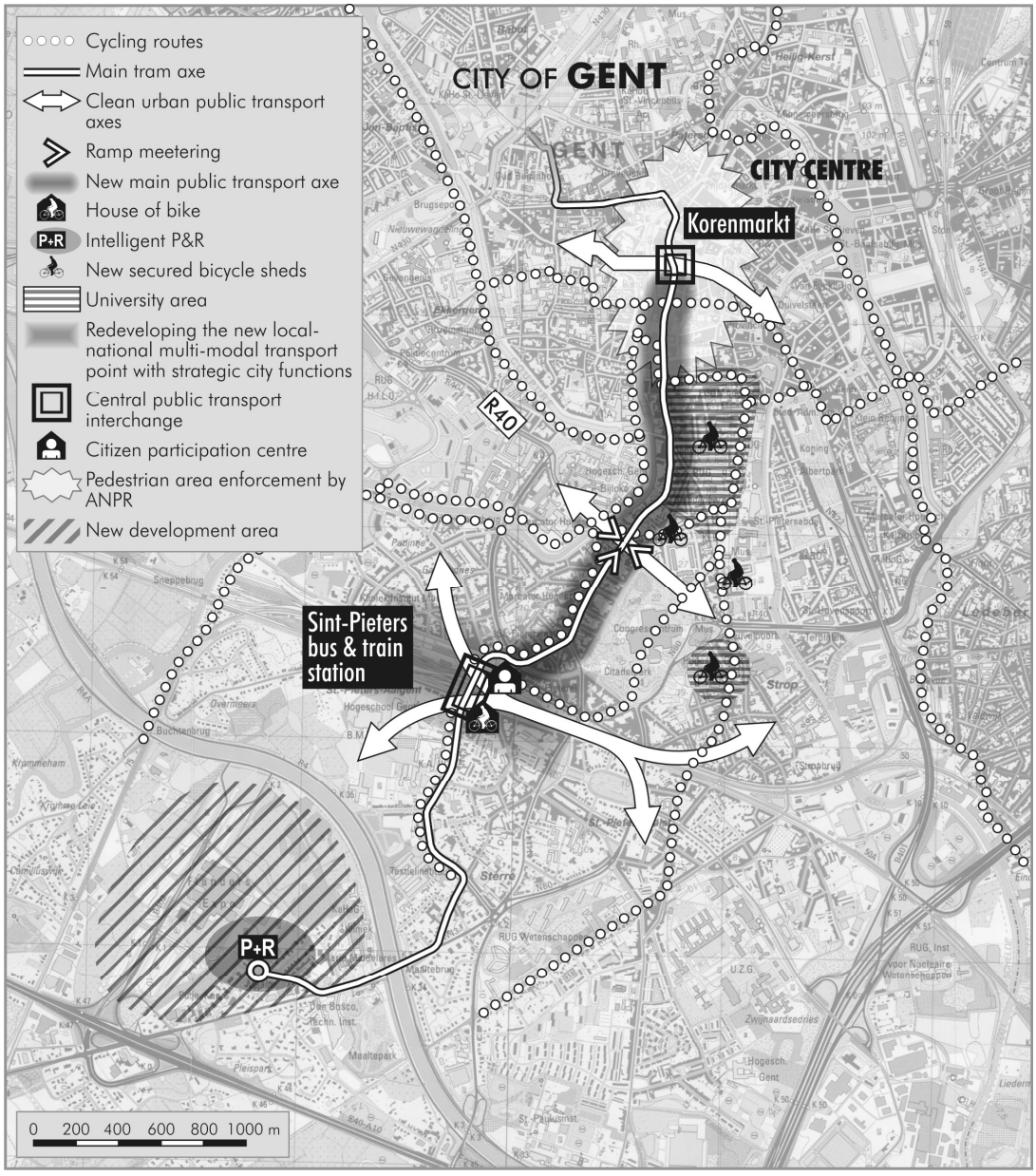

Figure 2: border of the corridor

The corridor is one of the most dynamic areas in Gent, with the fair ground area being developed (more leisure and retail activities), the railway station area is about to be developed (extension of railway station, development of an area with housing and offices) and in the University area the University and high schools are extending their premises. Finally the city plans to refurbish the Korenmarkt, the central city square and public transport node.

The corridor is the main link, with high concentration of housing, business and school activities between the city centre and the international and regional railway station including also the two most important interchange zones on urban level, the current conflict with its function as a car access axis to the city centre will be one of the important challenges for the CIVITAS-ELAN project.

In the northern part of the corridor, at the Korenmarkt, the existing old trolleybuses will be replaced by new energy efficient hybrid buses. The Korenmarkt is also the heart of the pedestrian area. To enforce the quality of this area, traffic will be decreased by means of an automatic number plate recognition system. Only cars on a 'white list' will get access. Goods distribution will also be managed in this area by providing dedicated loading and unloading spots and specific hours to distribute goods.

The connecting axe between the Korenmarkt and the Sint-Pieters main train station will be redeveloped entirely to provide smooth access for the main tramline 1. Ramp metering, redesign of the road with specific attention towards pedestrians and cyclists will be an important element of this redevelopment.

At the Sint-Pieters main train station clean buses will replace the existing ones. To promote the CIVITAS-ELAN project an information point will be installed. In this information point also the promotion of the road works will be organised. The car sharing partners Cambio and Maxmobiel will also organise their activities on this location. Additionally new safe and secured bicycle sheds, rental bikes will become available here.

In the south of the corridor P&R will be stimulated and route guidance systems will be improved.

Table 1: Key characteristics for the city of GENT

CHARACTERISTICS	CITY	ELAN-CORRIDOR
Area		
Surface (km²)	158	8,6
Transport		
Car ownership (per 1000 inhabitants) [3] Households with 1 or more cars	370 67.588	396 8.717
% daily trips by mode of transport [4]		*Study ongoing*
- Car	46	N/A
- Walk	6,9	N/A

[3] source: stadsmonitor 2008

[4] source: leefbaarheidsmonitor 2006

CHARACTERISTICS	CITY	ELAN-CORRIDOR
- Cycle	19,9	N/A
- Bus/Tram/Train	23,2	N/A
Society and economy		
Population [5]	239.905	29.525
% unemployment	10,04	N/A
un employed [6]	11.082	1.256
% employed in service sector (tertiair sector) [6]	46	N/A
% households receiving council tax benefit	N/A	N/A
% pop over age 65 [5]	17,1	18,3
% pop under age 17 [5]	18,9	11,7
Energy and environment		
% estimated energy use – Transport [7]	11,8	N/A
% emissions of Carbon Dioxide by road sector [8]	25	N/A

[5] source: DPM status 2008

[6] source: Sociaal-economisch profiel van Gent 2004

[7] source: Emis 2007

[8] source: VMM lozingen in de lucht 1990-2007

3. Overview table of all the evaluation activities

Below an overview can be found of all the evaluation activities carried out for the city of Gent during the project life cycle. The table includes information on the level at which the evaluation task will be carried out; city/corridor level, Integrated Package –level or Measure level and also indicates which basic evaluation tasks will be done and which in-depth analysis will take place for the focus measures.

Table 2: Summary table of the Impact evaluation activities for the city of Gent

City/ IP/ Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA/ financial	In-depth Process Evaluation
City Level	Modal Split Citizen Engagement/Participation Air Quality	x				
IP 1	Promoting and enhancing the use of clean vehicles	x		x		
1.2-GEN	Energy efficient city fleet manage-ment	x	x		x	x
1.8-GEN	Extended biodiesel production	x				
1.9-GEN	Semi-public clean car fleet	x		x		
1.10-GEN	Introduction of hybrid vehicles	x	x	x		
1.13-GEN	Clean public transport strategies	x	x	x		
IP 2	Citizen engagement leading to changing Mobility Behaviour	x				
2.9-GEN	Participatory re-development of main train station area	x				x
4.2-GEN	Mobility management for companies	x		x		
4.3-GEN	Mobility management for schools	x				
4.10-GEN	Comprehensive mobility dialogue and marketing campaign	x				
6.2-GEN	Innovative car sharing	x				
6.3-GEN	Holistic event management	x				
IP 3	Adjust car & freight traffic by Traffic Management	x				

City/ IP/ Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA/ financial	In-depth Process Evaluation
2.4-GEN	Intelligent Park&Ride enforcement	x	x			
3.3-GEN	Parking and public space management around train station and ELAN corridor	x				
3.4-GEN	Pedestrian area enforcement with automatic number plate recognition	x	x		x	x
7.3-GEN	Institutional platform for city freight management	x				x
8.6-GEN	Sustainable multi-modal traffic management	x				
IP 4	Improving the Quality of collective transport	x				
2.2-GEN	Improved Public Transport service levels	x	x	x	x	x
5.7-GEN	Security enforcement in public transport	x				x
IP 5	Stimulating Cycling and Walking conditions	x				
4.5-GEN	“The House of Bike” and bicycle activities	x			x	x
4.7-GEN	Walking promotion	x				
5.6-GEN	Safe cycling corridor	x		x		
8.9-GEN	IT-based bicycle theft prevention	x	x		x	x
8.10-GEN	Route planner for bicycles	x				

4. Focus measures

For each city a selection of focus measures has been carried out. For these measures extra attention will be paid to all the evaluation activities but a strong focus will be on the CBA and/or in-depth process evaluation of these measures. Below you can find the selection of focus measures for the city of GENT. Also the motivation for selecting these measures is described.

- 1.2-GEN Green fleet management

This measure is an innovative measure in the city of Gent. The city of Gent does not only want to replace its fleet to a cleaner one, but also want to set up a green fleet management by e.g. stimulating the use of shared cars, organising ecodriving courses for their drivers, stimulating the use of B30…

Due to this general approach, an in-depth evaluation (as well for impact and process) is a must.

This measure is also suitable for CBA because its outcomes and benefits will not occur only in financial benefits but mainly in better air quality of the city of Gent. Thus the outcomes will be measurable in CBA and it will be possible to identify if the expenditures on the measure were worthy.

- 2.2-GEN Improved Public Transport service levels

The city of Gent and the public transport company De Lijn have a strong commitment to define actions on several levels to improve the commercial speed of trams and city buses with 10%.

Due to this commitment, this measure is an innovative measure of which an in-depth analysis (as well for impact and process) is strongly recommended by both partners.

This measure is suitable for in-depth analysis and cost-benefits analysis since De Lijn has several monitoring systems with required information for many years. E.g. the Quality Monitor and the Hastus database (a kind of commercial speed monitory system).

- 2.9-GEN Participatory re-development of main train station area

The city of Gent has many experiences with stakeholder and citizen's participation, Gent is with this measure a leading city. For this reason this measure is selected for in-depth process evaluation.

- 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

This measure is a measure with high risks. For this reason, it is worth to plan in an in-depth process evaluation.

Nowadays at least 2 policemen have to control the traffic movements permanently, which increases the workload of the police. With this measure, the pedestrian area enforcement system, actions will be taken to reduce the workload of the police. The impact of this measure on the workload of the police will be done by cost-benefit analysis.

- 4.5-GEN "The House of Bike" and bicycle activities

To improve the quality and image of the bike services, the mobility department of the city of Gent, Max Mobiel ngo and the StudentEnMobiliteit ngo have an ambitious plan to integrate all bike services to one central service point on a top location, namely at the direct environment of the main train station. Due to this ambitious plan, lots of barriers are expected. Therefore, an in-depth process evaluation of this measure is planned.

Next to this ambitious plan, the city of Gent wants to improve the quality and the supply of different kind of bicycle sheds. To analyse the quality of those sheds, also cost-benefit analysis is planned. Since the CBA of the bicycle sheds is planned, this measure is selected as a focus measure.

- 5.7-GEN Security enforcement in PT

De Lijn improves the security in PT by making the youth aware of their attitudes by close cooperation with schools and youngsters in particular and by enhancement of second persons on the PT vehicles. This is part of the safety plan, set up by De Lijn, to substantially improve the safety and security of public transport users and drivers. Due to this new approach, this measure is selected as a focus measure.

- 7.3-GEN Institutional platform for city freight management

The process of this measure (bottom-up approach towards freight distributors and shopkeepers) is innovative. In the past the measure failed due to the top-down approach. In the process evaluation, comparison of both approaches will be made. For this reason, this measure is selected as focus measure.

- 8.9-GEN IT-based bicycle theft prevention

This measure has an innovative approach to reduce bicycle theft in the city of Gent. Figures to make a cost-benefit analysis are available.

Table 3: List of focus measures for the city of GENT

MEASURE NUMBER	MEASURE TITLE	IN-DEPTH ANALYSIS		MOTIVATION[9]					
		Cost benefit analysis	In – depth Process	Towards greener towns	Towards free-flowing towns and cities fluid	Towards smarter urban	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
1.2	Green fleet management	x	x	xxx		x	x	x	Possibility to carry out a good CBA The measure has a good relation with the city policy
2.2	Improved Public Transport service levels	x	x		xxx		xx		The city of Gent and the public transport company have already worked out a plan to improve the commercial speed of trams and city buses with 10%
2.9	Participatory re-development of main train station area		x			x	xxx		Strong commitment with stakeholders and citizens required. Focus on citizen engagement
3.4	Pedestrian area enforcement with automatic number plate recogni-tion	x	x	x	x	xxx			Innovative (on technique) and measure with high risks
4.5	"The House of Bike" and bicycle activities	x	x	xxx	x	x	xx	xx	Complex measure to improve the quality and image of bicycle services. CBA of different types of bicycle sheds will be done

[9] Ranging from x= relevant to xxx= very relevant

MEASURE NUMBER	MEASURE TITLE	IN-DEPTH ANALYSIS		MOTIVATION[9]					
		Cost benefit analysis	In – depth Process	Towards greener towns	Towards free-flowing towns and cities fluid	Towards smarter urban	Towards accessible urban transport	Towards safe and secure urban transport	Key Motivation
5.7	Security enforcement in PT		x				x	xxx	New approach to improve security in PT by making the youth aware of their attitudes by close cooperation with schools and youngsters in particular and by enhancement of second persons on the PT vehicles.
7.3	Institutional platform for city freight management		x		xx	x	xxx	xx	Comparison of bottom-up approach with top-down approach of this measure
8.9	IT-based bicycle theft prevention	x	x			xx		xxx	Innovative approach to reduce bicycle theft in the city of Gent

5. Impact Evaluation

5.1. Measure and Integrated package level

5.1.1. Integrated package 1: Promoting and enhancing the use of clean vehicles

5.1.1.1. Description

A Objectives and scope

IP objectives

The objective of this integrated package is to reduce the emissions of the (semi) public vehicle fleet. This will be achieved by:

- Reducing fuel consumption
- Cleaning up local vehicle fleets through:
  - Replacing old vehicles by clean cars (euro 5).
  - Implementing new techniques (hybrid, electric, CNG vehicles).
  - Implementation of bio fuel in (semi) public vehicle fleet.

Measure related objectives

- 1.2-GEN Energy efficient city fleet management:
  - Reduction of emissions by efficient use of the city fleet.
  - Reduction in the use of fossil fuels in the City fleet.
  - Reduction of fuel consumption through driver training
- 1.8-GEN Extended bio diesel production:
  - Reduction of emissions by stimulating the implementation of bio diesel use (B30) in the surroundings of Gent by captive fleets of public organizations.
  - Increase in the share of bio diesel by installing a (separate) circuit of pumps providing B30.
- 1.9-GEN Semi-public clean car fleet:
  - Reduce the use of fossil fuels in the car fleets of Cambio (car sharing fleet) and Maxmobiel (a private shuttle service for employees between the main train station and the harbour of Gent) by using more sustainable alternatives and by introducing eco-driving principles towards the users of this fleet.
  - Promote clean and energy-efficient vehicles towards a broader public (see also measure 6.2. “Innovative car sharing”).
- 1.10-GEN Introduction of hybrid vehicles:
  - Introduce articulated hybrid buses as a transitional measure between the present old high-floor trolleybuses and the future tramcars foreseen on a part of present trolley line.
  - Increase our experiences with articulated hybrid buses so that all next buying’s could be with hybrid (diesel) traction.
  - Ride with energy-efficient buses without the disadvantages of the 600 Volt catenaries lines and limited freedom of movement of our trolleybuses nowadays.
  - Optimize the efforts of the maintenance staff and of the stock of spare parts by eliminating the trolleybus technology so that we can focus more on our buses and trams

- 1.13-GEN Clean public transport strategies
  - Reduction of emissions by introducing B30-buses and hydrogen buses to the city of Gent

B Overview of the measures

- 1.2-GEN Energy efficient city fleet management

The use of bio diesel (30% mix with standard diesel) in the city fleet (when it is economically and technically feasible) and the replacement of existing cars by environmentally friendlier cars enables the City of Gent to prove that fuel can be used in a more sustainable way. By reducing the use of fossil fuels, the City of Gent sets an example for the city employees and the public to become less dependent on fossil fuels. A City fleet management will be implemented to increase the efficiency of the city fleet. By providing the car fleet at important and central locations, plenty of staff members can use these shared vehicles more efficiently. The focus here is on the standard vehicles (e.g. passenger cars). By giving the car fleet drivers driver training (Ecodriving), driving becomes more energy efficient and environmentally friendlier.

- 1.8-GEN Extended bio diesel production

In Belgium there is today a tax exemption for diesel mixtures containing 4.29% bio diesel (= FAME, Fatty Acid Methyl Esters). Only for public transport organisations such as De Lijn, there is an additional tax exemption for mixtures containing a higher percentage of FAME, up to 100%. This means that captive fleets of other public organisations are not eligible for additional tax exemption when they use higher (than 4.29%) blends of bio diesel.

A second constraint is posed by the fact that there is still no bio diesel available at the pump today because there is currently no obligation to add bio diesel to normal diesel. This should legally be arranged by the end of 2009.

The final aim is to reduce dependence on fossil fuels and to increase the share of bio-diesel in compliance with EU legislation which will also reduce CO2 and other pollutant emissions.

This will be reached by implementing:

- Extension of the current law on the tax exemption.
- Technical guarantees from car manufacturers for the use of B30.
- A (separate) circuit of pumps to provide B30.

- 1.9-GEN Semi-public clean car fleet

By operating this car sharing scheme in Gent, Cambio is already working on a more energy efficient way of car possession and car usage. It has been proved that 1 car sharing car is replacing 6-8 private cars, reducing energy consumption substantially. Moreover car sharing schemes lead towards a decrease in car usage and an increase in more sustainable transport modes such as public transport, biking, walking, etc.

Cambio wants to integrate clean and more energy efficient vehicles into its fleet, but it has to take into account that this should not form an extra barrier for the people using the Cambio car sharing fleet.

MaxMobiel currently provides a shuttle service to employees from the train station to the harbour of Gent which is difficult to reach by public transport. This way the accessibility of this important labour intensive area is guaranteed and collective transport to this area is provided. By using bio diesel, petrol/CNG/LPG and electric propulsion in their shuttle fleet and own fleet, they can use their energy more efficiently which contributes to lower energy consumption.

- 1.10-GEN Introduction of hybrid vehicles

In the context of the global objective to have - in the short term - a complete fleet of easy accessible vehicles reaching the highest standards on energy efficiency and reduction of negative impacts as noise and emissions in the urban area of Gent, De Lijn will replace the old high floor trolleybuses by 23 new energy-efficient and innovative articulated low floor hybrid buses.

- 1.13-GEN Clean public transport strategies

The strategic objective of this measure is to contribute to a shift towards clean PT fleets by substituting diesel with B30 and by buying a hydrogen bus. The specific operational objectives of this measure are to:

- try to organise tests with B30-buses and hydrogen buses to the City of Gent in full exploitation;
- all new buses should be B30-proof, which has to be foreseen in the next calls for tender.

C Innovative aspects

- 1.2-GEN Energy efficient city fleet management

The City of Gent is the only city in Belgium that is organising efficient fleet management at such a profound and ambitious scale:

- City fleet drivers will be trained to drive more efficiently and safely.
- A city fleet management cell will be responsible for the city fleet. The different municipal services will have to use the same shared car fleet.
- The use of bio diesel in the city car fleet will stimulate the market for alternative fuels.

- 1.8-GEN Extended bio diesel production

This measure aims to extend the current tax exemption on bio diesel to other organisations than the public transportation organisations and to mixtures of diesel containing a percentage of FAME higher than 4.29%.

- 1.9-GEN Semi-public clean car fleet

The use of bio diesel, electricity and CNG in the city car fleet (MaxMobiel) will help stimulating a sustainable market for fuels as an alternative to mineral oil.

Both the car fleet of Cambio and the MaxMobiel bus shuttle are running on diesel. Using bio diesel or hybrid cars will be an innovation for both fleets.

By stimulating their drivers/ clients to drive in a more eco-efficient way an extra reduction should be achieved.

- 1.10-GEN Introduction of hybrid vehicles

In the context of the global objective to have - in the short term - a complete fleet of easy accessible vehicles reaching the highest standards on energy efficiency and reduction of negative impacts as noise and emissions in the urban area of Gent, De Lijn will replace the old high floor trolleybuses by 20 new energy-efficient and innovative articulated hybrid buses.

- 1.13-GEN Clean public transport strategies

This measure assists in stimulating a sustainable market for clean and efficient buses by using the best available clean fuel vehicle technology.

By introducing a number of different durably fuelled buses, De Lijn sets an example and assists in stimulating a sustainable market for clean and efficient vehicles.

D Research and technical development

- 1.2-GEN Energy efficient city fleet management

First, the City of Gent wants to investigate the possibility of using 30% bio diesel (B30), and in particular the following issues: tax reduction, manufacturers' technical warranties, availability and distribution of appropriate filling stations, experience of fleet managers with bio diesel, etc.

- 1.8-GEN Extended bio diesel production

The Gent Bio-Energy Valley (GBEV) wants to investigate the possibility of using 30% bio diesel (B30), and wants to force it by: the removal of the financial (tax) barrier and setting up a forum of potential bio diesl users.

- 1.9-GEN Semi-public clean car fleet

CAMBIO

In a first phase, some research will have to be done about the different options which are available (bio diesel, hybrids, etc) in order to see which of those options are realisable within the context described above (car sharing scheme, different car users). Two aspects as technical aspect and user friendliness and user needs have to be taken into account.

MAX MOBIEL

Research into how bio fuels can be used in the fleet or the transport services.

- 1.10-GEN Introduction of hybrid vehicles

After an in-depth analysis of the required specifications to fulfil the objectives in the energy and quality policy of De Lijn, a call for tender will be launched.

In this call, a test phase is foreseen for the offered vehicles of the interested suppliers.

- 1.13-GEN Clean public transport strategies

After an in-depth analysis of the required specifications to fulfil the objectives in the energy and quality policy of De Lijn the calls for tender will be launched.

E Situation before CIVITAS

- 1.2-GEN Energy efficient city fleet management

The City council consists of several different departments: environmental department, department of mobility, special planning and public space, facility management department, etc. Every department within the City of Gent has its own fleet and every alderman (head of the department) can decide on the city fleet cars for his or her department. There is no general management of the fleet. As a result, an important part of the fleet is not used efficiently.

The city fleet cars are mostly diesel-fuelled vehicles, and most of the staff has not received an Eco training so far.

When buying new trucks, the city already chooses EURO V-norm trucks.

- 1.8-GEN Extended bio diesel production

About 2 years ago, Gent Bio-Energy Valley (GBEV) was initiated by Prof. Soetaert of the Department of Biochemical and Microbial Technology of Gent University. The legal entity of Gent Bio-Energy Valley is based at Gent University which is also the partner within the CIVITAS-ELAN project.

Gent Bio-Energy Valley is a Public Private Partnership between Gent University, the port of Gent, the City of Gent, the Development Agency of East-Flanders and a number of private companies that are active in the field of bio-energy generation, distribution, storage and use as Oleon and Bioro which have obtained a quorum from the Belgian government to produce bio diesel. GBEV aims to support the development of sustainable bio-energy activities and resulting economic growth in the region of Gent, Belgium. In particular, GBEV promotes the development of bio refineries in the port of Gent for the production of bio-energy. GBEV is also a well-renowned partner in decision making processes with regard to bio fuels in Belgium. Therefore, GBEV and its public partners are well positioned to send out a bio diesel communiqué stressing the importance to change national laws, to the government and respective politicians.

In Belgium there is a tax exemption for diesel mixtures containing 4.29% bio diesel (= FAME, Fatty Acid Methyl Esters). For public transport organisations such as De Lijn there is an additional tax exemption for mixtures containing a higher percentage of FAME, up to 100%. However, there is still no

bio diesel available at the pump today because there is currently no obligation to add bio diesel to normal diesel. This should legally be arranged by the end of 2009.

In this measure the use of B30 will be stimulated in the region of Gent. The main barrier to use higher percentages of bio diesel on a large scale is the absence of a tax exemption for diesel mixtures containing more than 4.29% bio diesel for organisations other than public transport organisations. Currently, Belgium fails to comply with the EU guidelines and it did not match the targets that were set for 2005. The extension of the tax exemption offers a way to implement bio diesel use to a larger extent; this will involve changes in the current legislation.

- 1.9-GEN Semi-public clean car fleet

Currently, the Cambio and MaxMobiel fleet are both diesel-fuelled. Cambio wants to integrate clean and more energy efficient vehicles into its fleet, but it has to take into account that this should not form an extra barrier for the people using the Cambio car sharing fleet (keeping in mind that changing from the private car towards a car sharing scheme already asks quite some flexibility from these people - or at least this is how it is perceived).

By operating this car sharing scheme in Gent, Cambio is already working on a more energy efficient way of car possession and car usage. It has been proved that 1 car sharing car is replacing 6-8 private cars, reducing energy consumption substantially. Moreover car sharing schemes lead towards a decrease in car usage and an increase in more sustainable transport modes such as public transport, biking, walking, etc.

MaxMobiel currently provides a shuttle service to employees from the train station to the harbour of Gent which is difficult to reach by public transport. This way the accessibility of this important labour intensive area is guaranteed and collective transport to this area is provided. By using bio diesel, petrol/ CNG and electric propulsion in their fleet they can use their energy more efficiently which contributes to lower energy consumption.

- 1.10-GEN Introduction of hybrid vehicles

Today, De Lijn operates 1 trolley line which is, together with the tramlines, part of the main urban transport network. Taking into account the urban structure and the narrow street lay-out it is not easy to introduce tramlines in a short period of time.

The new articulated 100% low floor hybrid buses will replace the old high-floor trolleybuses while the studies are running for introducing the new tramlines.

- 1.13-GEN Clean public transport strategies

Today, De Lijn operates diesel-fuelled buses, nearly all of them cross the implementation corridor, which has been selected by the city of Gent.

F Inter- relationship with other measures

All measures in this IP have the same objective, namely the reduction of emissions. This will be achieved by reducing fuel consumption and cleaning up the fleet.

The measures of this IP will help stimulating a sustainable market for fuels as an alternative to mineral oil.

The research of the implementation of bio diesel in several measures of this integrated package (1.2-GEN,1.9-GEN and 1.13-GEN) will be coordinated by the measure leader of the measure 1.8-GEN „Extended bio diesel production“, namely Gent Bio-Energy Valley (GBEV).. Gent Bio-Energy Valley is a Public Private Partnership between Gent University, the port of Gent, the City of Gent, the Development Agency of East-Flanders and a number of private companies that are active in the field of bio-energy generation, distribution, storage and use. Its legal entity is based at Gent University.

5.1.1.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts for the IP 1 Promoting and enhancing the use of clean vehicles

The expected impacts are:

- Decrease in energy consumption of fossil fuels

The decrease in energy consumption will be measured within each measure of the IP and then combined to draw conclusions on the IP level. Data on fuel consumption will be very precise which will lead to a very accurate impact calculation allowing to distillate the exact impact of this set of measures.

- Degree of cleanliness of the vehicle fleet

The degree of cleanliness of the vehicle fleet can be measured based on some characteristics of the vehicles. This rather new technique allows easily compare the cleanliness of different fleets based on one score rather then a complete set of figures (ecoscore and euronorm). The degree of cleanliness will be measured within each measure of the IP and then combined to draw conclusions on the IP level.

- Decrease in emissions

The same reason as for the decrease in energy consumption can be used here. The degree of emissions of this measure will be deducted out of the energy consumption and the cleanliness of the vehicle fleet. The decrease will be measured within each measure of the IP and then combined to draw conclusions on the IP level.

- Improved air quality

The air quality will not be measured on IP level as the impact for this set of measures separately on the air quality is hard to distinguish. Although the air quality will be measured on city level to follow the general trend of the air quality within the city of Gent, for this IP the decrease of emissions can give more accurate view of the impact of this IP in terms of environmental impacts.

Selected Indicators for the IP 1 Promoting and enhancing the use of clean vehicles

Below an overview is given of all the evaluation activities and indicators for the IP 1 Promoting and enhancing the use of clean vehicles.

Table 4: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 1: PROMOTING AND ENHANCING THE USE OF CLEAN VEHICLES	▪ Combining the results of different measures to come to conclusions on IP level: - Fuel consumption - Fuel mix - Fleet composition - Ecoscore of the standard fleet (no fire trucks, public transport buses, excavators,…) - Euronorm - PM10, NO2 and CO2	Total decrease of PM10, NO2 and CO2 emissions and total increase of the ecoscore/ euronorm within the public fleet by a combined strategy of a set of measures → Scope: city → Target group: public fleet

Details of the evaluation activities

To analyse the decrease of the emissions, following indicators will be used

- Fleet composition and its fuel mix.
- PM10 and NO2 emissions will be extracted out of the other indicators as euronorm and eco-score. (see literatures of euronorm and ecoscore).
- CO2 emissions will be calculated out of the fuel consumption following different formulas defined in different literature of CO2 emissions.
- Bio fuel: since biofuel is a new type of fuel, based on the literature, the PM10, NO2 and CO2 emissions will be calculated.
- Fuel consumption = fuel used /km driven

The meaning of the following indicators are:

Ecoscore: the ecoscore is a way to measure the cleanliness of a standard vehicle fleet, not public transport fleet, based on some characteristics of the vehicle like type of engine, type of fuel, emissions, sound/noise,… (www.ecoscore.be)

The SEM will use an innovative evaluation method to evaluate the emissions of the standard fleet, namely the ecoscore, developed by VITO.

The eco-score permits estimating the environmental performances of a standard vehicle by taking into account the most important environmental impacts caused by the vehicle. Every vehicle has an eco-score between 0 and 100. The closer the score is to 100, the more environmental friendly the vehicle is.

On the one hand the eco-score takes into account the greenhouse gas emissions (especially CO2) that cause the heating of the earth, and on the other hand emissions that have a directly negative impact on citizen's health (such as fine particles, nitrogen oxides, etc.). The impact of certain emissions on eco-systems is also taken into account, and to a lesser degree also sound/ noise production.

Euronorm: the euronorm is a way to measure the cleanliness of all vehicles based on some characteristics of the vehicle like type of engine, emissions,… This euronorm gives insight in the emission of PM10 and CO2

B Evaluation activities and indicators on measure level

Expected possible impacts for the measure 1.2 Energy efficient city fleet

The expected impacts are:

- Decrease in energy consumption

The decrease in energy consumption will be measured on measure level. The results will also be used on the IP level. Data on fuel consumption will be very precise which will lead to a very accurate impact calculation allowing to distillate the exact impact of this measure.

- Degree of cleanliness of the vehicle fleet

The degree of cleanliness of the vehicle fleet can be measured rather easy based on some characteristics of the vehicles. This rather new technique allows easily compare the cleanliness of different fleets based on one score rather then a complete set of figures (ecoscore and euronorm). The measurement of this impact will be measured on measure level. The results of this analysis will be used to draw conclusions on the IP level.

- Decrease in emissions

The same reason as for the decrease in energy consumption and cleanliness of the vehicle fleet can be used here. The degree of emissions of this measure will be deducted out of the energy consumption and the cleanliness of the vehicle fleet.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is hard to distinguish. To have some insight on the impact of all measures on the air quality the air quality will be modelled on city level.

- Increased user acceptance of the ecodriving courses

The user acceptance will be measured in this measure. This will be done on objective way and subjective way.

- Increased user acceptance of the reservation tool of shared cars

The user acceptance will be measured in this measure. This will be done on objective way and subjective way.

Selected Indicators for the measure 1.2 Energy efficient city fleet

Below an overview is given of all the evaluation activities and indicators for the measure 1.2 Energy efficient city fleet management.

Table 5: Evaluation activities and indicators for measure 1.2 Energy efficient city fleet management

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.2-GEN Energy efficient city fleet management	▪ Measurement of: - Ecoscore of standard vehicles (no fire trucks, excavators,…) - Euronorm of standard vehicles - PM10, NO2 and CO2 emissions of standard vehicles - Fuel consumption per standard vehicle - Record of the fleet composition - Record of ecodriving trainees and its fuel consumption - Amount of shared cars and its use. ▪ Survey on: - user acceptance of the ecodriving courses - user acceptance of the reservation tool of shared cars	▪ Improvement of ecoscore and euronorm of the city fleet ▪ Decrease of PM10, NO2 and CO2 emissions ▪ Evolution of fuel mix ▪ Decrease of fuel consumption ▪ Decrease of fuel consumption due to ecodriving techniques ▪ Evolution in use of shared cars ▪ User acceptance of the ecodriving courses and reservation tool ▪ CBA → Target group: City fleet

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
	▪ BAU	

Details of the evaluation activities

To analyse the decrease of the emissions, following indicators will be used

- City Fleet composition and its fuel mix.
- PM10 and NO2 emissions will be extracted out of the other indicators as euronorm and ecoscore. (see literatures of euronorm and ecoscore).
- CO2 emissions will be calculated out of the fuel consumption following different formulas defined in different literature of CO2 emissions.
- Bio fuel: since biofuel is a new type of fuel, based on the literature, the PM10, NO2 and CO2 emissions will be calculated.
- Fuel consumption = fuel used /km driven

The impact of the ecodriving courses will be measured on objective way (reduction of fuel consumption) and on subjective way (survey on user acceptance).

The impact of the reservation tool of shared cars will be measured on objective way (number and use of shared cars) and on subjective way (survey on user acceptance).

The meaning of the following indicators are:

- Ecoscore: the ecoscore is a way to measure the cleanliness of a standard vehicle fleet based on some characteristics of the vehicle like type of engine, type of fuel, emissions, sound,… (www.ecoscore.be)
- Euronorm: the euronorm is a way to measure the cleanliness of all vehicles based on some characteristics of the vehicle like type of engine, emissions,… This euronorm gives insight in the emission of PM10 and CO2

Details for Business as usual and up-scaling

- BAU

A replacement of a depreciated old car to a newer one will have impact on the fuel consumption and emission anyway. Innovative tasks of this measure are replacing all cars/trucks with bad ecoscore to new ones with better ecoscore, even cars/trucks which are not depreciated yet and thus not yet planned to be replaced.

In the business as usual scenario the decrease of fuel consumption and emissions by a standard replacement of depreciated old fleet will be taken into account when measuring the effective impact on the decrease of fuel consumption and emissions of this measure.

- Up-scaling

Not applicable since this measure will be implemented in the whole city fleet (except for fire trucks, excavators,…)

Expected possible impacts for the measure 1.8 extended bio diesel production

The expected impacts are:

- Increased use of bio diesel

The use of bio diesel will be measured on measure level. By gathering the number of bio diesel users, liters of bio diesel ordered and tax exemption for diesel mixtures the use of bio diesel can be evaluated.

- Decrease in emissions

The emissions will not be measured on measure level as it will not be possible how many km will be driven with bio diesel. This information is needed to measure the emissions.

- Improved air quality

The air quality will not be measured on measure level. The impact of this measure will be taken into account when evaluating the air quality on city level.

Selected Indicators for the measure 1.8 extended bio diesel production

Below an overview is given of all the evaluation activities for the measure 1.2 Energy efficient city fleet management

Table 6: Evaluation activities and indicators for measure 1.8 Extended Bio diesel production

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.8-GEN Extended bio diesel production	▪ Measurement of: - Liter of bio fuel ordered per bio fuel user (organisation) - Tax exemption for diesel mixtures	▪ Increased use of bio diesel more specific B30 in public fleet

Details of the evaluation activities

Tax exemption: drivers have to pay taxes on diesel. If bio fuel will have the same tax exemption, the market price of bio fuel will be higher then the fossil fuel (due to higher production costs). The ambition of this measure is to stimulate use of bio fuel in Flanders by convincing the Flemish and Belgian government to reduce tax exemption on bio fuel, depending on several diesel mixtures (B10, B30,…). By reducing tax exemption on several diesel mixtures, the market price of bio fuel will be the same or even lower than the market price of fossil fuel.

For this reason the evaluation on the tax exemption for diesel mixtures will be useful.

Details for Business as usual and up- scaling

Not applicable

Expected possible impacts for the measure 1.9 semi-public clean car fleet

The expected impacts are:

- Decrease in energy consumption

The decrease in energy consumption will be measured within this measure. The reason is the same one as mentioned in measure 1.2.

- Degree of cleanliness of the vehicle fleet

The degree of cleanliness of the vehicle fleet can be measured based on some characteristics of the car fleet of Cambio and Max Mobiel. This rather new technique allows easily compare the cleanliness of different fleets based on one score rather then a complete set of figures (ecoscore and euronorm). The measurement of this impact will be measured on measure level. The results will be used to draw conclusions on IP level.

- Decrease in emissions

The same reason as for the decrease in energy consumption and cleanliness of the car fleet is used here. The degree of emissions of this measure will be deducted out of the energy consumption and the cleanliness of the vehicle fleet.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is hard to distinguish. The air quality will be modelled on city level to have an understanding of the general trend of the air quality within the city of Gent.

Selected Indicators for the measure 1.9 semi-public clean car fleet

Below an overview is given of all the evaluation activities for the measure 1.9-GEN Semi-public clean car fleet.

Table 7: Evaluation activities and indicators for measure 1.9 Semi-public clean car fleet

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.9-GEN Semi-public clean car fleet	▪ Measurement of: - Ecoscore of vehicles - Euronorm of vehicles - PM10, NO2 and CO2 emissions of vehicles - Fuel consumption per vehicle - Fleet composition ▪ Up- scaling	▪ Improvement of ecoscore and euronorm of the Cambio fleet in Gent and MaxMobiel ▪ Decrease of PM10, NO2 and CO2 emissions ▪ Evolution of fuel mix ▪ Decrease of fuel consumption of Cambio fleet in Gent and MaxMobiel → Target group: Cambio and MaxMobiel fleet

Details of the evaluation activities

To analyse the decrease of the emissions, following indicators will be used

- Cambio and Max Mobiel Fleet composition and its fuel mix.
- PM10 and NO2 emissions will be extracted out of the other indicators as euronorm and ecoscore. (see literatures of euronorm and ecoscore).
- CO2 emissions will be calculated out of the fuel consumption following different formulas defined in different literature of CO2 emissions.
- Bio fuel: since biofuel is a new type of fuel, based on the literature, the PM10, NO2 and CO2 emissions will be calculated.
- Fuel consumption = fuel used /km driven
- The meaning of the following indicators are:

- Ecoscore: the ecoscore is a way to measure the cleanliness of a standard vehicle fleet based on some characteristics of the vehicle like type of engine, type of fuel, emissions, sound,… (www.ecoscore.be)
- Euronorm: the euronorm is a way to measure the cleanliness of all vehicles based on some characteristics of the vehicle like type of engine, emissions,… This euronorm gives insight in the emission of PM10 and CO2

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up-scaling

The impact on the emissions and fuel consumption will be modelled, assuming all cars of Cambio and Max Mobiel will be replaced into durable alternatives.

Expected possible impacts for the measure 1.10 Introduction of hybrid vehicles

The expected impacts are:

- Decrease in energy consumption

The decrease in energy consumption will be measured on measure level. The results will be used to draw conclusions on the IP level. Data on fuel consumption will be very precise which will lead to a very accurate impact calculation allowing to distillate the exact impact of this measure.

- Increased degree of cleanliness of the vehicle fleet

The degree of cleanliness of the public transport fleet can be measured based on some characteristics of the vehicles. This rather new technique allows easily compare the cleanliness of different public transport fleet based on one score rather then a complete set of figures (euronorm). The evaluation of the degree of cleanliness will be measured within each measure of the IP and then combined to draw conclusions on the IP level.

- Decrease in emissions

As the costs to measure the emissions of hybrid buses is higher than the budget available for CIVITAS evaluation, the degree of emissions will be deducted out of the energy consumption and the cleanliness of the hybrid buses.

- Improved air quality

The air quality will not be measured on measure level as the impact on the air quality is hard to distinguish. The impact of hybrid buses will be taken into account when evaluating the air quality on city level.

- Increased acceptance level by bus drivers

The acceptance / user friendliness of the hybrid bus by bus drivers will be measured on measure level. This will be done by interviewing the bus drivers.

Selected Indicators for the measure 1.10 introduction of hybrid vehicles

Below an overview is given of all the evaluation activities and indicators for the measure 1.10 Introduction of hybrid vehicles

Table 8: Evaluation activities and indicators for measure 1.10 Introduction of hybrid vehicles

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.10-GEN Introduction of hybrid vehicles	▪ Measurement of: - Euronorm of vehicles - PM10, NO2 and CO2 emissions of vehicles - Fuel consumption per vehicle type (of all city buses) - Record of fuel used of city buses (for CBA) - Fleet composition ▪ Survey on: - user friendliness of the hybrid bus by bus drivers ▪ BUA ▪ Up- scaling	▪ User friendliness level of hybrid bus by bus drivers ▪ Increase of the euronorm of the city buses ▪ Decrease of PM10, NO2 and CO2 emissions as a result of this measure ▪ Decrease of fuel consumption → Target group: Public transport fleet

Details of the evaluation activities

To analyse the decrease of the emissions, following indicators will be used

- Public Transport fleet composition and its fuel mix.
- PM10 and NO2 emissions will be extracted out of the other indicators as euronorm (see literatures of euronorm).
- CO2 emissions will be calculated out of the fuel consumption following different formulas defined in different literature of CO2 emissions.
- Fuel consumption = fuel used /km driven

The meaning of the following indicators are:

- Euronorm: the euronorm is a way to measure the cleanliness of all vehicles based on some characteristics of the vehicle like type of engine, emissions,… This euronorm gives insight in the emission of PM10 and CO2

Details for Business as usual and up- scaling

- BAU

A replacement of a depreciated old city bus to a newer one will have impact on the fuel consumption and emission anyway. An innovative task of this measure is to replace some buses to a hybrid one.

In the business as usual scenario the decrease of fuel consumption and emissions by a standard replacement of depreciated old city bus will be taken into account when measuring the effective impact on the decrease of fuel consumption and emissions of this measure.

- Up- scaling

The impact on the emissions and fuel consumption will be modeled, assuming all city buses will be replaced into hybrid buses.

Expected possible impacts for the measure 1.13 clean public transport strategies

The expected impacts are:

- Decrease in energy consumption

The decrease in energy consumption will be measured on measure level. The results will be used to draw conclusions on the IP level. Data on fuel consumption will be very precise which will lead to a very accurate impact calculation allowing to distillate the exact impact of this measure.

- Increased degree of cleanliness of the vehicle fleet

The degree of cleanliness of the public transport fleet can be measured based on some characteristics of the vehicles. This rather new technique allows easily compare the cleanliness of the public transport fleet based on one score rather then a complete set of figures (euronorm). The evaluation of the degree of cleanliness will be measured within each measure of the IP and then combined to draw conclusions on the IP level.

- Decrease in emissions

As the costs to measure the emissions of hydrogen buses is higher than the budget available for CIVITAS evaluation, the degree of emissions will be deducted out of the energy consumption and the cleanliness of the hybrid buses.

- Improved air quality

The air quality will not be measured on measure level as the impact on the air quality is hard to distinguish. The impact of hybrid buses will be taken into account when evaluating the air quality on city level.

- Increased acceptance level by bus drivers

The acceptance / user friendliness of the hydrogen bus by bus drivers will be measured on measure level. This will be done by interviewing the bus drivers.

Selected Indicators for the measure 1.13 clean public transport strategies

Below an overview is given of all the evaluation activities for the measure 1.13 clean public transport strategies

Table 9: Evaluation activities and indicators for measure 1.10 Introduction of hybrid vehicles

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.13-GEN Clean public transport strategies (B30 & emission control)	▪ Measurement of: - Euronorm of vehicles - PM10, NO2 and CO2 emissions of vehicles - Nr of km driven per vehicle - Record of fuel used per vehicle - Public transport fleet composition ▪ Survey on: - user friendliness of the hydrogen bus by bus drivers ▪ BAU ▪ Up- scaling	▪ User friendliness level of hydrogen bus by bus drivers ▪ Improvement of euronorm of the city buses and trams ▪ Decrease of PM10, NO2 and CO2 emissions ▪ Evolution of fuel mix ▪ Decrease of fuel consumption → Target group : Public transport fleet

Details of the evaluation activities

To analyse the decrease of the emissions, following indicators will be used

- Public Transport fleet composition and its fuel mix.
- PM10 and NO2 emissions will be extracted out of the other indicators as euronorm (see literatures of euronorm).
- CO2 emissions will be calculated out of the fuel consumption following different formulas defined in different literature of CO2 emissions.
- Fuel consumption = fuel used /km driven

The meaning of the following indicators are:

- Euronorm: the euronorm is a way to measure the cleanliness of all vehicles based on some characteristics of the vehicle like type of engine, emissions,… This euronorm gives insight in the emission of PM10 and CO2

Details for Business as usual and up-scaling

- BAU

A replacement of a depreciated old city bus to a newer one will have impact on the fuel consumption and emission anyway. An innovative task of this measure is to replace some buses to a hybrid one.

In the business as usual scenario the decrease of fuel consumption and emissions by a standard replacement of depreciated old city bus will be taken into account when measuring the effective impact on the decrease of fuel consumption and emissions of this measure.

- Up- scaling

The impact on the emissions and fuel consumption will be modelled, assuming all city buses will be replaced into hydrogen buses.

C CBA

For the measure 1.2-GEN Energy efficient city fleet management an CBA will be carried out. The following table shows the CBA indicators selected for tis purpose.

Table 10: Overview indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
City Fleet operator	Investment costs car fleet Maintenance costs car fleet Operating costs	Fuel consumption reduction
Households		Reduced emissions

5.1.1.3. Data collection

The table below represents all the data collection activities for IP 1 Promoting and enhancing the use of clean vehicles, which will be carried out in the city of Gent during the project life cycle.

Table 11: Data collection inventory for the city of GENT for IP 1 Promoting and enhancing the use of clean vehicles

INDICATOR	LEVEL10	FOCUS [11]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Inventory ecoscore per vehicle	IP	F	Quarterly	recording	ecoscore	Standard vehicle fleet	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent, MaxMobiel and Cambio
Inventory euronorm per vehicle	IP	F	Quarterly	recording	euronorm	Vehicle fleet	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent, De Lijn, MaxMobiel and Cambio
Driven km per vehicle	IP	F	Quarterly	recording	km	Vehicle fleet	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent, De Lijn, MaxMobiel and Cambio

[10] M= Measure level

IP= Integrated Package Level

[11] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL10	FOCUS [11]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Fuel used per vehicle	IP	F	Quarterly	recording	l	Vehicle fleet	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent, De Lijn, MaxMobiel and Cambio
Market prices fuels	M	F	continious	Recording market prices	€	Costs	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent
Operational costs	M	F	yearly	Recording costs	€	costs	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent
Investment costs	M	F	yearly	Recording costs	€	costs	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent
Maintenance costs	M	F	yearly	Recording costs	€	costs	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent
Fleet composition	IP	F	yearly	Recording fleet	Vehicle type (hybrid car, hybrid bus, car, bus, freight, electric car…)	fleet	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent, De Lijn, MaxMobiel and Cambio

INDICATOR	LEVEL10	FOCUS [11]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
eco-driving trainees and the number plate of their vehicle	M		Before/after	Recording trainees	trainees	Target group (selected group of drivers)	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent, Cambio/ MaxMobiel
Fuel consumption (km driven and fuel use) of eco-driving trainees	M		Before/after	Recording use	l/100 km	Vehicles of ecodriving trainees	During course and 6 months after	City of Gent, Cambio/ MaxMobiel
User friendliness of hybrid buses by drivers	M		after	workshop	Bus drivers	Bus drivers	June 2009 (intro) + after a set of new training course	De Lijn
User friendliness of hydrogen buses by drivers	M		after	workshop	Bus drivers	Bus drivers	March 2010 (intro) + after a set of new training course	De Lijn
User acceptance of ecodriving techniques	M		after	Questionnaire (mail)	Ecodriving trainees	Target group (selected group of drivers)	after training courses	City of Gent
User acceptance of reservation tool for shared cars	M		after	workshop	stakeholders	Stakeholders involved in this	Jan 2012	City of Gent

INDICATOR	LEVEL10	FOCUS [11]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
						measure		
Amount of shared cars	M		Quarterly	recording	Shared cars	Shared cars	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent
amount of shared car users	M		Quarterly	recording	drivers	Target group of city of Gent	Jan 2009 Jan 2010 Jan 2011 Jan 2012	City of Gent

Details on the data collection

The measure leader will collect all operational data and do surveys with help from the SEM.

For collecting data as euronorm, ecoscore, fuel used, km driven, type fuel,… per vehicle, the SEM will develop an input database for all measure leaders involved in the IP 1 Promoting and enhancing the use of clean vehicles. The development will be based on the existing database of the City of Gent.

- User acceptance survey of ecodriving techniques:
  - Target group: all trainees following ecodriving courses
  - The questionnaire will be sent by mail, at least 1 week after the training course
- User friendliness survey reservation tool of shared cars
  - Target group: stakeholders
  - Workshop/interview will be organised by the SEM with TRITEL. The workshop will be integrated in the focussed measure process evaluation workshop.
- User friendliness survey of hybrid buses and hydrogen buses by bus drivers
  - Target group: hybrid bus drivers
  - Workshop/interview will be organised by the SEM with TRITEL in January 2009 and after a set of new training courses

5.1.2. Integrated package 2: Mobility management as a tool for changing mobility behaviour

5.1.2.1. Description

A Objectives and scope

IP objectives

The measures within this integrated package have the aim to improve the citizen's awareness of their own contribution towards a sustainable and liveable city. This leads towards the change of their mobility behaviour. Citizen's engagement will help to reach this goal.

Measure related objectives

- 2.9-GEN Participatory re-development of main train station area
  - Raise public awareness and support for the major construction works (redevelopment of the Kortrijksesteenweg; new train station, new terminals for public transport, 10.000 new bicycle sheds, underground parking for 2810 cars etc.) through public communication channels/ Forum;
  - develop an information centre to promote and inform the main projects (new public transport hub and Kortrijksesteenweg);
  - Change the mobility behaviour in the area of the CIVITAS-ELAN-corridor.
  - Implement innovative communication tools such as a 3D digital model.
- 4.2-GEN Mobility management for companies

  In the ELAN-corridor a lot of businesses are situated. Gent City Council wants to coordinate the company mobility plans and stimulate sustainable traffic modes. By producing company mobility plans tailored to each business the measure aims at:
  - Creating overall awareness concerning "Sustainable Mobility".
  - Convince companies to act upon the proposed actions described in the Mobility Plan made by the GCC.
  - Lessening the dependency on car especially at peak periods.
  - Fostering a climate that is receptive to alternatives to the car.
- 4.3-GEN Mobility management for schools

  The objective of this measure is to implement school travel plans (STP) for all the secondary schools situated in the ELAN-corridor corridor and on basis of the experience to extend the measure to as much secondary schools as possible.
- 4.10-GEN Comprehensive mobility dialogue and marketing campaign
  - To provide individuals with one-to-one travel advice, practical support and to market sustainable travel modes to target groups in order to achieve modal shift.

  The aim of this measure is to:
  - Increase the use of alternative transport modes.
  - Decrease car use.
  - Increase public health by increasing cycling and walking.

- 6.2-GEN Innovative car sharing
  - Car sharing shall expand to new target groups and explore the field of new promotion and communication channels.
  - The objective is to achieve a change in mobility behaviour:
  - Fewer cars for mobility needs required.
  - Higher efficiency of infrastructure use.
  - Use of less polluting and of more energy-efficient cars.
- 6.3-GEN Holistic event management

  The operational focus of this measure is:
  - Implementation of a holistic event management system;

  The objective of this measure is to:
  - Increase accessibility in case of planned events;
  - Provide alternative modes for transport to and from planned events;
  - Decrease the use of private cars to and from the event.

B Overview of the measures

- 2.9-GEN Participatory re-development of main train station area

The whole area around the main train station will be redeveloped including the CIVITAS-ELAN-corridor. The redevelopment started in 2006 and will be finished in 2016. The redevelopment will have a massive impact on the area in terms of noise and dust nuisance, traffic rerouting and accessibility.

A second project concerns the redevelopment of the Kortrijksesteenweg, a part of the CIVITAS-ELAN-corridor as well as the train station. The whole axe between the train station and the ring road R40 will be rebuilt from facade to facade. The axe also includes the tram tracks of tramline 1, which connects the train station to the city centre.

Public use of the area around the main train station and the CIVITAS-ELAN-corridor is extremely intense. 43.000 commuters per working day take a train departing from Gent. This number will increase up to 60.000 per day. During every working phase, the exploitation of public transport and train station is guaranteed.

The immediate area of the train station hosts 8000 families (dense population), 16 schools (and high schools), as well as 500 retailers and enterprises.

There is a vast need of information and dialogue (about mobility objectives and about hindrance and accessibility) with the inhabitants, schools, retailers, unions of public transport users, cyclists, pedestrians, administration, planners, public and private transport organisations, companies, etc.

- 4.2-GEN Mobility management for companies

Step by step, all larger companies in the corridor and adjoining areas will be contacted. They receive a proposition of the City council to cooperate in the implementation of a company mobility plan.

Once the agreement is determined, the City council and the company will cooperate to realise the next steps:

- Analyse current mobility characteristics of the company (nearest bus or tram stop, accessibility, parking spaces…)
- Analyse current mobility behaviour of employees (transport mode, distance work-home, etc.)
- Draft list of possible solutions/ proposed actions a company can take.
- The final company mobility plan will include main problems and solutions on specific transport issues for the company.

- 4.3-GEN Mobility management for schools

Since 2002 the Gent City Council supports schools in making a school travel plan in the framework of 'safe school environments'. There are mostly primary schools that have school travel plans. With this measure, the objective is to implement school mobility plans in secondary schools.

A school travel plan (STP) is a document produced by a school in conjunction with the Gent City Council. It encompasses all the issues relevant to journeys to and from the school and includes concerns about safety and health, and proposals for ways to make improvements. It is a means to bring together the ideas and contributions of different groups of people, to help to solve problems. The main elements will be common to all STPs but each plan is unique because it is produced and owned by a particular school, and addresses that school's needs.

- 4.10-GEN Comprehensive mobility dialogue and marketing campaign

The individual marketing campaign will target all the inhabitants of the ELAN-corridor by providing individuals with one-to-one travel advice, practical support and to market sustainable travel modes.

The scheme works by contacting people in their households and aims to quickly identify those who are likely to change their travel behaviour and then provide information about the availability of public transport, bicycle and walking routes in their neighbourhood. A follow-up action to enable changes in travel patterns will be done.

- 6.2-GEN Innovative car sharing

Car sharing in Gent has nine car sharing stations, with 26 cars available. There are mainly private users, utilising the system mainly in the evening and during weekends. There is no special marketing towards businesses. At the same time, experiences in the past (and up to now) have shown that car sharing still is a new concept, which is rather difficult to introduce to people in a car-oriented society. Therefore, Cambio aims to launch some experimental initiatives based on the common knowledge of car sharing experts that mouth-to-mouth communication is still the best promotion channel for this concept. Client-ambassadors, Cambio home parties after installing a new car sharing station within the project corridor or other possible marketing strategies might pass the scene in order for Cambio to see which the most effective way is to reinforce the growth curve of car sharing in Gent and especially in the targeted corridor of this project. Next to the production of new communication tools, Cambio will install a locker system at one of the 2 Cambio stations within the corridor.

- 6.3-GEN Holistic event management

The City of Gent has no experience with event management tools and will first make a concept study on the approach for the implementation of an event management system.

Additionally, an Internet-based tool will be built to manage all the information on upcoming events and to organise holistic event management. Once the event management tool is online the mobility will be organised in a more efficient way in case of a planned event and major roadwork.

C Innovative aspects

- 2.9-GEN Participatory re-development of main train station area

All involved parties (stakeholders) who participate in the construction works around the station and in the CIVITAS-ELAN-corridor collaborate in the communication (financially and with outsourced personnel). All parties subscribe the objective of participative communication (with inhabitants, commuters, schools, unions of public transport users, cyclists, pedestrians, disabled persons, retailers, administrations, planners, public and private transport organisations, companies, etc …). All involved parties will have a voice in the participative fora.

Innovative is also the use of a digital 3D scale model showing the future situation in the area, as a participative communication tool. All participants in the communication process will thus be able to process the accessibility and efficiency in modal split (modes of public and other transport before taking the train).

- 4.2-GEN Mobility management for companies

The development of travel and mobility plans for companies located in the corridor, alongside a strong public transport line, is innovative in Gent.

Mobility plans will also be developed for companies, situated in areas that do not entirely fit the description of the corridor, but where a strong expansion of activity will take place (in the nearby future). Therefore, we can also assign these areas to the term “innovative aspects”.

- 4.3-GEN Mobility management for schools

The innovative aspect of this measure is the concentration of the implementation of school travel plans in one zone (ELAN-corridor) in the city and its extension to all the secondary schools. By this action, barriers evolving in several school travel plans could be tackled in a more efficient way.

Traffic training for secondary schools will be totally new, until today only primary schoolgirls and schoolboys receive traffic training in Gent.

- 4.10-GEN Comprehensive mobility dialogue and marketing campaign

The individual marketing campaign will target all the inhabitants of the ELAN-corridor. Also many other inhabitants of the city will receive personalised information. The final element in the marketing campaign is personalised information communication to help people choose sustainable modes of transport.

- 6.2-GEN Innovative car sharing

During this project phase, Cambio will especially target new user groups as e.g. business users grouped within one building site, inhabitants of new housing areas, etc. While doing so, there will also be experiments with new communication and promotion channels in order to get more people involved in this energy-efficient system and to achieve a bigger change in mobility behaviour. This will happen in combination with measure GEN 5.2. (Alternative fuel in semi public transport), the expected outcome should be reinforced. There will also be experiments with a new locker system, which should make it possible to use less Cambio cars in order to fulfill existing mobility needs of the car sharing users.

- 6.3-GEN Holistic event management

The innovative aspect of this measure is the integrated approach towards the accessibility in case of planned events. The term “integrated” has a dual meaning:

- Every mode of transport will be an aspect of this tool,
- All the available information from all partners concerning mobility before/during/after an event will be gathered in one place, so that users of the tool will be able to consult all the information in just one second.

D Research and technical development

- 2.9-GEN Participatory re-development of main train station area

In order to get public support for the two projects the stakeholders invest in an extended project communication policy.

One communication channel will be organised by means of an information centre. In this centre, information will be available on the main reconstruction projects as well as on the CIVITAS initiative. Visibility and architectural quality of the newly constructed information centre is high. Not only will there be communicated receptively. Regularly, easy-process able information will be (pro-actively) provided to the involved publics and groups, by means of information letters, printed communication products (periodicals), website, audio-visual products, and press releases.

A major innovative tool of communication is the digital 3D model, implemented within the information centre and in an internet environment.

Rigid individual follow up of FAQ’s is planned.

A policy of reduced hindrance will be developed, through weekly meetings with all stakeholders, on the daily impact of the construction works. Every complaint of inhabitants, public transport users, or other involved persons will be registered and answered with extra measures.

One of the main parts of the participative communication system includes periodically organized public fora, where the each of the involved parties (public transport companies De Lijn and NMBS, the city, etc.) will contributes. These fora will take place at least every month to give actual information on and discuss the projects with all involved parties. By this means, the whole redevelopment process will be improved by creating a very strong participation of citizens and stakeholders. This communication will take place at all stages of the implementation of the two projects.

- 4.2-GEN Mobility management for companies

First all larger companies in the corridor and adjoining areas will be contacted. They receive a proposition of the City council to cooperate in the implementation of a company mobility plan.

- 4.3-GEN Mobility management for schools

In the planning stage, the schools will be listed, contacted and informed about the school travel plans. Also a schedule for the implementation of a school travel plan will be drafted.

- 4.10-GEN Comprehensive mobility dialogue and marketing campaign

At first the whole communication campaign has to be worked out:

- Which message will be communicated?
- Which information will be included in the campaign at which phase?
- Decide on detailed timing.
- Decide on layout.

Secondly the personal visits have to be prepared: timing, expected duration per visit, communication schedule, etc.

- 6.2-GEN Innovative car sharing

For the four items mentioned above, marketing and communication strategies should be worked out and/or tailor-made product specifications should be developed:

- Introducing car sharing towards business clients.
- Introducing car sharing in new housing areas.
- Exploring new ways of promoting car sharing.
- Implementing a test with a locker system.

Depending on the developed strategies it will be necessary to get in touch with third parties such as building promoters, city administration etc.

As for the business market, existing business clients will be contacted in order to see what should be done in order to make the concept more attractive for business users.

- 6.3-GEN Holistic event management

The City of Gent has no experience with event management tools and will first make a concept study on the approach for the implementation of an event management system.

After the concept study, the event management tool will be worked out more in detail. Additionally, an Internet-based tool will be built to manage all the information on upcoming events and to organise holistic event management.

E Situation before CIVITAS

- 2.9-GEN Participatory re-development of main train station area

Currently the communication on the major roadwork in the city is a task of the constructor. Often the information provided is very poor, out of date and late. Also, communication is not combined in case of coinciding types of roadwork at the same time at close distance from one another.

- 4.2-GEN Mobility management for companies

Mobility plans are produced by a variety of organisations sometimes associated with the planning approval process.

Mobility plans are produced ad hoc. Very little travel plans are combined to organise common alternatives for home-work transportation.

- 4.3-GEN Mobility management for schools

Since 2002 Gent City Council supports schools in making a school travel plan in the framework of 'safe school environments'. Each year some 10 schools are developing and implementing a school travel plan. Mostly primary schools have school travel plans. Currently secondary schools hardly have school travel plans.

- 4.10-GEN Comprehensive mobility dialogue and marketing campaign

Today, inhabitants of Gent have access to information on mobility on different locations (website, information points, etc.) and from different operators (City, public transport operator De Lijn, etc.). The information is widely spread, but sometimes hard to find for elderly or people who do not have access to Internet.

- 6.2-GEN Innovative car sharing

Car sharing in Gent has nine car sharing stations with 26 cars available. There are mainly private users, utilising the system in the evening and during weekends. There is no special marketing towards businesses. At the same time experiences in the past (and up to now) have shown that car sharing still is a new concept, which is rather difficult to introduce to people in a car-oriented society. Therefore, Cambio aims to launch some experimental initiatives based on the common knowledge of car sharing experts that mouth-to-mouth communication is still the best promotion channel for this concept. Client-ambassadors, Cambio home parties or other possible marketing strategies might pass the scene in order for Cambio to see which way the most effective is to reinforce the growth curve of car sharing in Gent and especially in the targeted corridor of this project.

- 6.3-GEN Holistic event management

Traffic incidents, major road works, planned special events, and other types of non-recurring events generally result in congestion and delays that travelers are not expecting. These delays are unlike congestion caused by routine traffic during daily peak travel periods. More than half of all congestion that motorists encounter is non-recurring. The frequency and severity of the impacts resulting from these disruptions are increasing significantly in both metropolitan and rural areas. To advance or improve current practices new local initiatives are requires that focus on improving the planning, coordination, and traffic management for all planned special events in a region, or for specific events.

Planned special events have the potential to affect not only the people traveling to the event, using the adjoining roadway network, or people providing services in support of the event, but also the normal traffic using the adjoining roadways. Transportation users who may be affected include the general public, public transport (e.g. regional, local, or specialized services), and other service providers such as law enforcement, medical units, or fire responders.

Today, traffic problems caused by events in Gent are mainly dealt with by the traffic police and in specific cases by the public transport operator De Lijn. Citizens are most of the time informed of the event and the nuisance it might bring in terms of traffic jams, parking problems, accessibility of roads. However, usually no accompanying measures are set up.

Only for really big planned events (Gentse feesten, pop concerts) De Lijn provides extra buses to and from the train stations and suburbs and to and from existing and one-time P&R. Today, limiting nui-

sance and improving accessibility is mainly done at an ad hoc basis. The different kinds of measures are organised by the responsible (De Lijn, the City…). So whether a measure is implemented or not depends on the responsible operator.

F Inter-relationships with other measures

The measures of this integrated package have the aim to improve the citizen's awareness of their own contribution towards a sustainable and liveable city. This leads towards the change of their mobility behaviour.

The measure 2.9 Participatory re-development of main train station area has also a direct link with measure 2.2 improved public transport service levels, since the communication of the reconstruction projects in the neighbourhood of the main train station will be coordinated by the same measure leader.

The measure 4.3 Mobility management for schools has the same target group as the measure 5.7 security enforcement in PT namely the youth.

5.1.2.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts for the IP 2 Mobility management as a tool for changing mobility behaviour

The expected impacts are:

- Modal shift towards more durable transport modes

The modal shift towards more durable transport modes of different target groups will be measured on integrated package level. To have a good overview of the modal shift of different target groups, it is required to do the evaluation on IP level.

- Improvement of awareness of these mobility management programs which leads to changed mobility behaviour.

The survey on changing mobility behaviour, by analyzing the awareness of the mobility management programs, will be measured on integrated package level. To have a good overview of the awareness within different target groups, it is required to do the evaluation on integrated package level. This survey will be done together with the modal split survey.

- Increased response rate

The response rate on the mobility management programs will be measured on measure level and then combined to draw conclusions on the IP level. Each measure leader has to keep detailed track of the response rates within each target group. The response rate gives also an indication of the increased awareness.

- Less cars in city centre

The reduction of cars will not be measured as the impact of this measure cannot be distinguished. The decreased number of cars will be indirectly measured from the modal shift towards more durable transport modes of the different target groups.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is not measurable. The consequence of the impact of the measures in this integrated package as modal shift will be taken into account when modeling the air quality on city level.

- Increased public health

The increased public health will not be measured on integrated package level as the impact for this set of measures separately on the public health is hard to distinguish. Although on measure level (4.10-GEN) detailed analysis on health improvement will be done.

Selected indicators for the IP 2 Mobility management as a tool for changing mobility behaviour

In the table below an overview is given of all the evaluation activities and indicators for the IP 2 Mobility management as a tool for changing mobility behaviour

Table 12: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 2: MOBILITY MANAGEMENT AS A TOOL FOR CHANGING MOBILITY BEHAVIOUR	▪ Evaluation directly on IP level: - Survey on modal shift of target groups - Survey on awareness of these mobility management programs ▪ Combining the results of different measures to come to conclusions on IP level: - Inventory of the response rate of target groups	▪ Evolution of modal shift towards sustainable transport modes of target groups ▪ Evolution of the awareness level ▪ Increased response rate of target groups → Scope: ELAN- corridor

Details of the evaluation activities

A modal shift towards more sustainable travel modes is expected by the efforts of this IP. The modal shift reflects the share of users that has changed its travel choice from individual car use towards a more sustainable mode choice as PT, cycling, walking or even car sharing.

This shift will be measured in the following target groups:

- Employees of companies involved in the measure 4.2 Mobility management for companies
- Students of secondary schools involved in the measure 4.3 Mobility management for schools
- Several smaller target groups involved in the measure 4.10 Comprehensive mobility dialogue and marketing campaign as citizens living in focussed streets, volunteers,…

The second method used for measuring the effectiveness of mobility management programs is analysing the response rate and the awareness level of these programs.

A comparison between the modal shift and the response rate and awareness level can give an indication of its effectiveness and exclude the influence of external factors that might have an effect on the modal split data. It is some kind of sensitivity test to extract the results from this IP from other influences that might be noticed in the modal shift data.

B Evaluation activities and indicators on measure level

Expected possible impacts for the measure 2.9 Participatory re-development of main train station area

The expected impacts are:

- Raise public awareness and support for the major construction works in and around the main train station

The evaluation of this measure will be done on IP level. As the measure 2.9 is selected as a focus measure, a more detailed analysis is planned on awareness level of the redevelopment of main train station and surroundings. The detailed analysis will focus on the impact of the citizen's engagement strategy on the awareness level.

- Change the mobility behaviour in the area of the CIVITAS-ELAN-corridor.

The change of the mobility behaviour will not be measured on measure level as the impact is hard to distinguish.

- Increased response rate

The response rate on the mobility management programs will be measured within each measure of the IP and then combined to draw conclusions on the IP level. It is fairly easy to keep detailed track of the response rate.

Selected indicators for the measure 2.9 Participatory re-development of main train station area

In the table below an overview is given of all the evaluation activities

Table 13: Evaluation activities and indicators for measure 2.9 Participatory re-development of main train station area

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
2.9-GEN Participatory re-development of main train station area	Detailed analysis on the awareness level	Increased awareness level → Target group: citizens living in area around the main train station; commuters; students and trades

Details of the evaluation activities

On measure level a detailed analysis on the awareness level is planned next to the general analysis on IP level.

On measure level the evaluation will be focussed on the increase of the awareness level of the redevelopment of the main train station area due to the success of the citizen's engagement strategies.

This evaluation task is planned on demand of the measure leader and the dissemination manager. The advance of this extra evaluation task on measure level is that the impact of the citizen's engagement shall be evaluated.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

Expected possible impacts for the measure 4.2 Mobility management for companies

The expected impacts are:

- Modal shift towards more durable transport modes

The modal shift towards more durable transport modes of employees of a selected group of companies within the corridor will be measured.

- Improvement of awareness of this mobility management program which leads to changed mobility behaviour

The survey on awareness of the mobility management for companies will be measured on integrated package level.

- Increased response rate

The response rate for the target group companies will be measured on measure level. The results will be used on IP level to draw conclusions on this level.

- Less cars

The reduction of cars will not be measured as the impact of this measure cannot be measured. The decreased car will be indirectly measured from the modal shift towards more durable transport modes of the different target groups.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is hard to distinguish. The impact of this measure will be taken into account when modeling the air quality on city level.

- Increased public health

The increased public health will not be measured on measure level. It will be too hard to follow up the health of employees – specialized evaluation tools for this purpose are not available at the city of Gent.

Selected indicators for the measure 4.2 Mobility management for companies

In the table below an overview is given of all the evaluation activities

Table 14: Evaluation activities and indicators for measure 4.2 Mobility management for companies

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.2 -GEN Mobility management for companies	▪ Measurement of: - Response rate of companies ▪ Up- scaling	▪ Response rate of companies → Target group: selected group of employees of companies within the corridor

Details of the evaluation activities

As in all the other measures of this IP the response rate will be measured. For this measure the response rate will be measured for the companies as this is the target group of this measure.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Upscaling analysis of the modal shift will be done towards all business companies in Gent (except harbour), based on the result of this measure.

Expected possible impacts for the measure 4.3 Mobility management for schools

The expected impacts are:

- Modal shift towards more durable transport modes

The modal shift towards more durable transport modes of students of selected secondary schools in the corridor will be measured on integrated package level.

- Increased of awareness of this mobility management program which leads to changed mobility behaviour

The survey on awareness of the mobility management for school programs will be measured on integrated package level.

- Increased response rate

The response rate of this mobility management program will be measured on measure level. The result will be used on IP level to draw conclusions on IP level.

- Less cars in corridor

The reduction of car will not be measured on measure level as the impact of this measure cannot be measured. The decreased car will be indirectly measured from the modal shift towards more durable transport modes of the different target groups.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is hard to distinguish. Although the air quality will be measured on city level to follow the general trend of the air quality within the city of Gent.

- Increased public health

The increased public health will not be measured on measure level. It will be too hard to follow up the health of students because specialized evaluation tools are not available at the city of Gent.

Selected indicators for the measure 4.3 Mobility management for schools

In the table below an overview is given of all the evaluation activities

Table 15: Evaluation activities and indicators for measure 4.3 Mobility management for schools

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.3-GEN Mobility management for schools	▪ Measurement of - Response rate	▪ Response rate → Target group: secondary schools

Details of the evaluation activities

As in all the other measures of this IP the response rate will be collected. For this measure the response rate will be measured for the secondary schools, as the target group of this measure.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

Expected possible impacts for the measure 4.10 comprehensive mobility dialogue and marketing campaign

The expected impacts are:

- Modal shift towards more durable transport modes

The modal shift towards more durable transport modes of different target groups, as e.g. citizens living in selected streets where active campaigns are planned, will be measured on integrated package level.

- Improvement of awareness of this mobility management program which leads to changed mobility behaviour

The survey on awareness of the mobility management program will be measured on integrated package level.

- Increased response rate

The response rate on the several mobility marketing campaigns will be measured on measure level. The results will be used on IP level to draw conclusions on IP level. The reason is that it is easy to keep detailed track of the response which is also an indicator of the increased awareness.

- Less cars in corridor

The reduction of car will not be measured on measure level as the impact of this measure cannot be measured. The decreased car will be indirectly measured from the modal shift towards more durable transport modes of the different target groups.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is hard to distinguish. The impact of this measure will be taken into account when modeling the air quality on city level.

- Increased public health

To evaluate the increase of health, specialists (doctors…) will be asked to follow up a group of volunteers.

Selected indicators for the measure 4.10 comprehensive mobility dialogue and marketing campaign

In the table below an overview is given of all the evaluation activities and indicators for the measure 4.10 comprehensive mobility dialogue and marketing campaign.

Table 16: Evaluation activities and indicators for measure 4.10 Comprehensive mobility dialogue and marketing campaign

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.10-GEN Comprehensive mobility dialogue and marketing campaign	▪ Response rate ▪ Follow up of health of group of volunteers	▪ Response rate ▪ Increase of health due to change in mobility behaviour → Target group: citizens (different target groups – eg. Citizens livening in selected

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
		streets; citizens who wants to improve their health,…)

Details of the evaluation activities

As in all the other measures of this IP the response rate will be collected. For this measure the response rate will be measured for the citizens, as the target groups of this measure.

To measure the health of a group of volunteers certainly following indicators will be measured:

- Weight
- Blood pressure

As till now this campaign isn't worked out in detail and no doctors or health care institutions are contacted yet, it is not possible to define the evaluation task in detail.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

Expected possible impacts for the measure 6.2 innovative car sharing

The expected impacts are:

- Improvement of awareness of this innovative car sharing program which leads to changed mobility behaviour

The survey on awareness of this innovative car sharing program will be measured on integrated package level.

- Increased use of Cambio

Since plenty of actions will be done to convince companies using Cambio, the evolution of business users will be measured. Since the impact of this measure to the evolution of (new) citizens using Cambio is hard to distinguish, the impact on this target group will not be measured.

- Less cars in corridor

The reduction of car use will not be measured on measure level as the impact of this measure cannot be measured. The decreased car use will be indirectly measured from the modal shift towards more durable transport modes of the different target groups.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is hard to distinguish.

Selected indicators for the measure 6.2 innovative car sharing

In the table below an overview is given of all the evaluation activities and indicators for the measure 6.2 innovative car sharing

Table 17: Evaluation activities and indicators for measure 6.2 Innovative car sharing

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
6.2 -GEN Innovative car sharing	▪ Inventory new business users	▪ Increase of new business users of Cambio → Target group: citizens and companies in ELAN corridor

Details of the evaluation activities

Since plenty of actions will be done to convince companies using Cambio, the evolution of business users will be measured. Since the impact of this measure to the evolution of (new) citizens using Cambio is hard to distinguish, the impact on this target group will not be measured. This inventory is an indicator on the response rate of this measure.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

Expected possible impacts for the measure 6.3 holistic event management

The expected impacts are:

- Improvement of awareness of this holistic event management program which leads to changed mobility behaviour

The survey on awareness of this holistic event management program will be measured on integrated package level.

- High acceptance level of the tool

The survey on acceptance level of the tool will be measured by interviewing stakeholders.

- Less cars in corridor during events

The reduction of car use will not be measured on measure level as the impact of this measure cannot be measured.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure separately on the air quality is hard to distinguish.

Selected indicators for the measure 6.3 holistic event management

In the table below an overview is given of all the evaluation activities and indicators for the measure 6.3 holistic event management.

Table 18: Evaluation activities and indicators for measure 6.3 Holistic event management

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
6.3-GEN Holistic event management	▪ Survey and interview on acceptance level by stake-holders	▪ Acceptance level of holistic event management tool → Target group: Event organisa-tions and visitors

Details of the evaluation activities

Not applicable

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

C CBA

N/A

5.1.2.3. Data collection

The table below represents all the data collection activities that will be carried out for IP 2 Mobility management which leads to changing mobility behaviour, in the city of Gent during the project life cycle

Table 19: Data collection inventory for the city of GENT for IP 2 Mobility management which leads to changing mobility behaviour

INDICATOR	LEVEL[12]	FOCUS[13]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Awareness on changing mobility behaviour	IP		Before/ after	surveys	Schools/ companies/ citizens	Secondary schools/ selected group of companies and different target groups within the mobility campaign towards citizens in ELAN corridor	Start project at schools, companies or mobility campaigns and on the end of each school year (school) 2 years later (companies) or 3 months later (campaign)	City of Gent
Awareness on redevelopment of main train station area	M		Before/ after	surveys	Citizens, students, commuters, com-	Main train station area	Dec 2009	City of Gent

[12] M= Measure level

IP= Integrated Package Level

[13] The F refers wether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL[12]	FOCUS[13]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
					panies		Dec 2011	
Modal shift	IP		Before/ after	surveys	Schools, companies and citizens	Secondary schools, selected group of companies and different target groups of mobility campaigns in corridor	Start project at schools, companies or mobility campaigns and on the end of each school year (school) 2 years later (companies) or 3 months later (campaign)	City of Gent
Inventory of contacted target groups and their response	M/ IP		continuous	recording	Schools, companies and citizens	Secondary schools, selected group of companies and different target groups of mobility campaigns in corridor	Start project(s)	City of Gent
User acceptance by stakeholders	M		After	Interview/ workshop	stakeholders	stakeholders	2012	City of Gent

Details on the data collection

The measure leader will collect the number of contacted target groups (school, companies, citizens in streets, citizens around main train station corridor, citizens who wants to improve their health,…) and their response at each start of their communication strategy.

The content of the **survey on modal shift and awareness** will be defined by the University of Gent, in cooperation with the measure leaders and the site evaluation manager. The questionnaire will be distributed, if technical possible with use of the local CIVITAS website www.civitasgent.be , and collected by the measure leaders of different target groups and with help from the site evaluation manager:

The target group and sample sizes are:

- School (all students of school working with this project): ML of 4.3-GEN
- Companies (all employees of company): ML of 4.2-GEN and 6.2-GEN
- citizens (different target groups): ML of 4.10-GEN and 6.2-GEN
- organizations (all organizations having an address in Gent): ML 6.3-GEN

The survey is planned at:

- school: start project with school and at the end of the school year
- Companies: 4.2-GEN start each project with selected companies and 2 years later. Remark: the modal split information of employees of all companies with more than 100 employers will be gathered out of the Federal database “Diagnostic” which is updated each 3 years. The before data, used in this evaluation, are figures which are collected in 2008
- Companies: 6.2-GEN Dec 2009 and Dec 2011.
- Citizens (different target groups): start project with selected group of citizens and 3 months later.
- Organisations: Sept 2009 and Sept 2012.

The **survey on communication, participation and mobility awareness** in main train station area (2.9-GEN) will be done by the University of Gent, Economy Department.

4 different target groups will be contacted:

- citizens of main train station area (sample size will be based on address information)
- commuters (sample size will be based on total number of commuters counted at morning peak at entrances of main train station)
- companies (sample size based on total number of companies in main train station area)
- students of all schools include university campus in main train station area

The survey will be done by students of master on master at the end of 2009 and 2011.

The key stakeholders will be interviewed on their **acceptance level of the holistic event management tool.** This will be done after the implementation of the tool by the measure leader.

5.1.3. Integrated package 3: Adjust car & freight traffic by Traffic Management

5.1.3.1. Description

A Objectives and scope

IP objectives

The objective of the measures of this integrated package is to decrease car and freight nuisance by implementing sustainable traffic management.

Measure related objectives

- 2.4-GEN Intelligent Park&Ride enforcement
  - Enable the full use of P+R parking by PT users by decreasing the improper use of the (cheaper) P+R parking by fairground visitors;
  - Offer a complementary service to the public transport chain.
- 3.3-GEN Parking and public space management around main train station and ELAN corridor
  - The objective is to reduce the use of the private car in the ELAN corridor and especially within the area around the train station.
  - Through this measure, employees and residents will be supported and encouraged to use sustainable transport modes as carpooling, public transport, walking or cycling.
  - By reducing the number of trips by car, emissions and traffic will be limited.
- 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

  By access restriction with respect to the pedestrian area, the City of Gent wants to
  - Limit traffic in the pedestrian area;
  - Limit emissions in the pedestrian area;
  - Improve overall ambience and pedestrian safety in the area.
- 7.3-GEN Institutional platform for city freight management
  - The organisation of a discussion forum on city distribution transport with the distributors;
  - Searching for solutions for city goods distribution by discussing implementation of specific measures to limit the nuisance of the city distribution of goods.

  The discussion platform on sustainable goods delivery should result in to:
  - Set-up a range of systems to limit the nuisance of the distribution of goods. Focusing for example on time-arrangements, separating through traffic and distribution traffic, special rules in the pedestrian area, ...
  - More efficient delivery by investigating and implementation of certain measures as for example ‘collecting at the source’, ‘waterbased transport’, acknowledgement of ‘real’ city distributors, ...
- 8.6-GEN Sustainable multi-modal traffic management

  The sustainability-oriented multi-modal traffic management system aims at limiting the number of cars in the city centre, especially during peak hours. This will be done by providing information on upcoming events (roadwork), congestion warnings, Park+Ride recommendations, parking guidance and real-time traffic information. Through this mix of information and traffic guidance, the municipality seeks to decrease the number of kilometres driven in the area inside the city ring.

Provision of more and better information on the traffic situation and provision of re-routing advice will result in:

- More efficient use of the road network;
- Less congestion in PT corridors, hereby increasing the commercial speed of trams and buses;
- Increased use of P+R facilities;
- Less cars in the city centre.

B Overview of the measures

An overview of the measures in this IP with a short description.

- 2.4-GEN Intelligent Park&Ride enforcement

Today, the Flanders Expo site consists of a large exposition hall surrounded by approximately 5,000 parking spaces, a hotel and a small number of businesses. Tramline 1 also has its terminal stop at the site, so visitors can reach Flanders Expo by public transport. In the direction of the city centre, the tram links the P+R-parking at the Flanders Expo site with the main train station and the city centre. By car, the site is very well accessible, directly from the ring road R4 and the E17-E40 highway. From the CIVITAS-ELAN corridor (Kortrijksesteenweg), the site is accessible as well. In the near future, a large expansion of the Flanders Expo site is planned, with a total of 450,000 m² of floor space (office, retail, leisure, etc). Currently, there is no hard division between the P+R-parking and the parking for the fairground visitors. Fairground visitors often park at the P+R-parking (free of charge) for their visit to the expo halls. The fairground visitors should not use the P+R-parking because this will raise the number of parking places for fairground visitors in an unacceptable way, which would not support sustainable transport to and from the event halls. On the other hand, the P+R-parking should be kept available for P+R-users.

- 3.3-GEN Parking and public space management around main train station and ELAN corridor

The area around the main train station is densely built. Businesses as well as residential areas are located here. Car use in the area is quite high, so parking spaces are well used. Since the implementation of paid parking spaces, the pressure on parking availability has decreased somehow. Still, the availability for parking spots is rather low, especially for residents.

When planning new offices, project developers are asked to foresee a minimum number of parking places for the employees working in the new buildings. This is to avoid the increase of parking pressure in the neighbourhood. Next to parking limitation for businesses new criteria for residential parking will be set up. To reduce parking pressure car free housing concepts in the City of Gent will be worked out.

- 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

The City of Gent seeks to reduce the flow of vehicles passing through the pedestrian area, including motorised two-wheelers, and thus to improve the pedestrian amenity. The aim is to control the time, speed and type of vehicle that travels the pedestrian area, using a system of cameras to ensure an efficient enforcement.

- 7.3-GEN Institutional platform for city freight management

Today the distribution of goods in the city centre is limited to certain timeframes and to certain parking spaces. The problem with the parking spots is the abuse by other motorised vehicles. The good distributors park on the street once the dedicated parking spaces are taken. This causes traffic jams, dangerous situations for cyclists and pedestrians and nuisance for public transport.

A study in 2004 showed that a classic distribution centre in the city of Gent is not feasible. Therefore the problem has to be tackled implementing other measures. Firstly, discussion platforms will be organised. Secondly, these platforms should enable us to come to a feasible solution for the problem.

Within the CIVITAS-ELAN-project and this work package the first step is to set up a forum where goods distribution can be discussed by the city council and the stakeholders (distributors, shop own-

ers, etc.). Several subjects will be discussed with the distributors aiming at a practical task list on how to organise distribution in the city centre.

Another element in this measure is the control and enforcement of the existing dedicated parking spaces and the creation of extra dedicated parking spaces. A concept and design study will be carried out to decide on the location of these loading and unloading spots.

- 8.6-GEN Sustainable multi-modal traffic management

Today, the City of Gent has its own parking guidance system. It displays the up-to-date amounts of available parking spaces in ten different parking garages spread throughout the city centre. Even if the guidance system clearly offers alternatives to parking garages that are full, a reasonable amount of people will still queue in front of the parking entrances hoping to find a free parking space when they enter the building. This causes unnecessary congestion on the roads leading to these parking buildings resulting in significant delays for public transport. The city centre roads are clogged even more by motorists who hope to find a free parking spot on the street.

The sustainability-oriented multi-modal traffic management system will integrate VMS-signs for traffic information, traffic light management and the parking guidance system. In the long term, even real time traffic information (traffic difficulties caused by road works, accidents, events…) will be incorporated. Innovative in this measure is also the ramp metering[14], which will limit the number of cars entering the corridor when the city centre is congested.

C Innovative aspects

- 2.4-GEN Intelligent Park&Ride enforcement

The measure will offer a better distinction between fairground visitors and public transport users when entering the parking site by means of a clear separation of the two parking facilities.

- 3.3-GEN Parking and public space management around main train station and ELAN corridor

Instead of demanding a minimum number of parking places, the City of Gent will limit the maximum number of parking places for businesses around the train station and the ELAN corridor.

Developers and city planners will be advised to integrate car sharing and measures to support car free living in their planning tools and to use space more efficiently.

Use of private parking lots (parking lots owned by private companies, used by employees during work hours) for residential parking outside the usual working hours is absolutely new in Gent.

- 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

A new permit system will be developed for the pedestrian area. Permits will be issued by category (e.g. residents, deliveries of perishables, deliveries of non- perishable goods, postal services, etc.). Each vehicle holding a permit will be granted access to the pedestrian area a limited number of times (e.g. 5 fares / month). Any attempt to access the pedestrian area without a permit or any vehicle exceeding the number of allocated fares will result in a (financial) penalty. The number of times per month that a certain vehicle may enter the pedestrian area without penalty is dependent on the category the permit was issued to.

Cameras will record the movements of vehicles accessing the pedestrian area. Automatic number plate reading technology will be used to identify the passing vehicles. If the license plate matches a white list of vehicles with valid permits, then the recorded image will be erased, with no action being taken. Any vehicle that is not on the white list (i.e. a vehicle that does not have a permit or a vehicle that has used up all the access fares on its permit) will have its recorded images archived and a financial penalty will be imposed.

[14] This ramp metering is the same ramp metering system mentioned in Measure 6.2 “Improved public transport levels”.

This proposed access control system holds a major advantage: the possibility to control the actual amount of usage of the permits instead of merely trying to limit the number of permits issued.

By means of monitoring the time lapse between entry into and exit out of the pedestrian area, penalties can also be issued to drivers (with a permit, possibly with a high or even unlimited number of access fares, like residents) who try to use the area as a convenient shortcut to get to the other side of the city.

An important aspect to be noted here is the need to keep the access control system (permits, ANPR, enforcement) under municipal control and out of the traffic law the reason for this being that the national traffic law until now does not allow pedestrian areas to be enforced in a way as described above. An extensive information campaign will be necessary to raise awareness and acceptance of the measure.

- 7.3-GEN Institutional platform for city freight management

The City of Gent experienced a lot of resistance against policy-based solutions for the distribution of goods. As a result, the City of Gent decided to tackle the problem in another way, focussing on measures and initiatives, which are facilitating life for the distribution traffic: specific unloading spots, etc.

The installation of the discussion platform will result in pilot projects for goods delivery in the city (reserving special places, limiting access to clean vehicles only, etc.). The platform as well as the measures, which will be discussed and implemented, will be innovative for the city.

- 8.6-GEN Sustainable multi-modal traffic management

The sustainability-oriented multi-modal traffic management system will integrate VMS-signs for traffic information, traffic light management and the parking guidance system. In the long term, even real time traffic information (traffic difficulties caused by roadwork, accidents, events…) will be incorporated. Innovative in this measure is also the ramp metering[15], which will limit the number of cars entering the corridor when the city centre is congested.

D Research and technical development

- 2.4-GEN Intelligent Park&Ride enforcement

The first step of this measure is the design of a system to make a clear distinction between the parking for fairground visitors and the parking for P+R-users. On the one hand, the physical division of the two parking lots should be strengthened, on the other hand the two parking lots should get a clear access control and payment system that distinguishes both users.

- 3.3-GEN Parking and public space management around main train station and ELAN corridor

Study on sustainable parking policy indicators for the City of Gent in general

- literature study
- by the use of GIS data (Geographic Information System) of the City
- field survey

Design study on special planning parking restrictions in the CIVITAS corridor

- 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

First, the concept and feasibility study will be realised. After the plan is approved by the city council, a tender will be launched.

In the planning phase, a ‘white list’ will be prepared. This list includes all vehicles which have access to the pedestrian area (e.g. inhabitants).

[15] This ramp metering is the same ramp metering system mentioned in Measure 6.2 “Improved public transport levels”.

- 7.3-GEN Institutional platform for city freight management

Within the CIVITAS-ELAN-project and this work package the first step is to set up a forum where goods distribution can be discussed by the city council and the stakeholders (distributors, shop owners, etc.). Several subjects[16] will be discussed with the distributors aiming at a practical task list on how to organise distribution in the city centre.

Another element in this measure is the control and enforcement of the existing dedicated parking spaces and the creation of extra dedicated parking spaces. A concept and design study will be carried out to decide on the location of these loading and unloading spots.

- 8.6-GEN Sustainable multi-modal traffic management

The traffic management system will be implemented in three phases:

- Phase 1: parking information and parking guidance (mid-2008)
- Phase 2: traffic information based on known events (2009)
- Phase 3: real-time traffic information and re-routing (>2010)

A tender will be published in 2007 (so before the start of the CIVITAS-ELAN project) for the delivery and installation of a significant part of the hardware and software needed for the traffic guidance system.

E Situation before CIVITAS

- 2.4-GEN Intelligent Park&Ride enforcement

Fairground visitors often park at the P+R-parking (free of charge) for their visit to the expo halls. The fairground visitors should not use the P+R-parking because this will raise the number of parking places for fairground visitors in an unacceptable way, which would not support sustainable transport to and from the event halls.

- 3.3-GEN Parking and public space management around main train station and ELAN corridor

The area around the main train station is densely built. Businesses as well as residential areas are located here. Car use in the area is quite high, so parking spaces are well used. Since the implementation of paid parking spaces, the pressure on parking availability has decreased somehow. Still, the availability for parking spots is rather low, especially for residents.

When planning new offices, project developers are asked to foresee a minimum number of parking places for the employees working in the new buildings. This is to avoid the increase of parking pressure in the neighborhood.

- 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

As a significant part of its urban and mobility planning, Gent has converted 35 hectares of its city centre into a pedestrian area, some 10 years ago. The pedestrian area is served by numerous tram and bus lines, with an important public transport hub in the middle of it.

Currently, access to the pedestrian area by motorised vehicles is restricted, but only by means of traffic signs. Unfortunately many drivers choose to disobey these signs.

Access control is enforced in a limited way by means of police presence inside the pedestrian area on a daily basis (3 police officers during peak hours i.e. 11:00 – 18:00). Obviously, this is not an efficient use of police personnel and should be replaced by an automatic access control system.

[16] Like for example: the concept of collecting at the source, the concept 'clean and quiet', water based transport, separating through traffic and distribution traffic, etc.

Surveys undertaken by the municipality indicate that a significant part of the flow of vehicles is through traffic, and that most of these vehicles pass at times when there is a high level of pedestrian activity.

The municipality seeks to implement an advanced automated access control system for this area, but refrains from using standard solutions such as automatic bollards because of their high malfunction rate and a possible reduction of the service speed of public transport.

- 7.3-GEN Institutional platform for city freight management

Today the distribution of goods in the city centre is limited to certain timeframes and to certain parking spaces. The problem with the parking spots is the abuse by other motorised vehicles. The good distributors park on the street once the dedicated parking spaces are taken. This causes traffic jams, dangerous situations for cyclists and pedestrians and nuisance for public transport.

In 2004, the Gent City Council ordered a study on the feasibility of a goods distribution centre. 4 concepts were studied:

- A classic distribution centre.
- Acknowledgement of 'real' city distributors (minimal number of distributions in the city centre).
- Concept of collecting at the source.
- Concept 'quiet and clean' (use of low emission vehicles).

The study showed that the classic distribution centre is not feasible within the City of Gent.

- 8.6-GEN Sustainable multi-modal traffic management

Today, the City of Gent operates its own dynamic parking guidance system. The parking system provides the number of available parking spaces in different parking lots in the city centre. In spite of this parking guidance system, a lot of people drive towards the city centre even if the guidance system shows that the car parks are full. This is mainly caused by the hope to find a parking spot in the street, or people just queue in front of the parking lots until someone is leaving. Often this causes obstruction on the roads where the parking entrance is situated, resulting in significant delays for public transport, which uses the same corridors.

There is also a great need to issue traffic warnings about upcoming roadwork, major events etc. which have an impact on traffic in the city. To be fully effective, these messages would need to be provided on all road categories, from highways down to local roads.

Tender documents have already been prepared for phase 1(see below).

F Inter-relationships with other measures

All measures of this integrated package have the same objective, namely the decrease of car and freight nuisance in the CIVITAS corridor.

5.1.3.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts for the integrated package 4 Adjust car and freight traffic by traffic management

The expected impacts are:

- Decrease of car and freight nuisance by implementing sustainable traffic management

The decrease of the car and freight nuisance will be evaluated at integrated package level by combing results of the different measures.

- Less cars in corridor

The reduction of cars will not be measured on measure level as the impact of this set of measures separately is hard to distinguish.

- Decrease of emissions

The emissions will not be measured on integrated package level as it will be difficult to get the right emissions figures for these measures. The general emission reduction will be modelled on city level to follow the general trend in the city of Gent.

- Improved air quality

The air quality will not be measured on integrated package level as the impact for this set of measures separately on the air quality is hard to distinguish. The air quality will be modelled on city level.

Selected indicators for the integrated package 4 Adjust car and freight traffic by traffic management

In the table below an overview is given of all the evaluation activities and indicators selected for the IP4 Adjust car and freight traffic by traffic management.

Table 20: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 4: ADJUST CAR & FREIGHT TRAFFIC BY TRAFFIC MANAGEMENT	▪ Combining results of the different measures to come to conclusions on IP level: - Recording improper use of P+R parking by fairground visitors - Recording traffic flow in pedestrian area during blocking period - Recording improper use of loading spaces - Recording congestions at entrance of main parking garages and on the main axes in the corridor	Decrease of car and freight nuisance by implementing sustainable traffic management → Scope: ELAN- corridor

Details of the evaluation activities

To measure this integrated set of measures different indicators were selected that can give a full overview of the decrease in nuisance caused by car and freight movements.

The improper use of P+R refers to the use of parking spaces for other purpose then to make use of the PT link to the city centre.

The traffic flow in the pedestrian area refers to the illegal motorised vehicle movements that cross the pedestrian area during the blocking period.

The improper use of loading spaces is the parking of motorised vehicles on loading spaces for a purpose different than loading or unloading.

The congestion levels at the entrance of main parking garages and on the main axes in the corridor will be measured as well as an indicator of car and freight nuisance. This congestion will be expressed by the length of the waiting queue.

B Evaluation activities and indicators on measure level

Expected possible impacts for the measure 2.4 Intelligent Park&Ride enforcement

The expected impacts are:

- Decrease of nuisance, improper use of P+R by implementing an intelligent P+R enforcement

The decrease of improper use of the P+R will be measured on measure level; results will also be used on IP level to draw conclusions on higher level.

- Increase of Public Transport users

This will not be measured since the relation of increase of public transport users to this measure is too hard or even impossible to distinguish.

Selected indicators for the measure 2.4 Intelligent Park&Ride enforcement

In the table below an overview is given of all the evaluation activities

Table 21: Evaluation activities and indicators for measure 2.4 Intelligent Park&Ride enforcement

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
2.4-GEN Intelligent Park&Ride enforcement	▪ Measurement of: - Inventory improper use of P+R - Inventory P+R occupancy ▪ BAU	▪ Decrease of improper use of P+R → Target group: P+R users

Details of the evaluation activities

Not applicable

Details for Business as usual and up- scaling

- BAU

The impact of this measure on the parking and P+R occupancy will be analysed, taking into account the tendency of the increasing use of parkings and P+R. The business as usual scenario will be based on the occupancy figures of the parkings and P+R Gentbrugge available for several years.

- Up – scaling

Not Applicable

Expected possible impacts for the measure 3.3 Parking and public space management around main train station and corridor

The expected impacts are:

- Decrease of nuisance by reducing parking pressure in main train station area

The decrease of parking pressure in main train station area of cannot be evaluated during the CIVITAS period since the parking and public space management will focus on new buildings and not all buildings will be built till the end of the CIVITAS project.

- High acceptance level of parking guidelines by stakeholders

Since it is hard to evaluate the reduced parking pressure in main train station area during the CIVITAS period, the acceptance level of the parking guidelines will be evaluated by interviewing stakeholders.

Selected indicators for the measure 3.3 Parking and public space management around main train station and corridor

In the table below an overview is given of all the evaluation activities

Table 22: Evaluation activities and indicators for measure 3.3 Parking and public space management around main train station and ELAN corridor

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
3.3-GEN Parking and public space management around main train station and ELAN corridor	▪ Measurement of: - interview on acceptance level by stakeholders	▪ Acceptance level of parking guidelines → Target group: main train station area

Details of the evaluation activities

Not applicable

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

Expected possible impacts for the measure 3.4 Pedestrian area enforcement with automatic number plate recognition

The expected impacts are:

- Decrease of car or freight traffic in pedestrian area during blocked period

The traffic flow in pedestrian area will be recorded and analysed on measure level. The results will be used on IP level as well.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure separately on the air quality is hard to distinguish. Although the air quality will be measured on city level to follow the general trend of the air quality within the city of Gent.

Selected indicators for the measure 3.4 Pedestrian area enforcement with automatic number plate recognition

In the table below an overview is given of all the evaluation activities and indicators for the measure 3.4 Pedestrian area enforcement with automatic number plate recognition.

Table 23: Evaluation activities and indicators for measure 3.4 Pedestrian area enforcement with automatic number plate recognition

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
3.4-GEN Pedestrian area enforcement with automatic number plate recognition	▪ Measurement of: - Recording traffic flow in pedestrian area	▪ Decrease of car and freight traffic in pedestrian area during blocked period ▪ CBA → Target group: Pedestrians and drivers in pedestrian area

Details of the evaluation activities

The traffic flow of cars and freights will be recorded before and during the blocked period to have a good insight on the impact of this measure.

Details for Business as usual and up- scaling

- BAU

We want to analyse the impact of this measure on the car/freight traffic in the pedestrian area, taking into account the tendency of the traffic flow in the pedestrian area. The business as usual scenario will be based on the traffic flow figures available for a couple of years.

- Up – scaling

Not applicable

Expected possible impacts for the measure 7.3 Institutional platform for city freight management

The expected impacts are:

- Improved quality and amount of loading space

The quality and amount of loading spaces will be measured on measure level. The quality index of the loading spaces will be based on following sub-indicators: occupancy, abuse, location, visibility, amount of the loading spaces. This will be discussed with the measure leader since this will be the output of the discussions during the different workshops.

- Decreased nuisance by following up the quality of the freight management

The quality of the freight management will be measured on measure level. The quality index of the freight management will be based on following sub-indicators: freight movements, nuisances, inventory and analysis of outputs. The definition of this quality index will be discussed first with the measure leader.

- Improved acceptance level by shopkeepers, caterings and distributors

During the workshop the acceptance level will be measured by interviews.

- Improved air quality

The air quality will not be measured on measure level as the impact for this measure on the air quality is hard to distinguish. Although the air quality will be measured on city level to follow the general trend of the air quality within the city of Gent.

Selected indicators for the measure 7.3 Institutional platform for city freight management

In the table below an overview is given of all the evaluation activities

Table 24: Evaluation activities and indicators for measure 7.3 Institutional platform for city freight management

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
7.3-GEN Institutional platform for city freight management	▪ Measurement of: - Inventory of loading spaces + the quality and the abuse of loading places in selected streets (output of platform) - Inventory of the sub indicators of the quality index of the freight management in selected streets (output of platform) - Acceptance of the stakeholders regarding city freight distribution	▪ Improve the quality and amount of loading space ▪ Increase of the quality of freight management (based on output of the platform) ▪ Improve of the acceptance level by stakeholders → Target group: goods distributors, caterings and shopkeepers

Details of the evaluation activities

- quality of loading space

The quality index of the loading spaces will be based on following sub-indicators: occupancy, abuse, location, visibility of the loading spaces.

- quality of the freight management

The quality index of the freight management will be based on following sub-indicators: freight movements, nuisances, inventory and analysis of outputs. The definition of this quality index will be discussed first with the measure leader.

- acceptance level by shopkeepers, caterings and distributors

At the end of a set of workshops focused in a selected street the acceptance level will be measured by interviewing stakeholders during the latest workshop.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

Expected possible impacts for the measure 8.6 Sustainable multi-modal traffic management

The expected impacts are:

- Reduction of congestions in city centre

Since it is hard to measure cause effect relationships of this measure on the congestion problems in city centre, this impact will not be measured. Although to have a small insight in the impact, congestions at entrance of main parking garages and on the main axes in the corridor (Nederkouter) will be measured.

- Decrease of parking explorative movements

The decrease of parking explorative movements is very hard or even impossible to measure, for this reason this impact cannot be measured.

- Decrease of traffic flow in local streets (no parking routes)

The cause effect relationships of this measure on the decrease of traffic flow in local streets, is not measurable, for this reason this impact will not be evaluated.

- Increased use of P+R and parking garages

The use of P+R and parking garages will be measured on measure level, by recording and analyzing the parking occupancy and traffic flow at entrance of P+R.

- Improved air quality

The air quality will not be measured on integrated package level as the impact for this set of measures separately on the air quality is hard to distinguish. Although the air quality will be measured on city level to follow the general trend of the air quality within the city of Gent.

Selected indicators for the measure 8.6 Sustainable multi-modal traffic management

In the table below an overview is given of all the evaluation activities

Table 25: Evaluation activities and indicators for measure 8.6 Sustainable multi-modal traffic management

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
8.6-GEN Sustainable multi-modal traffic management	▪ Measurement of: - Recording congestions at entrance of main parking garages and on the main axes in the corridor, namely Nederkouter - Recording parking and P+R occupancy - Recording traffic flow on entrance of P+R of Flanders Expo and Gentbrugge	▪ Increase of the influence of the multimodal traffic guiding system on the traffic nuisance in the city centre and the (efficient) use of parking and P+R. → Target group: car drivers

Details of the evaluation activities

Not applicable

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up – scaling

Not applicable

C CBA

- 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

Nowadays at least 2 policemen have to control the traffic movements permanently, which increases the workload of the police. With this measure, the pedestrian area enforcement system, actions will be taken to reduce the workload of the police. The impact of this measure on the workload of the police will be done by cost-benefit analysis.

Table 26: Overview indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
Police department/Parking company	Operating costs analysts on speed and type of vehicles traveling in pedestrian area	Operating costs of police agents on entrance of pedestrian area (not be needed anymore)
Justice department	Operating costs of justice (follow up of fine collection)	Revenues by collecting fines
Pedestrian area Management system	Investment costs Maintenance costs	
Pedestrian area		Reduction traffic flow (cars and freights)
Households		Reduction of emissions

5.1.3.3. Data collection

The table below represents all the data collection activities for IP 3 Adjust car and freight traffic by traffic management, which will be carried out in the city of Gent during the project life cycle.

Table 27: Data collection inventory for the city of GENTfor IP 3 adjust car and freight traffic by traffic management

INDICATOR	LEVEL[17]	FOCUS[18]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Inventory improper use of P&R	M/ IP		Before/ after	Recording	%	P+R of Flanders Expo	3 days on which Flanders Expo hosts fairs with high turn-outs in 2009 and in 2011	City of Gent, ML
Traffic flow towards P+R	M		Before/after	Automatic counter	Car	P+R of Flanders Expo P+R Gentbrugge	During the whole week(s) in Oct 2009 and Oct 2011	AWV

[17] M= Measure level

IP= Integrated Package Level

[18] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL[17]	FOCUS[18]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Congestion levels	M		Before/after	recording	m	Length congestion on main entrance of parking Speed lof traffic on main entrance of parking[19]	During the shopping period (lots of traffic in the city centre expected) in Dec 2009 and Dec 2011 At a normal Saturday and a normal day in Jan 2010 and Jan 2011	City of Gent, Data collector
Inventory P&R and parking occupancy	M		Before/ after	recording	%	P&R of Flanders Expo P&R of Gentbrugge P&R of Oostakker	3 weeks (no major activities in the city centre, no fairs and not during public holi-	City of Gent, ML

[19] measuring congestion levels based on speed will be tested

INDICATOR	LEVEL[17]	FOCUS[18]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
							days) + 2 days (dur-ing public summer holiday and with major activities in the city centre) in 2009 and in 2011	
Inventory of loading spaces	M		Before/ after	recording	number	Loading spaces in selected streets (output platform)	Before noon during a couple of weeks in Jan 2010 and Jan 2012	City of Gent, Data collector
Inventory improper use of loading spaces	M/ IP		Before/ after	recording	%	Loading spaces in selected streets (output platform)	Before noon during a couple of weeks in Jan 2010 and Jan 2011	City of Gent, Data collector

INDICATOR	LEVEL[17]	FOCUS[18]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Inventory of freight nuisance/ movements	M/ IP		Before/ after	observa-tion	Number per type	freight nuisance in selected streets (output platform)	Before noon during a couple of weeks in Jan 2010 and Jan 2012	City of Gent, Data collector
Awareness and acceptance of distribution platform	M		Before/ after	Interview/ workshop	Shopkeepers	Shopkeepers in-volved in platform?	June 2010 June 2012	City of Gent, ML and SEM
Traffic flow in pedestrian area	M/ IP		Before/ after	Recording + auto-matic counter	Car freight	Traffic flow during blocked period and non-blocked period in pedestrian area	June 2009 June 2012	City of Gent, data collector
Operating costs pedestrian area enforcements	M	F	Yearly	recording	Euro	Operating costs (po-lice officers, justice and analysts)	Feb 2011 Feb 2012	City of Gent, ML
Maintenance costs	M	F	Yearly	recording	euro	Maintenance costs	Feb 2011 Feb 2012	City of Gent, ML
Investment costs	M	F	Yearly	recording	Euro	Investment costs	Feb 2011 Feb 2012	City of Gent, ML
Benefits (fine) pedestrian area enforcements	M	F	Yearly	Recording	Euro	benefits	Feb 2011 Feb 2012	City of Gent, ML

INDICATOR	LEVEL[17]	FOCUS[18]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Emissions	M	F	After	Modeling	g/m3	CO2, …	Feb 2012	City of Gent, SEM
User acceptance by stake-holders	M		After	Interview/ workshop	stakeholders	stakeholders	March 2010 March 2012	City of Gent, SEM

Details on the data collection

City of Gent, ML = the measure leader will collect all data. Where possible the CIVITAS Data collector, who's the head of the traffic research cell in the mobility department, will collect on street data. And AWV, partner of CIVITAS Gent, will collect traffic flow information with their automatic counters.

- 7.3 GEN Institutional platform for city freight management: the data collection depends of the output of the institutional platform for city freight management.
- For cost benefit analysis, emissions figures which will be modelled on city level will be used
- Quality of loading space: the quality index of the loading spaces will be based on following sub-indicators: occupancy, abuse, location, visibility, amount of the loading spaces. This will be discussed with the measure leader since this will be the output of the discussions during the different workshops.
- Quality of the freight management: the quality index of the freight management will be based on following sub-indicators: freight movements, nuisances, inventory and analysis of outputs. This will be discussed with the measure leader.
- Workshop interview on acceptance and awareness of the freight traffic management by shopkeepers, distributors involved in the workshops will take place after a set of preparation workshops.
- Interviews with the key stakeholders about the acceptance of the Parking and public space management around main train station and ELAN corridor will take place when the parking guidelines are approved.

5.1.4. Integrated package 4: Improving the quality of public transport

5.1.4.1. Description

A Objectives and scope

IP objectives

The measures in this integrated package have the objectives to improve the quality and the image of the public transport services.

Measure related objectives

- 2.2-GEN Improved Public Transport service levels
  - Improve the quality and the image of public transport
  - Increase the number of public transport users
  - Improve the accommodation and access to public transport stops
  - Increase the commercial speed on public transport
- 5.7-GEN Security enforcement in PT
  - Increase the security perception of the PT users

B Overview of the measures

An overview of the measures in this IP with a short description.

- 2.2-GEN Improved Public Transport service levels

The measure will improve the quality of the public transport service and will transform the corridor into a strong public transport axis for the city. People will receive planning and real-time info at all stops and at interchange points, public transport will have a high level of accessibility and the public transport axis will be a structuring mobility axis for the city. Secondly a number of 'hot spots' in the network of the whole city, traffic lights and bus stops will be reorganised to cut commercial speed (increase travel time) and to improve the access to stops.

The final objective is:

- Improve the image of public transport
- Increase the number of public transport users
- Improve the accommodation and access to public transport stops
- Cut travel times on public transport

- 5.7-GEN Security enforcement in PT

During the last few years, safety and security in public transport has been a very hot issue in Belgium, as several abuses led to severe casualties (drivers as well as users) and damage of public transport material. The decision was made to implement an integrated safety and security plan 'Safe on the road' (Veilig op weg).

C Innovative aspects

- 2.2-GEN Improved Public Transport service levels

The innovative aspects of this measure are the holistic way the improvements of the public transport service will transform the corridor into a strong mobility axis for the city. People will receive planning and real-time info at all stops and in the interchange points, public transport will have a high level of accessibility and the public transport axis will be a structuring mobility axis for the city (not anymore

seen as a car axis, but clearly a public transport axis). To avoid congestion of the public transport, we will redesign several cross points on this axe.

Moreover a number of stops will be adapted to the special needs of mobility impaired people. This will be done by involving associations of mobility impaired people.

- 5.7-GEN Security enforcement in PT

To increase the safety and security on buses and trams of De Lijn, a whole set of integrated measures will be implemented:

- Installing cameras.
- Organise closed driver's cabins.
- Close cooperation with schools and youngsters in particular.

D Research and technical development

- 2.2-GEN Improved Public Transport service levels
  - Planning and designing the RTPI-system.
  - Redevelopment of the tram axis between train station Sint-Pieters and ring road R40

The implementation will start from scratch: pre-design, technical design, implementation.

In the planning phase of the reconstruction work for the corridor, the City of Gent will perform pedestrian and cycling audits to increase safety and comfort. This is described in the measure sheet on Walking Promotion and Safe cycling corridor.

In the early planning phase of the reconstruction works for the corridor, De Lijn will perform congestion audits to define the needed transit time for the tram in both directions.

- 5.7-GEN Security enforcement in PT

Within the CIVITAS-ELAN project the integrated set of safety measures will be implemented in the buses and trams running across the corridor. The safety plan (see Situation before CIVITAS) is ready to implement.

E Situation before CIVITAS

- 2.2-GEN Improved Public Transport service levels

Tramline 1 connects the Flanders Expo (event hall/centre) site with the main train and bus station Sint-Pieters and further on towards the city centre. The tramline is also a main entrance road to the city centre for other motorised transport. It is also part of the parking-route system. Today, private cars and the tram share the same narrow space. Especially during peak hours on weekdays, but also during the main shopping hours (Saturday afternoon and shopping Sundays), the road is severely congested, resulting in long delays for the tram.

Finally the current road is in very bad shape and has an out-of-date and inefficient lay-out putting car traffic still as the main mode on the corridor.

In 2006, a feasibility study was carried out. This study resulted in a basic set-up of the congestion system and measures to assure full public transport priority.

Quite a large number of stops are not fully accessible to people with special needs.

Tram and bus travel times are on some places not excellent.

- 5.7-GEN Security enforcement in PT

In the last few years, safety and security in public transport has been a very hot issue in Belgium, as several abuses led to severe casualties (drivers as well as users) and damage of public transport material. In 2006 the Flemish government organised a consultation with the public transport operator, all cities and all other involved policymakers (Ministries of Internal Affaires, Education, Justice and Well-

being) regarding safety and security. The decision was made to implement an integrated safety and security plan 'Safe on the road' (Veilig op weg).

A first step has already been realised. As a test case people can only enter the bus at the front door to decrease non-paying customers and to increase the safety feeling (contact with driver). Also as a test case 'lijnspotters' (second person on the bus to accompany driver and customers on the bus) are being used to limit incidents.

For the moment, the safety plan already exists.

The main aspects of the safety plan are:

- To implement safety camera's for monitoring.
- To work with scholars and students in a cooperative and participative program ("Trammelant") with prevention as most important goal.
- To increase the number of "lijnspotters".
- To train personnel with a focus on safety and security (e.g. how to handle difficult situations, attitude, working with youth organisations and schools…).
- To invest in safe and secure infrastructure: architectural aspects (no dark spots, sufficient lighting, accessibility…), radio connection and GPS-system in all buses and trams, closed driver's cabins, motorcycles for fast interventions…

To prioritise and list hotspots: a safety monitoring (real and subjective safety will be measured) will be installed, measuring the weakest points concerning safety. Each weak point will get a number ranging from 0 (safe) to 3 (severe nuisance). Based on the score, De Lijn will take the most urgent measures.

F Inter-relationships with other measures

The measures in this integrated package have the same objectives, namely improving the quality and the image of the public transport services.

Within the CIVITAS project the redevelopment of the Kortrijksesteenweg (main tram axis towards the main train station, see measure 2.2) is the main project. This project will also have impact on the other measures:

- 2.9 – participatory re-development of main train station area

The citizen's engagement strategy of the redevelopment of the Kortrijksesteenweg will be organised by the measure leader of 2.9.

- 4.7 – walking promotion

With the redevelopment of the Kortrijksesteenweg, the quality of the footpaths will be improved. The redevelopment of the footpaths along this axis will contribute to the success of this measure.

- 5.6 – safe cycling corridor

With the redevelopment of the Kortrijksesteenweg, the quality of the cycle paths will be improved. Nowadays the adjacent cycle track along this axis is too small, after the redevelopment the safety of this cycle track will be improved because the cycle lane will be separated from the traffic lane.

5.1.4.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts for the integrated package 4 improving the quality of public transport

The expected impacts are:

- Improved quality of the public transport services

The evaluation of the quality of the public transport services will be done on integrated package level.

- Improved image of the public transport services

The evaluation of the image of the public transport services will be done on integrated package level.

- Increased number of public transport users

The number of public transport users will be measured on integrated package level.

Selected indicators for the integrated package 4 improving the quality of public transport

In the table below an overview is given of all the evaluation activities and indicators selected for the IP 4 improving the quality of public transport.

Table 28: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 4: IMPROVING THE QUALITY OF PUBLIC TRANSPORT	▪ Evaluation directly on IP level: - Survey on the quality and image of the public transport services - Number of PT users	Improvement of the quality and image of the public transport services on ELAN-corridor (Lijn1) and on city level Increase of PT users → Scope: City

Details of the evaluation activities

In this integrated package the evaluation will happen directly on the IP level. The improvement of the quality and image of the public transport services as a result of the implementation of this IP will be measured. Also a vast record of the number of users will be recorded.

The evaluation will be done **on 2 different levels**:

- on Lijn1, the main tramline of the city of GENT, which runs through the ELAN-corridor (redevelopment of Kortrijksesteenweg and implementation of car access restriction system on crossroad Kortrijksesteenweg and R40)
- on city level= on the total group of tram and city bus lines where reorganisation of bus stops and traffic lights took place

B Evaluation activities and indicators on measure level

Expected possible impacts for the measure 2.2 improved public transport levels

The expected impacts are:

- Improved quality of the public transport services

The evaluation of the quality of the public transport services will be done on integrated package level.

- Improved image of the public transport services

The evaluation of the image of the public transport services will be done on integrated package level.

- Increased number of public transport users

The number of public transport users will be measured on integrated package level.

- Increased flow on Lijn 1 and all trams/city buses

The flow of the trams/buses will be measured on measure level, by measuring the commercial speed of the public transport and recording number of reorganized bus stops and traffic lights on PT lines.

Selected indicators for the measure 2.2 Improved public transport levels

In the table below an overview is given of all the evaluation activities and indicators selected for the measure 2.2 Improved public transport levels.

Table 29: Evaluation activities and indicators for measure 2.2 Improved public transport levels

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
2.2-GEN Improved Public Transport service levels	▪ Measurement of: - Inventory of commercial speed - Inventory (reorganised) PT stops - Inventory (reorganised) traffic lights on PT lines ▪ BAU ▪ Up-scaling	▪ Increase of flow on Lijn1 ▪ Increase of flow on trams/city buses ▪ Increased number of reorganised PT stops and traffic lights on PT lines ▪ CBA → Target group: PT users

Details of the evaluation activities

Evaluation of the focus measure 2.2-GEN Improved Public Transport service levels will be done **on 2 different levels**:

- on Lijn1, the main tramline of the city of GENT, which runs through the ELAN-corridor (redevelopment of Kortrijksesteenweg and implementation of car access restriction system on crossroad Kortrijksesteenweg and R40)
- on city level = on the total group of tram and city bus lines where reorganisation of bus stops and traffic lights took place

For both levels the commercial speed will be measured. Commercial speed is defined as the average journey speed of public transport vehicles between an origin and a destination stop, including any delay arisen in the course of the journey.

Also a detailed inventory of the reorganised bus stops and traffic lights will be measured.

Details for Business as usual and up- scaling

- BAU

As figures of the commercial speed are gathered during the month of October for each project year, an evolution of the commercial speed of all trams and city buses can be extracted, which can be compared with a business as usual scenario. This will be carried out on both levels (Lijn1 and city level).

As surveys on the quality and image of the PT services are done on 2-yearly and on quarterly base, an evolution of the quality and image perceptions can be extracted. For this reason a business as usual scenario will be worked out on both levels (Lijn1 and city level).

- Up- scaling

As figures of the commercial speed are gathered on segment-level (bus stop A to bus stop B), up-scaling of the commercial speed (with redevelopment of all bus stops) will be done on both levels (Lijn1 and city level).

Expected possible impacts for the measure 5.7 Security enforcement in PT

The expected impacts are:

- Improved quality of the public transport services

The evaluation of the quality of the public transport services will be done on integrated package level.

- Improved image of the public transport services

The evaluation of the image of the public transport services will be done on integrated package level.

- Increased number of public transport users

The number of public transport users will be measured on integrated package level.

- Improved security on the PT services

The evaluation of the security on the public transport services will be done on measure level.

Selected indicators for the measure 5.7 security enforcement in PT

In the table below an overview is given of all the evaluation activities

Table 30: Evaluation activities and indicators for measure 5.7 Security enforcement in PT

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
5.7-GEN Security enforcement in PT	▪ Measurement of : - Inventory of the Local Quotidient of Crime (LQC) indexes - Inventory of types of behaviour at incidents on PT or PT stops - Inventory contacted schools and students by Trammelant	▪ Improvement of the security of the PT services, based on LQC indexes ▪ Reduction of number of incidents by convincing students (Trammelant) → Target group: PT users

Details of the evaluation activities

De Lijn has maintained the security monitoring system for many years. Since this tool contains all required information, it will be used to evaluate the security in public transport and the number of incidents.

The security of the PT services is will be measured following the Local Quotidient of Crime – index. This index is based on the total number of forms (type of behaviour at incidents[20]) in a certain sector in a region (in Gent a sector = a statistical sector) to the total number of form (type of behaviour at incidents) in the whole region (= Gent or even the province of East Flanders). The index is based on the studies of Brantingham & Brantingham (criminology appliance – geographical criminology).

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up- scaling

Not applicable

C CBA

- 2.2-GEN Improved public transport service levels

The measure will have a huge impact on the commercial speed of the public transport. By reducing the commercial speed, the travel time for passengers will be shorter, less trams or buses need to be used, and there will be less fuel consumption.

Table 31: Overview indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
Public Transport Operator		Operating costs PT drivers (less PT drivers needed) Operating costs trams/buses (less trams/buses needed) Revenue (more PT users) Reduced fuel consumption
Local authorities	Investment costs of reorganised bus stops Investment costs of reorganised traffic lights (including car restriction system) Investment redevelopment of Kortrijksesteenweg	
Public transport users		Reduced travel time (commercial speed)
Households		Reduced emissions

[20] An incident is an event in a vehicle of De Lijn or at a (bus)stop of De Lijn including certain defined behaviour. The incident took place between personnel of De Lijn and travellers/ non-travellers or travellers amongst each other.

5.1.4.3. Data collection

The table below represents all the data collection activities for IP 3 Adjust car and freight traffic by traffic management, which will be carried out in the city of Gent during the project life cycle.

Table 32: Data collection inventory for the city of GENT for IP 4 improving the quality of collective transport

INDICATOR	LEVEL [21]	Focus [22]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Inventory operating revenues	M	F	after	recording	euro	Reduction of invested Drivers and buses (Jan 2009 – Jan 2012)	Jan 2012	De Lijn
Inventory operating revenues	M	F	after	recording	euro	PT users (vending tickets, subscribers)	Jan 2012	De Lijn
Inventory investment costs	M	F	after	recording	euro	reorganised bus stops	Jan 2012	City of Gent
Inventory investment costs	M	F	after	recording	euro	reorganised traffic lights	Jan 2012	City of Gent

[21] M= Measure level

IP= Integrated Package Level

[22] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL [21]	Focus [22]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Inventory of fuel consumption	M	F	after	recording	l/100km	Trams and city buses	Jan 2012	De Lijn
Inventory emissions	M	F	after	modeling	CO2	Trams and city buses	Jan 2012	City of Gent
Inventory commercial speed	M		Yearly	Hastus Database	Commercial speed (km/h)	Commercial speed of trams and city buses during the month of October 2007-2011	Nov 2009 Nov 2011	De Lijn
Inventory reorganized bus stops	M		Yearly	recording	Tram and bus stops	Tram and bus stops	Nov 2009 Nov 2011	City of Gent
Inventory reorganized traffic lights	M		Yearly	recording	Traffic lights	Traffic lights on PT lines	Nov 2009 Nov 2011	City of Gent
Inventory public transport users	IP		Before/ after	modeling	PT users	PT users	Nov 2009 Nov 2011	De Lijn
Inventory incidents on PT	M		2-yearly/ quarterly	Input of Security monitoring system	incidents	Incidents on trams/ city buses in Gent	Nov 2009 Nov 2011	De Lijn
Inventory contacted schools / students (security campaign Trammelant)	M		Yearly	recording	Schools/ students	Schools/ students in ELAN corridor	Nov 2009 Nov 2011	De Lijn

INDICATOR	LEVEL [21]	Focus [22]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Quality and image of PT services	IP		2-yearly/ quarterly	Questionnaire used for input Quality monitoring system	Image PT	PT users and citizens	Nov 2009 Nov 2011	De Lijn
Security of PT services	M		2-yearly/ quarterly	LQC in security monitoring system	LQC	PT users	Nov 2009 Nov 2011	De Lijn

Details on the data collection

All the **financial data (costs and benefits)** used for the CBA will be gathered after the implementation of the measure (2.2). This data is available at the PT operator (De Lijn) where detailed track of financial data is kept. The financial data consist of:

- Investment cost
- Operating revenues

The **environmental factors** that will serve as input for the CBA a close record will be kept of:

- The fuel consumption before and after the implementation of measure 2.2.
- The reduction in CO2 emissions as a consequence of the implementation of the measure. This will be based on modeling techniques used for studies of the air quality.

The **commercial speed**: the city of Gent has a strong commitment with the public transport company to improve the commercial speed with 10%. Therefore a yearly evaluation report in GIS is already set up with use of data of the HASTUS database. Figures of 2007 will be used as before data.

The survey on the **quality and image of PT** services will cover the following themes:

- Satisfaction
- Info en communication (especially info on stops)
- Reliance
- Bus stops
- Routes (especially travel time)
- Security
- Cleanliness
- Image

Information will be extracted out of the Quality Monitor of De Lijn. Surveys for the quality monitoring are done on yearly (general) and on quarterly base (on tram/bus). Figures of 2007 will be used as before data. The monitoring system is worked out by the consultancy agency Significant.

Survey on the **security of PT services**:

Information will be extracted out of the Security Monitor of De Lijn which contains the Local Quotidient of Crime – index. This index is based on the total number of forms (type of behaviour at incidents[23]) in a certain sector in a region (in Gent a sector = a statistical sector) to the total number of form (type of behaviour at incidents) in the whole region (= Gent or even the province of East Flanders). The index is based on the studies of Brantingham & Brantingham (criminology appliance – geographical criminology). Each behaviour at incidents needs to be filled in forms of the security monitoring system. The behaviour are categorised as follows:

- Verbal aggression
- Insults
- Threats with weapons
- Threats without weapons
- Sexual intimidation

[23] An incident is an event in a vehicle of De Lijn or at a (bus)stop of De Lijn including certain defined behaviour. The incident took place between personnel of De Lijn and travellers/ non-travellers or travellers amongst each other.

- Sexual violations (vice)
- (attempt of) rape
- Public use of narcotics
- Spitting
- Aggressive theft
- Non-aggressive theft (pick-pocketing)
- Physical aggression
- Throwing projectiles at persons
- Throwing projectiles at vehicle
- Vandalism/graffiti
- Traffic aggression
- (attempt of) suicide

Surveys for the Security monitor are done on quarterly base. Figures of 2008 will be used as before data. The monitoring system is worked out by the University of Gent following the studies of Brantingham & Brantingham (criminology appliance – geographical criminology).

The total number of reorganized traffic lights will be recorded.

De Lijn will collect an inventory of total of PT users.

5.1.5. Integrated package 5: Stimulating cycling and walking

5.1.5.1. Description

A Objectives and scope

IP objectives

The measures within this integrated package are addressing cycling and walking services in a comprehensive and integrative approach. This will be achieved by:

- Improved accessibility to bike and walking services.
- Increased cycling and walking.
- Improved user perception of quality of the bike and walking services.

Measure related objectives

- 4.5-GEN "The House of the Bike" and bicycle activities
  - Increase cycling of commuters
  - Limit number of stolen bikes
- 4.7-GEN Walking promotion
  - Improvement of the convenience and safety of pedestrians
  - Enhancing the pedestrian environment
- 5.6-GEN Safe cycling corridor
  - Improve the user perception of safety and user confidence by improving a decent and safe bicycle infrastructure
  - Increase the modal share for cycling in the corridor
  - Reduce the number and the severity of road collisions involving vulnerable users
- 8.9-GEN IT-based bicycle theft prevention
  - A decrease in stolen rental bikes
  - An increase in rental bike use
- 8.10-GEN Route planner for bicycles
  - Increase the user perception of safety by offering safe bicycle routes

B Overview of the measures

An overview of the measures in this IP with a short description.

- 4.5-GEN "The House of the Bike" and bicycle activities

Until today there is no main contact or information point where cyclists can get specialised information, nor access to small-scale services, such as bicycle repair. Therefore a 'House of the Bike' will be installed where all kind of bicycle services will be offered.

The operational focus is:

- The establishment of a provisional 'House of the Bike' with a bicycle service (hire, small reparation, information) for incoming and outgoing train commuters.
- The extension of the premises of the 'Student and Mobility' bicycle hire program.
- The implementation of a bike sharing program (white bicycles).

- The implementation of a Park and Bike program.
- Test new types of bicycle sheds as secured bicycle sheds, local neighbourhood bicycle sheds…

- 4.7-GEN Walking promotion

With the combination of existing and new promotion campaigns and small infrastructure works in this measure, the city wants to support walking as a sustainable transport mode.

The first step in this measure is to stimulate walking through intensive promotion campaigns.

The second step is to analyse the current state of the roadwork with a focus on pedestrians. Based on this analysis actions will be undertaken in the ELAN-corridor.

The third step is to implement small infrastructure works that increase the safety and comfort of the corridor for pedestrians.

- 5.6-GEN Safe cycling corridor

Gent has already a widespread cycle infrastructure as well as leisure and functional cycling routes. Unfortunately, these routes often show gaps or unsafe crossings or junctions. This measure will work on safer and better cycling routes in the corridor.

This measure includes improvements of the main crossroads on the cycling routes from the main train station towards the city centre and the university area. Also the other cycling routes to and from the station will be audited and improved within this measure.

- 8.9-GEN IT-based bicycle theft prevention

The City of Gent offers a rental bike to students at very low costs (€40 per year). A lot of these bikes get stolen or are missing. In order to decrease the number of bike thefts, anti-theft actions will be developed:

- An IT-based anti-theft system with a theft prevention system in rental bikes and hand computers to locate stolen or displaced bikes.
- A unique frame for rental bicycles.
- Secured bicycle sheds for rental bikes.
- Enticing bicycle

- 8.10-GEN Route planner for bicycles

Currently more and more cars have route guidance systems. Via the Internet, car drivers and public transport users can also simulate their trip with all kinds of models. For cyclists, systems like this are available, but they do not give information about the safest cycling route. The City of Gent is now developing its own cycling model.

For cyclists route guidance systems are available. But these existing systems do not always give information on the safest route. Therefore, a new guidance system will be elaborated that not only gives the fastest route, but also the safest one.

Safe cycling in the City of Gent through:

- An Internet-based route planner system for bicycles.
- A route guidance system for bicycles based on PDA and a navigation system.

C Innovative aspects

- 4.5-GEN “The House of the Bike” and bicycle activities

A specific location will be installed to offer a combination of bicycle measures. As the train station will be redeveloped, the surroundings around the railway station will be transformed into building area. As a result, the space for bicycle parking and bicycle services will diminish. Therefore a ‘House of the bicycle’ will be installed where all kind of bicycles services will be offered (bicycle hire, repair, information, maps, etc.).

The location will become the main contact point for cycling information in and around the City of Gent.

Additionally a bike sharing system (white bicycles) will be implemented.

The Park & Bike programme will give car drivers the opportunity to leave their car behind and visit the city by bike.

- 4.7-GEN Walking promotion

The innovative aspect of this particular measure is that the whole corridor will receive specific attention concerning safe and comfortable pedestrian crossings and paths ('walking audit'). All measures, which will be implemented in the corridor, will be screened on pedestrian users.

- 5.6-GEN Safe cycling corridor

Incorporate cycling measures as complementary initiatives within the targeted demonstration corridor. Introduce measures to give priority to safe cycling movements, e.g. reallocation of road space, surface treatments, changes to junction priorities and timings…

- 8.9-GEN IT-based bicycle theft prevention

In order to decrease the number of bike thefts, a chip will be implanted in rental bikes (rental bikes for students).

By means of a hand computer, the city bicycle guards will be able to check on the spot whether registered bikes are stolen or not. Automatic data collection and management will simplify the administration.

The development of a unique frame will lead to immediate recognition of the rental bikes and will prevent bicycle theft.

- 8.10-GEN Route planner for bicycles

The City of Gent wants to implement route planning and route guidance systems for cyclists, which are able to provide the safest route. The route planning and guidance systems will show the safest cycling routes or alternative routes with cycling paths and little traffic. Additionally, the system will show the availability of safe crossings by means of cycling tunnels or bridges.

D Research and technical development

- 4.5-GEN "The House of the Bike" and bicycle activities
  - Planning and design of the House of the Bike (User demand study).
  - Preparation of extension of activities of the rental bikes offered by Student and Mobility.
  - Tender for the implementation of the Bike sharing programme.
  - Planning and design of Park and Bike programme.
  - Planning and design of local neighbourhood bicycle sheds.
- 4.7-GEN Walking promotion

The first step in this measure is to analyse the current state of the roadwork with a focus on pedestrians. Based on this analysis actions will be taken in the ELAN-corridor.

The new measures, which will be implemented in the ELAN-project, will receive a special pedestrian audit.

- 5.6-GEN Safe cycling corridor

This measure includes improvements of the main crossroads on the cycling routes from the main train station towards the city centre and the university area. Also the other cycling routes to and from the station will be audited and improved within this measure. Especially the crossroad 'De Sterre', currently a vast and poorly organised crossroads with 5 arms and specified as 'black spot' will be reorganised.

First the corridor will be analysed by means of a bicycle safety audit on the current road network within the corridor, as well as on the other planned measures within the ELAN-project. The safety audit will happen in close cooperation with the important user groups like schools, cycling union…

- 8.9-GEN IT-based bicycle theft prevention

At the first stage, the theft prevention system and the software development that is necessary to use the hand computers has to be studied. Most probably, chips will be used and implanted in the rental bikes. By means of a monitor, stolen bikes can be located.

A proposal for a unique frame for rental bikes will be developed and tested.

- 8.10-GEN Route planner for bicycles

To install a web-based route planner for safe cycling, the following steps will be taken in the CIVITAS-ELAN project:

  - Decide on safest, shortest, most comfortable cycling routes Network.
  - Create an interface for the Internet-based route planner.

The information gained from the steps mentioned above will also be used as input for the PDA-based route guidance system. The most important step before implementation is the conversion of the data to a compact format.

E Situation before CIVITAS

- 4.5-GEN “The House of the Bike” and bicycle activities

Quite a number of people use the bike in the city centre, especially schoolboys and girls, students and train commuters. Until today there is no main contact point or information point where cyclists can get specialised information, nor access to small-scale services, such as bicycle repair.

Good secured bicycle sheds could limit the number of thefts. At the train station, 6,000 bicycles are counted daily. There is too little space for bicycles in general and secured bicycle sheds especially. In the University area or the city centre, no secured bicycle sheds are available at this moment.

- 4.7-GEN Walking promotion

Currently, Gent stimulates its inhabitants to walk by a walking campaign. The campaign is based on the ‘1,000 steps a day objective’. Inhabitants can buy a pedometer (20 Euro) to count their steps they daily take. This promotion campaign has its focus on the health of citizens.

With the promotion campaigns and small infrastructure works in this measure, the city wants to support walking as a sustainable transport mode.

- 5.6-GEN Safe cycling corridor

Widespread cycle infrastructure as well as leisure and functional cycling routes across the city, but often the routes show gaps or unsafe crossings or junctions.

- 8.9-GEN IT-based bicycle theft prevention

The City of Gent offers a rental bike to students at very low costs. Students can rent a bike at the price of 40 Euros a year. A lot of these bikes get stolen or go missing. These bicycles have a particular colour (yellow), but the frame is not unique.

However bike theft is a huge problem in Gent, especially around the main train station, as well as in the university area and the city centre. Bike theft is often a reason not to use a bike in the city centre or a reason for not using a quality bike and thus being exposed to unnecessary risks.

- 8.10-GEN Route planner for bicycles

Currently more and more cars have route guidance systems. Via the Internet, car drivers and public transport users can also simulate their trip with all kinds of models. They are able to look for the fastest or shortest way. For cyclists, systems like this are available, but they are not giving information about the safest cycling route.

The City of Gent is developing its own cycling model. Currently the tool will be used to check the most important cycling flows and to evaluate safety on these cycling routes. The tool could be used as a basis for the implementation of the route guidance system for bicycles.

F Inter-relationships with other measures

The measures within this integrated package have strong relationships with each other.

These measures have the scope to improve the accessibility to bike and walking services which leads to increased cycling and walking.

The Route planner for bicycles will be promoted through other measures as e.g. 4.10 (comprehensive mobility dialogue), 4.2 (mobility management for companies).

5.1.5.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts for the integrated package 5 Stimulating cycling and walking

The expected impacts are:

- Improved quality of the walking, cycling conditions and bike services

The evaluation of the quality of the walking, cycling conditions and bike services will be done on integrated package level and on objective (walkability index and bikeability index) and subjective way (survey)

- Improved image on the walking, cycling conditions and bike services

The evaluation of the image of the walking, cycling conditions and bike services will be done on integrated package level.

- Increase of number of cyclists and pedestrians

The number of cyclists and pedestrians will be measured on integrated package level.

Selected indicators for the integrated package 5 Stimulating cycling and walking

In the table below an overview is given of all the evaluation activities

Table 33: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 5: STIMULATING CYCLING AND WALKING	▪ Evaluation directly on IP level: - Walkability index/ bikeability index - Traffic counts on pedestrians and cyclists - Survey on image of quality of walking, cycling conditions and bike services	▪ Evolution of the quality and image of walking, cycling conditions and bike services ▪ Increase of number of cyclists and pedestrians → Scope: ELAN- corridor

Details of the evaluation activities

Based on a detailed inventory of the quality of walking and cycling conditions and bike services a walkability and bike-ability index will be calculated. The content of this walkability index and this bike-ability index will be defined by the University of Gent, based on literature.

The bike-ability and walkability indexes will cover the objective part of the quality and image of cycling and walking conditions. However it is also important to measure if these infrastructural improvements have led to a change in attitude towards cycling and walking. For this reason also a survey on the quality and image of cycling and walking will take place.

To measure the increased number of pedestrians and cyclists traffic counts will measure the increase in the number of cyclists and pedestrians.

B Evaluation activities and indicators on measure level

Expected possible impacts for the measure 4.5 The "House of the Bike" and bicycle activities

The expected impacts are:

- Improved quality of the cycling conditions and bike services

The evaluation of the quality of the cycling conditions and bike services will be done on integrated package level.

- Improved image on the cycling conditions and bike services

The evaluation of the image of the cycling conditions and bike services will be done on integrated package level.

- Increase of number of cyclists

The number of cyclists will be measured on integrated package level.

- Increase of use of bicycle sheds

The number and occupancy of the bicycle sheds will be measured on measure level.

Selected indicators for the measure 4.5 The "House of the Bike" and bicycle activities

In the table below an overview is given of all the evaluation activities

Table 34: Evaluation activities and indicators for the measure 4.5 The "House of Bike" and bicycle activities

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.5-GEN "The House of Bike" and bicycle activities	▪ Measurement of: - Occupancy and number of (secured) bicycle shed - Costs of bicycle sheds (per type)	▪ Increased use and supply of cycling infrastructure ▪ CBA → Target group: cyclists

Details of the evaluation activities

The occupancy and number of secured bicycle sheds will give a clear indication of the infrastructural improvements to offer safe cycling parking infrastructure. The occupancy will give an indication of the success of this measure in terms of the use of the new infrastructure.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up- scaling

Not applicable

Expected possible impacts for the measure 4.7 walking promotion

The expected impacts are:

- Improved quality of the walking conditions

The evaluation of the quality of the walking conditions will be done on integrated package level.

- Improved image on the walking conditions

The evaluation of the image of the walking conditions will be done on integrated package level.

- Increase of number of pedestrians

The number of pedestrians will be measured on integrated package level.

Selected indicators for the measure 4.7 walking promotion

In the table below an overview is given of all the evaluation activities

Table 35: Evaluation activities and indicators for the measure 4.7 Walking promotion

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.7-GEN Walking promotion	N/A measured on IP level	→ Target group: pedestrians at main train station area

Details of the evaluation activities

Not applicable

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up- scaling

Not applicable

Expected possible impacts for the measure 5.6 safe cycling corridor

The expected impacts are:

- Improved quality of the cycling conditions

The evaluation of the quality of the cycling conditions will be done on integrated package level.

- Improved image on the cycling conditions

The evaluation of the image of the cycling conditions will be done on integrated package level.

- Increase of number of cyclists

The number of cyclists will be measured on integrated package level.

Selected indicators for the measure 5.6 safe cycling corridor

In the table below an overview is given of all the evaluation activities

Table 36: Evaluation activities and indicators for the measure 5.6 Safe cycling corridor

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
5.6-GEN Safe cycling corridor	▪ Up –scaling	→ Target group: cyclists in corridor

Details of the evaluation activities

- Not applicable

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up- scaling

The measure 5.6 safe cycling corridor will improve the cycling conditions within the CIVITAS ELAN corridor considerably. Since the mobility department of the city of Gent wants to improve its bicycle plan (Fietsfonds), the results of this measure are of great value for them. Therefore an up scaling analysis will be carried out to estimate the effects of this measure when it will be implemented on the city scale. The results can then also be used by the city as a tool to improve its bicycle plan (Fiets-fonds).

Expected possible impacts for the measure 8.9 IT-based bicycle theft prevention

The expected impacts are:

- Improved quality of the bike services

The evaluation of the quality of the bike services will be done on integrated package level.

- Improved image on the cycling conditions and bike services

The evaluation of the image of the bike services will be done on integrated package level.

- Increase of number of cyclists

The number of cyclists will be measured on integrated package level.

- Decrease of stolen rented bikes and increase of recovered stolen rented bikes

The decrease of stolen rented bikes and the increase of recovered stolen rented bikes will be measured on measure level.

Selected indicators for the measure 8.9 IT-based bicycle theft prevention

In the table below an overview is given of all the evaluation activities an indicators for the measure 8.9 IT-based bicycle theft prevention.

Table 37: Evaluation activities and indicators for the measure 8.9 IT-based bicycle theft prevention

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
8.9-GEN IT-based bicycle theft prevention	▪ Measurement of: - Inventory of the (re-covered) stolen bikes ▪ BAU	▪ Increase of quality of bicycle theft prevention system ▪ CBA → Target group: students

Details of the evaluation activities

The amount of stolen and recovered bikes will indicate the impact of this measure. A detailed inventory will be carried out for this purpose.

Details for Business as usual and up- scaling

- BAU

Information of (recovered) stolen bikes is available since a couple of years. This information will be used to define the business as usual scenario to be compared with the results of the measure in terms of the amount of stolen and recovered bikes. .

- Up- scaling

Not applicable

Expected possible impacts for the measure 8.10 Route planner for bicycles

The expected impacts are:

- Improved quality of the bike services

The evaluation of the quality of the bike services will be done on integrated package level.

- Improved image on the cycling conditions and bike services

The evaluation of the image of the bike services will be done on integrated package level.

- Increase of number of cyclists

The number of cyclists will be measured on integrated package level.

- Increase of user acceptance of the route planner for bicycles

The user acceptance of the route planner for bicycles will be measured on the measure level..

Selected indicators for the measure 8.10 Route planner for bicycles

In the table below an overview is given of all the evaluation activities and indicators for the measure

Table 38: Evaluation activities and indicators for the measure 8.10 Route planner for bicycles

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
8.10-GEN Route planner for bicycles	▪ Measurement of: - Survey on user acceptance of the guiding system - Inventory of number hits	▪ Increased User acceptance level of route planner → Target group: cyclists

Details of the evaluation activities

To measure the impact of the route planner for bicycles the user acceptance will be measured. The level of acceptance will be measured through a survey.

The number of hits can also give an indication of the success of the route planner. This data is fairly easy to extract and can add to the overall picture of user acceptance.

Details for Business as usual and up- scaling

- BAU

Not applicable

- Up- scaling

Not applicable

C CBA

- 4.5-GEN House of the bike – bicycle sheds

Cost benefits of each type of bicycle sheds will be evaluated. Based on these results bicycle shed plan will be set up (larger implementation in city of Gent).

Table 39: Overview indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
Local authorities	Operating costs Capital costs (investment + maintenance costs)	Operating revenues
cyclists		Reduced stolen bikes

- 8.9-GEN IT-based bicycle theft prevention

Cost benefits of bicycle theft prevention programme will be evaluated since this is an innovative measure.

Table 40: Overview indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
Local authorities	Operating costs Capital costs (maintenance costs and investment costs)	Operating revenues
Cycling organisation	Investment bikes	Relocated stolen rental bikes Reduction of number of stolen rental bikes
cyclists		Security perception

5.1.5.3. Data collection

Table 41: Data collection inventory for IP5 Stimulating cycling and walking

INDICATOR	LEVEL[24]	FOCUS[25]	PERIODICITY	TYPE	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Costs bike theft prevention (operational and capital)	M	F	Before/ after	operational	euro	Bike theft prevention	Dec 2010	StudentEnMobiliteit
Costs bike sheds (operational and capital)	M	F	Before/ after	operational	euro	Bike theft prevention	Dec 2010	City of Gent, ML
Number of cyclists	IP		Before/ after	Operational	cyclists	Cyclists in corridor	Jan 2010 Jan 2012	City of Gent, Data Collector
Number of pedestrians	IP		Before/ after	Operational	pedestrians	Pedestrians on main axis of corridor	Jan 2010 Jan 2012	City of Gent, Data Collector
Quality cycling conditions and bike services (objective)	IP		Before/ after	Operational	Bikeability index	Selected streets in main train	Dec 2009 Dec 2011	University of Gent, ML

[24] M= Measure level

IP= Integrated Package Level

[25] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL24	FOCUS[25]	PERIODICITY	TYPE	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
						station area		
Quality cycling conditions and bike services (subjective)	IP		Before/ after	survey	questionnaire	Students, inhabitants (based on address information) and commuters.	Dec 2009 Dec 2011	University of Gent, ML
Quality walking conditions (objective)	IP		Before/ after	operational	Walkability index	Selected streets in main train station area	Dec 2009 Dec 2011	University of Gent, ML
Quality walking conditions (subjective)	IP		Before/ after	survey	questionnaire	Students, inhabitants (based on address information) and commuters.	Dec 2009 Dec 2011	University of Gent, ML
Inventory of (recovered) stolen bikes	M		yearly	operational	number	Bikes of StudentEnMobiliteit	Dec 2009 Dec 2011	StudentEnMobiliteit / MaxMobiel
(secured) bicycle shed occupancy	M		Before/ after	operational	%	Several types of new bicycle sheds	Dec 2009 Dec 2011	City of Gent, Data Collector
Image of cycling conditions and bike services	IP		Before/ after	survey	Questionnaire	Students, inhabitants (based on address information) and	Dec 2009 Dec 2011	University of Gent, ML

INDICATOR	LEVEL24	FOCUS[25]	PERIODICITY	TYPE	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
						commuters.		
Image of walking conditions	IP		Before/ after	survey	Questionnaire	Students, inhabitants (based on address information) and commuters.	Dec 2009 Dec 2011	University of Gent, ML
User acceptance of route planner	M		after	survey	Questionnaire	Cyclists using the route planner	March 2012	City of Gent, ML
Inventory of route planner contacts	M		After	operational	Number of hits	Hits on route planner	Month 18 to 35	City of Gent, ML

Details on the data collection

The evaluation on the quality of the walking conditions will be done by the University of GENT.

The objective quality of the walking conditions will be based on walkability index. This will be defined by the University of Gent based on literature study. A detailed inventory of the cycling conditions will however be the starting point to further define this index.

The objective quality of the cycling conditions and bike services will be based on bikeability index. This will be defined by the University of Gent based on literature study. . A detailed inventory of the walking conditions will however be the starting point to further define this index.

Survey on image and subjective quality of the walking, cycling conditions and bike services (including security) will take place in the main train station area and the axis Kortrijksesteenweg to Nederkouter – the centre of the CIVITAS corridor. This will be done by the University of Gent and following target groups will be contacted: students, inhabitants of the area (sample size based on number of addresses) and commuters.

The survey of the user acceptance of the cycle route planner will be integrated in the webpage. It will be integrated in the website during the project life cycle

5.2. City / corridor level

5.2.1. Objectives and scope

The objectives of all CIVITAS measures are

- Change of mobility behaviour towards sustainable transport modes as bike, foot and collective transport modes (Public transport, taxi and/or cambio) in the CIVITAS corridor. Analysis of the modal split within and outside the corridor is planned.
- Change of patronage in and outside the CIVITAS corridor
- Improvement of air quality on city level
- Improvement of the public support by citizen engagement/ participation of the mobility measures in the CIVITAS corridor (in the city of Gent). Analysis of the impact of the citizen engagement/ participation within and outside the corridor is planned.

5.2.2. Key Impacts

A description of the indicators that will be measured within the city corridor

5.2.2.1. Modal split

Survey will be done to analyse the evolution of the modal shift towards sustainable transport modes. Following indicators will be measured.

- % car users
- % car passengers
- % motor
- % cyclists
- % public transport (tram/bus/train)
- % pedestrians

The department Data-analyse and GIS collects on 3-yearly base (planned in 2009 and 2012) modal split data of the citizens of Gent. The modal split will be done on main trips towards work or school.

To analyse significant differences of the modal split of the corridor towards the city of Gent the same indicators and survey methods will be used for modal split analysis in the CIVITAS corridor.

5.2.2.2. Air quality

Results of the air quality will be based on results of Cube Voyager traffic model status 2007; expected status 2015 will be set up.

- CO2 emissions

In the Cube Voyager traffic model status 2007 an extra module is foreseen to get figures on emissions and air quality.

5.2.2.3. Citizen Engagement/Participation

Survey will be done to analyse the evolution of the public support of the mobility measures in the CIVITAS corridor.

The department Data-analyse and GIS collects on 3-yearly base (planned in 2009 and 2012) information concerning the acceptance level of the citizen's engagement/participation of the city of Gent.

To analyse significant differences of information concerning the acceptance level of the citizen's engagement/participation of the corridor towards the city of Gent the same indicators and survey methods will be used for the analysis in the CIVITAS corridor.

5.2.3. Data collection

Below the data collection inventory for evaluation activities on corridor level are described:

Table 42: Data collection inventory for the city of GENT

	DATA COLLECTION ACTIVITY	LEVEL [26]	PERIODICITY	TYPE	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
City / corridor level	Modal split	Corridor	Before/ after	survey	questionnaire	%	Citizens in corridor	Sept 2009 Sept 2012	SEM
	Citizen engagement/Participation	Corridor	Before/ after	survey	questionnaire	%	Citizens in corridor	Sept 2009 Sept 2012	SEM
	Air quality	city	Before/ after	modeling	modeling	g/m3	CO2, NOx, PM10	Sept 2009 Sept 2012	SEM

[26] M= Measure level

IP= Integrated Package Level

5.2.3.1. Details of the data collection

- Modal split

The department Data-analyse and GIS collects on 3-yearly base (planned in 2009 and 2012) modal split data of the citizens of Gent. The modal split will be done on main trips towards work or school. The number of samples representative to number on inhabitants of the city of Gent and to gender and age.

To get modal split information in the CIVITAS corridor, extra samples are foreseen. The extra survey in the corridor is planned in Sept. 2009 and Sept. 2011 (at least at Sept. 2012). The number of samples is representative to number on inhabitants of the corridor and to gender and age.

Significant differences of the modal split of the corridor towards the city of Gent will be analysed.

- Air Quality

Results of the air quality will be based on results of Car II Model with information from Cube Voyager traffic model status 2007; expected status 2012 will be set up. The study will be done by DTV consultants of the Netherlands together with the environment department of the city of Gent.

- Citizen Engagement/Participation

The department Data-analyse and GIS collects on 3-yearly base (planned in 2009 and 2012) information on citizen engagement. Extra budget and actions are foreseen to collect more samples in the CIVITAS corridor.

The department Data-analyse and GIS collects on 3-yearly base (planned in 2009 and 2012) information on citizen engagement data of the citizens of Gent. Number of samples representative to number on inhabitants of the city of Gent and to gender and age.

To get information on citizen engagement in the CIVITAS corridor, extra samples are foreseen. The extra survey in the corridor is planned in Sept. 2009 and Sept. 2011 (at least at Sept. 2012). The number of samples is representative to number on inhabitants of the corridor and to gender and age.

Significant differences of the information on citizen engagement of the corridor towards the city of Gent will be analysed.

6. In- depth process evaluation

In this chapter only the focus measures that are subject to the in- depth process evaluation are described. For these measures the process of implementation will be analysed very closely to obtain a full understanding and overview of the implementation process.

The non-focus measures will not be described here however some basic process evaluation will be provided for these measures based on a fill- in form filled in by the ML's on a yearly basis.

6.1. Measure 1.2-GEN Green fleet management

6.1.1. Description

See impact evaluation

6.1.2. Process stages

The process to increase the efficient use of the city fleet will be investigated. The process of the implementation of bio diesel in the city fleet will be evaluated as well.

The different stages of the process to increase the efficient use of the city fleet and to implement bio diesel (B30) in the city fleet are:

- City fleet drivers will be trained to drive more efficiently and safely
- Stimulating use of shared car fleet by providing more shared car fleet and developing a shared car registration tool
- The organisation of the distribution of B30, by developing a (separate) pump circuit.

This results in the following timeline:

Stage	year 1				year 2				year 3				year 4			
Providing ecodriving courses																
Stimulating use of shared cars																
Use of B30																

6.1.3. Methodology for the process evaluation

To evaluate the process of the implementation of the ecodriving courses, following persons will be interviewed:

- Responsible of the education and training department of the City of Gent who organised the eco driving training courses.
- The private organisation who has given eco driving courses towards the drivers.
- To evaluate the process of stimulating the use of shared cars, a focus group interview will be organised.

As the implementation of bio diesel in the city fleet depends on the success of the implementation of the measure 1.8 Extended bio diesel production, the process will be evaluated by interviewing the measure leaders of 1.8 and 1.2.

6.2. Measure 2.2-GEN Improved Public transport service levels

6.2.1. Description

See impact evaluation

6.2.2. Process stages

- Planning and design of redevelopment Kortrijksesteenweg
- Involve citizens in the planning processes by setting up several workshops (see focus measure 2.9)
- Implementation of the redevelopment of main public transport axis
- Design of the Real time passenger information (RTPI)-system
- Installation of the RTPI-system
- Research on quality of the public transport stops (lay-out, equipment and accessibility)
- Planning and implementation of the redevelopment of public transport stops

This results in the following timeline:

Stage	year 1				year 2				year 3				year 4			
Planning and design of Kortrijksesteenweg																
citizens participation																
Implementation of the redevelopment of main public transport axis																
Design of the RTPI system																
Installation of the RTPI system																
Research on quality of PT stops																
Planning and implementation of the redevelopment of PT stops																

6.2.3. Methodology for the process evaluation

Since there is a strong involvement of the focus measure 2.9 (participatory of the redevelopment of the main train station area); the process evaluation of the redevelopment of the Kortrijksesteenweg will be done together focus measure 2.9.

The process evaluation of this measure will be focussed on the process of the redevelopment of the Kortrijksesteenweg including the implementation of RTPI system along this axis, will be done by a learning history. The stakeholders are the partners involved in this project: De Lijn, AWV, the Mobility Department, Infopunt Gent Sint Pieters (measure leader 2.9), the district communication responsible of the city of Gent and some citizens. A special focus will be on the process of cooperation with citizens and other main stakeholder groups.

6.3. Measure 2.9-GEN Participatory re-development of main train station area

6.3.1. Description

See impact evaluation

6.3.2. Process stages

Only the process of the citizen's engagement and participation on the redevelopment of the main tram axes (Kortrijksesteenweg) will be investigated.

This results in the following timeline:

Stage	year 1				year 2				year 3				year 4			
Citizens engagement on redevelopment of main tram axes (Kortrijksesteenweg)																

6.3.3. Methodology for the process evaluation

Since there is a strong involvement of this measure on the focus measure 2.2 Improved public service levels, the process will be evaluated together with this focus measure. For more information see 6.2.

6.4. Measure 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

6.4.1. Description

See impact evaluation

6.4.2. Process stages

The process to implement an enforcement system with automatic number plate recognition will be investigated.

And define the different stages of this process

- Technical research and benchmarking
- Support of politicians
- Cooperation with several partners
- Planning
- Set up structured cell (hiring people, reorganise organisations…)
- Communication
- Implementation

This results in the following timeline:

Table 43: expected process stages for the measure 3.4-GEN Pedestrian area enforcement with automatic number plate recognition

Stage	year 1				year 2				year 3				year 4			
Technical research and benchmarking																
Support of politicians																
Cooperation with several partners																
Planning																
Set up structured cell (hiring people, reorganise organisations…)																
Communication																
Implementation																

6.4.3. Methodology for the process evaluation

The process evaluation will be done by interviewing partners involved in the project about the implementation of the pedestrian area enforcement system. The partners are the Mobility department and the parking company.

6.5. Measure 4.5-GEN "The House of Bike" and bicycle activities

6.5.1. Description

See impact evaluation

6.5.2. Process stages

The process of the setup of a House of the Bike will be investigated.

And define the different stages of this process

- Research and planning concept "House of the Bike" related to the present bike services
- Work out of the virtual "House of the Bike"
- Set up of the physical bicycle information point
- Communication

This results in the following timeline:

Table 44: expected process stages for the measure 4 .5-GEN "The House of Bike" and bicycle activities

Stage	year 1				year 2				year 3				year 4			
Research and planning																
Virtual House of Bike																
Physical bicycle information point																
Communication																

6.5.3. Methodology for the process evaluation

The process evaluation will be done by focus group workshop about the setup of the House of the Bike. Certainly the Bike Organisation (Fietsersbond) will be invited in this workshop.

6.6. Measure 5.7-GEN Security enforcement in public transport

6.6.1. Description

See impact evaluation

6.6.2. Process stages

- Implementation of "lijnspotters"
- Implementation of an educational 'Trammelant' bus
- Implementation of safety increasing measures as leasing extra cameras to equip 'older' buses.

This results in the following timeline:

Table 45: expected process stages for the measure 5.7-GEN Security enforcement in public transport

Stage	year 1				year 2				year 3				year 4			
Implementation of 'lijnspotters'																
Implementation of an educational 'trammelant' bus																
Implementation of cameras on 'older' buses																

6.6.3. Methodology for the process evaluation

The process evaluation will be done by a focus group workshop on the integrated approach to increase the security in public transport. This process will be evaluated with the measure leader and the head of the security coordination centre of De Lijn.

6.7. Measure 7.3-GEN Institutional platform for city freight management

6.7.1. Description

See impact evaluation

6.7.2. Process stages

The process of the setup of a freight platform will be investigated

And define the different stages of this process

- Set up workshops in selected streets. First workshops are focussed on the Vlaanderenstraat and surroundings. In the next coming years workshops focussed on other streets will be organised.
- Analysing several output workshops
- Implementing approved output of workshops

This results in the following timeline:

Table 46: expected process stages for the measure 7.3-GEN Institutional platform for city freight management

Stage	year 1				year 2				year 3				year 4			
Set up workshops of selected streets																
Output analysis																
Implementation output																

6.7.3. Methodology for the process evaluation

The process evaluation of this measure will be done by several learning history workshops within this platform where partners and citizens (shopkeepers, distributors and caterings) are involved.

6.8. Measure 8.9-GEN IT-based bicycle theft prevention

6.8.1. Description

See impact evaluation

6.8.2. Process stages

- Developing and implementing a unique physical form (frame) for rental bicycles;
- Installing secured sheds for rental bikes;
- Installing a theft prevention system in rental bikes; with hand computers to locate stolen or displaced bikes;
- Using “lokfiets”.

This results in the following timeline:

Table 47: Expected process stages for the measure 8.9-GEN IT-based bicycle theft prevention

Stage	year 1				year 2				year 3				year 4			
Unique physical frame																
Installation of secured sheds for rental bikes																
Installation of theft prevention system																
Using “lokfiets”																

6.8.3. Methodology for the process evaluation

The process evaluation will be done by an interview with the Board of StudentEnMobiliteit organisation about the integrated approach to decrease the number of stolen rental bikes.

Part 2: Site Evaluation Plan for the City of Ljubljana

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Site Evaluation Plan for the City of Ljubljana

1. City context

As the capital of Slovenia and the country's largest city (276,000 inhabitants), Ljubljana is a strong centre of economic and cultural activities for the wider region. Over 47.000 students, a wide range of companies and research facilities, many important national institutions, diplomatic services, and cultural facilities make it a vibrant and diverse city.

The historic city centre at the side of Ljubljanica River is the focus of urban life. The manifold activities in the area and the related movements of people and goods make urban transport a key variable for the economic success and the liveability of the city and the entire region. Ljubljana has a strong commitment to work towards a more sustainable urban transport system, which is also demonstrated through its participation in the CIVITAS MOBILIS and ELAN projects.

Ljubljana is a transport node at the intersection of two TEN corridors: V and X. Over the last 15 years there has been a constant growth in urban and regional car (and cargo) traffic. Transport in the city is causing air (NO_X, CO, CO_2, and PM10) and noise pollution, because commuter streams heavily rely on the private car use (at the present the ratio between car and PT is 59:13 inside the city and 74:8 in the region). This traffic streams are the origin of congestions during peak hours which significantly contribute to the present traffic situation in Ljubljana in general – average speed in the city centre ranges between 10 and 18 km/h. Therefore, among multiple measures towards improving the situation a congestion charging scheme with the aim of reducing car use deserves special attention. This needs to be combined with a significant change in the modal split in favour of modes that are less harmful for the environment such as public transport (by improving its quality, speed, safety and image), cycling and walking. Awareness, acceptance and citizen participation to take part in processes leading to better traffic situation is of key importance. A change in their minds is needed to reach the goal of better mobility and decreased emissions from the traffic in the urban agglomeration.

In table 1 emissions (CO_2, NO_x and particulate matter) for Ljubljana by economy sectors are given. Table 2 shows shares of transport emissions, derived from table 1.

Table 1: CO_2, NO_x and PM emissions in the City of Ljubljana by sectors (tons/year)

Sector	CO_2	NO_x	PM
Industry	104.940	191	5
Traffic and transport	**595.980**	**2.942**	**180**
Households and other	1.279.080	2.168	95
SUM	1.980.000	5.301	280

Source: Annual environmental report for the City of Ljubljana (2007)

Table 2: Shares (%) of CO_2, NO_x and PM emissions caused by traffic in the City of Ljubljana

Emission	Caused by traffic
CO_2	30,1
NO_x	55,5
PM	64,0

Source: Annual environmental report for the City of Ljubljana (2007)

Ljubljana's public transport system is a typical example of inefficient use of the public transport, as reflected in imbalanced and excessive use of individual means of transport. This imbalanced and inefficient use of public transport is related to encouraging individual (passenger vehicle) mode of city transport, and to a different arrangement of time-space pathways i.e. daily activities of habitual city actors. If 10 years ago about 40% of the working population drove to work by their cars, the current number is about 85%. It should also be mentioned that the existing traffic situation contributes to the increasing significance of commercial centres located on the city outskirts (e.g. BTC, Rudnik) vs. the city centre. The rapid growth of shopping centres located on the city outskirts and reduced adaptability of the city centre to shoppers' needs (increased demand for car access) inevitably leads to a decrease in the number of visitors and reduction of the significance of the city centre for engaging in various leisure and cultural activities, such as going to the cinema, theatre, exhibitions, walking, shopping, dining, etc. Although the problem of intense car traffic is evident in the case of Ljubljana, up to now there did not exist a collective effort i.e. interactive communication and synergistic cooperation between various institutions that deal with mobility in the field of public involvement, information and marketing. Mobility marketing campaigns mainly existed on the level of individual institutions that are directly linked to transport services (e.g. LPP, the city PT operator). More has been done on the level of gathering specific data and information concerning the traffic flows in Ljubljana (e.g. a survey on the number of car users in specific parts of Ljubljana) but again without networking and synergistic effect that would provide reliable solutions for the optimisation of individualised transport in the city centre of Ljubljana.

2. Target Corridor

The traffic situation in Ljubljana shows the following situation: the morning rush hour traffic is in the direction towards the city, the afternoon rush hour traffic heads to the opposite direction. Both are consequences of high volume commuter streams from other places to Ljubljana. Besides this, inside the town the citizens who use their own cars instead of public transport or other alternative transport modes generate additional traffic.

Personal car use has reached a significant level in Slovenia and it has been increasing for the last 15 years compared to the other modes of transport.

At the same time, Ljubljana's city centre is crowded and there is a permanent lack of parking places. During the day employees, who arrive to their job by car, occupied most parking places. Because of the traffic congestion, the public transport is slow and unpunctual, therefore unattractive. This is a vicious circle where - without an important intervention – a change is not possible. The intervention to be tested/demonstrated in the framework of the CIVITAS ELAN project, however planned at the level of the new Ljubljana Municipality spatial plan, is the corridor throughout the city centre.

The corridor will be crossing the city from south to north. It begins and ends on both sides on motorway ring and comprises the following major roads: Barjanska, Slovenska and Dunajska. In the last year a very important bridge has been constructed on Barjanska road. Thus Barjanska road is the shortest link from the motorway to the city centre. Construction of a P+R facility in the coming years is proposed at the junction of the South ring and Barjanska road in the new Urban plan. At the end of Dunajska road before entering the city centre a new main passenger interchange centre is planned. In the middle of the corridor around Slovenska road there is the city centre. In this section of the corridor there are the only dedicated lanes for public transport in the whole city road network. Dunajska road is connecting the city centre from the north. This is the most congested arterial road inside the motorway ring and extra priority is needed for a high quality bus corridor. Construction of a P+R facility in coming years is proposed in the new Urban plan close to new development – a new Stadium with supportive services.

The corridor is presented in Figure 1.

Figure 1: Ljubljana demo coridor

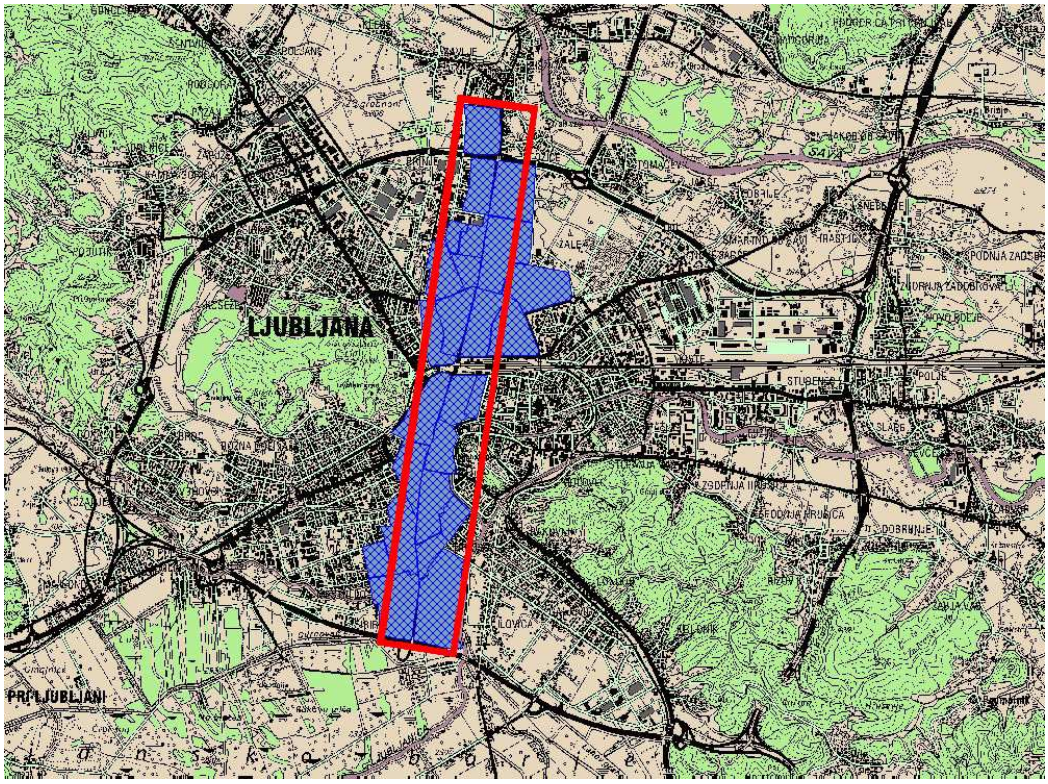

Table 2: Key characteristics for the city of Ljubljana (figures in brackets are for the Municipality of Ljubljana due to statistical source of information, www.stat.si, 2007)

Characteristics	City	ELAN- Corridor
Area		
Surface (km²)	75 (275)	8
Transport		
Car ownership (per 1000 inhabitants)	tbd	tbd
% daily trips by mode of transport		
- Car	57	tbd
- Walk/cycle	19/10	tbd

- Bus	13	tbd
Society and economy		
Population	(267760)	tbd
% unemployment	7.3	n/a
% employed in service sector	n/a	n/a
% pop over age 65	17	tbd
% pop under age 16	18	tbd
Energy and environment		
% estimated energy use – Transport	n/a	n/a
% emissions of Carbon Dioxide by road sector	30 (see Tables 1 and 2 above)	n/a

Note: tbd – to be determined; n/a –not pplicable/available

3. Overview of all the evaluation activities

In table 3 an overview can be found of all the evaluation activities planned during the project life cycle in the city of Ljubljana. The table includes information on the level at which the evaluation task will be carried out; city/corridor level, Integrated Package level or Measure level and the type of evaluation task (basic and/or in-depth evaluation).

In terms of final interpretation of the CIVITAS ELAN effects in Ljubljana it is important to note that a wider context of city development will also be considered. Namely, stakeholders who are responsible for citizens welfare (quality of life, public health, economic and spatial development, etc.) strive to implement not only transport related but also a number of other policies/strategies/measures which contribute to city's life and have implications to the city transport. Therefore, it is not only the isolated effects of particular CIVITAS measures which will provide answers to the higher policy level questions of welfare, but a combination of effects of different measures implemented in the city. So, the overall approach of evaluating and interpreting expected transport changes/improvements in Ljubljana is a combination/integration of different effects on measure and IP level in ELAN on one side, and related measures and policies outside ELAN on the other. The ultimate purpose of such evaluation efforts is twofold:

- first, to show how beneficial (worthwile) was to implement the CIVITAS ELAN measures in Ljubljana based on trustworthy CBA and strategic environmental asessment, involving public health considerations, for the citizens of Ljubljana
- second, to contribute to the overall understanding what are the effective and reasonable ways for the implementation and operation of transport improvements in urban agglomerations, and what are the potentials for their transfer/application elsewhere in the world – based on Process and Impact Evaluation involving CBA of the ELAN measures.

.

Table 3: Summary table of the evaluation activities for the city of Ljubljana

City/ IP/Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA/ financial	In- depth Process evaluation
City/ corridor level	Modal split Air quality	x				
IP 1	MAKING PT IN THE CORRIDOR THE MOST DESIRABLE TRANSPORT MODE	x	x			x
1.11	Hybrid bus implementation		x	x	x	x
2.1	Integrated high-quality mobility corridor[1,2]	x			x	x
3.1	Implementation of a sustainable congestion charging scheme in co-operation with actors on national and regional levels	x				
4.1	Individualized mobility marketing based on public involvement and inclusion in defining city transport policy	x				
8.1	Public Transport priority at intersections	x		x		
8.4	Real time information for staff and passengers	x		x		
8.5	E-ticketing and fare integration				x	x
IP 2	FOR VITAL, HEALTHIER AND SAFER CITIZENS IN CITY TRANSPORT	x				x
4.6	Comprehensive Cycling Strategy	x		x		

[1] Evaluation of modal split changes is one of the evaluation tasks for this measure (situation befor/after)

[2] Evaluation of air quality changes is one of the evaluation tasks for this measure (situation befor/after)

City/ IP/Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA/ financial	In- depth Process evaluation
4.9	Update of the Sustainable Urban Transport Plan					x
5.2	Safety & security for seniors and PT users	x				
5.4	Safe routes to school	x				
5.5	Reduces speed zones	x				
6.1	Demand responsive service		x	x	x	x
IP 3	IMPROVED FREIGHT TRANS-PORT	x		x		x
7.1	Integrated freight policy develop-ment		x	x		x
7.2	Sustainable Freight Logistics	x		x	x	x
	Other Measures					
1.7	Pure plant oil for vehicle propulsion		x	x		
1.12	Green procurement for public fleets		x	x		

4. Focus measures

For the city of Ljubljana a selection of focus measures was made. For these measures extra attention will be paid to all the evaluation activities but a strong focus will be on the CBA and the in- depth process evaluation. The motivation behind this selection is described below.

- 1.11 Hybrid bus implementation

The PT provider in Ljubljana (LPP) checked a wide scale introduction of biodiesel in its buses in CIVITAS Mobilis project. The outcome of this testing was negative. Therefore LPP decided to purchase hybrid buses instead of buses running on biodiesel. Since it was not clear for the LPP managers which type of hybrid buses it is best to choose CIVITAS Elan demo activities are to clarify these questions. In addition it is expected that hybrid buses, since the public perceives them as the most clean in comparison to regular or buses running on biodiesel or gas, will contribute to higher usage of PT in the city of Ljubljana. In this context this measure has been chosen as a focus measure to thoroughly check whether cleaner/hybrid buses really contribute to higher PT usage and to understand costs and benefits of introducing hybrid buses in PT. Comparison of their costs with costs of the regular buses will serve as an additional argumentation for decision making of the LPP managers.

- 2.1 Integrated high-quality mobility corridor

Introduction of the mobility corridor requires not only a transport related consideration of the issues but many others as well. One of the most demanding areas for consideration and reaching agreement among involved parties is the change and adoption of the spatial/land-use plan for the city of Ljubljana. New infrastructure objects related to the corridor are to be built on one side, e.g. P+R which require prior land acquisition and attraction of services and business providers at these sites (as to make P+R operational and functional), while some others are to be removed as to make the corridor wide enough for fluent traffic. There are many barriers and drivers expected on the way towards implementation of this measure; also, its operation will bring a number of technical and societal issues which will require prompt and justifiable responses. For all these reasons this complex measure has been selected as a focus measure to clearly understand and monitor its implementation, and to assess its implication on land-use and urban planning and agreements and disagreements among stakeholders and citizens. In final instance it is expected that it will be possible to demonstrate that public transport can be competitive (based on CBA/financial evaluation), efficient (time savings), comfortable and attractive (surveys on acceptability and perception of PT users).

- 6.1 Demand responsive services

This is an innovative measure in Ljubljana. Existing providers of services for disabled persons do not meet all the needs; also there are areas in the city where PT services are lacking. Thorough evaluation of the implementation and operation of this measure is aimed at collecting information on its development and success with the possibility of extending and transferring it to other areas/cities. It will be crucial to see how beneficial the investments into demand responsive services turned out after a couple of years of operation, and what is the satisfaction of the users of these services.

- 7.2 Sustainable Freight Logistics

This is an innovative measure in Ljubljana. It is expected to find out what is the effectiveness of such logistics in terms of energy and time savings for cargo distributers, what are the benefits in terms of streets occupancy at critical hours, and what is the satisfaction/unsatisfaction of neighboring business and living occupancies. Efforts will be paid to monitoring of change in noise and air pollution levels at selected sites and hours in the city centre.

- 8.5 E-ticketing and fare integration

This measure is expected to contribute to improvements in modal split, especially regarding the PT usage in the city and at the regional level. As a part of the measure 2.1 (mobility corridor), i.e. together with other measures consisting 2.1, improvements will be measured by means of indicators like (reduced) travel times in the corridor, (lower) fuel consumption, (lower) energy use, (lower) pollutants emission, (better) image of the PT in Ljubljana, etc. One of the key evaluation components will be monitoring of the process and success of the measure implementation and operation.

Table 4: List of focus measures for the city of Ljubljana

MEASURE NUMBER	MEASURE TITLE	IN-DEPTH ANALYSIS		MOTIVATION					
		Cost benefit analysis	In – depth Process	Towards greener	Towards free- flowing towns and	Towards smarter	Towards accessible urban	Towards safe and secure ur-	Key Motivation
1.11	Hybrid bus implementation	x	x	xxx					To check whether cleaner buses contribute to higher PT usage; to understand costs and benefits of introducing hybrid buses in PT and to compare their costs with costs of the regular buses
2.1	Integrated high-quality mobility corridor	x	x	xx	xxx	xxx	xxx		To clearly understand and monitor/follow the implementation of such a complex measure; to assess its implication on land-use and urban planning - agreements and disagreements among stakeholders and citizens
6.1	Demand responsive services	x	x				xxx	xx	Innovative measure; to monitor process and success of its implementation
7.2	Sustainable Freight Logistics	x	x	xxx		xxx			Innovative measure; to monitor process and success of its implementation
8.5	E-ticketing and fare integration	x	x		xxx	xxx	xxx		To monitor process and success of its implementation

5. Impact Evaluation

5.1. Measure and Integrated package level

5.1.1. Integrated package 1: Making PT in the corridor the most desirable transport mode

5.1.1.1. Description

A Objectives and scope

IP objectives

- Establishment of a high quality mobility north - south corridor through the city centre and towards neighbouring municipalities, integrating a variety of measures and transport modes,
- Demonstration that public transport can be competitive, efficient, comfortable and attractive.

Measure related objectives

- 1.11 Hybrid bus implementation
  - To introduce clean and energy efficient public transportation hybrid buses in Ljubljana
  - To train 20 instructors on eco-efficient hybrid bus driving
- 2.1 Integrated high-quality mobility corridor
  - To increase travel speeds and raise PT usage on the corridor
  - To demonstrate that public transport can be competitive, efficient and fast
  - To develop and demonstrate efficiency of a mobility management plan
- 3.1 Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels
  - To make a study on alternative congestion charging schemes
  - To achieve a formal agreement among decision makers on implementation plan for selected congestion charging scheme in the Ljubljana region
- 4.1 Individualized mobility marketing based on public involvement and inclusion in defining city transport policy
  - To analyse the public opinion (of selected target groups) concerning the adoption of new transport measures;
  - To develop and implement an individualised mobility marketing strategy based on individuals as a target group (inhabitants of Ljubljana and potential users of public transport)
- 8.1 Public Transport priority at intersections
  - To increase average speed of the bus fleet on the corridor
  - To make PT in the corridor competitive with other transport modes in terms of costs and benefits, and travel times
- 8.4 LJU Real time information for staff and passengers
  - To provide staff and passengers with real time information about public transport services at different locations on the corridor;
  - To attract passengers who commute to the city to use park & ride ;
  - To increase passenger satisfaction with, and accessibility of, the PT system
- 8.5 E-ticketing and fare integration

- To create an integrated e-ticketing system for all PT operations on the local and regional level
- To contribute to modal split changes towards increase of PT on city and regional level

B Overview of the measures

- 1.11 Hybrid bus implementation

The measure is focused on purchasing and operation of 27 hybrid buses. The improvements in terms of energy efficiency, pollutants emission, bus/PT usage, and customers' satisfaction are to be monitored and evaluated. Before purchase of the buses testing of different hybrid bus types will be performed. Testing will cover examination of the performance of each hybrid bus type at different weather and traffic conditions in Ljubljana, e.g., low temperatures in winter time and high ones in the summer, daily and seasonal variations in bus occupation, as well as service and maintenance frequencies and costs, etc.

Training programme for 20 instructors on eco-efficient hybrid bus driving will also be made. Afterwards, these 20 instructors will train other hybrid bus drivers.

Training of maintenance personnel for hybrid buses will be applied; among these 6 instructors will be trained.

- 2.1 Integrated high-quality mobility corridor

This measure integrates a number of (sub)measures. Such a concept requires additional effort in coordination, where a measure leader needs to demonstrate a high level of technical and organisational competence on one side, and personal authority on the other. In addition, since implementation and operation of the measure relates to different stakeholders and their interests, the measure leader needs to express at least basic sensitivity for political circumstances. Anyhow, the list of related measures is the following:

- 1.11-LJU Hybrid bus implementation
- 3.1-LJU Implementing a sustainable congestion charging scheme in cooperation with actors on national and regional levels
- 4.1-LJU Individualized mobility marketing based on public involvement and inclusion in defining city transport policy
- 4.6-LJU Comprehensive cycling strategy
- 4.9-LJU Update of the Sustainable Urban Transport Plan
- 5.2-LJU Safety & security for seniors and PT users
- 5.5-LJU Reduced speed zones
- 6.1-LJU Demand responsive services
- 7.2-LJU Sustainable freight logistics
- 8.1-LJU Public transport priority at intersection
- 8.4-LJU Real time information for staff and passengers
- 8.5-LJU E-ticketing and fare integration

The following activities for implementation of a high quality corridor as a first step towards a modern city public transport will be performed:

- Dedicated bus lines on the corridor
- Additional infrastructure and equipment improvements for cyclists and pedestrians.
- P+R sites at both ends of the corridor.
- Improvement of PT efficiency and quality by implementing:
    - PT priority at crossroads (Measure 8.1)

- On-trip information for passengers on PT buses and static and real-time information on bus stops (Measure 8.4)
- Integrated e-ticketing system (Measure 8.5)
- Accessible PT also for disabled (Measure 6.1)
- Cleaner and more attractive PT vehicles (Measure 1.11)
- Improving connections with neighbouring municipalities – regional level (Measure 8.5)
- Training for improved competencies in PT and eco-driving domain (Measure 1.11).
- Mobility management plan for the new administrative building of the Municipality of Ljubljana and a major traffic generator along the corridor.

- 3.1 Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels

Today it becomes clear that urban transport problems are so pressing that urban road pricing measures need to be implemented with a focus on the improvement of the quality of urban space by the reduction of congestion and consequently air and noise pollution.

The goal is to make a step forward towards a road pricing tool that reduces car traffic in the city. Cities London and Stockholm demonstrated that congestion charging schemes can have impact when designed according to local conditions and problem solving. Ljubljana aims to be among those forerunner cities implementing a sustainable congestion charging scheme that benefits its citizens with a higher quality of life and better health.

The development of a commonly accepted and effective congestion charging scheme needs thorough preparation. This includes the following activities:

- Comprehensive analysis on urban road pricing experiences from elsewhere, helping to design a tailored Ljubljana scheme
- Study on possible additional measures for traffic regulation considering different possibilities of congestion charging
- Proposal of the congestion pricing scheme in Ljubljana
- Selection and presentation of the most appropriate technical solution for the implementation.

- 4.1 Individualized mobility marketing based on public involvement and inclusion in defining city transport policy

Any change to the traffic arrangement in a city can have significant effects on the socio-economic development of individual city quarters, especially the city centre, which is highly sensitive to changes due to its protected, compact historical structure. In this context, introducing restrictive traffic measures (e.g. introducing a congestion charging) in the city centre can have negative impact on the development of the city. In order to preserve present positive aspects of life in the city centre (the variety of events, shopping and other socio-economic services), the measures that are expected to be implemented need to be subjected to scrupulous consideration so that they will stimulate the preservation of the existing living routines of the citizens, visitors, consumers, employees, etc. From the aspect of curbing the process of the city centre's functional impoverishment and transfer of certain activities (shops, services, culture) to the outskirts of the city, the existing socio-environmental channels and routines of individuals must be studied carefully after which the urban transport system should be adapted accordingly.

The measure consists of:

- Research on Ljubljana's current and potential public transport users, their positions, values and motivations

- Based on these a tailored individualised mobility marketing strategy based on individuals as a target group (inhabitants of Ljubljana and potential users of public transport), will be developed and implemented via a range of innovative measures
- A multi-stage analysis on legitimacy of changes i.e. interventions into the socio-environmental structure of the city will be conducted. To this end, a quantitative study will have to be repeated, i.e. a longitudinal study will need to be prepared (i.e. the same study will be carried out twice, at two different points in time, on a representative sample(s) for the City of Ljubljana), which will show how, or if at all, the public attitude towards the traffic has changed over time.

Individualized mobility marketing campaign will be planned and implemented to influence travel demand/behaviour by:

- building individual capacity to use more sustainable alternatives to car, and
- building local stakeholders capacity to assist individual choice of travel in the city.

Campaign will focus on households in the area of the corridor where differentiation will be made among the population (regular users of the alternative modes of transport with/without interest in more information, interested in the project, not interested in the project).

Target groups will be individually addressed by specially trained personnel who will provide information on availability, advantages and possibilities of:

- alternative modes of transport to personal car,
- destination shift,
- smart use of cars.

Campaign will also cover local traffic generators (shopping malls, public buildings, etc.). Networking among local NGOs and schools is expected.

- 8.1 Public Transport priority at intersections

Currently, congestions in the city centre determine average speed between 10 and 18 km/h. Based on a study related to traffic light priority for selected critical junctions in the city centre, which has been performed in 2006-2007, a number of issues and their solutions have been identified to be treated by this measure.

At the national and European level research in the field of prioritisation of PT show that communication technology which enables communication between PT fleet and traffic light infrastructure contributes to effectiveness of PT. Traffic light priority has already been successfully implemented in several cities where average saving time per bus is around 20% for junctions equipped with such a communication system.

First, the work will be carried out as a study on the effect of direct communication between PT fleet and infrastructure in the corridor to ensure input for the demonstration part:

- A development of models and proof of concept using historical and real time data. The analysis of different traffic light intervals impact and pre-emption at the intersections will be made
- Based on results, objectives of changed traffic control parameters (for instance: extension of green light interval) will be defined and new traffic control parameters will be implemented.

The demonstration activities will include:

- Equipment for 210 buses with direct communication technology called Zigbee to enable communication between PT fleet and infrastructure and exploitation of this technology on the corridor
- Equipment for 26 intersections with Zigbee, direct communication technology

- Set up of the communication between PT fleet and traffic lights
- Practical control of new system functioning by PT fleet drivers
- Testing reliability of new traffic system by PT fleet drivers

- 8.4 LJU Real time information for staff and passengers

The purpose of this measure is to implement the infrastructure and technology that will provide passenger and staff with real time PT information (schedule, delays, travel times, occupancy, etc.). Consequently, the image of the PT services is expected to be gradually improved.

The work encompasses:

- LED information display on the corridor
- Integration of LED information display on bus stops with present LPP information system to support real-time information for passengers
- Integration of two large roadside LED information displays prior to the exit to P+R with the present LPP information system to provide drivers actual info on PT; this will enable P+R users to promptly decide on PT use
- Implementation of direct communication technology called Zigbee between PT fleet and bus stops on the corridor for higher information accuracy (see measure 8.1)

The demonstration activities will include:

- Equipment for 33 bus stops with remotely managed LED information displays for real time information about estimated time of bus arrivals
- Implementation of direct communication technology (Zigbee) at the bus stops for higher information accuracy so that passengers get as reliable information as possible
- Equipment for 2 P+R facilities with 2 large roadside LED information displays to attract the drivers who are entering the city to use P+R and related service
- Monitoring of predicted bus arrival information displayed on LEDs and testing the reliability by PT operator

- 8.5 E-ticketing and fare integration

The measure includes integration of information systems (fares and timetable) of all public transporters. It will be an innovation for operators at the local and regional level and a complete novelty to passengers, who will be able to travel with one ticket on all transport modes. The system will use contactless smart card technology for electronic ticketing. Furthermore, passengers could purchase tickets via new modern payment system; it is the M-pay technology, which provides cashless payment via mobile phone. In the future (i.e. after CIVITAS) the system could be transfered to regional level or even wider.

Integration of PT services consists of 2 phases:

- Phase 1: providing contactless card as a payment tool for buying train tickets for whole Slovenia
- Phase 2: contactless card that enables users to travel within city area for different time zone (90 minutes or whole day) by bus (LPP) or/and by train (SZ).

Both SZ and LPP already perform regular surveys on passengers' satisfaction; the changes in opinions, acceptability (perception) and modal split pertinent to the implementation of the measure will be checked/evaluated.

C Innovative aspects

Innovative aspects of the measures are:

- New conceptual approach
  - Measure 2.1: establishment of a corridor by integrating urban planning with technical solutions on PT operation and specific mobility plan.
  - Measure 3.1: development of the congestion charging scheme tailored for Ljubljana
- Use of new technology/ITS
  - Measure 1.11: hybrid buses bring improvement in different aspets; this will be first operation of such buses in Slovenia.
  - Measure 8.1: communication technology for communication between PT buses and traffic light infrastructure (Zigbee). This technology provides priority for PT buses at intesections. It is planned to run this technology over Galileo when operational.
  - Measure 8.4: LED displays associated with P+R facilities informing users about PT possibilities etc. as well as provision of inforrmation to drivers and PT users.
  - Measure 8.5: fare integration among PT providers/operators by using contactless smart card.
- Targeting specific user groups
  - Measure 4.1: individual mobility marketing in the city centre for the purpose of changing travel habits.
  - Measure 1.11: Training on eco-driving will be performed for the first time
- New economic instrument
  - Measure 3.1: development of the congestion charging scheme tailored for Ljubljana
- New policy instrument
  - Measure 2.1: establishment of a corridor by integrating urban planning with technical solutions on PT operation and specific mobility plan.
  - Measure 3.1: development of the congestion charging scheme tailored for Ljubljana
- New organisational arrangements or relationships
  - Measure 8.5: fare integration among PT providers/operators (LPP and SZ) which did not cooperate so far.
- New physical infrastructure solutions
  - Measure 2.1: establishment of a corridor by integrating urban planning with technical solutions on PT operation. The measure involves construction of at least two P+R facilities.

D Research and technical development

The establishment of the corridor (measure 2.1) is a pre-condition for making PT the most desirable transport mode in the corridor. A study will show how this new arrangement will influence the mobility of the general public. We have to bear in mind that the general public is still car oriented and apart from the restrictions on using cars in the city centre provisions of new P + R facilities with a new high quality bus line are to be implemented.

The Park & Ride locations which are foreseen in the Urban Development Plan of the City of Ljubljana will be evaluated in detail by urbanists, land-use and traffic expert group:

- Spatial/land-use, economic, and functional appraisal and than selection of the best proposals
- Analysis of the ownership of the land and possibilities to purchase or rent
- Appraisal of the parking places which includes nfrastructure and equipment
- Obtaining construction permit.

For this ambitious measure a communication and marketing plan will be prepared. The outreach high quality mobility corridor campaign will be formulated.

A new approach of mobility management for new developments will be tested. The new administrative building of the Municipality of Ljubljana will be a very valuable pilot project, where investors will be asked to apply mobility management concepts during the project preparation phase.

Prior to the implementation of measures 8.1 and 8.4 modeling will be performed to identify the best set of program settings as to achieve the highest efficiency of the measures. The Zigbee technology together with Galileo will be used in Slovenia for the first time.

Studies in relation to design, implementation and operation of measure 8.5 will enable efficient application of new technology associated with the usage of contactless card and mobile phone supported purchasing of tickets in the PT system.

E Situation before CIVITAS

The traffic situation in Ljubljana shows the following: the morning rush hour traffic is in the direction towards the city, the afternoon rush hour traffic heads the opposite direction. Both are consequences of high volume commuter streams from other places to Ljubljana. Besides this, inside the town the citizens who use their own cars instead of public transport or other alternative transport modes generate additional traffic/congestion.

Personal car use has reached a significant level in Slovenia and it has been increasing for the last 15 years compared to the other modes of transport.

At the same time, Ljubljana's city centre is crowded and there is a permanent lack of parking places. During the day employees, who arrive to their job by car, occupy most parking places. Because of the traffic congestion the public transport is slow and unpunctual, therefore unattractive. This is a vicious circle where - without an important intervention – a change is not possible.

To solve this problem a number of measures are combinedto achieve an effective mobility corridor through the city centre. The corridor will be crossing the city from south to north. It begins and ends on both sides on motorway ring and comprises the following major roads: Barjanska, Slovenska and Dunajska. In the last year a very important bridge has been constructed on Barjanska road. Thus Barjanska road is the shortest link from the motorway to the city centre. Construction of a P+R facility in the coming years is proposed at the junction of the South ring and Barjanska road in the new Urban plan. At the end of Dunajska road before entering the city centre a new main passenger interchange centre is planned. In the middle of the corridor around Slovenska street there is a city centre. In this section of the corridor there are the only dedicated lanes for public transport in the whole city road network. Dunajska road is connecting the city centre from the north. This is the most congested arterial road inside the motorway ring and extra priority is needed for a high quality bus corridor. Construction of a P+R facility in coming years is also proposed in the new Urban plan close to new development – a new Stadium with supportive services. In the context of regional public transport planning several other P+R facilities are planned around the city of Ljubljana. Additional attraction of citizens to use PT is expected by introduction of new hybrid buses (measure 1.11) and availability of service on demand (measure 6.1); both are lacking at the moment in the city of Ljubljana.

Freight transport in/through the city centre has been recognised as an issue, however, no specific solutions are under development. Existing system for controlling freight transport (deliveries to stores and other business) is by means of permits issued by the COL. Measure 7.2 has an ambition to motivate several companies to establish a network aimed at performing deliveries in a more sustainable manner.

Agricultural sector in Slovenia rests on small farms striving to produce quality, specific products like wine, cheese, olive oil, meat, vegetables. Capacities are for domestic use only, with a few exceptions in terms of appearance on the international market. In such a situation there is no infrastructure on national/regional level which would provide continuous introduction of innovations into production process. The measure 1.7 Pure plant oil for vehicle propulsion brings new thinking into agricultural economy and self-sustainability of small farmers.

F Inter-relationships with other measures

The Ljubljana urban region is in the process of preparing a new spatial plan. Considerable efforts go towards integration of new housing needs, employment and living zones with the traffic infrastructure development and other solutions which are aimed to reduce the need to travel as well as to achieve spatial cohesion. This approach has been already applied in the process of renewal of the spatial plan for the Municipality of Ljubljana; it is now in the process of adoption. In parallel to these activities the new PT concept for Ljubljana region is under development. All these efforts go in line with the CIVITAS ELAN measures and their goals. Strategic assessments which are obliged for the above mentioned spatial plans are being made with the inclusion of evaluation criteria which also come from the CIVITAS Initiative. It is hoped that such networking and synchronization will bring improvement in a number of aspects of citizens' life in Ljubljana region.

5.1.1.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts

The expected effects of the IP1: Making PT in the corridor the most desirable transport mode, are:

- reduction of congestions

  Creation of the corridor is expected to bring a whole range of improvements in the city transport, as well as in the citizens' behaviour and environmental quality. However, these improvements depend on successful implementation of a number of measures and their specific impacts. One of these is making PT in the corridor efficient, comfortable, and reliable. If all of these expectations come true it is reasonably to expect that transport in the city centre (corridor) will reorganise in a way to reduce travel times, congestions, air and noise pollution, etc. Occurrence of these effects will be monitored/evaluated by means of direct measurable indicators (e.g., travel times in the corridor) and semi-qualitative and qualitative interpretation of the benefits (e.g., general improvement of air quality along the corridor as a consequence of reduced fuel consumption/pollutant emission).

- increase of attractiveness/desirability of the PT (change in perception)

  It is expected that establishment of the corridor, involving the whole range of measures (see measure 2.1) will attract citizens (and others) to take the advantage of its use. In terms of transportation in the city the effect will be seen as an increase of attractiveness/desirability of the PT. Whether this realises or not the evaluation activities will follow by means of surveying/checking the perception of the PT users before and after.

- change in modal split (more PT, more cycling, more walking)

  If PT in the corridor becomes the most desirable transport mode as expected, it will reflect as a change in modal split. The change will be measured by means of combination of targeted survey and traffic modeling in the city centre.

- reduction of travel times

  See reduction of congestions above.

- reduction of energy/fuel consumption

  See reduction of congestions above.

- reduction of air pollution

  See reduction of congestions above.

Selected indicators

A number of evaluation activities (with associated indicators for quantitative and qualitative measurement of their impact) will be applied to monitor both progress and success/effects of the corridor implementation. The main evaluation activities on IP level are listed in the Table 5 below.

Table 5: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 1: MAKING PT IN THE CORRIDOR THE MOST DESIRABLE TRANSPORT MODE	Combining results of different measures to come to the conclusions at IP level: ▪ Measurement of the change in the acceptance level of the PT by different users ▪ Measurement of changes in the average speed of PT buses, ▪ Measurement of reduction of congestion levels in the corridor ▪ Measurement of the improvement in environmental quality in the corridor (noise and emissions) ▪ Evaluation of the level of stakeholders satisfaction with changes in the corridor ▪ evaluation of costs and benefits of the corridor implementation (establishment and operation)	▪ Whether the establishment of a high quality mobility corridor has been successful ▪ Whether the demonstration that public transport can be competitive, efficient, comfortable and attractive is solid (persuasive, robust, technically justifiable) → Scope: corridor → Target group: PT users, citizens, business providers (small and micro enterprises)

Details of the evaluation activities

The individual measures consisting IP1 should be understood as a set of pre-conditions for successful establishment and operation of the corridor. The expected role of PT in the corridor is pre-determined, however, it remains to be seen whether expectations regarding desirability and efficiency of the PT will come true. Additionally, during operation of the corridor there is a need for maintaining PT as the most desirable transport mode, if the corridor is perceived (accepted) as a contribution to better transport, business and life in the city. In that context successful implementation of the measure 2.1 is crucial[3]. At the same time proper monitoring of this success is needed as a tool for prompt triggering of intervention activities to remove/mitigate barriers, if needed. Intervention may be needed, for example, regarding improving the efficiency of the measures 8.1, 8.4 and 8.5. Evaluation activities will properly cover these issues by collecting data on the performance of a particular measure by using indicators which will provide evidence on the effect of the particular measure. For checking desirability of the PT in the corridor the following minimal set of indicators will be applied:

- (perception of) acceptability of the PT in the corridor; the indicator combines several characteristics of the PT/vehicles like reliability/punctuality, comfort, cleanliness, environmental performance,

[3] It is important to note the difference when interpreting measure 2.1 in the context of IP1 and individually. In terms of constituen

etc.; this indicator measures synthetic, i.e. overall response/perception regarding PT in the corridor. It is worth having the overall picture about how citizens perceive the corridor and the PT as its key operational component.

- availability and accessibility of PT related information for all users (consideration of different target groups); this indicator measures quality and reliability of the PT related information – both are important for PT users
- (perception of) physical/urban changes in the city due to corridor establishment; the indicator measures response of the citizens (living in the wider area along the corridor) to urban changes which will occur together with the construction of the corridor, like new infrastructure objects (P+R), demolishing of several buildings, etc.
- (perception of) business related changes due to corridor establishment; the indicator measures how business providers (small and micro enterprises) needed to respond/adapt to traffic changes due to corridor operation
- (perception of) city-life changes due to corridor establishment; the indicator measures how citizens in general feel about traffic changes due to corridor operation
- (perception of) environmental improvements due to corridor establishment (noise, emissions, fuel and energy consumption); the indicator measures responses of the citizens to expected/achieved environmental improvements, which, in turn, will be directly measured as well
- (perception of) costs and benefits due to corridor establishment for individuals (PT users) and the city as a whole; the indicator measures financial impact of establishing the corridor.

B Evaluation activities and indicators on measure level

Expected possible impacts

The main expected effects of individual measures are:

- Measure 1.11 Hybrid bus implementation
  - Higher acceptance level of PT/better image of PT providers
  - Decrease of air pollution
  - Lower fuel consumption/energy savings/more eco-driving
  - Decrease in noise levels
- Measure 2.1 Integrated high-quality mobility corridor

  As already mentioned at IP level the creation of the corridor is expected to bring the whole range of improvements in the city transport, as well as in citizens' behaviour and environmental quality. Measurable expected changes are reduced travel times, less frequent congestions, lower air and noise pollution, etc. In summary, change in modal split (more PT, more cycling, more walking) is expected as a general impact of the measure.
- Measure 3.1 Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels
  - Decrease of air pollution
  - Decrease in noise levels
  - (Cost of) Access to business providers/locations
  - General traffic changes in the city centre
- Measure 4.1Individualized mobility marketing based on public involvement and inclusion in defining city transport policy
  - more consolidated design, implementation and operation of other CIVITAS ELAN measures in Ljubljana
  - Public involvement in city transport development
  - Reduction of poor transportation habits
  - Improvement of traffic situation in the city centre
- Measure 8.1 Public Transport priority at intersections
  - Improvement of traffic flows in the corridor
  - Improvement of the efficiency of PT
  - Improved attractiveness of the PT
- Measure 8.4 Real time information for staff and passengers
  - Improved attractiveness of PT
  - Improved image of PT providers
- Measure 8.5 ticketing and fare integration
  - Improved image of PT in the corridor
  - Higher PT share – a trend in modal split
  - Increased satisfaction of stakeholders/PT users

Selected indicators

In the table below an overview is given on the evaluation activities for measures consisting IP 1: Making PT in the corridor the most desirable transport mode.

Table 6: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.11 Hybrid bus implementation	▪ Measurement of: - Acceptance/Awareness about hybrid bus transportation benefits (index, %) - emissions (calculation, modeling): NOx, CO, CO2, PM10 concentration (ppm or mg/m3)+amount emitted per vkm - Nuisance/noise levels - Specific fuel consumption: L per standard distance driven - Efficiency: L per vkm and bus - Investment and maintenance cost for the hybrid buses - Operating revenues and costs; possible categorisation by bus line and bus type - Effectiveness: # of PT users ▪ BAU (situation before/after; general city policy on bus fleet); includes evaluation of the selection process for hybrid buses and the efficiency of training on eco-driving ▪ Up-scaling (rationale for extending achievements of the 1.11 results)	▪ Evolution in acceptance level ▪ Simulation of impact on air quality based on modeling (e.g., kms driven x average decrease of CO/CO2/PM10 per km) ▪ Decrease in noise levels ▪ Evolution in fuel consumption per vkm taking also into account driver's competence in eco-driving ▪ Contribution of hybrid buses to the change of # of PT users (based on attitude/behaviour & perception surveys) ▪ CBA → Target groups: hybrid bus fleet & drivers, PT users
2.1 Integrated high-quality mobility corridor	▪ Measurement of: - Acceptance/Awareness level change of regu-	▪ Evolution in acceptance level ▪ Decrease of air pollution as a result of this measure ▪ Decrease in noise levels

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
	lar PT users - Pollution: NOx, CO, PM10 concentration (ppm or mg/m3) – changes measured in the city centre - Nuisance/noise levels – measurements and modeling - Costs and benefits of the corridor's implementation and operation: investments into infrastructure, maintenance cost, costs of equipment operation, PT operating revenues, etc. - Modal split changes - Journey time by corridor sections - Congestion duration ▪ Before/after situation on traffic in the city centre ▪ Process evaluation & Performance assessment (checking whether tasks are performed at due dates, investigation of the bariers and drivers)	▪ Successful control of barriers and drivers; regular performance assessment contributes to successful implementation of the measure ▪ Modal split change in favour of PT based on time saved for journeys and increased PT efficiency ▪ Financial analysis → Target group: PT providers and users, corridor service providers
3.1 Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels	▪ Appraisal of: - Acceptance/awareness about urban transport changes - (index, %), attitude survey of current acceptance of the measure - Pollution: NOx, CO, PM10 concentration (ppm or mg/m3) based on modeling - Nuisance/Noise levels changes (model-	▪ Evolution in acceptance level, stakeholders' satisfaction ▪ Decrease of air pollution as a result of the measure ▪ Decrease in noise levels ▪ Traffic/accessibilty changes for business providers ▪ General traffic changes in the city centre → Target group: citizens of Ljubljana, small and micro enterprises

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
	ing, perception) - Transport system/trafic levels, congestion levels, parking levels, modal split	
4.1 Individualized mobility marketing based on public involvement and inclusion in defining city transport policy	▪ Measurement of: - Acceptance/awareness about modal split, - preparedness to change travel habits (index, %), - usefulness of information about traffic situation in Ljubljana as well as citizens' attitudes and behavior for MLs of other Civitas Elan measures	▪ Improvement of the transport situation in the city centre → Target group: citizens of Ljubljana (along the corridor), a group of 500 citizens/households/micro enterprises with poor travel habits
8.1 Public Transport priority at intersections	▪ Measurement of: - Investment and maintenance cost of intersection system - Operating cost of intersections system - Travel time/average speed of PT fleet in the corridor - The quality of service/service reliability, punctuality of traffic light triggering (index, %) ▪ Before/after in terms of traffic flow ▪ Up-scaling (taking into account financial analysis/CBA)	▪ Improvement of traffic flows in the corridor for PT ▪ Improved attractiveness of the PT → Target group: PT users, PT fleet drivers, providers/controllers of the equipment
8.4 LJU Real time information for staff and passengers	▪ Measurement of: - Investment and maintenance cost of ITS system - Operating cost of ITS system - Quality of ser-	▪ Perception of the quality of the PT in the corridor ▪ Improved attractiveness of the PT → Target group: PT users, provid-

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
	vice/service reliability, punctuality of LED information (index, %) - Satisfaction of PT users with completeness, actuality, utility of the information ▪ Before/after (taking into account need for such information) ▪ Up-scaling (taking into account financial analysis/CBA)	ers/controllers of the ITS system
8.5 E-ticketing and fare integration	▪ Measurement of: - Quality of service/ perception of the quality by PT users - Change in modal split - Acceptance/survey on current acceptance of the measure (%) - Investment and maintenance cost of ticketing system - Operating cost and revenues of ticketing system ▪ Process evaluation (focus on technology related barriers associated with merging different systems at two PT providers)	▪ Improved image of the PT in the corridor ▪ Higher PT share – a trend ▪ Increased satisfaction by stakeholders/PT users ▪ CBA → Target group: citizens of Ljubljana region, PT providers in the region: SZ and LPP

Details of the evaluation activities

Table 6 provides a list of indicators which will serve as a tool for measuring changes/impacts of particular measures. Further specification of reasons why these indicators have been selected is as follows:

- Measure 1.11 Hybrid bus implementation
  - Measurement of acceptance/awareness about hybrid bus transportation benefits will contribute to the overall evaluation of the PT's attractiveness and desirability. It is important to

show the link between introduction of new technology – hybrid buses - and awareness building.

- Measurement of emissions from hybrid buses will contribute to the assessment of air quality improvement, energy efficiency and CBA on PT fleet in Ljubljana. Citizens/stakeholders count on clear demonstration of such benefits so measurements are inevitable.
- Measurement of nuisance/noise levels from/due to hybrid buses will contribute to the evaluation of PT image, PT users' attitudes towards transport in Ljubljana, traffic conditions in the city, etc. Reasons for including this indicator is similar as for pollution indicators (see item above).
- Measurement of fuel consumption and its efficiency will contribute to the assessment on energy savings and overall image of the PT provider
- Measurement of investment, maintenance and operation cost for the hybrid buses will be used in CBA. CBA serves as one of the most persuasive tool in decision making.
- Measurement of the effectiveness in terms of change of # of PT users will contribute to the assessment of whether hybrid buses have contributed to increased desirability of PT (see also the first item above).

- Measure 2.1 Integrated high-quality mobility corridor
  - Indicator Acceptance/Awareness level change of regular PT users: contribution to the evaluation of corridor's desirability
  - Indicator concentration of NOx, CO, PM10: contribution to comparative evaluation of air quality improvements
  - Indicator Nuisance/Noise levels: contribution to the evaluation of quality of life in the city, PT image, traffic conditions in the city, etc.
  - Indicator Investments into infrastructure, maintenance cost, costs of equipment operation, PT operating revenues, etc.: components of CBA which will contribute to the overall understanding of the corridor's utility
  - Indicator Modal split changes: aggregated evaluation of improvements in city transport
  - Indicator Journey time by corridor sections: contribution to the evaluation of desirability of PT based on time spent for travelling, traffic flow, contribution to the image of PT.
  - Indicator Congestion duration: see item above

- Measure 3.1 Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels
  - Indicator Acceptance/awareness about urban transport changes: the measure is expected to bring major transport changes in the city centre. Therefore, it is important to investigate/assess stakeholders' and public opinion about these changes.
  - Indicator attitude survey of current acceptance of the measure: see item above
  - Indicator NOx, CO, PM10 concentration (ppm or mg/m3) based on modeling: similar reasoning as for measure 2.1 (see above)
  - Indicator Nuisance/Noise levels changes (modeling, perception): similar reasoning as for measure 2.1 (see above)
  - Indicator Transport system/trafic levels, congestion levels, parking levels, modal split: similar reasoning as for measure 2.1 (see above)

- Measure 4.1 Individualized mobility marketing based on public involvement and inclusion in defining city transport policy

- Indicator Acceptance/awareness about modal split: the indicator is designed to measure aggregated opinion of citiizens about city transport before and after implementing and operation of the CIVITAS ELAN measures. Two longitudinal surveys are going to be performed for this purpose.
- Indicator Preparedness to change travel habits: based on results of the first survey (see item above) a targeted sample of individuals/households/micro enterprises will identified to perform Individualised Mobility Marketing (IMM). Based on responses of the sample the efficiency of IMM will be evaluated using results of the second survey. It is important to investigate how successful is the individual approach compared to a classic (i.e., general) information campaign in terms of persuading population to change poor travel habits. Such an approach will be used in Slovenia for the first time.
- Indicator Usefulness of information about traffic situation in Ljubljana as well as citizens' attitudes and behaviour for MLs of other Civitas Elan measures: the idea is to evaluate whether concrete information from the fist survey (see the first item above) is useful for MLs to adapt design and implementation of their measures. The indicator measures responses of MLs towards higher efficiency of their measures.

- Measure 8.1 Public Transport priority at intersections
  - Indicator Investment and maintenance cost of intersection system: contribution to CBA for the corridor
  - Indicator Operating cost of intersections system: contribution to CBA for the corridor
  - Indicator Travel time/average speed of PT fleet in the corridor: se justification for 2.1 above
  - Indicator The quality of service/service reliability, punctuality of traffic light triggering: in addition to perception of PT users regarding the system it is important to collect actual data on the performance of the intersection system.

- Measure 8.4 Real time information for staff and passengers
  - Indicator Investment and maintenance cost of ITS system: the reasoning is similar as for 8.1, see above
  - Indicator Operating cost of ITS system: the reasoning is similar as for 8.1, see above
  - Indicator Quality of service/service reliability, punctuality of LED information: the reasoning is similar as for 8.1, see above
  - Indicator Satisfaction of PT users with completeness, actuality, utility of the information: the reasoning is similar as for 8.1, see above

- Measure 8.5 E-ticketing and fare integration
  - Indicator Quality of service/ perception of the quality by PT users: electronic ticketng is a novelty in Slovenia, so it is beneficial to follow its development and perception of its quality for the users
  - Indicator Change in modal split: it is expected that modern ticketing system will attract new users of PT which will accordingly give some influence on modal split.
  - Indicator Acceptance/survey on current acceptance of the measure: the indicator measures popularity of the new ticketing system (comparative assessment with the old one)
  - Indicator Investment and maintenance cost of ticketing system: contribution to CBA for the measure

- Indicator Operating cost and revenues of ticketing system: contribution to CBA for the measure

Details for Business as usual and up- scaling

- BAU

BAU analysis will be applied for measures 1.11 and 2.1. The approach for the analysis is modeling traffic development in the city centre without selected CIVITAS ELAN measures, i.e. prediction of the situation if only measures outside CIVITAS ELAN were to be implemented. As already mentioned these other measures/policies are integrated into new spatial development plans for Ljubljana urban region and the new plan for the municipality of Ljubljana (see sub-chapter 4.1.1.6). The initial modeling state/data is present situation.

- Up- scaling

Up-scaling analysis is foreseen for measures 1.11, 8.1 and 8.4. The approach for this analysis is multi-attribute evaluation encompassing CBA and in-depth process evaluation. If the CBA results reveal that the implementation of the measures is rationale, and in-depth process evaluation discovers key barriers and drivers which can be effectively controlled, than directions for up-scaling will be formulated.

C CBA

CBA (or at least certain level of financial analysis) will be performed for measures 1.11, 2.1 and 8.5. The motivation to perform this analysis is to clarify rationale for the implementation of the measures.

- 1.11 Hybrid bus implementation

For measure 1.11 the motivation is to understand costs and benefits of introducing hybrid buses in PT and to compare their costs with costs of the regular buses.

Table 7: Overview indicators and data collection activities for CBA – measure 1.11

AGENTS	COSTS	BENEFITS
PT operator	Capital costs, operation and maintenance costs	Operating revenues, profitability, change in modal split towards increase in the level of PT users Increased quality of service in terms or reliability
PT users	PT usage	Reduced journey times and congestion duration

- 2.1 Integrated high-quality mobility corridor

For measure 2.1., the motivation is to clearly understand and monitor/follow the implementation of the corridor as a complex measure.

Table 8: Overview indicators and data collection activities for CBA – measure 2.1

AGENTS	COSTS	BENEFITS
PT users	PT usage	Reduced journey times and congestion duration
Car users	Fuel consumption, journey times, congestion duration	Reduced fuel consumption, journey times, congestion duration
Local authorities	Capital costs for infrastructure	Change in modal split

- 8.5 E-ticketing and fare integration

In terms of measure 8.5 the motivation is to monitor process and success of the implementation of the integrated fare in PT. These motivations have been discussed with MLs of the measures; agreements have been reached/signed with all MLs that they will organise data collection as specified in these agreements (methods, frequency, reporting). These agreements are annexes to the Evaluation Plan for Ljubljana and are available on demand.

Table 9: Overview indicators and data collection activities for CBA – measure 8.5

AGENTS	COSTS	BENEFITS
PT operator	Capital costs,operation and maintenance costs	Operating revenues, profitability, change in modal split towards increase in the level of PT users Increased quality of service in terms or reliability
PT users	PT usage	Reduced journey times and congestion duration
Technology (hardware) providers	Capital costs, operation and maintenance costs	Profitability
Infrastructure maintenance operators	operation and maintenance costs	Journey times, congestion duration

5.1.1.3. Data collection

Basically, data will be collected by means of measurements, surveys, counting, and recording. Based on these calculation/modeling and interpretation is envisaged.

ML of each measure will assure data collection together with partners working on the implementation of the measure. According to specifications given in the agreement between ML and the evaluation team the collected data will be regularly submitted to the evaluation team. SEM will provide review of the calculations/modeling and interpretation of findings on both measure and IP level as a result of data collection. A similar approach is applied for all types of data collection and interpretation.

Table10: Data collection inventory for the city of Ljubljana – IP1

INDICATOR	LEVEL4	Focus[5]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
The acceptance of the corridor, e-ticketing, hybrid buses, communication technology between buses and traffic light infrastructure, congestion charging scheme, etc.	M/IP	F	before/ after	survey	participants	all participants	Duration of the project; details are in the agreements on data collection between ML and the evaluation team for each measure. The agreements are annexes to the evalua-	LPP, SZ. COL, Telargo, UL
CO, CO2, NOx and PM10 concentration/emissions. Modeling and interpretation.	M/IP	F	regularly	Measurement, recording	ppm	all hybrid buses		LPP, COL
Costs and benefits of 1.11, 2.1 and 8.5: capital, maintenance and operation costs; benefits in terms of modal split change, air pollution reduction, energy savings, time savings, PT users satisfaction, etc.	M	F	continuous	Recording, calculation	€	All involved		LPP, SZ, COL,Telargo, SZ

[4] M= Measure level

IP= Integrated Package Level

[5] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL4	Focus[5]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Parking and PT usage	M/ IP	F	regularly	Counting, recording	#	P+R, PT fleet	tion plan and are available on demand	COL
Regular fuel consumption records per bus/driver	M		continuous	Measurement, recording	L per km driven	PT operator		LPP
Quantitative measurement of vehicle speed – calculation of average speed	M	F	regularly	Measurement, recording	Km/hour	PT fleet, other vehicles on the corridor		LPP, COL
Survey on the quality of the service	M		regularly	survey	PT passengers	PT passengers		LPP, SZ, UL
Maintenance logs/reports	M		continuous	Measurement, recording, calculation	Hours, €	Maintenance operators		LPP

Details on the data collection

The approach for data collection in Ljubljana, as indicated in Table 12, is as follows:

a) Evaluation team, ML of a measure, and representatives of partners involved in the design, implementation and operation of the particular measure met several times, discussed all aspects of the measure and came to the agreement about data collection for the evaluation purposes: impact and process. Such an agreement has been signed by Site Evaluation Manager, ML, and the person from the evaluation team who is directly responsible for the evaluation of a particular measure (each agreement has three signatures). Agreements have been signed for all measures.

b) Besides general info on the measure the agreements provide clear description of the evaluation purpose and cover specification of the evaluation indicators. In addition, measurement/evaluation approaches, methods and tools; measurement units; frequency of data collection; frequency/timing of reporting; role of the evaluation team are specified.

c) Agreements also cover needs of, and approach to, process evaluation combining understanding of stakeholders involvement for the purpose of assuring measure implementation/operation, and consequently data collection.

d) According to specifications in each of the agreements the evaluation team (responsible evaluator of a particular measure) regularly communicates (meetings, phone calls, site visits, monitoring of measurement equipment, consultation, etc.) with the ML and partners involved. Based on this continuous insight the measure performance is assured which is reflected and conveyed into IPRs preparation, project coordination and project management.

e) The agreements are annexes to the Evaluation Plan for Ljubljana; they are available on request/demand.

Summary on data collection

- Measure 1.11 Hybrid bus implementation

Quantitative measurement of CO, CO2, NOx and PM10 emissions will be performed quarterly by LPP. Noise nuisance will also be measured regularly. Fuel consumption will be recorded by the LPP continuously. The data will be used for modeling and interpretation by the LPP and JSI.

Surveys on the awareness about hybrid bus transportation benefits and acceptance level will be performed twice a year by LPP. Costs on bus operation will be collected continuously; aggregation will be performed quarterly. Capital costs will also be recorded by the LPP.

- Measure 2.1 Integrated high-quality mobility corridor

Quantitative measurement of CO, CO2, NOx and PM10 concentration will be performed quarterly by COL. Noise nuisance will be measured "before and after". The data will be used for modeling and interpretation by the LPP and JSI.

The data on travel times and congestion duration will be gathered quarterly by COL and calculated in terms of time savings, energy efficiency – fuel consumption. etc. by the JSI.

Acceptance and awareness level will be performed "before and after". Capital and maintenance costs will be recorded by the COL.

- Measure 3.1 Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels

Pollution by NOx, CO, CO2, PM10 – measurement of concentrations (ppm or mg/m3) by COL as well as noise level perception (see 2.1. above).

Acceptance/awareness about urban transport problems (index, %), attitude survey of current acceptance of the measure (%), transport system/trafic levels, congestion levels, parking levels, modal split. Data will be collected by COL.

- Measure 4.1 Individualized mobility marketing based on public involvement and inclusion in defining city transport policy

Acceptance/awareness about modal split, preparedness to change travel habits, actual change of travel habits based on individual mobility marketing (effectiveness of this marketing), usefulness of information for MLs of Civitas Elan measures and their response in terms of measures implementation and operation adaptation. Data will be collected by the JSI, University of Ljubljana and REC.

- Measure 8.1 Public Transport priority at intersections

Measurement of the punctuality of traffic light triggering; measurement of the fuel consumption per distance driven, travel time, average speed. Data will be collected by Telargo and LPP regularly.

Measurement (random interviews) of the quality of service at least twice a year, recording of service reliability and punctuality of traffic light triggering, will be performed by Telargo.

Investment, operational and maintenance cost of intersection system will be performed regularly by Telargo.

- Measure 8.4 Real time information for staff and passengers

Punctuality of LED information will be measured and recorded continuously by Telargo.

Service reliability, punctuality of LED information will be continuously made by Telargo.

Investment, operational and maintenance cost of the ITS system will be performed regularly by Telargo. Acceptance/# of newly attracted passengers "before and after" will be surveyed by Telargo; collection of opinions by means of random interviews of users on buses and bus stops will also be made.

- Measure 8.5 E-ticketing and fare integration

Data on modal split changes will be collected "before and after" by SZ. This will include recording/calculation of pkm and vkm. Perception of the quality of service will be performed together by the LPP, SZ and UL "before and after".

Survey on the public opinion will be made "before and after" by UL.

Capital, operational and maintenance costs will be recorded regularly by the SZ.

- Attitude and behaviour surveys and interviews

Since majority of ML expect changes in modal split towards increased use of PT and desirability of the corridor it is planned to conduct two comprehensive/general surveys among citizens of Ljubljana. Sample size of this target group is 1100. In addition, perception and level of satisfaction with particular measures will be checked among users of PT, namely : e-ticketing (8.5), hybrid buses (1.11), communication technology between buses and traffic light infrastructure (8.1), quality of service of the PT service (8.5), congestion charging (3.1). These surveys will be performed by common effort of the LPP, SZ, Telargo, COL and UL according to the approach "before and after" the implementation of the measures. The common effort means that one survey "before" and one survey "after" will be per-

formed in a way that all measures will be covered in these two surveys. UL will operationally lead/conduct the surveys. The surveys will be done on PT buses and stops in the corridor, and trains in the Ljubljana region.

5.1.2. Integrated package 2: For vital, healthier and safer citizens in city transport

5.1.2.1. Description

A Objectives and scope

IP objectives

- To improve public health status by promoting and providing healthier modes of transport
- To offer PT fleet and infrastructure more accessible and secure for elderly
- To provide safer school areas in terms of transport

Measure related objectives

- 4.6 Comprehensive Cycling Strategy
  - to improve status of cycling in Ljubljana
  - to make cycling interesting/acceptable
  - to set the city vision on cycling and define political choices by developing a local cycling partnership/platform
  - to develop and implement a comprehensive cycling plan
- 4.9 Update of the Sustainable Urban Transport Plan
  - to develop a Sustainable Urban Transport Plan (SUTP) in a participatory process involving citizens and stakeholders.
  - to coordinate and place measures implemented in Ljubljana in CIVITAS-ELAN into a common framework and to create synergies between them.
- 5.2 Safety & security for seniors and PT users
  - to improve safety of PT users with special attention to the senior population
  - to cut down vandalism and violence in PT buses to the lowest possible level by introducing new surveillance technologies
- 5.4 Safe routes to school
  - to ensure the safety of children/pupils on the way to school and back home
  - to introduce safe routes plan with training of pupils from the start of the school year
- 5.5 Reduces speed zones
  - to increase the safety of weaker traffic participants by reducing speed in city centre from 50 km/h to 30 km/h
  - to introduce new zones with 10 km/h speed limit in front of some elementary schools, hospitals or in residential areas
- 6.1 Demand responsive services
  - to implement flexible demand responsive PT service for impaired people and to assure their mobility

B Overview of the measures

- 4.6 Comprehensive Cycling Strategy

This measure will combine three components on three different levels of mobility management:

- Engagement,
- Training and
- Campaign activities

The development of the local cycling partnership/platform will enable citizens to be engaged at the earliest point possible: at the beginning of the planning process and further on. The local cycling partnership/platform will be supported by a comprehensive training of stakeholders on engagement in identifying cycling issues, developing policy responses (cycling plan) and in prioritising the tasks. Training will focus on decision makers, district representatives, mobility stakeholders and citizens. In addition to that the 'Outreach' campaign will be organized to get citizens involved in city mobility issues. An interactive cycling map will be produced. These elements are not yet current practice in European cities but crucial to bring forward the use of the bicycle as urban transport mode in a participatory process. To include the city bike project as alternative transport mode will also be an innovation in Ljubljana.

- 4.9 Update of the Sustainable Urban Transport Plan

The main long term objective for the transport development of the existing spatial strategy in Ljubljana is the improvement of modal split through reduced volume of motorised traffic and promotion of alternative transport modes. Main issues addressed in existing plan are:

- Development of a quality PT system - introduction of a new light urban rail, transformation of a main rail station into a main intermodal passenger terminal, development of other interchanges in PT;
- Development of P+R system;
- Completion of road network to better distribute traffic flows and redirect them out of the city centre;
- Network of parking lots around inner ring;
- Completion of cycling network;
- New rail by-pass and freight terminal.

- 5.2 Safety & security for seniors and PT users

There are already activities aimed at improving safety & security of different groups of bus users therfore the main innovation will be their direct involvement through senior's or other organizations. The video surveillance system which will be further installed on LPP buses will serve to discourage offenders of public law and order on buses and to enforce measures against them, if needed. In addition:

- Strategy for specific groups, especially elderly training on safety & security on buses will be prepared;
- Plan for further training of drivers and other LPP personnel will be produced
- Plan (timetable and technical plan) for installing the equipment in suitable vehicles will be drawn-up

- 5.4 Safe routes to school

Up to twice a year workshops will be used mainly to train traffic educators in elementary schools, who will also be in charge of preparing the plan of safe routes to and from school. In order to prepare the necessary information, the mentors will collaborate with the Traffic Accident Prevention and Education Council, the Police Administration, societies and associations, and other institutions dealing with traffic safety. This will provide a basis for preparing plans of safe routes to and from school in computerised form.

Data for an interactive safe routes plan will be collected on the number of pupils, the school district and manner of arrival to school (on foot, by car, by bicycle, school bus, etc.), which will then be processed. The plans will thus be marked accordingly, indicating # of pupils, the main directions from which pupils arrive to school, way of transport,etc.

Other activities include:

- Determining and identifying less safe and potentially dangerous road crossing points – danger zones
- Processing a survey among parents and children to obtain their proposals to ensure safe routes
- Collecting data for traffic signage (vertical and horizontal), which will serve as a basis for preparing a signalisation plan.

- 5.5 Reduces speed zones

Physical implementation of new traffic regime with new horizontal and vertical traffic signage over the entire city centre area. The most problematic road sections, where current traffic situation allows higher driving speeds (main multi-lane city avenues), will be fitted with modern traffic control devices allowing effective sanctioning of traffic violations. Also planned is a purchase of suitable equipment for monitoring and keeping records of driving speed violations. New traffic calming devices will be used to change the road and street network in order to further ensure better traffic safety.

- 6.1 Demand responsive services

Demand responsive public transport services do not exist in the city, nor in the Republic of Slovenia so far. The latest transport law on road traffic gives the possibility to organise new public transport services for low density areas. Up till now no research or study has been carried out. For this reason the city has decided to take proper actions to develop demand responsive public transport services for impaired people at a first stage. Afterwards the same system could be applied to serve transport needs of people living in low density areas.

C Innovative aspects

- New conceptual approach
  - Measure 4.6: development of the local cycling partnership/platform.
  - Measure 4.9: integration of transport development and spatial strategy in Ljubljana. With the development of a new SUTP (Sustainable Urban Transport Plan), updating existing mobility plans, Ljubljana will become the first city in the country and one of the first in the new EU member states transforming its transport strategy into a modern SUTP according to standards set in recent EC activities. The development of a SUTP is an innovative measure that helps to develop multifaceted policy responses, based on a long-term strategy. SUTP encourages new efficient ways of working in local transport planning, while using existing resources – budgets, workforce, knowledge, technology or infrastructure. The innovative approach, which receives strong support from the EU, addresses mobility in the urban agglomeration through integrated packages of transport measures and creates win-win solutions.

- Use of new technology/ITS
  - Measure 5.2: video surveillance system will be installed on LPP buses which will serve to discourage offenders of public law and order on buses.
  - Measure 6.1: A novelty will be the use of new state-of-the art technology (satellite tracking, routing optimization using traffic history, etc) with the option to build on GALILEO, when available, to provide the service. This new software will introduce a direct connection (via tracking system) passenger-operator (driver) to offer response to transport needs.
- Targeting specific user groups
  - Measure 5.2: safety for elderly.
  - Measure 6.1: for disabled persons.
- New economic instrument
  - Measure 6.1: demand responsive service should prove as economically viable in comparison with regular PT system
- New policy instrument
  - Measures 5.4 and 5.5: The innovative aspect of these measures is the combination of different activities in a new way for Ljubljana and Slovenia. It will bring down speed limits in the most of the city centre from 50km/h to 30km/h and introduce new zones with 10 km/h speed limit in front of some elementary schools, hospitals and in residential areas.
  - Measure 5.2: LPP is running a campaign called BUSBONTON. It is a leaflet full of information. It is simple and teaches in amusing way what one should and should not do on the bus: avoid talk to the driver for safety reasons, give space to other users, avoid disturbing on-board instruments with cell-phones, avoid damaging the seats and on-board bus equipment, avoid using rollers on the bus for safety reasons and other things. There is also training of drivers to sensitise them on particular needs of specific groups of bus users like elderly people, mothers with small children, disabled.
  - Measure 3.1: development of the congestion charging scheme tailored for Ljubljana
- New organisational arrangements or relationships
  - Measure 6.1: Demand responsive public transport services do not exist in the city, nor in the Republic of Slovenia so far. The novelty will be to provide public transport service to impaired people who are now lacking such a service.
- New physical infrastructure solutions
  - Measure 4.6: In terms of innovation for cyclists the existing cycling map is outdated and new is needed. The new map shall enable users to interactively search for data on cycling quality and safety. The interactive map will build on existing GIS data, updated with additional information and guidance. Connection with new cycling infrastructure and P+R will be established.
  - Measure 5.5: new pedestrian zones for speed limit reduction up to zero.

D Research and technical development

Research and technical development in IP2 relates to measures 4.6 and 6.1, respectively. In that context, measure 4.6 requires considerable effort of research in developing SUTP as to become justifiable, acceptable by all stakeholders and finally approved, while 6.1 depends on technical development in terms of special vehicles and special communication between users and providers of the service. Details are in the following.

According to recommendations of the PILOT project five main tasks will be required for drawing up an SUTP (Measure 4.9: Sustainable urban transport plan) ready for implementation:

- drawing up a SUTP Status analysis - a comprehensive review and assessment of the current strategy

- Development of a common stakeholder vision, definition of objectives and setting of targets
- Preparation of a new version of plan, defining policies, measures and required budgets
- Assignment of implementation responsibilities and resources
- Set up of monitoring system according to a set of selected indicators

Besides running the SUTP process a range of closely interrelated activities also need to be undertaken to achieve the specific qualities of the SUTP process and to build a strategic and operative framework to facilitate its realisation. These supporting actions are:

- Timing the entire process carefully;
- Meeting specific requirements in terms of strategic actor coordination and an adequate horizontal integration;
- Realizing targeted outreach and participation activities for citizens and stakeholders;
- Undertaking particular efforts for cross-sector policy integration and for achieving social inclusion and gender equity;
- Working with the media and developing an SUTP marketing strategy;
- Ensuring the availability of key staff skills and performing a prudent technical management.

During the first 6 month of work on the state-of-the-art analysis a need emerged to establish an external advisory board (EAB) for SUTP in Ljubljana. It became clear that Ljubljana is missing local (national) knowledge and experience in some fields of strategic transport planning and that local experts have sometimes contradictory views on transport solutions for Ljubljana. Previous experience showed that external view might help solving these dilemmas. EAB will mainly consist from experts from CIVITAS partners but also need to involve other external experts for some specific fields became clear. Main task of EAB will be to help solving dilemmas in the SUTP process and comment working documents developed in the framework of this measure.

Regarding measure 6.1 the city has decided to take actions to develop demand responsive public transport services for impaired people at a first stage. Afterwards, the same system could be applied to serve transport needs of people living in low density areas, which may prove as self-sustained economic category. Implementation relies on special vehicles for disabled and the use of advanced communication technology (satellite tracking, routing optimization using traffic history, etc) with the option to build on GALILEO, when available, to provide the service. This new soft and hardware will introduce a direct connection (via tracking system) passenger-operator (driver) to offer response to transport needs.

E Situation before CIVITAS

Cycling (4.6), safety for elderly on buses (5.2), reduced speed zones (5.5) and PT service for disabled as well as in low density areas (6.1) are poorly or completely undeveloped at the moment. Special overall problem seems to be development of a comprehensive urban transport strategy. Traditionally, transport was a part of comprehensive long-term spatial strategies, however, success of such integration is relatively poor. Only recently things seem to change in proper direction.

The preparation process for the new strategy which would also involve consideration of health in terms of transport started in 2002 with a preparation of a conceptual framework which included also an extensive public participation. The development concept which is in process for Ljubljana ambitiously addresses SUT planning issues (e.g. new tram for Ljubljana) however the latest developments concerning SUTP on EU level bring some new aspects and elements into urban transport planning which are not implemented in Ljubljana yet.

The main long term objective for the transport development of the existing spatial and public health strategy in Ljubljana is the improvement of modal split through reduced volume of motorised traffic and promotion of alternative transport modes. Main issues addressed in existing plan are:

- Development of a quality PT system - introduction of a new light urban rail, transformation of a main rail station into a main intermodal passenger terminal, development of other interchanges in PT;
- Development of P+R system;
- Completion of road network to better distribute traffic flows and redirect them out of the city centre;
- Network of parking houses around inner ring;
- Completion of cycling network;
- New rail by-pass and freight terminal.

It is obvious that mainly "hard" infrastructure aspects of the transport system development are regulated in the present transport strategy and many of the "soft" measures are missing, e.g. Mobility Management.

Many of the objectives are set in Ljubljana's strategic documents without being implemented. In SUTP a focus on the achievement of measurable targets is recommended - derived from short term objectives, aligned with a vision for transport and embedded in an overall sustainable development strategy.

Another problem connected with the existing transport strategy in Ljubljana is lack of its horizontal (between different municipality's sectors and neighbouring municipalities) and vertical integration (with strategies on national and regional level). It is an important goal of a new SUTP to overcome these deficiencies. An integrated approach of practices and policies between transport modes, policy sectors (e.g. spatial and urban planning, environment, economic development, social inclusion, health, safety), public and private agencies, authority levels, and between neighbouring authorities is definitely needed.

Some improvements related to cycling are expected due to implementation of the regional spatial plan.

F Inter-relationships with other measures

A new PT concept for Ljubljana region is under development. The efforts are in line with the CIVITAS ELAN measures and their goals. Assuring safety of citizens in transport is one of the primary goals of the concept. New and dedicated cycling infrastructure together with reduction of motorized transport and reduced speed zones in the city is well recognized in the concrete projects. Strategic evaluation of plans which includes evaluation criteria coming from the CIVITAS Initiative is also recent practice. It is hoped that such networking and synchronization will bring improvement in a number of aspects of citizens' life in Ljubljana region.

5.1.2.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts

The expected effects of IP2 are:

- improved safety and security in city transport

  The comprehensive cycling strategy (4.6) and SUTP (4.9) are two measures which can be considered as a policy level intervention for making improvements in safety and security in city transport. Measures 5.2, 5.4 and 5.5, on the other hand, are more operational in terms of achieving safety and security, especially for scholars and elderly. Measure 6.1 has the same goal and is focused on special population: disabled persons. Altogether are expected to bring considerable improvements in safety and security in city transport.

- better coverage with PT in low density areas

Measure 6.1 is aimed to check feasibility and economy of providing PT service on demand in lower populated areas in the city. Possibly, this may prove reasonable.

- improvements on accessibility and mobility of impaired people

  Service on demand, as a part of PT system, is expected to widen possibilities of movement for disabled persons. At the moment only health care system provides such service in addition to taxi and other self/private arrangements.

- reduction of violations on PT buses

  It is expected that installation of cameras will contribute to reduction of # of violations on PT buses (less thefts, less damages of equipment, less intrusion and violence over weak passengers, etc.).

Selected indicators

A number of evaluation activities (with associated indicators for quantitative and qualitative measurement of their impact) will be applied to monitor both progress and success/effect of the measures integrated in IP 2 For vital healthier and safer citizens in city transport. An overview of these activities is provided in Table 11.

Table 11: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 2: FOR VITAL, HEALTHIER AND SAFER CITIZENS IN CITY TRANSPORT	▪ Combining results of different measures to come to a conclusions on IP level: - evolution in modal split - regular performance assessments of the measures (see section 6 for details) - measurement of safety and security conditions of vulnerable citizens (children and elderly) and PT users expressed by average vehicle speed in city centre and school zones, # and trends of violations on PT buses, costs of damage related to violations - measurement of the improvement in mobility of impaired people - evaluation of costs and benefits of the demand responsive service	▪ improvements of safety and security in city transport ▪ improvements on accessibility and mobility of impaired people ▪ whether different strategies for healthier mobility in the city are approved ▪ SUTP and cycling strategy adopted, city bike implemented, safety cameras installed at PT buses, # of violations reduced, vehicle speed violations reduced, demand responsive service customers satisfied → Scope: city of Ljubljana → Target group: cyclists, elderly, disabled population

Details of the evaluation activities

Measures comprising IP2 are designed in a way that they are expected to bring improvements in safety and security for special population groups. These improvements will be monitored directly and indirectly by checking:

- Evolution in modal split. SUTP is expected to support better and safer (more sustainable) ways of transport, which will be manifested in modal split change. Such changes will be recorded and evaluated.
- Measurement of safety and security conditions of vulnerable citizens (children and elderly), and of PT users in general, expressed by average vehicle speed in the city centre and school zones, # and trends of violations on PT buses, costs of damage related to violations. These measurements are direct and will contribute to quantitative evaluation of the effectiveness of IP2 in terms of safety and security improvement.
- Measurement of the improvement in mobility of impaired people. Here, rather perception of the improvement by the users and their family members than solely counting # and types of services on demand will be monitored.
- Evaluation of costs and benefits of the demand responsive service. Recording of costs for service providers and benefits for service users will be made. The aim is to make consistent CBA for measure 6.1 as a basis for its eventual scale-up and transferability.

In addition, regular performance assessments of the measures will also be made (see section 6 for details). It is important to monitor how measures are being implemented and how they are operating. Regular and properly detailed performance assessment is a tool for early recognition of deviations in measures implementation and operation which enables prompt response for tackling barriers against measures' implementation and operation. The performance assessment is a part of process evaluation and is applied for all Ljubljana ELAN measures, not only IP2.

B Evaluation activities and indicators on measure level

Expected possible impacts

The main expected effects of individual measures are:

- 4.6 Comprehensive Cycling Strategy
  - Increased share of cycling (change in modal split) with associated effect on air pollution, fuel consumption, noise reduction. Etc
  - safer cycling due to tolerance and support increase in city transportation culture
- 4.9 Update of the Sustainable Urban Transport Plan

  As already mentioned at IP level the SUTP is expected to bring the whole range of improvements in the city transport, as well as in citizens' behaviour and environmental quality. Measurable expected changes are reduced travel times, less frequent congestions, lower air and noise pollution, etc. In summary, change in modal split (more PT, more cycling, more walking) is expected as a general impact of the measure.
- 5.2 Safety & security for seniors and PT users
  - Improved safety and security for seniors in PT
- 5.4 Safe routes to school
  - Improved safety of scholars
- Measure 5.5 Reduces speed zones
  - improved traffic safety in the city due to reduced speed
  - higher satisfaction of citizens due to establishment of new pedestrian zones

- Measure 6.1 Demand responsive services
  - Improved accessibility and mobility of disabled persons
  - Introduction and operation of rationale public response service on demand

Selected indicators

In the table below an overview is given of all the evaluation activities for the measures of IP 2 For vital healthier and safer citizens in city transport .

Table 12: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.6 Comprehensive Cycling Strategy	▪ measurement of - the modal split - inventory of the number of injuries - the acceptance level through number of users of the interactive cycling map and web questionnaire ▪ potential for up-scaling	▪ Increased share of cycling ▪ Reduced # of injuries ▪ Evolution in acceptance level → Target group: modal split changes will be extracted from the city level survey and modeling, other effects from data pertinent for cyclists
4.9 Update of the Sustainable Urban Transport Plan	▪ measurement of: - the acceptance level by stakeholders and city council ▪ in-depth process evaluation	▪ Approval of the plan → Target group: citizens, city council, city transport relevant stakeholders
5.2 Safety & security for seniors and PT users	▪ measurement of: - the awareness level of the implemented video surveillance system (index, %) - Perception of security when using PT service (index, %) ▪ comparative evaluation before/after	▪ Evolution in acceptance level, stakeholders satisfaction ▪ Improved security → Target group: senior PT users

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
5.4 Safe routes to school	▪ measurement of: - Transport safety/# of violations, # of injuries/deaths - Acceptance of the safety improvements (index, %) ▪ comparative evaluation before/after	▪ Improved safety ▪ Improvement of acceptance → Target group: scholars and their parents, primary school staff
5.5 Reduces speed zones	▪ measurement of: - number and extent of new pedestrian zones - Acceptance by stakeholders (index, %) - Number of traffic accidents and traffic violations. Average vehicle speed. ▪ comparative evaluation before/after	▪ Improvement in satisfaction/acceptance ▪ Improved traffic safety → Target group: citizens of Ljubljana
6.1 Demand responsive service	▪ measurement of: - Acceptance/awarenes ss, accessibility - Quality of service: service reliability, friendliness, availability, assistance of drivers to impaired people (index, %) ▪ BAU ▪ Up-scaling ▪ CBA ▪ In-depth process	▪ Rationale of the demand responsive service ▪ Improvement in acceptance ▪ Improved accessibility and mobility ▪ CBA → Target group: disabled persons

Details of the evaluation activities

Table 12 provides a list of indicators which will serve as a tool for measuring changes/impacts of particular measures. Further specification of reasons why these indicators have been selected is as follows:

- Measure 4.6 Comprehensive Cycling Strategy

- Indicator "modal split" will show whether comprehensive cycling strategy has been adopted by citizens in such extent that it resulted/has effect on the overall city transport habits.
- Indicator "inventory of number of injuries" will show whether cycling strategy also resulted into better cycling infrastructure (more dedicated lines, for example) and more tolerable and cautious culture of the city transport participants which eventually brought better safety
- Indicator "the acceptance level through number of users of the interactive cycling map and web questionnaire" will directly measure change in intensity of interest for cycling on one side, and the need for cycling information on the other. Both will be evaluated through the evaluation of satisfaction of web info users.

- Measure 4.9 Update of the Sustainable Urban Transport Plan
  - Indicator "the acceptance level by stakeholders and city council" is the only and final evaluation tool for the SUTP. If approved, the SUTP will go into implementation.

- Measure 5.2 Safety & security for seniors and PT users
  - Indicator "the awareness level of the implemented video surveillance system" serves for the evaluation of recognition of the system as a contributor to safety and security on PT buses. It is a pre-condition in terms of expectation for reduced violence and damage on PT buses.
  - Indicator "Perception of security when using PT service" will clarify and distinguish among different contributors to PT security and safety.
- Measure 5.4 Safe routes to school
  - Indicator "Transport safety/# of violations, # of injuries/deaths" directly measures safety of scholars on their way to schools. Traffic speed violations are expected to show difference in terms before/after implementation of the measure.
  - Indicator "Acceptance of safety improvements" will register parents' and teachers' understanding of the measure's contribution to safety improvement around schools.
- Measure 5.5 Reduces speed zones
  - Indicator "number and extent of new pedestrian zones" directly measures where speed has been reduced to zero.
  - Indicator "Acceptance by stakeholders" will monitor satisfaction of selected stakeholders about excluding certain zones from city transport and reducing speed in others.
  - Indictor "Number of traffic accidents and traffic violations" directly measures adaptation to new speed regulation in the city centre/selected zones. It will indirectly show cultural change among car users regarding new traffic arrangements in the city.
- Measure 6.1 Demand responsive service
  - Indicator "Acceptance/awareness, accessibility" is selected for measuring actual needs of disabled persons about mobility. If accessibility is improved and confirmed by the users the demand response service is to be further developed.
  - Indicator "Quality of service: service reliability, friendliness, availability, assistance of drivers to impaired people" directly measures components of operability and implementation of the service together with the evaluation of its perception by users.

Details for Business as usual and up- scaling

- BAU

BAU analysis will be applied for measure 6.1. The approach for the analysis is comparative assessment of the existing praxis to offer service to impaired people and alternative approaches to the measure 6.1. A survey among organisations and individuals offering assistance to impaired people will be made.

- Up- scaling

Up-scaling analysis is foreseen for measures 4.6 and 6.1. The approach for this analysis is multi-attribute evaluation encompassing CBA and in-depth process evaluation for 6.1, while for 4.6 the basis will be expected shift in modal split towards more cycling. If CBA for 6.1. reveals that implementation of the measures is rationale, and in-depth process evaluation discovers key barriers and drivers which can be effectively controlled, than directions for up-scaling will be formulated.

C CBA

CBA (or at least certain level of financial analysis) will be performed for measure 6.1.

- 6.1 Demand responsive service

The motivation to perform this analysis is to clarify rationale for the implementation of the measure. More specifically, the motivation is to understand costs and benefits of introducing demand responsive service. This motivation has been discussed with ML; agreement has been reached/signed with the ML that data collection as specified in the agreements (methods, frequency, reporting) will be made. This agreement is annex to the Evaluation Plan and is available on demand.

Table 13: Overview indicators and data collection activities for CBA – Measure 6.1

AGENTS	COSTS	BENEFITS
Demand responsive service providers	Capital costs,operation and maintenance costs	Operating revenues, profitability
Demand responsive service users	Cost of service	Mobility, accessibility
Demand responsive service users' relatives/nursery	Fuel consumption, journey times	Perception of savings (time, availability to perform other work, comparison of expenses between old and new service, e.g. personal car usage, taxi, special vehicles)

5.1.2.3. Data collection

The approach for data collection has been described in detail in the sub-section "Details on the data collection" under paragraph "Data collection 5.1.1.3", page 206.

Basically, data will be collected by means of measurements, surveys, counting, and recording. Based on these calculation/modeling and interpretation is envisaged.

ML of each measure will assure the data collection together with partners working on the implementation of the measure. According to the specifications given in the agreement between ML and the evaluation team the collected data will be regularly submitted to the evaluation team. The SEM will provide a review of the calculations/modeling and interpretation of the findings on both measure and IP level as a result of data collection. Similar approach is applied for all types of data collection and interpretation.

Table 14: Data collection inventory for the city of Ljubljana – IP2

INDICATOR	LEVEL[6]	Focus[7]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
The acceptance of the comprehensive cycling strategy, SUTP, security and safety in PT, reduced speed zones in the city, etc.	M/IP		before/ after	survey	Stakeholders, citizens	citizens	Frequency, duration, start, end and other; details are in the agreements on data collection which are annexes to the evaluation plan and are available on demand	LPP, COL, REC, UIRS
Mileage of vehicles, fuel consumption per distance driven, service needs, working hours of drivers.	M/IP	F	regularly	Measurement, recording	km, L/km, #, €	all special vehicles in 6.1		LPP, COL
Costs and benefits of the implementation of 6.1: capital, maintenance, and operational costs of special vehicles, costs of staff involved in providing demand response service, benefits in time savings of users family members, benefits of improved accessibility of users, benefits of	M	F	continuous	Recording, calculation	€	All involved in measure 6.1		LPP, COL

[6] M= Measure level

IP= Integrated Package Level

[7] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL[6]	Focus[7]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
improved quality of life of users								
# of injuries, # of violations in reduced speed zones, # of events of vandalism,	M/ IP		regularly	Counting, recording	#	All PT buses		COL, LPP
The quality of service of 6.1: service reliability, friendliness, availability, assistance of drivers to impaired people	M		regularly	survey	Service on demand users	Service on demand users and their family members		LPP, COL
Maintenance logs/reports	M		continuous	Measurement, recording, calculation	Hours, €	Maintenance operators for vehicles in 6.1		LPP

Details on the data collection

- Measure 4.6 Comprehensive Cycling Strategy

COL and REC will continuously record the number of injuries based on formal (city police) information. The JSI and REC will perform comparative evaluation regularly (twice a year). Measurement of change in modal split will be performed at city level – see also measures 2.1 and 4.1 - before the end of the project and compared to the initial (before) situation; this will serve for the interpretation of the success of the measure as well.

COL and REC will collect data on acceptance level for the measure through the number of users of the interactive cycling map and web questionnaires after implementing the strategy.

- Measure 4.9 Update of the Sustainable Urban Transport Plan

UIRS will check acceptance level by stakeholders and the city council continuously; however, the final and formal assessment will be made after finalisation and submission of the SUTP to the city council.

- Measure 5.2 Safety & security for seniors and PT users

LPP will record # of events (vandalism) continuously, i.e. promptly after an event happens, with the evaluation of their cost.

LPP will do regular, i.e. annual recording of total costs due to vandalism, and perform measurement on the awareness level of the implemented video surveillance system together with the evaluation team, as well as perception of the overall (improvement of) security in PT.

- Measure 5.4 Safe routes to school

COL will record # of speed violations around schools twice a year based on police record, # of injuries/deaths will be recorded promptly after events. Interpretation by the evaluation team will be provided annually.

COL will do interviews with parents and teachers on the acceptance of the safety improvements "before and after" in cooperation with the evaluation team.

- Measure 5.5 Reduces speed zones

COL will do random interviews among citizens on the acceptance, or rather perception, of reduced speed and pedestrian zones throughout the city "before and after". This will be done twice a year: in spring/summer and winter season to check and combine understanding about the need for cars depending on weather conditions.

- Measure 6.1 Demand responsive service

LPP will regularly (quarterly) monitor acceptance/awareness levels, accessibility for impaired people, and quality of service: service reliability, friendliness, availability, assistance of drivers to impaired people. These data will be collected by means of questionnaires and interviews among all members/groups of disabled persons formally recorded as members of, or special groups or societies. Continuous recording of costs of the service for special vehicles will be made (e.g. fuel costs, working hours, maintenance costs). Benefits like time saved by impaired people family members, improved accessibility of service users, etc. will be calculated based on data collected from interviews among users and their family members taking into account their perception of monetization of these benefits.

General approach to conducting the surveys and interviews has been described in detail in subsection Details on the data collection of paragraph 5.1.2.3, page 206.

5.1.3. Integrated package 3: Improved freight transport

This IP consists of the following two measures: 7.1 Integrated freight policy development and 7.2 Sustainable freight logistics. However, since the evaluation approach for the common measures has not yet been defined in detail a full description of IP3 is not possible at this stage. Measure 7.2 on the other hand is additionally described by means of Annex to the Evaluation Plan which serves as an example how these annexes look like for all Ljubljana ELAN measures.

5.1.3.1. Description

A Objectives and scope

IP objectives

The improved freight transport aims at achieving more coordinated policies and activities for delivering freight in the city centre. The expected effects of the new approach is less expensive freight transport (less vkm, energy effective deliveries, less fuel consumption, less vehicles involved in deliveries, more time saved for involved staff in deliveries, etc.) on one side, and benefits for citizens/neighbors of the business locations where deliveries are performed (less streets occupation by freight vehicles, lower emission of pollutants in city centre, less noise, etc.).

The primary objective of this IP is to emphasize the importance of clean and sustainable distribution of goods in ELAN cities. Furthermore, the objective of this common measure is to set up stable local freight partnership of stakeholders in all participating cities. The local freight partnerships are seen as a crucial prerequisite for the successful implementation of all planned activities.

Measure- related objectives

- Measure 7.1 Integrated freight policy development
  - to set up stable local freight partnership of stakeholders in the participating cities
  - to enhance understanding between local authority and freight sector
  - to increase knowledge and awareness of freight issues
  - to stimulate best practice through exchange of information and ideas

- Measure 7.2 Sustainable freight logistics
  - to set up an efficient distribution of goods in a demo area including the corridor (Slovenska Street), mainly in the city centre
  - to maintain a vibrant city centre by changing the existing pattern of goods distribution
  - to reduce the existing number of deliveries the corridor and demo area by 20 %
  - to educe pollutant emissions from urban freight traffic by 15 % for CO2, NOx and PM10 each in the corridor (Slovenska Street) and demo area
  - to improve the energy efficiency in urban freight distribution and reduce energy consumption in the corridor (Slovenska Street and demo area by 10 %).

B Overview of the measures

- Measure 7.1 Integrated freight policy development

The aim is to establish partnerships in each of the partner cities including mainly representatives from freight companies, small and large haulage companies, public transport operators, transport authorities, including different involved departments, drivers, vehicle providers, large supplier companies, representatives from businesses, traffic police, etc. The partnership will function as an advisor and

support group for anchoring the ideas developed within the project in each city. In addition, it will act as an important dissemination tool at the local and national level.

Each city will define a person responsible for setting up and running the local freight partnership. Each partnership will be city-tailored based on user acceptance and needs. It is of major importance that all levels in the transport chain, from the suppliers to the customers, are represented through a strong partnership at the local level at the demonstration sites. The support for and active participation in the partnership should preferably be formalised through a memorandum of understanding or similar undertaking amongst the members. At the local level, 10-20 partners, depending on the city, will be gathered to work together throughout the project's lifetime and in close collaboration with the CIVITAS-ELAN consortium. It is intended that the discussions and work of the partnership will influence and inform on the working practices, policies and plans of the member organisations and will be used to promote good practice in general. The partnership will be managed through periodic local working meetings covering: establishment of user–stakeholders needs, operational issues for demonstration, planning of dissemination actions and discussion of evaluation results.

- Measure 7.2 Sustainable freight logistics

To complement the long-term planning of measures aimed at reducing freight traffic, Ljubljana will adopt a short-term approach consisting of the implementation of a pilot project. Part of this project will comprise testing a combination of innovative measures in the field of limiting access and consolidated deliveries, as well as the introduction of appropriate incentives for cleaner freight traffic. By consolidation of deliveries is meant coordinated distribution of goods where the goods are being collected in certain place (consolidation centre) and then distributed to the city centre in order to achieve optimal load factor and minimum number of trips. Through pilot testing, the benefits and effect of individual measures will be analysed as regards both the economy and inhabitants of the testing area, as we expect that by implementing the above measures the delivery of goods within the city will be rendered more energy efficient, which will resulted in reduced air pollution.

This approach is based on close cooperation between city authorities, transport companies and local economic entities, but it is also enhanced by the inclusion of a local freight transport network. Activities and progress regarding the project will be discussed at regular meetings between the representatives of local networks.

C Innovative aspects

Previous experience from projects, including the START project funded by IEE, has proved that in order to reduce energy consumption in the freight business sector, collaboration and communication is a factor for success. Today, there are several of freight-related issues to be addressed: sustainable urban transportation plans, balancing sustainable transport with economic vitality; cities are unaware of freight sector issues and little or no mechanism is available for discussion in the field of logistics.

The local freight partnership in Ljubljana was established in 2006. Potential stakeholders have shown interest in public – private cooperation and joining a local freight partnership in Ljubljana. So far Ljubljana has a partnership of ten to fifteen stakeholders from different interest groups from city administration to road hauliers and logistics companies, retailers, manufacturing, service providers – couriers, access restriction manager and research organisations. Ten of them have signed a memorandum of understanding for active participation in a local freight partnership.

All of the mentioned activities and networking are considered new and innovative not only on city/national but also the EU level.

D Research and technical development

No research activities are envisaged within the IP3.

E Situation before Civitas

Since Slovenia's join to the European Union Ljubljana has been facing a large increase in freight traffic, as well as problems in the area of urban freight traffic arising from the increase. The implementation of solutions arising from the experience from the START project, especially in connection with the existing local network for transporting goods in Ljubljana, is therefore of particular importance for the city. The overall goal of START project was to reduce energy use by making freight traffic more efficient, by consolidation of deliveries, access restrictions, improved load factors and greater use of more energy efficient vehicles in urban freight transport. One of the main problems in the City of Ljubljana is that the access restrictions for freight traffic which were implemented in the city centre and in broader city area within the motorway ring in year 2001 are not strictly obeyed. The implemented concept of access restriction also does not fully ensure an efficient, sustainable and pedestrian friendly city logistic system.

Generally, the delivery of goods in Ljubljana is not coordinated. There are several logistics centres for the distribution of goods into the Ljubljana's city centre in which are situated in different locations in the city but do not operate together or in co-operation, which causes a large number of transport operations and predictably lower load factor.

F Inter- relationship with other measures

At the moment Ljubljana applies a system of restricted access for delivery vehicles to the city centre. The implementation and operation of the measures in IP3 will provide basis for considering and finding the best combination between the two approaches which will provide best efficiency and other benefits in terms of freight logistics in the future. The city council together with logistics stakeholders will make final decision.

5.1.3.2. Evaluation activities and indicators

A Evaluation activities and indicators on IP level

Expected possible impacts

The expected effects of IP3 are:

- improvement in city freight transport organisation

  The common measure 7.1 builds upon the establishment of a partnership among stakeholders involved in the city freight transport. This is a pre-condition for making the measure effective. Therefore, a process of establishment and strength/dedication of the network is to be checked for the evaluation of the improvements.

- improvements in energy savings of freight transport

  Not only energy savings improvements but also improvements in terms of air pollution and streets occupation and citizens' disturbance are expected.

Selected indicators

In the table below an overview is given of the evaluation activities for the IP Improved freight transport

Table 15: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 3: IMPROVED FREIGHT TRANSPORT	▪ Combining results of the two measures to come to a conclusions on IP level: - Number and roles of participants in local freight partnership, - Number of local freight partnership meetings during project lifetime, - Topics of the meetings and major achievements - Traffic observing and counting, - Modeling pollutants emission in urban freight traffic, - Calculating energy consumption of freight traffic, - Measuring and calculating loading capacities of freight vehicles.	▪ improvements in energy savings of freight transport ▪ improvements in rationality of freight transport ▪ improvement in city freight transport organisation in terms of citizens satisfaction (less disturbance, less air pollution, less street occupancy, etc.) → Scope: city centre of Ljubljana → Target group: stakeholders involved in freight transport, city council

Details of the evaluation activities

Details on the evaluation activities for IP3 is not possible to specify at this stage since evaluation approach for one of the two measures, which comprise this IP, have not yet been agreed on the project level. In such a situation a reasonable approach would be to apply adapted specifications for measure 7.2.

B Evaluation activities and indicators on measure level

Expected possible impacts

- Measure 7.1 COM Integrated freight policy development
  - improved city freight transport organisation
  - active network of participants/stakeholders in freight transport in the city
- Measure 7.2 Sustainable freight logistics

- improvements in energy savings of freight transport (not only energy savings improvements but also improvements in terms of air pollution and streets occupation and citizens disturbance are expected)
- higher rationality (economic, environmental) and potential for up-scaling is expected

Selected indicators

Below an overview is given of the evaluation activities for the measures in IP3 Improved freight transport.

Table 16: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
7.1 COM Integrated freight policy development	▪ measurement of - Number and roles of participants in local freight partnership, - Number of local freight partnership meetings during project lifetime, - Topics of the meetings and major achievements ▪ BAU ▪ potential for up-scaling ▪ In-depth process evaluation	▪ active network of participants/stakeholders in freight transport in the city ▪ improved organisation of freight transport → Target group: participants in freight transport, city council → Scope: city centre
7.2 Sustainable freight logistics	▪ measurement of: - Freight traffic situation (observing and counting) - Measuring and calculating loading capacities of freight vehicles - Calculating energy consumption of freight traffic - Modeling pollutants emission in urban freight traffic ▪ before/after ▪ up-scaling ▪ CBA ▪ in-depth process evaluation	▪ Energy efficient freight transport → Target group: network of freight transport stakeholders → Scope: city centre

Details of the evaluation activities

- Indicator Improved city freight transport organisation: based on questionnaires (forms of reporting) the data will be collected in each city about the progress of local freight partnership establishment. A basis for the evaluation will be a partnership establishment plan which will be prepared by the measure leader in collaboration with other dedicated representatives from Brno, Gent, Porto and Zagreb. Evaluation will cover the progress of local freight partnership development in each city with a final report on the impact of local freight partnerships.
- Indicator Energy efficient freight transport: Attention will be paid to the number of runs, the occupancy of loading space, the consumption of energy, the number of permits, client satisfaction. Surveys/interviews and the recording of violations will be considered. The impact of other measures to be implemented in the target area will also be assessed.

General approach to conducting the surveys and interviews has been described in detail in subsection Details on the data collection of paragraph 5.1.2.3, page 206.

Details for Business as usual and up- scaling

- BAU

BAU analysis will be applied for measure 7.1 COM. The approach for the analysis is a prediction of traffic development in the city centre with and without this measure, i.e. predicition of the situation if only measures outside CIVITAS ELAN are implemented, or both. The initial reference state/data is present situation.

- Up- scaling

Up-scaling analysis is foreseen for both measures 7.1 COM and 7.2. The approach for this analysis is multi-attribute evaluation encompassing CBA for 7.2 and in-depth process evaluation. If CBA reveals that implementation of the measure is rationale, and in-depth process evaluation discovers key barriers and drivers which can be effectively controlled, than directions for up-scaling will be formulated for both measures.

C CBA

CBA (or at least certain level of financial analysis) will be performed for measure 7.2 Sustainable freight logistics. The motivation to perform this analysis is to clarify rationale of the implementation of the measure. More specifically, the motivation is to understand costs and benefits of establishing a network of freight logistics providers and users with collaboration of the city departments. This motivation has been discussed with ML and COL responsible perons; agreement has been reached/signed with the ML that data collection as specified in the agreements (methods, frequency, reporting) will be made. This agreement is annex to the Evaluation Plan and is available on demand.

Table 17: Overview indicators and data collection activities for CBA – Measure 7.2

AGENTS	COSTS	BENEFITS
Freight logistics providers	Capital costs, operation and maintenance costs	Operating revenues, fuel cost reduction, profitability
Freight logistics users	Cost of service	Time savings, staff effort reduction
Citizens	-	Perception of energy savings and air pollution reduction, reduction of streets occupancy, reduction of

AGENTS	COSTS	BENEFITS
		disturbance

5.1.3.3. Data collection

The approach for data collection has been described in detail in sub-section "Details on the data collection" under paragraph "Data collection 5.1.1.3", page 206.

Basically, data will be collected by means of measurements, questionnaires/interviews, counting, and recording. Based on these calculations/modeling results, prediction and interpretation is envisaged.

ML of both measures is the same. He will assure data collection together with partners working on the implementation of the measure. According to specifications given in the agreement between ML and the evaluation team the collected data will be regularly submitted to the evaluation team. SEM will provide review of the calculations/modeling and interpretation of findings on both measure and IP level as a result of data collection.

Table 18: Data collection inventory for the city of Ljubljana – IP3

INDICATOR	LEVEL[8]	Focus[9]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Improved city freight transport organisation	M/IP	F	before/ after	Questionnaire/interview	Stakeholders, city departments responsible for freight transport organisation/permitting	City centre	Frequency, duration, start, end and other; details are in the agreements on data collection which are annexes to the evaluation plan and are available on demand	COL, UI, other cities in ELAN
Improvements in energy savings of freight transport	M/IP	F	regularly	Measurement, recording	km, L/km, #, €	all involved vehicles in 7.2		Providers, UI
Costs and benefits of the implementation of 7.2: capital, maintenance, and operational costs of new vehicles, costs of staff involved in providing the service, benefits in time savings of users, benefits of less disturbance of citizens, benefits of improved air quality	M	F	continuous	Recording, calculation	€	All involved in measure 7.2		Providers, users, UI, COL

[8] M= Measure level

IP= Integrated Package Level

[9] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL[8]	Focus[9]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Maintenance logs/reports	M	F	continuous	Measurement, recording, calculation	Hours, €	Maintenance operators involved in 7.2		Providers, UI

Details on the data collection

- Measure 7.1 COM Integrated freight policy development

PI is responsible for the implementation of this common measure. This work will build on the partnership formed as part of the START project in Ljubljana and on know how and implementation of 7.2-LJU objectives. The City of Ljubljana will transfer know how and experience with establishing local freight partnerships to all partner cities. The knowledge transfer inspired by this measure will have a positive impact on the implementation of the strategies: fostering the awareness in terms of potential environment-/ energy- related gains attainable through the adoption of a more efficient freight distribution system; facilitating the acceptance of measures beyond and above mere considerations of corporate interest; and better comprehending motivations and technicalities behind the selected freight measures. During the project's lifetime, the City of Ljubljana will organise an open European event: "The role of local freight partnerships".

- Measure 7.2 Sustainable freight logistics

In the agreement on the next page specification in terms of data collection (responsibility, content, frequency) is provided. PI has the key responsibility, data collection is envisaged annually, evaluation and interpretation is foreseen to be conducted by the JSI and PI. COL will support these activities particularly in terms of environmental data provision from the on-going measurement station in the city centre.

General approach to conducting questionnaire surveys and interviews has been described in detail in sub-section Details on the data collection of paragraph 5.1.2.3, page 206.

Agreement about the evaluation and data collection activities for Measure 7.2-LJU

Annex to the Evaluation Plan - Measure 7.2-LJU

Ljubljana, 07.04.2009

1 **Key specific measure information**

7.2-LJU Sustainable Freight Logistics		
Measure leader	**Partners Involved**	**Total PM**
Blaž Jemenšek, PI	PI (59.5 PM), COL (24.5 PM)	84 PM
Functionality		
Improved freight logistics.		
Purpose/goals		
To set up an efficient distribution of goods in a demo area.		
Evaluation (general goal, targets)		
The assessment of differences in freight vehicles emissions will be made before and after the implementation of the measure. Attention will be paid to the number of runs, the occupancy of loading space, the consumption of energy, the number of permits, client satisfaction. The cost-benefit analysis and the impact of measures to be implemented in the target area and will also be assessed.		
Reference scenario (BAU, zero state)		
Analysis of the current freight logistic situation to establish the baseline.		

2 **Evaluation and data collection plan**

Measure name: 7.2-LJU Sustainable Freight Logistics						
Evaluation category	**Evaluation sub-category**	**Impact**	**Indicator - general**	**Indicator – specific (unit)**	**Analytical method/data collection method**	**Data collection / measurement frequency / No. of task – activity / WP allocation**
ENVIRONMENT	Pollution	Emissions/ air quality	COx emissions	COx emissions (g and g/vkm)	Calculation of COx, NOx and PM10 emissions. Comparison of results (before and after the implementation of the measure).	PI with support of COL zero state – February, March 09 12/30/40 7.2-M7 M WP7
			NOx emissions	NOx emissions (g and g/vkm)		
			Particulate emissions	PM10 emissions (g and g/vkm)		
TRANSPORT	Transport System	Freight movements	No. of goods vehicles.	No. of goods vehicles moving in demo areas	Quantitative (surveys - questionnaires), derived or measurement.	PI with support of COL zero state – April, May 09 12/30/40 7.2-M7 M WP7
			Load factor	Load (t/vehicle or % share of maximum load capacity)		
			Time	Time (h)		
			Energy consumption	Fuel Consumption (MJ or litters)		

Measure name: 7.2-LJU Sustainable Freight Logistics						
Evaluation category	**Evaluation sub-category**	**Impact**	**Indicator - general**	**Indicator – specific (unit)**	**Analytical method/data collection method**	**Data collection / measurement frequency / No. of task – activity / WP allocation**
SOCIETY	Acceptance	Acceptance	Acceptance level	Acceptance by stakeholders (index, %)	A trend in acceptability will be evaluated based on the response of the key stakeholders (surveys-questionnaries)	PI with support of COL 12/30/40 7.2-M7 M WP7
ECONOMY	Benefits	Operating Revenues	Operating revenues	Revenues per tonne-km (tkm)	Euros/tkm, quantitative, derived	PI with support of COL 40 7.2-M7 M WP7
	Costs	Operating Costs	Operating costs	Costs per tonne-km (tkm)	Euros/tkm, quantitative, derived	PI with support of COL 40 7.2-M7 M WP7

3 **Timetable of Tasks & Planned activities**

No.	Type	Tasks & Planned activities	Month	Allocated to WP
		7.2.1 LJU - Research and development		**WP11**
7.2 – M1	M	Research on traffic flows and traffic modeling on target demo area as a basis for the consolidation centre and other measures	18	WP11
		7.2.2 LJU - Implementation & demonstration		**WP7**
7.2 – WD1	WD	Determination of pilot project measures using the START project recommendations as an input	6	WP7
7.2 – M2	M	Public tender for the selection of the consolidation centre operator	20	WP7
7.2 – M3	M	Establishment of the first phase of modifications to the traffic pattern (adjusted access restriction)	15	WP7
7.2 – M4	M	Public tender for the selection of the driver training provider	20	WP7
7.2 – M5	M	Establishment of the second phase of modifications to the traffic pattern (establishment of the consolidation centre)	22	WP7
7.2 – M6	M	Establishment of the third phase of modifications to the traffic pattern (incentives for cleaner vehicles)	30	WP7
7.2 – WD2	WD	Submission of the plan for the consolidation of deliveries in corridor and target demo area	18	WP7
		2.7.3 LJU Data collection		**WP7**
7.2 – M7	M	Data collection for evaluating and measuring impacts of task	12,30,40	WP7
		7.2.4 LJU In-depth data analysis and studies		**WP12**
7.2 – WD3	WD	Evaluation of the impact during measures implementation	16,34,44	WP12
		7.2.5 LJU - Measure-related dissemination		**WP7**
7.2 – WD4	WD	Thematic brochures and leaflets	12, 24, 36, 48	WP7
		7.2.6 LJU - Dissemination & training		**WP13**
7.2 – M8	M	Project promotion at thematic events	12,20, 30,40	WP13
7.2 – M9	M	Training of drivers to ensure more optimal deliveries	24,30, 36,42	WP13

Measure leader	Site evaluation manager	Measure evaluator
Blaž Jemenšek, PI	Branko Kontić, JSI	David Kocman, JSI

5.1.4. Other measures

Measures 1.7 Pure plant oil for vehicle propulsion and 1.12 Green procurement for public fleets are not included in any of the three IPs of Ljubljana. Nevertheless, according to specifications given in Table 3: Summary table of the evaluation activities for the city of Ljubljana, page 174, BAU and up-scaling potential will be evaluated. It is therefore expected that the following approach will be implemented for both measures:

5.1.4.1. BAU

- Measure 1.7 Pure plant oil for vehicle propulsion

The approach for the analysis is a prediction of application of biofuels, including pure plant oil with and without implementation of 1.7. Prediction of the situation if only measures outside CIVITAS ELAN are implemented, or both, will be made. The initial reference state/data is present situation.

- Measure 1.12 Green procurement for public fleets

The approach for the analysis is a prediction of introducing hybrid vehicles into Ljubljana Administration fleet with and without implementation of 1.12. Prediction of the situation if only measures outside CIVITAS ELAN are implemented, or both, will be made. The initial reference state/data is present situation.

5.1.4.2. Up- scaling

The approach for this analysis for both measures is a multi-attribute evaluation encompassing financial analysis/limited CBA and process evaluation. If CBA reveals that implementation of the measures is rationale, and process evaluation discovers key barriers and drivers which can be effectively controlled, than directions for up-scaling will be formulated for both measures.

Data collection for 1.7 is responsibility of the AIS (Agricultural institute of the Republic of Slovenia), while for 1.12 City of Ljubljana. Data collection will be performed at least twice a year; the process evaluation and interpretation will be made every 6 months, while financial analysis will be made regularly on annual basis. Details on data collection, indicators for evaluation and the evaluation frequencies are summarized in the signed agreements between MLs and the evaluation team; agreements are annexes to the Evaluation Plan and are available on demand.

5.2. City/ corridor level

In the CIVITAS ELAN cities it has been agreed to measure some key indicators on a corridor level. The key indicators to be measured on this level are:

- Modal Split
- Air quality

For the city of Ljubljana however, both these indicators will be measured within the measure 2.1. Integrated high-quality mobility corridor. Since this measure is covering a wide range of measures all working on a common objective to create a high quality corridor both these indicators will be measured at the corridor level immediately and therefore no extra evaluation activities on this level are needed. For a detailed description please see chapter 5.1.1.

6. In- depth process evaluation

In this chapter only the focus measures that are subject to the in- depth process evaluation are described. For these measures the process of implementation will be analysed very closely to obtain a full understanding and overview of the implementation process.

The non-focus measures will not be described here however some basic process evaluation will be provided for these measures based on a fill- in form filled in by the ML's on a yearly basis.

The process evaluation in Ljubljana introduces in addition to the components which deal with identification and investigation of barriers and drivers a performance assessment of the measures. This performance assessment consists of the following three elements: assessment of the consolidation of the measure, assessment of the measure implementation, and assessment of evaluation planning & management activities. The approach, components and procedure of the performance assessment is described in detail in an Annex, see Chapter 7.

In-depth process evaluation will be performed for the following measures: 1.11, 2.1, 6.1, 7.2, and 8.5. (see Table 4on page 183). All of these have been described in detail in the previous sections.

6.1. Measure 1.11: Hybrid bus implementation

6.1.1. Description

See Chapter Impact Evaluation

6.1.1.1. Innovative aspects

By purchasing hybrid vehicles Ljubljana will start using one of the latest and cleanest technologies available for buses on the market. Hybrid buses are comparatively new to Europe and have not found wide spread use yet. In Slovenia it will anyhow be the first case of using hybrid buses in public transport. In addition, testing between 3 different types of hybrid buses will be performed.

6.1.1.2. Research and technical development

There is no use of pure plant oil for engine propulsion in transport in Slovenia yet. Therefore a stationary engine for use in laboratory and three engines on vehicles for use in real conditions will be modified and adjusted for the use of pure plant oil from rapeseed produced in decentralised, i.e. small farm units.

6.1.1.3. Situation before CIVITAS

The present bus fleet of the public transport operator LPP comprises 205 urban buses and 65 regional buses. The urban transport is operated on 23 lines of 268 km total length. The average age in October 2008 of the buses is more than 12 years. Approximately 126 are modern with low entering barrier and vocal information for passengers, 78 also with visual display, 128 buses are air-conditioned and 50 have on-board security cameras.

Therefore there is a strong need to modernise the bus fleet and to make the public transport more comfortable and efficient for passengers.

6.1.1.4. Inter-relationships with other measures

There is inter-relationship among measures which are covered by measure 2.1 High quality mobility corridor, see Integrated package 1: Making PT in the corridor the most desirable transport mode.

6.1.2. Process stages

The process evaluation will concentrate on the following stages of the measure implementation/operation:

- Stage 1: Planning and preparatory activities. This stage encompasses a preparation of a public tender documentation for testing 3 types of hybrid buses and data collection on the performance of existing buses.
- Stage 2: Testing three types of buses with data collection on performance.
- Stage 3: Analysis of testing results of the 3 types of buses; preparation of public tender documentation for purchasing 27 selected hybrid buses.
- Stage 4: Operation of 27 hybrid buses; data collection on performance; training of drivers and maintenance personnel
- Stage 5: Final analysis and dissemination

This results in the following timeline:

Table 19: process stages for measure 1.11 Hybrid bus implementation

Stage	year 1				year 2				year 3				year 4			
1 Planning and preparatory activities																
2 Testing three types of buses																
3 Analysis of testing results																
4 Operation of 27 hybrid buses																
5 Final analysis and dissemination																

6.1.3. Methodology for the process evaluation

The approach/methodology for process evaluation is based on the evaluation of the progress and effectiveness of the measures' implementation. This evaluation looks whether tasks have been performed at planned due dates, and if not, why not – identification of barriers. The tasks are identified in the MDS as milestones, so it is relatively straightforward to follow the implementation. Process evaluation will be supported by performance assessment as described in an Annex, see Section 7.

In addition a learning history approach as suggested by POINTER will be applied in all three stages: understanding of the measures' targeted implementation/operation, perception of the internal and external stakeholders on actual implementation/operation of the measures (drivers and barriers; learning process), reflection to changes during implementation/operation as to achieve goals.

6.2. Measure 2.1: Integrated high-quality mobility corridor

6.2.1. Description

See Chapter Impact evaluation.

6.2.2. Process stages

The process evaluation will concentrate on the following stages of the measure implementation/operation:

- Stage 1: Planning and preparatory activities. This stage encompasses a preparation of a communication and marketing plan for the corridor
- Stage 2: Implementation of the corridor: preparation of the Mobility Management Plan for two traffic generators, establishment of dedicated bus lanes, construction of P+R at both ends of the corridor, improvement of cycling and pedestrian infrastructure along the corridor, data collection.
- Stage 3: Analysis of the performance of the corridor, dissemination.

This results in the following timeline:

Table 20: process stages for measure 2.1 Integrated High quality mobility corridor

Stage	year 1				year 2				year 3				year 4			
1 Planning and preparatory activities																
2 Implementation of the corridor																
3 Analysis of the performance																

6.2.3. Methodology for the process evaluation

The approach/methodology for process evaluation is based on the evaluation of the progress and effectiveness of the measures' implementation. This evaluation looks whether tasks have been performed at planned due dates, and if not, why not – identification of barriers. The tasks are identified in the MDS as milestones, so it is relatively straightforward to follow the implementation. Process evaluation will be supported by performance assessment as described in an Annex, see Section 7.

In addition a learning history approach as suggested by POINTER will be applied in all three stages: understanding of the measures' targeted implementation/operation, perception of the internal and external stakeholders on actual implementation/operation of the measures (drivers and barriers; learning process), reflection to changes during implementation/operation as to achieve goals.

6.3. Measure 6.1: Demand responsive services

6.3.1. Description

6.3.1.1. Objectives and scope

The main objectives of this measure are:

- To study and implement the best solutions to operate an innovative and flexible Demand Responsive Public Transport System to serve the mobility needs of impaired people and assure their accessibility to places and services. The system could then be ap-

plied also to manage a Demand Responsive Public Transport System in areas not supported by regular public transport services

- To purchase one, if possible two vehicles, adapted to transport of impaired people
- To promote legislative and other activities aimed at granting impaired people equal access to public mobility services
- To build a network of stakeholders that provide mobility and accessibility services to impaired people and optimise their services

6.3.1.2. Description of the measure

The measure leader is the City of Ljubljana (COL). COL will coordinate the activities, promote cooperation with stakeholders (impaired peoples' associations, city's Council for removal of architectonic and communicational barriers) and promote activities at national level. Three other project partners will mainly be involved: Telargo for IT related activities, LPP for operating the flexible demand service and REC will be involved in communication campaigns.

6.3.1.3. Innovative aspects

The new service will be a complete novelty at the local and national level. The novelty will be to provide public transport service to impaired people who are now lacking such a service. A novelty will also be the use of new organisational solutions and of state-of-the art technology (satellite tracking, routing optimization using traffic history, etc) with the option to build on GALILEO, when available, to provide the service.

6.3.1.4. Research and technical development

- Analysis of user needs and stakeholders as well as provider needs will be implemented
- The organisational, financial, and policy framework for setting up Demand Responsive Public Transport service will be designed
- An innovative and flexible Demand Responsive Public Transport System introduction plan and future implementation design will be prepared

6.3.1.5. Situation before CIVITAS

Presently the impaired people's mobility needs are satisfied through associations that provide transport services only to their members (even relating to their members, the capacities are often not sufficient to give appropriate service to all that would need it), so there is a lack of accessible transport for non-members and other people visiting Ljubljana. The taxi services in Ljubljana do not operate vehicles that are suitable for impaired people's needs so they can not use them. The number of public buses on regular lines that are accessible to impaired is still insufficient (58 buses or 29% of the total urban bus fleet) and there remains the issue on how to serve the mobility needs of those that live in areas that are not covered by such buses. A positive aspect is that there is a system that provides information on time schedule of adequate buses via cell phone use, yet as mentioned, they are not available everywhere in the city.

Low density areas of the Ljubljana municipality represent around 5% of the population. The average density is very low and could not justify (for economical reason) the operation of a regular bus line.

Demand responsive public transport services do not exist in the city, nor in the Republic of Slovenia so far. The latest transport law on road traffic gives the possibility to organise new public transport services for low density areas. Up till now no research or study has been carried out. For this reason the city has decided to take proper actions to develop demand responsive public transport services for impaired people at a first stage. Afterwards the same system could be applied to serve transport needs of people living in low density areas

6.3.1.6. Inter-relationships with other measures

N/A

6.3.2. Process stages

The process evaluation will concentrate on the following stages of the measure implementation/operation:

- Stage 1: Planning and preparatory activities. This stage encompasses a needs assessment and stakeholders' network establishment
- Stage 2: Implementation and operation of the Demand responsive services: purchese of one/two vehicles, testing of communication between users and providers, data collection on performance assessment and satisfaction of the users, training of drivers
- Stage 3: Analysis of the performance of the service, dissemination.

This results in the following timeline:

Table 21: process stages for measure 6.1: Demand responsive services

Stage	year 1				year 2				year 3				year 4			
1: Planning and preparatory activities																
2 Implementation and operation																
3 Analysis of the performance																

6.3.3. Methodology for the process evaluation

The approach/methodology for process evaluation is based on the evaluation of the progress and effectiveness of the measures' implementation. This evaluation looks whether tasks have been performed at planned due dates, and if not, why not – identification of barriers. The tasks are identified in the MDS as milestones, so it is relatively straightforward to follow the implementation. Process evaluation will be supported by performance assessment as described in an Annex, see Section 7.

In addition a learning history approach as suggested by POINTER will be applied in all three stages: understanding of the measures' targeted implementation/operation, perception of the internal and external stakeholders on actual implementation/operation of the measures (drivers and barriers; learning process), reflection to changes during implementation/operation as to achieve goals.

6.4. Measure 7.2: Sustainable Freight Logistics

6.4.1. Description

6.4.1.1. Objectives and scope

The main objectives of this measure are:

- To set up an efficient distribution of goods in a demo area including the corridor (Slovenska Street), mainly in the city centre,
- to maintain a vibrant city centre by changing the existing pattern of goods distribution,
- to reduce the existing number of deliveries the corridor and demo area by 20 %,

- to reduce pollutant emissions from urban freight traffic by 15 % for CO2, NOx and PM10 each in the corridor (Slovenska Street) and demo area,
- to improve the energy efficiency in urban freight distribution and reduce energy consumption in the corridor (Slovenska Street and demo area by 10 %)

6.4.1.2. Description of the measure

The pilot project will include testing a combination of measures that are quite different in terms of content, yet they form a coherent unit aimed at improving city delivery. First, a pilot area will have to be determined, which will serve both for testing new delivery concepts as well as for performing the activities of a delivery consolidation centre (see more detailed description in the chapter Implementation & demonstration). In searching for an appropriate testing area, the city centre's business structure and locations of individual business entities will be analysed by type of goods, and a database of potential clients interested in consolidated deliveries will be compiled as part of the preparatory phase. As a basis for the traffic flows and goods flows analysis and for later implementation of the measures a public opinion survey made within WP 4 will be also taken into consideration.

The type of cargo deemed to be best suited for consolidation will be determined; then a programme and timetable of all activities necessary to inform potential clients of the advantages of delivery consolidated, and to obtain their consent for participation in the pilot project, will be drawn up.

The pilot testing area will be in the corridor (Slovenska Street) and probably near the corridor in the city centre and also on the eastern side of the corridor where the main roads connecting the city centre and logistics areas (the most convenient places for testing consolidation centre) are situated.

6.4.1.3. Innovative aspects

To complement the long-term planning of measures aimed at reducing freight traffic, Ljubljana will adopt a short-term approach consisting of the implementation of a pilot project. Part of this project will comprise testing a combination of innovative measures in the field of limiting access and consolidated deliveries, as well as the introduction of appropriate incentives for cleaner freight traffic. By consolidation of deliveries is meant coordinated distribution of goods where the goods are being collected in certain place (consolidation centre) and then distributed to the city centre in order to achieve optimal load factor and minimum number of trips.

Through pilot testing, the benefits and effect of individual measures will be analysed as regards both the economy and inhabitants of the testing area, as we expect that by implementing the above measures the delivery of goods within the city will be rendered more energy efficient, which will resulted in reduced air pollution.

This approach is based on close cooperation between city authorities, transport companies and local economic entities, but it is also enhanced by the inclusion of a local freight transport network. Activities and progress regarding the project will be discussed at regular meetings between the representatives of local networks

6.4.1.4. Research and technical development

See subsections above

6.4.1.5. Situation before CIVITAS

Since Slovenia's entry into the European Union and gaining even further economic attraction, Ljubljana has been facing a large increase in freight traffic, as well as problems in the area of urban freight traffic arising from the increase. The implementation of solutions arising from the experience to be gained during the course of the START project, especially in connection with the existing local network for transporting goods in Ljubljana, will therefore be of particular importance for the city. The overall goal of START project is to reduce energy use by making freight traffic in participating cities (Göteborg, Bristol, Riga, Ravenna and Ljubljana) more efficient, by consolidation of deliveries, access re-

strictions, improved load factors and greater use of more energy efficient vehicles in urban freight transport.

The primary goal for Ljubljana within START project is establishment of local freight network and creating the new logistics model/strategy for better freight transport in the city being acceptable for all the stakeholders and to be ready for the implementation by the city authorities. A crucial factor for reaching wider consensus in the freight traffic solutions is local freight network (also called freight partnership, city logistics forum, etc.) which role is to gather all the actors creating the city logistics at the same table in order to achieve better and more efficient solutions. The local freight network which has been already established in Ljubljana within START involves public and private organizations i.e. hauliers, retailers, forwarders, city authorities, research institutions, police, etc.

One of the main problems in the City of Ljubljana is that the access restrictions for freight traffic which were implemented in the city centre and in broader city area within the motorway ring in year 2001 are not strictly obeyed. The implemented concept of access restriction also does not fully ensure an efficient, sustainable and pedestrian friendly city logistic system.

Generally, the delivery of goods in Ljubljana is not coordinated. There are several logistics centres for the distribution of goods into the Ljubljana's city centre in which are situated in different locations in the city but do not operate together or in co-operation, which causes a large number of transport operations and predictably lower load factor

6.4.1.6. Inter-relationships with other measures

The measure is related to common measure 7.1, however, specification on the latter is to be established yet.

6.4.2. Process stages

The process evaluation will concentrate on the following stages of the measure implementation/operation:

- Stage 1: Planning and preparatory activities. This stage encompasses a research on traffic flows and traffic modeling on target demo area; determination of pilot project measures using the START project recommendations as an input
- Stage 2: Implementation/operation of the measure: Public tender for the selection of the consolidation centre operator, submission of the plan for the consolidation of deliveries in corridor and target demo area. establishment of the first phase of modifications to the traffic pattern (adjusted access restriction), public tender for the selection of the driver training provider, establishment of the second phase of modifications to the traffic pattern (establishment of the consolidation centre), establishment of the third phase of modifications to the traffic pattern (incentives for cleaner vehicles), data collection on the operation of the new system of delivery
- Stage 3: Analysis of the performance of the new delivery system, dissemination.

This results in the following timeline:

Table 22: process stages for measure 7.2 Sustainable Freight Logistics

Stage	year 1				year 2				year 3				year 4			
1: Planning and preparatory activities																
2 Implementation/operation of the measure																
3: Analysis of the performance																

6.4.3. Methodology for the process evaluation

The approach/methodology for process evaluation is based on the evaluation of the progress and effectiveness of the measures' implementation. This evaluation looks whether tasks have been performed at planned due dates, and if not, why not – identification of barriers. The tasks are identified in the MDS as milestones, so it is relatively straightforward to follow the implementation. Process evaluation will be supported by performance assessment as described in an Annex, see Section 7.

In addition a learning history approach as suggested by POINTER will be applied in all three stages: understanding of the measures' targeted implementation/operation, perception of the internal and external stakeholders on actual implementation/operation of the measures (drivers and barriers; learning process), reflection to changes during implementation/operation as to achieve goals.

6.5. Measure 8.5: E-ticketing and fare integration

6.5.1. Description

See chapter Impact Evaluation

6.5.2. Process stages

The process evaluation will concentrate on the following stages of the measure implementation/operation:

- Stage 1: Planning and preparatory activities. This stage encompasses an analysis of the present situation in the sphere of general conditions and fare systems, defining compatibility of ticket-issuing systems / payment systems
- Stage 2: Implementation/operation of the integrated fare system: testing the new ticketing system, time control of new ticketing system from the drivers, unifying the distinction parts of general conditions and fares of both systems to form the possibility of unified use, data collection.
- Stage 3: Analysis of the performance of the system, analysis of customers satisfaction, analysis on impact to modal split change, dissemination.

This results in the following timeline:

Table 23 process stages for measure 8.5 E-ticketing and fare integration

Stage	year 1				year 2				year 3				year 4			
1Planning and preparatory activities																
2 Implementation/operation of the integrated fare system																
3 Analysis of the performance of the system																

6.5.3. Methodology for the process evaluation

The approach/methodology for process evaluation is based on the evaluation of the progress and effectiveness of the measures' implementation. This evaluation looks whether tasks have been performed at planned due dates, and if not, why not – identification of barriers. The tasks are identified in

the MDS as milestones, so it is relatively straightforward to follow the implementation. Process evaluation will be supported by performance assessment as described in an Annex, see Section 7.

In addition a learning history approach as suggested by POINTER will be applied in all three stages: understanding of the measures' targeted implementation/operation, perception of the internal and external stakeholders on actual implementation/operation of the measures (drivers and barriers; learning process), reflection to changes during implementation/operation as to achieve goals.

7. ANNEX to draft evaluation plan Ljubljana

CIVITAS ELAN

Ljubljana

Approach to Performance Assessment

This document summarizes information on additional activity in the framework of process evaluation of the Ljubljana measures in terms of their progress and related evaluation activities. Basically it is a tool for measures' performance assessment. As such it is applied as part of the in-depth process evaluation activities. Application can be "on demand" or regularly every 3 or 6 months together with compilation of the IPRs.

The performance assessment covers three topics:

i) consolidation of the measures. This topic is relevant in terms of clarifying all aspects of each measure: its content, goals and aims, especially if some changes appeared compared to the initial proposal, as described in MDS; organisational aspects of the measure's implementation; timing of the implementation¸ resources available; staff involved; role of each collaborator/partner with the emphasis on the role of a ML; networking with other measures; stakeholders participation plan; data collection for the evaluation purposes. If a measure is consolidated two evaluation scores - specifications are available: a) functionality of the measure is achieved/guaranteed, and b) impact of the measure will be possible to evaluate during implementation (and afterwards). These two specifications are components of the process evaluation of a measure. Possible evaluation marks are C(a) – yes/no, stating whether a measure is consolidated (functionality is achieved/guaranteed), and C(a+b) – yes/no, stating whether the measure is/is not consolidated and evaluation of impact will be possible or not.

ii) implementation of the measures. This topic provides information on the performance of a measure. It combines two assessments: a) whether the activities, performed in a measure, have a direction towards measure goals as stated in the MDS, and b) whether the activities constitute a basis for the overall consistent evaluation of the measure's impact. Possible evaluation marks are I(a) – yes/no, stating whether a measure is in the implementation phase and whether activities have a proper direction, and I(a+b) – yes/no, stating whether implementation activities enable consistent evaluation of the measure's impact.

iii) evaluation planning & management activities. This topic provides information about the evaluation activities performed on both measure and city level. The focus is on the evaluation of interaction and networking for the purpose of good evaluation management. The evaluation considers whether the Site Evaluation Manager (SEM) together with other evaluation team members act as a mobilisator and aid point for MLs and Site Coordinator (SC) on one side, and prompt, complete and transparent provider of information to the Project Evaluation Manager (PEM) on the other. Possible evaluation marks are E1 – yes/no, and E2 – yes/no. The mark E1– yes/no states whether evaluation team performs as expected and whether evaluation plan including agreement between ML and SEM about data collection is prepared. The scores are subject of consultation among SEM, MLs and SC. The mark E2 – yes/no states whether evaluation management in relation to the project level is efficient or should be improved. The latter is subject of consultation between SEM and the Project Evaluation Manager.

Table 1 below summarizes the evaluation marks, while Table 2 provides an overview of the performance assessment approach.

Legend:	
Excellent	Excellent performance; evaluation scores: C(a) = yes or C(a+b) = yes, I(a) = yes or I(a+b) = yes, E1 = yes, E2 = yes.

Good	Good performance; in terms of any of the evaluation scores there is a possibity for improvements
Poor	Performance is lower than expected (poor); multiple evaluation scores should be improved
Alert	Alert; performance needs immediate consolidation and improvement

Explanation of the evaluation score parameters:

C(a) – evaluates whether a measure is consolidated (its functionality is achieved/guaranteed)

C(a+b) – evaluates whether a measure is consolidated and whether evaluation of measure's impact will be possible

I(a) - evaluates whether a measure is in the implementation phase and whether activities have a proper direction

I(a+b) – evaluates whether implementation activities enable consistent evaluation of a measure's impact

E1 – evaluates whether evaluation team performs as expected in terms of communication and assistance to MLs, and whether a precise evaluation plan is prepared/reviewed as to properly follow measure's implementation/operation

E2 – evaluates whether evaluation management on project level should be improved

Table 2: Performance assessment approach; ***Note: Specific questions in the Table are subject to adaptation/revision based on measures planning/implementation/operation phase***

Measure	
IPR period	Date
Evaluator/Role	

Topic	Sub-topic	Specification of a subtopic	Aid questions	Evaluation score	Aggregated evaluation score*
Consolidation of the measure	content, goals and aims	Clear specification of the content of a measure	Does MDS clearly specify the subject/theme of the measure i.e. what is planned to be done in the framewok of the measure?	C(a) = yes/no	C(a) = yes/no
		Quantitative and/or qualitative specification of the goals	Are the goals understandable in terms of expected benefits or improvements?	C(a) = yes/no	

		Aims and expectations of the measure in terms of tangible results	Are expected results clearly and systematically described? Are they measurable or quantifyable?	C(a) = yes/no	
	organisational aspects of the measure implementation	Activities, relations and communication network which identify ML as a good master of the measure and enable concrete measure being implemented	Is it clear who is responsible and the leading person in terms of implementation and taking care of the ativities related to the measure? Is it viable that the measure will be implemented taking into acount organisational aspects of the work?	C(a) = yes/no	
	timing of the implementation	Understnding of timing of the measure in the context of project implementation	Is it clear that the measure is one component in the "big picture" and that synchronisation in terms of timing is necessary?	C(a) = yes/no	
		Responsibility for harmonised time management of measure implementation	Is there any doubt that persons involved in the implementation, especially ML, will act in a responsible manner as regard timing? Is time management transparent?	C(a) = yes/no	
	resources available	Management of the resouces availbale	Is budget for measure planning, implementation and operation available and responsibly managed?	C(a) = yes/no	
	staff involved	Human resources management	Are there any doubts or deviations regarding balanced and reasonable HRM?	C(a) = yes/no	
	role of each collaborator/partner with the emphasis on the role of a ML	Definition and management of the roles of partners	Are planing and implementation plans available for each partner in the context of the overall planning, implementation and operational plan of the measure	C(a) = yes/no	
		Understanding responsibility of the role of ML and practicing of this role	Does ML act as a responsible, dedicated person? Does he/she perform as a key person in terms of project management? Does he/she respond accordingly to project hierarchy?	C(a) = yes/no	
	networking with other measures	Understanding inteconnection of the measures	Is interconnection/netwoking among measures clear? Is it established?	C(a) = yes/no	

		Maintenance and positive exploitation of the measures network	Is interconnection/networking among measures maintained? Are positive aspects of networking exploited?	C(a) = yes/no	
	stakeholders participation plan	Identification of relevant stakeholders	Are key stakeholders for the success of the measure identified?	C(a) = yes/no	
		Organisation, management, and responsibility for stakeholders participation	Is there a plan for stakeholders participation available? Is the plan implemented? Are there proper adaptations/flexibility in place if needed?	C(a) = yes/no	
	data collection for the evaluation purposes	Understanding the need and process of data collection	Is it clear why data collection for the evaluation purposes is needed? Is it clear how data will be collected (who, what, when, where, how)?	C(a+b) = yes/no	C(a+b) = yes/no
		Preparedness and dedication for data collection	Is it clear that organisation and management of the measure involve data collection activities?	C(a+b) = yes/no	
		Organisation, management, and responsibility for data collection	Is responsibility of ML for data collection specified? Does ML behave according to this responsibility?	C(a+b) = yes/no	
Implementation	direction towards measure goals	Specification of links between implementation activities and measure goals	Is it clear (specification of aims) that a certain activity contributes to the overall goals of the measure?	i(a) = yes/no	i(a) = yes/no
	basis for the overall consistent evaluation of the measure's impact	Contribution of successful implementation of the activity to evaluating overall impact of the measure	Does specific activity involve monitoring – e.g. measurements, counting, calculation, survey, questionnaire, etc. - of the success of its implementation and as a basis for evaluating its impact?	i(a+b) = yes/no	i(a+b) = yes/no
Evaluation planning & management activities	Mobilisation of measure planning, implementation and operation, as well as acting as an aid point for MLs and Site	Assessment of the consultancy role of the evaluation team	Does evaluation team acts more as external or as integral group of the project? Is communication between evaluation team members and measure implementation staff regular? Are evaluation team members, and especially SEM, involved in project coordination and	E1 = yes/no	E1 = yes/no

	Coordinator		management?		
	Prompt, complete and transparent provision of information to the Project Evaluation Manager	Assessment of the management role of the SEM	Is communication between SEM and project evaluation manager continuous? Are consultations efective and productive?	E2 = yes/no	E2 = yes/no
Final evaluation score for the measure	Excellent/Good/Poor/Alert				

* Aggregation rule: agreed integrated assessment by the SEM, SC and ML

Prepared by Branko Kontić, Site Evaluation Manager

Ljubljana, April 2009, last revision in November 2009

Part 3: Site Evaluation Plan for the City of Zagreb

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Site Evaluation Plan for the City of Zagreb

1. City context

City of Zagreb is a cultural, scientific, economic, political and administrative centre with the seat of Parliament, President and Government of the Republic of Croatia. It is the biggest city in Croatia and the capital with the population of 780 000.

By its historical tradition, cultural relations, and above all, its urban planning, Zagreb is a distinctly central European city situated in the middle of the triangle of Vienna, Budapest and Venice. It has always been and remains a part of the cultural circle of Central Europe.

The city with a tradition of almost one thousand years celebrated its 900th birthday in 1994. Zagreb University was founded in the 17th century, and it is one of the oldest in Europe. Nine-hundred-year-old Zagreb, capital of Croatia, lives a rich cultural life, with more than 20 theatres, 3 concert halls, around 60 museums and art galleries. It is a big centre of congress tourism, economic and business events, and trade fairs not only in Croatia but also in this part of Europe.

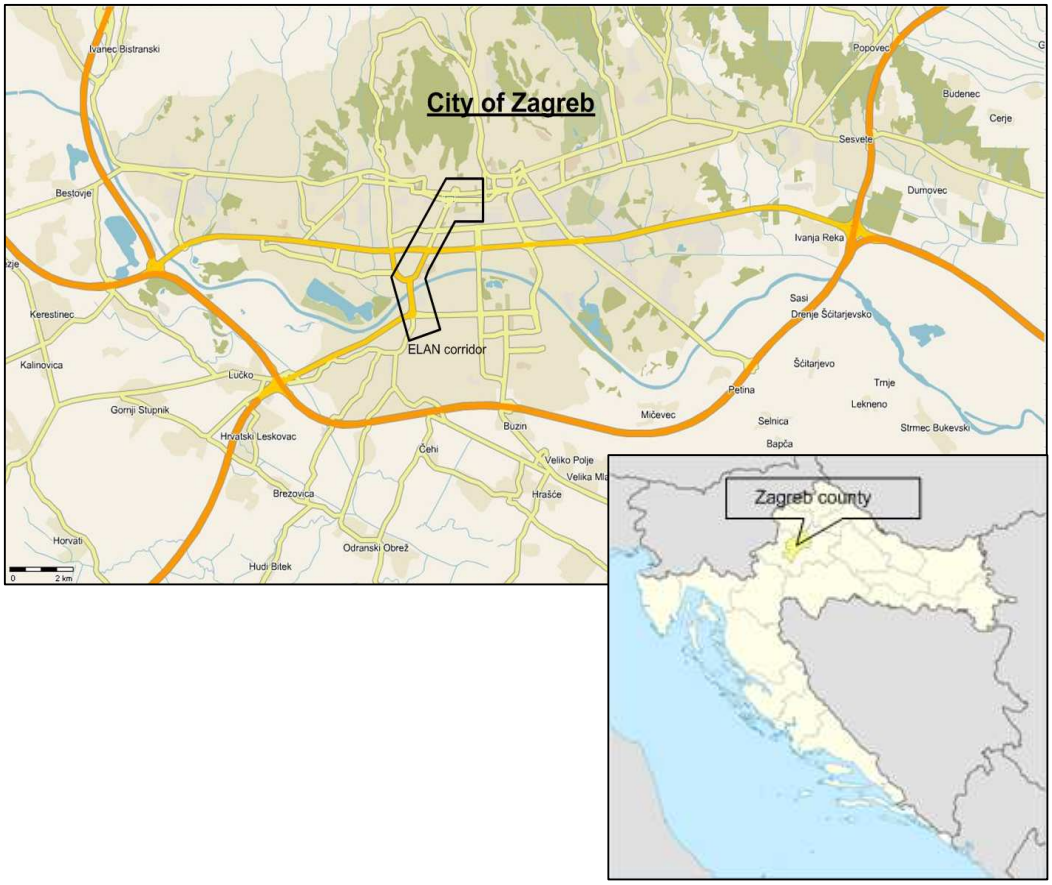

Figure 1: Zagreb city map

Most important branches of industry are: production of electrical machines and devices, chemical and pharmaceutical products, textile, food and drink processing. Zagreb is an important international trade and business centre, as well as a crossroad for transport between Central and East Europe. It is the home for the oldest university in Croatia and one of the oldest in Europe - the University of Zagreb, which was founded in 1669. Nowadays, the University of Zagreb includes 28 faculties, 3 art academies, and an expert Teacher Academy. Till

present more than 200,000 students have graduated, more than 18 000 graduates have a Master's Degree; more than 8,000 graduates received a Doctor's Degree.

PROCESSING

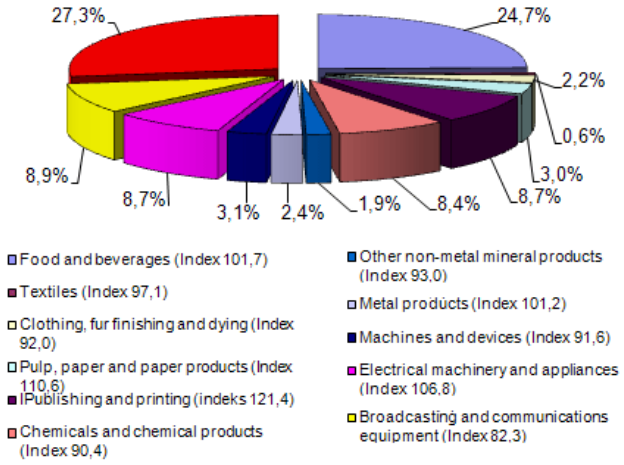

Figure 2: Structure of branches and production index (Jan.-Nov. 2007/Jan.-Nov. 2008.)

EMPLOYMENT according to National Classification of Activities (most persons employed in trade and processing)

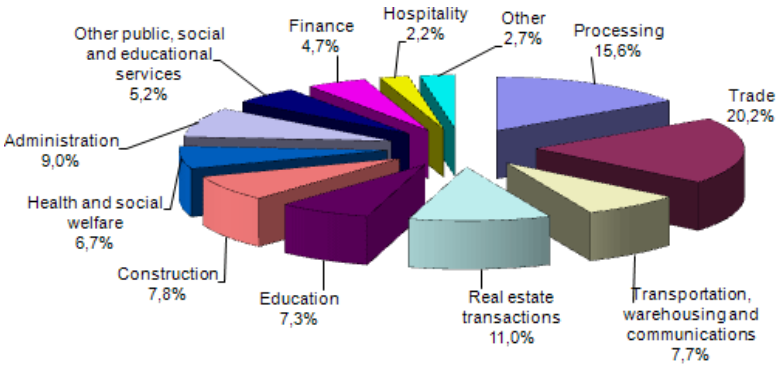

Figure 3: Structure of employment

The development of transport system has not been able to meet the growing needs of the city mobility. Within the overall investment system, special attention is given to mobility requirements of persons with special needs.

The most recent investments and trends within the city of Zagreb are:

- Road extension of *Radnička cesta* in the eastern part of Zagreb. It connects the city with the already completed new bridge *Domovinski most* across the Sava River, and, through the road ring, with regional motorways;
- In cooperation with the scientific community of Zagreb, feasibility studies have been conducted for building a tunnel through Medvednica Mountain (to position Zagreb in the centre of gravity of the region), for a LRT (Light Rail Transit) system, for two new bridges across Sava and for the northern belt road on the slopes of Medvednica;
- Croatian Railways will assume a more prominent role in urban public transport;

- Croatian Government together with the City of Zagreb will enter the project of reconstructing the Zagreb Airport;
- Systematic reconstruction of the city's infrastructure, particularly of its water supply and waste water disposal systems, which are in poor condition in some parts of the city, is permanently conducted.

1.1. Target Corridor

The demonstration corridor has a length of approximately 3.5 km and extends from the Main Railway Station on the north along *Savska cesta* road towards the future "SAVA-NORTH" intermodal interchange (i.e. on the northern side of the Sava River) in the south. Along the *Savska cesta* road there are several faculties and two large student canteens, as well as a few large private companies which represent the significant 'corridor attractors'.

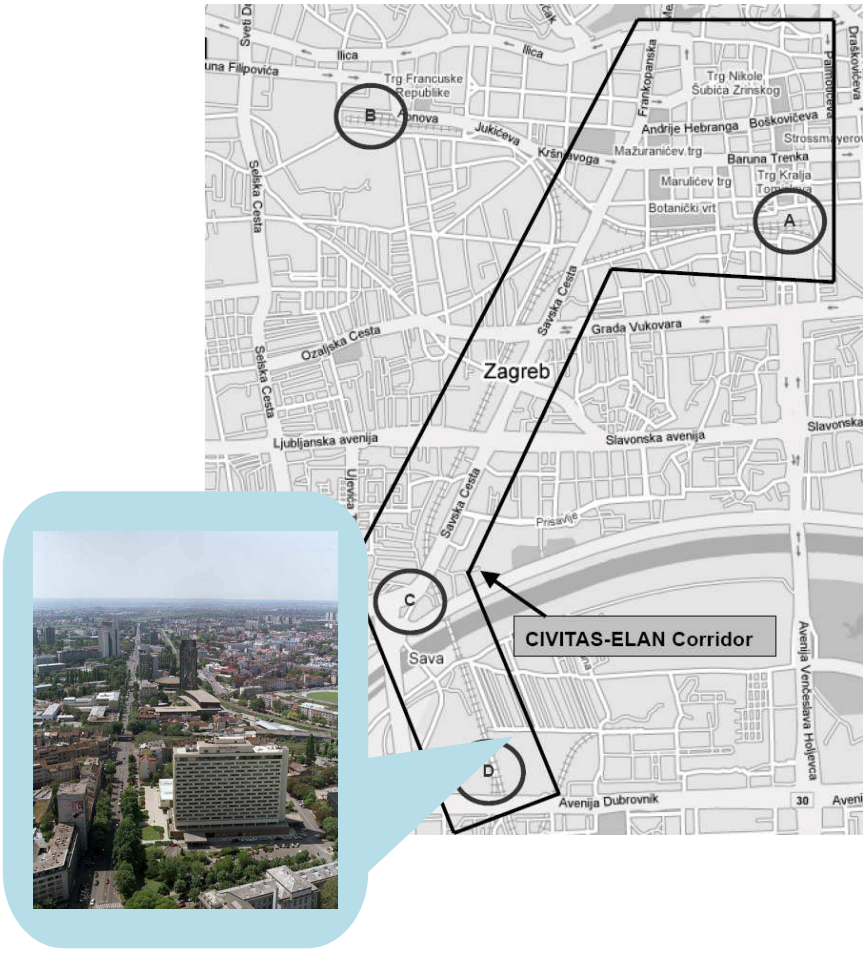

Figure 4: Target corridor Zagreb, A - Main Railway Station ; C - New interchange 'Sava-north'; B - West Railway Station; D - New PT stop

The *Savska cesta* road has been selected as in its present situation. It is one of the most congested traffic arteries, with a large number of tram lines and personal vehicles sharing insufficient space. This results in slow traffic flow and frequent traffic jams. The existing traffic signalization, which is separating trams from rest of traffic, is often ignored. Parallel to *Savska cesta* road two tracks of the railway presently do not integrate with the city's public transport system, due to the fact that there are no stations on it now. The area where the future inter-modal passenger terminal "SAVA-NORTH" is being planned is now partially used as a bus terminal, with a too small and inadequate interchange, which requires that passengers must cross a complicated single-level crossing to change from a bus to a tram.

Table 1: Key characteristics for the city of Zagreb[1]

Characteristics	City	ELAN- Corridor
Area		
Surface (km²)	641,29	2,37
Transport		
Car ownership (per 1000 inhabitants)	415	n/a
% daily trips by mode of transport		
- Car	n/a	n/a
- Walk/cycle	n/a	n/a
- Bus	n/a	n/a
Society and economy		
Population	779.000	27.900
% unemployment	7,8	n/a
% employed in service sector	4,1	n/a
% pop over age 65	14,9	22
% pop under age 16	15,8 (under age of 15)	13 (under age of 15)
Energy and environment		
% estimated energy use – Transport	n/a	n/a
% emissions of Carbon Dioxide by road sector	n/a	n/a

[1] The data was provided by Croatian Central Bureau of Statistics.

2. Overview of all the evaluation activities

Below an overview can be found of all the evaluation activities carried out for the city of Zagreb during the project life cycle. The table includes information on the level at which the evaluation task will be carried out; city/corridor level, Integrated Package level or Measure level and also indicates the basic evaluation tasks and in-depth analysis to be carried out during the project life time.

Table 2: Overview table of the evaluation activities for the City of Zagreb

IP/Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA	In- depth Process evaluation
City level	Modal split Air quality Noise level	x				
IP 1	Enhancing the use of clean vehicles	x				
1.3-ZAG	Energy recovery system for trams	x	x	x	x	x
1.14-ZAG	Clean public transport strategies	x	x	x	x	x
1.15-ZAG	Clean public fleet vehicles	x	x	x	x	x
IP 2	Stimulating intermodal journeys	x				
2.5-ZAG	Intermodal high-quality mobility corridor	x				
4.8-ZAG	Improving cycling conditions	x				
IP 3	Improving QoS of PT through innovative technologies	x				
2.6-ZAG	Promotion of electronic PT tariff system	x			x	x
8.2-ZAG	Public transport priority and traveller information	x	x	x		x
IP 4	Traffic management in dialogue with stakeholders	x				
3.2-ZAG	Study of congestion charging and dialogue on pricing	x			x	x

IP/Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA	In- depth Process evaluation
7.4-ZAG	Freight delivery restrictions	x				x
IP 5	Safe and secure public transport	x				
5.3-ZAG	Safety and security for seniors	x				
5.8-ZAG	Security improvement in PT	x				
IP 6	Changing travel behaviour	x				
4.4-ZAG	Mobility management for large institutions	x				
4.8-ZAG	Improving cycling conditions	x				
4.11-ZAG	Comprehensive mobility dialogue and marketing	x				

3. Focus measures

For each city a selection of focus measures has been made. For these measures extra attention will be paid to all the evaluation activities but a strong focus will be on the CBA an In-Depth Process. The selection of these focus measures in the city of Zagreb and the motivation behind this selection is described below:

- 1.3-Energy recovery system for trams

The modernization of the tram fleet in public transport presents a comprehensive process which includes planning, procurement and deployment of new vehicles. The work in all stages of this process involves different stakeholders and their interactions. Therefore, the measures in the integrated package 1 are subject to in- depth process evaluation. Also the actual and potential benefits will be investigated with CBA.

- 1.14-Clean public transport strategies

As it was stated for the measure 1.3, the same motivation for in- depth process evaluation is present here. This measure aims at modernisation of the bus fleet in public transport and supports the usage of alternative fuels in Croatia. CBA will provide us with additional conclusions.

- 1.15-Clean public fleet vehicles

The waste disposal company in Zagreb will acquire new vehicles (running on alternative fuels) and CBA will be used for the presentation of potential benefits (especially up-scaled positive effects on the city).

- 2.6-Promotion of electronic PT tariff system

The newly installed electronic PT tariff system includes new “smart card” technology and data base management and presents innovative technology in public transport.

- 3.2-Study of congestion charging and dialogue on pricing

The main output of this measure will be a feasibility study including a cost and benefit analysis for the proposed solution. The detailed analysis of different technological solutions for congestion charging will provide the City of Zagreb with “blueprints” for the future implementation supported by a sound CBA made in this study.

- 7.4-Freight delivery restrictions

Without a doubt, this measure brings a high risk of failing, considering the fact that the new and more restricted policy has to be introduced in order to decrease the number of delivery vehicles in the city centre during the day time period. Thus, detailed and continuous analysis of the implementation process will enable early detection of measure barriers , which will then give us a chance to have a proper, on-time “reaction” and decrease the before mentioned risk.

- 8.2-Public transport priority and traveller information

A strong ITS (Intelligent Transport System) nature of this measure has encouraged us to take a closer look at the implementation process of this measure. This is the first time that an ITS solution related to the public transport will be demonstrated in real-life situation so we are highly motivated for analysing the development process and impact of this measure.

In the table below you can find the selection of focus measures for the City of Zagreb.

Table 3: List of focus measures for the City of Zagreb

MEASURE NUMBER	MEASURE TITLE	IN-DEPTH ANALYSIS		MOTIVATION					
		Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid	Towards smarter urban transport	Towards ac-cessible urban transport	Towards safe and secure urban transport	2 key reasons
1.3	Energy recovery system for trams	x	x	xxx		xxx			Introducing smart solutions and saving energy. Innovative technology.
1.14	Clean public transport strategies	x	x	xxx		xx			Stimulating production and usage of alterna-tive fuels in Croatia. Saving resources and protecting the envi-ronment.
1.15	Clean public fleet vehicles	x	x	xxx					Stimulating production and usage of alterna-tive fuels in Croatia. Saving resources and protecting the envi-ronment.
2.6	Promotion of electronic PT tariff system	x	x			xxx	xx		Improving QoS of PT. Innovative technology.

MEASURE NUMBER	MEASURE TITLE	IN-DEPTH ANALYSIS		MOTIVATION					
		Cost benefit analysis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid	Towards smarter urban transport	Towards accessible urban transport	Towards safe and secure urban transport	2 key reasons
3.2	Study of congestion charging and dialogue on pricing	x	x	xxx	xx				Comparative analysis of the existing and new models for congestion charging policy. Rising ''quality of life'' in the city core.
7.4	Freight delivery restrictions		x	xxx	xx				Creating effective mobility management by encouraging stakeholders to an open dialogue. Decreasing congestion levels.
8.2	Public transport priority and traveller information		x		xx	xxx	xxx		Possibility of significant improvement of QoS in PT. Innovative technology.

x= relevant; xx= very relevant; xxx highly relevant

4. Impact Evaluation

4.1. Measure and Integrated package level

4.1.1. Integrated package 1: Implementing the use of clean vehicles in public fleets

4.1.1.1. Description

A Objectives and scope

IP objectives

By promoting and enhancing the use of clean and energy efficient vehicles within a public fleet this integrated package aims to:

- Decrease in energy consumption
- Decrease noise level;
- Reduce emissions.

Measure related objectives

- 1.3 Energy recovery system for trams
  - Decrease energy consumption / passenger (tram capacity) by 7 % in the ZET tram fleet;
  - Reduce tram noise level in curves by 5 dB;
  - Decrease tram noise level on the straight line.
- 1.14 Clean public transport strategies
  - Replace approximately 20% of fuel consumption in the public transport fleet with alternative fuels;
  - Reduce particulates and CO_2 emission by 5%;
  - Reduce bus noise level by 3 dB.
- 1.15 Clean public fleet vehicles
  - Replace approximately 20% of present fuel consumption of the CISTOCA fleet with alternative fuels by introducing 40 clean bio diesel vehicles;
  - Reduce particulate matters by 10% and CO_2 emission by 15% of the CISTOCA fleet;
  - Decrease noise level of the waste disposal fleet by 3 dB.

B Overview of the measures

- 1.3 Energy recovery system for trams

Since the tram fleet of Zagreb's PT company is outdated, 70 energy efficient, silent and accessible trams equipped with an energy recovery system will be purchased. This will help to reduce electricity consumption of public transport fleet. By gradually substituting the existing fleet by state-of-the-art air-conditioned low-floor trams that return braking power into electrical supply, the PT network will remarkably increase its level of service towards their users. Consequently the patronage of the trams will increase which will eventually lead towards less pollution by individual transport within the city.

- 1.14 Clean public transport strategies

In order to set an example in the promotion of less polluting vehicles and the reduction of greenhouse gas emissions, Zagreb PT company (ZET) will purchase and put in constant exploitation 60 CNG buses, 100 bio diesel buses and 40 clean bio diesel vehicles, which will be operating within the corridor and which have to comply with the Euro 5 emission standard. In order to achieve pollution reduction the ZET fleet needs to reduce CO_2 emissions by 5%. Furthermore, in the total fuel consumption of public transport vehicles, 20 % of the amount has to be used by clean buses.

- 1.15 Clean public fleet vehicles

The plan is to introduce at least 40% of vehicles running on some sort of clean fuel like CNG and bio diesel into the existing public fleet vehicles of waste disposal company which are running on fossil fuel. At least 20% of current fossil fuel consumption will be replaced with alternative clean fuels, which will lead to a total reduction in CO_2 emission by the public fleet of at least 15%.

C Innovative aspects

Use of new technology, nationally – Introduction of new trams equipped with energy recovery system (feeding back the power into the network while braking) and introduction of alternative fuels into a public fleet represents a new, innovative aspect of these measures. Also, an overall switch to the clean fuels should be reached by a nationwide use and production of bio diesel.

D Research and technical development

RTD activities include comprehensive planning process prior to the acquisition of the new vehicles. After deployment of the new vehicles (trams, busses and waste disposal vehicles) the influence on the service operators, their users and the environment will be analysed. First of all, solutions that enable using energy generated after tram braking will be investigated and their impact on decrease of energy consumption. Furthermore, impact that new buses and waste disposal vehicles that use alternative fuels, have on air quality and noise will be analysed.

E Situation before CIVITAS

- 1.3 Energy recovery system for trams

Tramways are the backbone of public transport in Zagreb. Zagreb Holding Co, via its subsidiary ZET, operates on 15 daily tram lines and 4 night lines with 267 motor cars and 129 trailers over 117 km tracks with 1000 mm gauge. Due to high energy consumption and inaccessible, uncomfortable and noisy vehicles, transport by tram is not sufficiently attractive to public.

- 1.14 Clean public transport strategies

In Zagreb, there are currently 117 urban bus lines running. A large number of these lines are driven by inefficient, polluting, noisy and uncomfortable vehicles which makes transportation by bus unattractive. Apart from running on sub-standard vehicles, there are also capacity problems on some lines.

- 1.15 Clean public fleet vehicles

The present fleet of waste collecting vehicles and sweeping machines owned by CISTOCA, a subsidiary of Zagreb Holding Co, consists of 98 waste collecting and 18 sweeping machines that operate on a daily basis. These vehicles run on standard Diesel fuel (Euro I-IV).

F Inter-relationships with other measures

The relationship between the measures in this integrated package is based on one general objective. The general objective of all the measures included in this IP is to introduce some form of alternative fuel into their fleet. Both subsidiaries of Zagreb Holding Co., ZET (PT company) and CISTOCA (waste disposal company), for the past few years have been trying to keep up with the new ecological standards by introducing new vehicles running on alternative fuels. The measures within this integrated package that are related to Zagreb PT company will also have an effect on the public perception of

image of PT company and the number of users. Both indicators are also the subject of analysis in the IP 3: Improving QoS of PT through innovative technologies.

4.1.1.2. Evaluation activities and indicators

A Evaluation activities and indicators on IP level

Expected possible impacts

The expected possible impacts of the IP 1: Enhancing the use of clean vehicles, are as follows:

- Increased energy efficiency

Relative fuel consumption should be decreased due to the new and modernised fleet vehicles. This will be measured on the IP level because there is a clear record of fuel consumption and travelled kilometres with old and new vehicles.

- Decrease of emission levels

New types of vehicles using alternative fuels (natural gas and biodiesel) should contribute to the lower emission levels. The reduction of these emissions by vehicle type (buses and waste disposal vehicles) will be measured on the IP level.

- Decrease of noise levels

All three measures in this IP will contribute to the overall decreasing of noise level as well as other ELAN measures. This is why the noise level will be measured on the city level. It is however possible to measure average noise levels for a specific vehicle type and this will be done on the IP level.

- Better air quality

Although an improvement of the air quality is a direct impact of this IP, it is impossible to determine the exact contribution of this IP, among all other ELAN measures and IPs, to the improvement of the air quality. This is why this will be measured on the city level.

- Increased production of alternative fuels in Croatia

For measures 1.14 Clean public transport strategies and 1.15 Clean public fleet vehicles an increased production of alternative fuels in Croatia can be one of the possible side effects. Especially when taking into account the size of the fleet of these two service operators (waste disposal and PT company). It could lead to a price drop of alternative fuels due to economies of scale and open up the market for other parties interested in alternative fuels (demand and supply). Although this would nonetheless be a positive impact that goes beyond the city boundaries, this impact will not be measured because of the project scope and the main objectives of these measures. We will however have an accurate view on all the alternative fuels used within the city of Zagreb thanks to these measures.

Selected indicators

In the table below an overview is given of all the evaluation activities and indicators selected for the IP 1: Enhancing the use of clean vehicles:

Table 4: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 1: ENHANCING THE USE OF CLEAN VEHICLES	▪ Combining results of different measures to come to conclusions on IP level: – Fuel consumption; – Electricity consumption; – Emissions; – Noise level by vehicle type.	▪ Increase of vehicle energy efficiency. ▪ Total decrease of NO_x, CO, CO_2 emissions and small particles (PM 2.5). ▪ Total decrease of noise levels generated by PT and waste disposal fleet vehicles within the ELAN-corridor using a strategy of combining a set of measures. → Scope: ELAN-corridor

Details of the evaluation activities

The evaluation activities for this integrated package include the combination of evaluation results of three measures. The main objective of all the measures in this IP is to decrease emissions and energy consumption by introducing cleaner and energy efficient vehicles into the public fleet. The selected indicators are environmental indicators that give a clear indication of the level of pollution and energy consumption generated by public vehicles. The selected indicators are in line with the objective of this IP and will give a clear view on the environmental impact of these measures implemented.

Evaluation activities on this level consists of combining the data for emission levels (NO_x, CO, CO_2 and PM 2.5), noise levels and energy efficiency collected from Zagreb PT company (ZET) and waste disposal company (CISTOCA).

Even though the vehicles are using different type of energy, combining different data for vehicle fuel consumption and tram electricity consumption is possible because their consumptions will be converted to the common unit (MJ/vkm).

B Evaluation activities and indicators on measure level

Expected possible impacts

The expected possible impacts of these three measures separately are the same as the ones discussed on IP level (see paragraph A evaluation activities and indicators on IP level). They will be measured within each measure and then merged to come to conclusions on IP level. Other expected impacts on measure level are:

<u>Measure 1.3 Energy recovery system for trams:</u>

- Number of clean trams

The modernization of the public transport fleet will be evaluated on the measure level by keeping track of number of new vehicles.

- Increased number of users

For measure 1.3 Energy recovery system for trams an increased number of users is expected. Hopefully the new vehicles will also improve the comfort and the image of PT what could lead to an increased amount of users. The image itself of the PT operator will be measured in IP 3. The number of PT users will be recorded on the city level.

Measures 1.14 Clean public transport strategies and 1.15 Clean public fleet vehicles:

- Cleaner public fleet vehicles

In these measures the new vehicles will modernise the fleet of the two service operators. Because of the difference in the financial resources which are allocated to the measures the number of the clean vehicles will be recorded as an impact of each measure separately, thus on the measure level.

Selected indicators

Below a detailed overview is given of all the evaluation activities and indicators for the measures within IP 1: Enhancing the use of clean vehicles:

Table 5: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.3-ZAG Energy recovery system for trams	▪ Measurement of: – Number of clean vehicles (trams) – Number of km driven with clean tram – Efficiency of vehicle electricity consumption – Tram noise level on the straight line – Tram noise level in curves – Operating costs – Investment costs – Maintenance costs ▪ BAU ▪ Up-scaling	▪ Evolution in the number of clean trams. ▪ Total increase of number of kilometres driven by clean trams. ▪ Decrease of electricity consumption in relation to the number of passengers and per km. ▪ Decrease of tram noise level on the straight line and in curves. ▪ Cost and benefit analysis. → Target group: Zagreb PT company (trams)

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.14-ZAG Clean public transport strategies	▪ Measurement of – Number of clean vehicles (busses) – Number of km driven by clean buses – Fuel consumption – Emissions – Bus noise level – Operating costs – Investment costs – Maintenance costs ▪ BAU ▪ Up-scaling	▪ Evolution in the number of clean buses. ▪ Total increase of number of kilometres driven by clean buses. ▪ Decrease of fuel consumption in relation to the vehicle capacity and per vkm. ▪ Decrease of emissions per vkm. ▪ Decrease of noise level generated by PT buses. ▪ Cost and benefit analysis. → Target group: Zagreb PT company (buses)
1.15-ZAG Clean public fleet vehicles	▪ Measurement of: – Number of clean vehicles – Number of km driven by clean vehicles – Fuel consumption – Emissions – Noise level of waste disposal fleet – Operating costs – Investment costs – Maintenance costs ▪ BAU ▪ Up-scaling	▪ Evolution in the number of clean vehicles in the waste disposal fleet. ▪ Total increase of number of kilometres driven by clean vehicles. ▪ Decrease of fuel consumption in relation to the vehicle capacity and per vkm. ▪ Decrease of emissions per vkm and noise level reduction. ▪ Cost and benefit analysis. → Target group: Zagreb waste company (CISTOCA)

Details of the evaluation activities

Apart from data collection activities needed on the integrated package level, the additional activities will be undertaken in order to get the exact data on a number of clean vehicles introduced in the fleet and the amount of “clean” kilometres driven.

Additional calculations will be necessary because the new trams consume more electricity than the old ones but they have more passenger capacity, they are more comfortable and safer (air conditioning system, heating system, CCTV surveillance system). Therefore, vehicle electricity consumption will be expressed in relation to the passenger capacity as well as per kilometre.

In addition, trams are using electricity (expressed in Amperes) and motorised fleet vehicles are using fuel (expressed in Joules). For this reason the extra work will be done (the measuring units will be transferred) in order to show the results in the following measuring unit: MJ/vehicle capacity.

Furthermore, a set of indicators was defined for the purpose of cost and benefit analysis which is also included. The main objective of these analyses is to determine the investment and operating costs for different types of vehicles and compare them with, mainly, environmental benefits.

Details for Business as usual and up- scaling

- BAU

BAU analysis will be carried out for all measures in this integrative package separately. The focus will lay on the financial aspect of these measures by showing how the investment into a new fleet can reduce operating and maintenance costs significantly over a certain time period. Following the same principle, analysis will be carried out about vehicle emission levels in relation to the average age of the vehicles.

- Up- scaling

Up-scaling will give a good overview of energy consumption savings and emission levels if a public fleet is modernised with new and clean vehicles. This will also be done for all measures in this integrative package separately.

Both of these analyses (BAU and up- scaling) will contribute and support the conclusions of CBA.

C CBA

The CBA will be done for all measures in this integrated package because they all contribute to the increase of vehicle energy efficiency of public fleet vehicles. The difference is that one of the measures involves the waste disposal company – CISTOCA (1.15) and the other two involve public transport company – ZET (1.3, 1.14).

The main objective of these analyses is to determine the investment and operating costs for different types of vehicles (new energy efficient trams, clean buses and waste disposal vehicles) and compare them with, mainly, environmental benefits.

- 1.3-ZAG Energy recovery system for trams

The main objective of this analysis is to determine the investment and operating costs for the new energy efficient trams and compare them with, mainly, environmental benefits.

Table 6: Overview of CBA indicators for the measure 1.3-ZAG Energy recovery system for trams

AGENTS	COSTS	BENEFITS
PT operator	Investment in new trams Operating costs in new trams Maintenance costs in new	Decrease in electricity consumption

AGENTS	COSTS	BENEFITS
	trams	
PT users		Decrease in noise level
Households		Decrease in noise level

- 1.14-ZAG Clean public transport strategies

The main objective of this analysis is to determine the investment and operating costs for the new clean busses and compare them with, mainly, environmental benefits.

Table 7: Overview of CBA indicators for the measure 1.14-ZAG Clean public transport strategies

AGENTS	COSTS	BENEFITS
PT operator	Investment in new buses Operating costs in new buses Maintenance costs in new buses	Decrease in fuel consumption
PT users		Decrease in noise level
Households		Decrease in noise level Decrease in emissions level

- 1.15-ZAG Clean public fleet vehicles

The main objective of this analysis is to determine the investment and operating costs for the new waste disposal vehicles and compare them with, mainly, environmental benefits.

Table 8: Overview of CBA indicators for the measure 1.15-ZAG Clean public fleet vehicles

AGENTS	COSTS	BENEFITS
Waste disposal company (CISTOCA)		Decrease in fuel consumption
Local authorities	Investment in new fleet Operating costs in new fleet Maintenance costs in new fleet	Decrease in noise level Decrease in emissions level
Households		Decrease in noise level Decrease in emissions level

4.1.1.3. Data collection

The table below gives an overview of all the data collection activities for IP 1: Enhancing the use of clean vehicles, during the project life cycle.

Table 9: Data collection inventory for the City of Zagreb

INDICATOR	LEVEL[2]	FOCUS[3]	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
Number of clean trams	M	F	Yearly	Recording	Number, Euro	Fleet	January	ZET
Number of clean vehicles	M	F	Yearly	Recording	Number, Euro	Fleet	January	ZET /CISTOCA
Tram noise level on straight line	M/IP	F	Before/ after	Measurement	dB	Fleet	Month 6 / 30	ZET
Tram noise level in curves	M/IP	F	Before/ after	Measurement	dB	Fleet	Month 6 / 30	ZET
Bus noise level	M/IP	F	Before/ after	Measurement	dB	Fleet	Month 6 / 30	ZET
Noise level of waste dis-posal fleet	M/IP	F	Before/ after	Measurement	dB	Fleet	Month 6 / 30	CISTOCA
Emissions	M/IP	F	Before/ after	Derived	g/vkm	Fleet	Month 6 / 30	ZET

[2] M= Measure level; IP= Integrated Package Level

[3] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL[2]	FOCUS[3]	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
								/CISTOCA
Fuel consumption	M/IP	F	Before/ after	Derived	MJ/vkm	Fleet	Month 8&9 / 20&21	ZET /CISTOCA
Efficiency of vehicle elec-tricity consumption	M/IP	F	Before/ after	Derived	MJ/vkm	Fleet	Month 8&9 / 20&21	ZET
Number of kilometres driven by clean vehicles	M/IP		Yearly	Recording	km	All vehicles	January	ZET /CISTOCA
Maintenance costs	M	F	Yearly	Recording	Euro	Maintenance costs	January	ZET /CISTOCA
Operating costs	M	F	Yearly	Recording	Euro	Operating costs	January	ZET /CISTOCA
Investment costs	M	F	Yearly	Recording	Euro	Investment costs	January	ZET /CISTOCA

Details on the data collection

Selected indicators, relevant to the data collection activities, for this integrated package and related measures are categorised into one group: operational data. Categorisation is as follows:

- Operational data
  - Investment, Maintenance and Operating costs

    Both service operators (ZET and CISTOCA) are public companies and their budget depends on the city budget and has to be transparent. Every major investment in their systems (new equipment, new vehicles etc.) has to go through a public tender so there is a clear record of every financial transaction. The same principle (transparency) applies for maintenance and operating costs.
  - Number of clean trams and Number of clean vehicles (buses in PT and waste disposal vehicles)

    ZET and CISTOCA are keeping all the data necessary for fleet management process so they will provide this data.
  - Number of kilometres driven by clean vehicles

    Number of kilometres driven with new, clean vehicles will be recorded on a yearly basis by service operators.
  - Tram noise level on the straight line, Tram noise level in curves and Bus noise level

    ZET has the measuring devices and they will collect this data. Measurements will be carried out in controlled conditions – eliminating external sound sources.
  - Noise level of the waste disposal fleet

    In cooperation with ZET, using their measuring devices and facilities, CISTOCA will measure the noise.
  - Emissions

    This will be derived using COPERT software.
  - Fuel consumption

    The service operators record fuel consumption for each vehicle type.
  - Efficiency of vehicle electricity consumption

    The electricity consumption figures will be provided by the PT operator as well as travelled kilometres. ZFOT will then derive efficiency rate not only in vehicle-km but passenger-km as well.

4.1.2. Integrated package 2: Stimulating intermodal journeys

4.1.2.1. Description

A Objectives and scope

IP objectives

This integrated package aims to improve transportation infrastructure needed for supporting intermodal journeys. Therefore, the main objectives are:

- Supporting intermodality by improving transportation infrastructure for cleaner modes;
- Achieving a shift towards clean and energy efficient modes;
- Improving safety of non-motorised traffic.

Measure related objectives

- 2.5 Intermodal high-quality mobility corridor
  - Make *Savska cesta* road more pedestrian and cyclist-friendly;
  - Decrease traffic congestion in *Savska cesta* road;
- 4.8 Improving cycling conditions
  - Strengthen the integration between cycling and public transport;
  - Enhance the conditions for cycling;
  - Increase the safety of cyclists.

B Overview of the measures

- 2.5 Intermodal high-quality mobility corridor

The main objective of this measure is to define a high-quality mobility corridor going from the historic city centre towards and across the Sava River, where public transport, bicycle lanes and pedestrians will have priority over individual motorized traffic. By establishing bicycle parking lots at PT stops and the future intermodal terminal Sava-North, the availability of infrastructure for cyclists will improve. With this integration of public transport and non-motorised traffic, increased mobility will be achieved in ELAN corridor.

- 4.8 Improving cycling conditions

This measure aims at bringing forward cycling and it will contribute to the development of a sustainable cycling policy in Zagreb. This will be done by providing the necessary infrastructure for cyclists (cycling lanes), thus improving availability and their safety. Furthermore, the role of citizens will not be limited to state their concerns; they will also be involved in developing concrete solutions through a dedicated marketing campaign. Moderate climate, attractive urban space (ELAN corridor) and a high number of students have facilitated the decision to further develop this clean, energy efficient and healthy transport mode in Zagreb.

C Innovative aspects

Targeting specific user groups, regionally – By providing necessary infrastructure for specific target groups like cyclists and pedestrians the transport conditions of non-motorised traffic will be improved (safety, accessibility, integration with other modes etc.).

New physical infrastructure solutions, regionally – The activities of these measures will contribute to the development of a mobility strategy in Zagreb. The new infrastructural improvements (cycle parking and cycling lanes) will contribute to the better integration between different modes. For the first time in Croatia cycling is considered in a really integrated and structured way.

D Research and technical development

Prior to the installation of new parking lots for bicycles and cycling lanes the locations have to be carefully selected. Past experiences show us that even though this type of infrastructure was necessary at certain locations (near schools, theatres etc.), bad positioning results in empty parking lots meaning, less cyclists. Good traffic planning is crucial. After this comprehensive process on-sight implementation will be executed by City's Traffic and Transport Department.

E Situation before CIVITAS

Savska cesta in its present situation is one of the most congested traffic arteries, with a large number of tram lines and personal vehicles. Thus, cycling is not treated equally to other modes and it has only a limited role in Zagreb. However, since recently it has been steadily increasing and slowly gaining on importance. This is also due to an active cycling scene with citizen driven organizations like BICIKL (among others), closely cooperating with the City of Zagreb. By making necessary infrastructural improvements, CIVITAS will further develop this clean, energy efficient and healthy transport mode in Zagreb.

The City of Zagreb will have a major role in achieving the aforementioned objectives of this integrated package because the municipality needs to provide necessary support in order for infrastructural improvements (different approvals and permits, arrange construction etc.) to be made.

F Inter-relationships with other measures

As mentioned before, the objective of both measures in this IP is to improve transport infrastructure. This integrated package is connected with IP 6: Changing travel behaviour because the objective is to stimulate cycling traffic and walking in the ELAN corridor. The main difference is in the approach: IP 2 will provide necessary infrastructural improvements and IP 6 will try to influence travel behaviour of citizens, mainly employees and students attracted to the corridor. Both of these integrated packages will have significant influence on modal split figures.

4.1.2.2. Evaluation activities and indicators

A Evaluation activities and indicators on IP level

Expected possible impacts

The expected possible impacts of the IP 2: Stimulating intermodal journeys, are as follows:

- Better accessibility

The introduction of new bicycle parking lots and new cycling lanes should provide better accessibility for cyclists. The impact of these infrastructural changes will be measured on the IP level.

- More cyclists and pedestrians

With the increased accessibility there should be more cyclists and pedestrians on the corridor especially when travelling on short distances. This impact will be also measured on the IP level.

- Less accidents

Increased number of cyclists and pedestrians using better infrastructure should lead towards less accidents involving non-motorised traffic participants. This impact will be measured on the IP level by keeping track of number of accidents in relation to the amount of cyclists and pedestrians.

- More multimodal journeys

This is expected impact of this IP but other measures in other IP are also stimulating intermodality. The usage of different modes of transport in single journey (in the one journey with one purpose) will be investigated on the city level with the modal split survey.

- Improved health conditions of citizens'

This impact is very hard if not impossible to measure, but it is not wrong to assume that more cycling and walking should contribute to the better health of the citizens, at least by decreasing the number of hart related diseases. But this would mean going too far with the IP impacts so this will not be measured.

Selected indicators

In the table below an overview is given of the evaluation activities and indicators selected for the IP 2: Stimulating intermodal journeys.

Table 10: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 2 STIMULATING INTERMODAL JOURNEYS	▪ Evaluation on IP level: – Availability of cycling infrastructure (cycle lanes and parking); – Number of non-motorised traffic users and PT users; – Number of injuries for non-motorised traffic.	▪ Evolution of spatial accessibility of transportation infrastructure for cyclists. ▪ Total increase of users of cleaner modes. ▪ Decrease in the number of accidents involving non-motorised traffic. → Scope: ELAN-corridor

Details of the evaluation activities

In order to improve the conditions necessary for supporting the intermodal journeys, certain infrastructural changes will be made in the demonstration area. This includes the introduction of cycling lanes and increasing the number of parking spaces for bicycles. Therefore, evaluation activities are steered towards detecting the change of service availability and number of users (mainly cyclists and pedestrians).

Due to the better traffic conditions, a certain decrease in number of accidents involving cyclists and pedestrians is expected. Thus, keeping track about the number of accidents and conclusion about transport safety is required on this IP level.

All of these evaluation activities will be conducted directly on this integrated package level.

B Evaluation activities on measure level

There will be no specific measure related evaluation activities for these measures.

C CBA

No CBA analysis will be conducted for these measures.

4.1.2.3. Data collection

In the table below an overview is given of all the data collection carried out by the city of Zagreb within the IP 2: stimulating intermodal journeys.

Table 11: Data collection inventory for the City of Zagreb

INDICATOR	LEVEL	FOCUS	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
Capacity of cycle parking	IP		Before/ after	Recording	No. of park-ing spaces	Corridor	Month 8 / 35	ZAGREB
Length of cycling lanes	IP		Before/ after	Recording	km	Corridor	Month 8 / 35	ZAGREB
Number of pedestrians	IP		Before/ after	Measurement	No. of pedes-trians/km^2	Corridor	Month 9 / 35	ZFOT
Number of cyclists	IP		Before/ after	Measurement	Number of cyclists/km	Corridor	Month 9 / 35	ZFOT
No. of accidents involving cyclists	IP		Yearly	Recording	Number	Corridor	January	ZFOT
No. of accidents involving pedestrians	IP		Yearly	Recording	Number	Corridor	January	ZFOT

Details on the data collection

Selected indicators, relevant to the data collection activities, for this integrated package and related measures are categorised into one group: traffic data. Categorisation of the indicators is as follows:

- Traffic data
  - Capacity of cycle parking and Length of cycling lanes

    This will be recorded by the city municipality (traffic and transport department). Furthermore, a counting of the cycle parking will be carried out because there are some parking lots on a private property, that is, outside jurisdiction of the city municipality (for example private parking spaces in some companies).
  - Number of pedestrians and Number of cyclists

    Counting will be carried out on the characteristic spots in the corridor. Additionally, as the first method for data collection of these indicators, an airborne imaging system will be tested. ZFOT plans to fly several times over ELAN corridor by an airplane (ZFOT Cessna) equipped with a multi-sensor imaging system. Pedestrians and cyclists will then be counted from video image. The downside of this method is that it collects the data on current state and for this reason it is necessary to fly over several times (even during the one day).
  - Number of accidents involving cyclists and Number of accidents involving pedestrians

    Accident rates will be requested from the city police department. They record the data about the number of accidents in each city neighbourhood.

4.1.3. Integrated package 3: Improving QoS of PT through innovative technologies

4.1.3.1. Description

A Objectives and scope

IP objectives

Since this integrated package is formed by two innovative measures in which the new technological and intelligent transport system (ITS) solutions will be implemented, the expected outcome is:

- Increase the satisfaction level of PT users
- Decrease travel time per mode.

Measure related objectives

- 2.6 Promotion of electronic PT tariff system
  - Unified tariff system for all providers of public transportation services
  - Improvement of the public transport quality.
- 8.2 Public transport priority and traveller information
  - Increase average speed of public transport vehicles by giving them traffic light priority at intersections, notably during rush hours, and displaying real time information about the arrival of vehicles on public transport stops
  - Reach improved mobility for all vehicles in the city by creating a system of coordinated traffic lights and „intelligent crossings“.

B Overview of the measures

- 2.6 Promotion of electronic PT tariff system

Electronic ticketing system should be introduced and promoted to consumers. To achieve an increase in the number of passengers using public transport, a unified tariff system should be set for all types of public transportation. The system will also enable a continuous counting of passenger numbers to verify an increased shift towards public transportation. Also, the introduction of electronic PT ticketing will enable the attribution of costs to every service provider.

- 8.2 Public transport priority and traveller information

The traffic PT system performances will be improved by giving priority to the PT vehicles and creating a system of coordinated traffic lights. Furthermore, within CIVITAS ELAN project, efforts will be made to speed up public transport in Zagreb and provide data on the vehicle's exact location or time of arrival to a specific station thus making it more attractive for passengers. Also, to improve the quality of the service, the public transportation management system must have the information of the exact position of its vehicles.

C Innovative aspects

Use of a new technology/ITS, nationally – Implementing new smart card technology and introducing public transport priority by establishing "intelligent crossings" represents a nationwide innovative aspect of these measures. Giving priority to the PT vehicles should lead to the significant QoS improvement.

D Research and technical development

The measure 8.2-ZAG Public transport priority and traveller information is planned to be realised through the following activities: data collection and preparation, modelling of the demonstration corridor and traffic flows, analysis and calibration of the model, simulation of different transport scenarios, implementation and demonstration of the measure. After analysing several available software implementations and in consultation with users of the traffic modelling and simulation software, the VISUM/VISSIM software system is chosen as one of the modelling and simulation software for the design and testing of the measure. The traffic model generated within this measure can then be used as a "test site" for other measures (e.g. 3.2.-ZAG Study on congestion charging and dialogue on pricing) to help to reach necessary conclusions.

E Situation before CIVITAS

At present a joint tariff system (ZET and Croatian Railways) exists within the City of Zagreb, whereas a number of individual operators provide service within Counties of Zagreb and Krapina-Zagorje on numerous lines and with autonomous tariffs.

The present situation regarding intelligent traffic management within the City of Zagreb cannot be considered satisfactory. Several coordinated traffic routes in the city cannot be controlled remotely in case of congestion and jam. Thus, the traffic system cannot answer to the dynamic changes in transport demand during the day.

F Inter-relationships with other measures

Together, these two measures will introduce ITS technologies into public transport system. Thus, both of the measures in this integrated package will improve the image and QoS of public transport company ZET by introducing ITS solutions into the daily life of users. But, as mentioned before, the IP 1: Enhancing the use of clean vehicles is also expected to have an impact on the image because ZET can now be described as a company with a high ecological awareness level.

Furthermore, outside the CIVITAS, ZET is now providing the traffic data about their vehicles via their webpage. The users can now find out the real-time information about vehicle arrival times for each PT stop.

4.1.3.2. Evaluation activities and indicators

A Evaluation activities and indicators on IP level

Expected possible impacts

The expected possible impacts of the IP 3: Improving the quality of service of PT through innovative technologies, are as follows:

- Increased QoS of public transport

This IP should increase the level of quality of service in public transport by improving the PT system performances. Also, the introduction of the new systems (information system and electronic ticketing) will have an influence on public perception about QoS in PT. Evaluation activities on this IP level are investigating both impacts: public perception through satisfaction level and actual performances through the measurement of travel time improvements.

- More PT users

Abovementioned newly installed systems and giving priority to the PT vehicles should lead towards increased usage of public transport services due to better performances and level of service for the end users. But still, the impact of these changes will be measured on the city level because other measures will also have an impact on it (new PT vehicles, higher security standards etc.).

Selected indicators

In the table below an overview is given of the evaluation activities and indicators for the IP 3: Improving the quality of service of PT through innovative technologies.

Table 12: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 3: IMPROVING QoS OF PT THROUGH INNOVATIVE TECHNOLOGIES	▪ Combining results of different measures to come to conclusions on IP level: – Perception of PT QoS: ▪ satisfaction level of TS[4] ▪ satisfaction level of TI[5] ▪ Conducting evaluation tasks directly on this level: – Accuracy of PT time-keeping – Operation time – Running time – Intersection delay – Dwell time – Driving time – Vehicle per hour (peek/off peek) – Commercial PT vehicle speed	▪ The change in the perception of PT users about QoS by giving them real-time traveller information and improving their mobility through electronic tariff system. ▪ Increase in the percentage of public transport vehicles operating according to the schedule. ▪ Decrease in the time needed for the departure from one terminal to the arrival at the other terminal on the line. ▪ Decrease in the time needed for a tram to travel between two PT stops. ▪ Decrease in the time that a tram spends on intersections. ▪ Dwell time and Driving time are measured only to come to the conclusions about how the public transport priority influences the operation time. ▪ Increase in the tram commercial speed. → Scope: ELAN-corridor

[4] TS - Tariff System

[5] TI - Traveller Information

Details of the evaluation activities

Both measures in this integrated package have an intense innovative aspect because the new technologies will be introduced to the traffic and transport system, thus improving overall Quality of Service (QoS).

In order to perform evaluation activities on this IP level it is necessary to understand the different aspects of QoS. There are two types of QoS needed for the evaluation of this IP:

- Citizens perception of PT QoS (this represents the subjective feeling about the PT system performances and level of service)
- Transport system QoS (this represents the objective determination of the transport system performances).

Citizens' satisfaction will be investigated through two surveys and the findings will be combined on the IP level. But in order to detect an actual change of PT system performances in an objective manner, a several indicators needed to be defined:

- Operation time

This is the time interval between departures from one terminal to the arrival at the other terminal on the line.

- Running time

This is the time interval between a tram starting from one stop and stopping at the next one.

- Intersection delay

This is the average stopped delay per vehicle passing through an intersection approach or intersection.

- Dwell time

The time spent on PT stops.

- Driving time

The time that vehicle spends in motion.

This operation time decomposition is necessary because there is a possibility that there won't be any change (decrease) in the time needed for PT vehicle to go from one stop to another or to go from one terminal to another. This is because one of the ELAN objectives is to increase the number of PT users, that is, to achieve modal shift in favour of cleaner modes. This will result in increased dwell time because PT vehicles will spend more time on PT stops waiting for people to get in and out. This is why it is necessary to keep track of each time segment individually in order to detect changes. The changes are expected to happen for the following segments of PT vehicle operation time: running time, intersection delay and driving time.

B Evaluation activities and indicators on measure level

Expected possible impacts

<u>Measure 2.6 Promotion of electronic PT tariff system:</u>

- More e-tickets sold

The promotion of the new electronic tariff system together with easier use should increase the share of electronic tickets in overall amount of sold tickets.

- Improved image of the PT service operator

Newly installed system for electronic ticketing will have a positive impact on image of the PT operator because this represents the deployment of innovative technology, thus promoting the service operator as modern company up-to-date with new solutions.

- Improved satisfaction level

Evaluation of the public perception about the old and new tariff system will be carried out with surveys about their satisfaction (before and after the implementation). The results will be combined on the IP level because their satisfaction about PT QoS is also under the influence of the measure 8.2.

Measure 8.2 Public transport Priority and traveller information:

- Decrease of individual car usage, thus decreasing congestion levels

Giving priority at intersections to the public transport vehicles (measure 8.2) discourages the individual usage cars because travelling by means of PT should become faster especially for the trips around and inside city centre. This will be measured on the measure level.

- Improved satisfaction level

Public perception about the new traveller information system will be carried out with a survey about the level of their satisfaction with the service. The results will be combined on the IP level because their satisfaction about PT QoS is also under the influence of the measure 2.6.

Selected indicators

In the table below an overview is given of all the evaluation tasks and indicators for the measures of IP 3 Improving the quality of service of PT through innovative technologies.

Table 13: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
2.6-ZAG Promotion of electronic PT tariff system	▪ Measurement of: – Inventory of the number of electronic tickets sold – the satisfaction level of TS – Investigation on the image of ZET – Investment costs – Operating costs – Maintenance costs	▪ Evolution in the number of electronic tickets sold. ▪ Increase in public satisfaction with the new tariff system (TS). ▪ Improvement in the public perception of PT company's image. ▪ Cost and benefit analysis. → Target group: PT users

MEASURE	EVALUATION ACTIVITIES/ INDI-CATORS	CONCLUSIONS
8.2-ZAG Public transport priority and traveller information	▪ Measurement of: – Level of satisfaction of TI – Congestion level ▪ BAU ▪ Up-scaling	▪ Improvement of the public satisfaction with traveller information and accuracy of PT timekeeping. ▪ Decrease in congestion level and decrease in the number of vehicles entering the ELAN corridor. → Target group: traffic entities in the corridor

Details of the evaluation activities

Apart from the two surveys about public satisfaction with newly installed systems (tariff system and information system), other measure related evaluation activities include data collection for the economic impact determination as well as for CBA purposes.

The analysis of the congestion levels inside the corridor is necessary in order to show how much giving priority at intersections to public transport vehicles discourages the individual usage of cars because travelling by means of PT becomes faster.

Details for Business as usual and up- scaling

- BAU

For the measure 8.2-ZAG Public transport priority and traveller information the business as usual scenario (BAU) is chosen to be a part of evaluation activities. Traffic modelling, which will be developed within this measure, will allow different kinds of manipulations of signal plans and predictions. Since a certain trend is still present in Zagreb, regarding the rapid increase in the number of individual vehicles, BAU scenario will provide necessary data for reaching conclusions and proving the fact that ITS solutions can significantly improve traffic flow performances.

- Up – scaling

The result of traffic modelling in the measure 8.2-ZAG Public transport priority and traveller information will be up-scaled for the City of Zagreb. The data gathered as output results of the traffic simulation and those measured in a real-time situation (operation time, running time, average PT vehicle speed etc.) will provide a good overview of the actual impact of this measure on the PT company but also on PT users.

C CBA

- 2.6-ZAG Promotion of electronic PT tariff system

Planned CBA for the measure 2.6-ZAG Promotion of electronic PT tariff system needs to identify, quantify and add the benefits of this new technology. The motivation behind this CBA is to determine the economic impact for the PT operator when investing into ITS technology.

Table 14: Overview of CBA indicators for the measure 2.6-ZAG Promotion of electronic PT tariff system

AGENTS	COSTS	BENEFITS
PT operator	Investment in new system Operating costs in new system Maintenance costs in new system	Increase in the number of PT users Number of electronic tickets sold
PT users		Satisfaction with the unified tariff system
Households		Decrease in congestion level

4.1.3.3. Data collection

In the table below an overview is given of all the data collection activities carried out by the city of Zagreb within the IP 3 Improving the quality of service of PT through innovative technologies.

Table 15: Data collection inventory for the City of Zagreb

INDICATOR	LEVEL	FOCUS	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
Number of electronic tick-ets sold	M	F	Yearly	Recording	Number	General number of sold tickets	January	ZET
Satisfaction with unified tariff system	M/IP	F	Before/ after	Surveys	Index	100 users	Month 14 / 36	ZFOT
Satisfaction with traveller information system	M/IP		Before/ after	Surveys	Index	100 users	Month 14 / 36	ZFOT
Image of ZET	M		Before/ after	Surveys	Index	100 users	Month 14 / 36	ZFOT
Accuracy of PT timekeep-ing	IP		Before/ after	Derived	%	All trams in corridor	Month 10 / 35	ZFOT
Operation time (and consti-tutive elements)	IP		Before/ after	Derived	Minutes	Trams in corridor	Month 10 / 35	ZFOT
Vehicle per hour (peak/off peak)	IP		Before/ after	Measurement	Veh/h	Corridor	Month 6 / 36	ZFOT
Commercial PT vehicle	IP		Before/ after	Derived	Km/h	All trams	Month 10 / 35	ZFOT

INDICATOR	LEVEL	FOCUS	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
speed								
Congestion level	M	F	Before/ after	Derived	LoS (A-F)	Corridor	Month 6 / 36	ZFOT
Investment costs	M	F	Yearly	Recording	Euro	Investment costs	January 2010 January 2011	ZET
Operating costs	M	F	Yearly	Recording	Euro	Operating costs	February	ZET
Maintenance costs	M	F	Yearly	Recording	Euro	Maintenance costs	February	ZET

Details on the data collection

Selected indicators, relevant to the data collection activities, for this integrated package and related measures are categorised into three groups: operational data, traffic data and attitude and behaviour surveys. Categorisation of the indicators is as follows:

- Operational data
  - Investment, Operating and Maintenance costs

    ZET is the public company and their budget depends on the city budget and has to be transparent. Every major investment in their systems (new equipment, new vehicles etc.) has to go through a public tender so there is a clear record of every financial transaction. Same principle (transparency) applies for maintenance and operating costs.

  - Number of electronic tickets sold

    Each electronic ticket sold is being recorded so that financial resources can be allocated. Mean number can be extracted from the log files.

  - Accuracy of PT timekeeping

    ZET's traffic management centre collects the data about tram arrival times and PT stops and compares them to the planned schedule. The percentage of vehicles operating according to the timetables is then expressed on a monthly base. Additional check will be carried on using GPS log files. Main focus will be on PT stops in the corridor.

  - Operation time (and constitutive elements: Running time, Intersection delay, Dwell time, Driving time)

    This indicator (group of indicators) is related only to trams because that is the main public transport mode in the ELAN corridor. Before data will be measured manually with stopwatches, PDA assisted stopwatch measuring and using small dimension GPS receivers which are going to be installed in the trams. The receivers are recording the position of a tram each second so it is relatively easy to extract the data about each segment of operation time.

    This data will then be used as an input for traffic modelling (VISUM/VISSIM) of the current state on the corridor. After the model calibration, different traffic signal schemes will be tested inside the model and the same set of data will be extracted. Finally, results from traffic model will point out the optimal signal plan for the selected crossings, and after data will be measured after the demonstration using GPS receivers again.

- Traffic data
  - Vehicle per hour (peak/off peak)

    First set of data will be collected manually by counting vehicles on several crossings during the one week period. Afterwards, several video cameras will be installed on major intersections in the corridor. Counting will be carried out based on video image which will be recorded. Cameras will be installed on the selected crossing within corridor and operational in on/off peak periods (Monday to Friday).

  - Commercial PT vehicle speed

    This is a result of distance travelled and operation time ratio. Considering the fact that giving priority to trams will happen only on selected crossings in the corridor (according to the DoW only a demonstration is required) this speed will be expressed separately: for the whole tram line and for the segment of the line under the ELAN demonstration activities.

  - Congestion level (expressed as Level of Service on the scale from A to F)

LoS for the ELAN corridor will be one of the derived outputs of the traffic modelling (VISUM/VISSIM).

- Attitude and behaviour surveys
  - Image of ZET, Satisfaction with the unified tariff system and Satisfaction with the traveller information system

    All the data necessary for these indicators will be collected with one survey – QoS in public transport survey. This survey will be developed by the ZFOT with the help of other ELAN cities. The questionnaires regarding the image of the public transport company will be exchanged with the City of Gent (De Lijn example) to achieve an optimal use and exchange of the existing knowledge and know how within the CIVITAS-ELAN cities.

    The survey will be carried out twice by the ZFOT with the help of other partners in Zagreb. The target group are PT users. Since this will be one comprehensive survey, covering several indicators related to several measures and IPs, it will be carried out during one month period on several spots (on PT stops, CIVITAS ELAN FORUM, via telephone).

4.1.4. Integrated package 4: Traffic management in dialogue with stakeholders

4.1.4.1. Description

A Objectives and scope

IP objectives

Both of the measures in this integrated package rely on stakeholder participation during the phase of analysis and implementation. Thus, the main objective is:

- Intensifying involvement of all stakeholders in policy making process.

Measure related objectives

- 3.2 Study of congestion charging and dialogue on pricing
  - Raising the awareness of congestion charging policy;
  - Developing a strategy for introducing congestion charging policy in Zagreb.
- 7.4 Freight delivery restrictions
  - Raising the acceptance of delivery restriction policy;
  - Reducing traffic congestion level.

B Overview of the measures

- 3.2 Study of congestion charging and dialogue on pricing

Like in other CEE countries, in the last 17 years (i.e. period after transition from previous political regimes) Croatia has experienced a drastic growth in the level of motorisation (number of individual cars between 1995-2005 doubled). Consequently, this has an enormous impact on the environment and on traffic situation. Thus, new ways must be found to limit this impact on the city. The main objective of this measure is to carry out a feasibility study on Congestion Charging. The study should give a clear overview of possible solutions for introduction of congestion charging scheme in Zagreb and compare it to the present parking policy. The possible benefits will be expressed through a CBA.

- 7.4 Freight delivery restrictions

An analysis of the city centre's business structure and locations of individual business entities will be conducted, potentials for joint deliveries within the city historic core will be investigated, and suggestions about possible approaches will be defined. Also, the possibility of forming a distribution centres will be investigated.

The type of cargo deemed to be best suited for consolidation will be determined; then a programme and timetable of all activities necessary to inform potential clients of the advantages of delivery consolidation, and to obtain their consent for participation in the pilot project, will be drawn up.

C Innovative aspects

New economic instrument, regionally – This is the first time that a study of congestion charging will be undertaken in Zagreb so the municipality will have a means for limiting traffic volume in the city centre, thus decreasing noise and emission levels.

New policy instrument, regionally – A new freight regulation for the city centre will be introduced, including restricted delivering times and particular delivery zones. The City traffic department will intro-

duce adequate signposting. The new regulation will be enforced trough frequent controls by the traffic police.

D Research and technical development

The first step towards the study on congestion charging is to prepare the design task for the study, and public procurement process for the study itself should be conducted. Financing for its implementation must be addressed. The study should consist of:

- Design concept and definition of no. of access/charging points
- Recommendations on how to establish privileged tariffs for local commercial activities and residents.

Concerning freight delivery regulation, the City municipality started the process of adopting a more restrictive policy, and it is strongly committed to implement all its rules. Cooperation with stakeholders is required in order to reach compromised solutions and avoid risks which these restrictive measures bring. Possibility of introducing certain benefits for the users who comply with the new regulations has to be explored.

E Situation before CIVITAS

The present state of the road infrastructure and traffic regulations induces users of vehicles to traverse the city centre when travelling from east to west. A remarkable share of private cars in this area is the result of insufficient road network in the northern part of the city, thus requiring all vehicles to travel across the city centre in order to transverse from east to west. As for congestion charging, the City of Zagreb tried to resolve these problems by introducing parking policy based on three parking zones.

Freight delivery in Zagreb is controlled by means of regulation (different areas have different rules: i.e. 5T delivery trucks are permitted only between 10 PM and 6 AM, and for 2,8T trucks on specially marked parking places from 9 AM till noon; on other times these delivery parking spaces can be used by all other users). However, this regulation is not sufficiently respected and implemented, and delivery trucks further increase daytime congestion. Furthermore, the strong presence of lorries on streets and pavements is clearly discouraging non-motorised modes (walking and cycling) and has a negative impact on the quality of urban space.

F Inter-relationships with other measures

As mentioned before, the City of Zagreb has a regulation regarding freight delivery restrictions as well as parking policy based of three zones (different price for each zone). ELAN evaluation activities on these measures are also aimed at establishing the dialogue with stakeholders encouraging them to respect these regulations, thus, helping to achieve congestion level, noise and emission level reduction in the corridor.

4.1.4.2. Evaluation activities and indicators

A Evaluation activities and indicators on IP level

Expected possible impacts

The expected possible impacts of the IP 4: Traffic management in dialogue with stakeholders, are as follows:

- Increased stakeholders acceptance

Combined work with stakeholders on both measures in this IP should lead toward increased acceptance of the new traffic management policies in Zagreb, especially when this work includes joined efforts of measure leaders and stakeholders in order to reach compromised solutions. The level of the stakeholder acceptance will be measured on the IP level.

Selected indicators

In the table below an overview is given of the evaluation activities and selected indicators on IP level for the IP 4: Traffic management in dialogue with stakeholders:

Table 16: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 4: TRAFFIC MANAGEMENT IN DIALOGUE WITH STAKEHOLDERS	▪ Combining results of different measures to come to conclusions on IP level: – Awareness level – Acceptance level	▪ Change the awareness and acceptance of new strategies among stakeholders. → Scope: ELAN-corridor

Details of the evaluation activities

The main evaluation activities on the integrated package level will be to detect the change (improvement) of dialogue among city authorities and other stakeholders involved in the implementation process of the measures. This IP aims to intensify stakeholder involvement in decision making process and changing their perception about the importance of the new city transport strategies.

B Evaluation activities and indicators on measure level

Expected possible impacts

Measure 3.2 study of congestion charging and dialogue on pricing

- Awareness level

Intensive dialogue with key stakeholders, especially the ones with decision making capabilities, should have an impact on their awareness about the negative impacts of congestion as well as the benefits of the congestion charging system in Zagreb.

- Improved environmental and societal indicators

A congestion charging scheme could have multiple environmental and societal effects such as; better air quality, fewer emissions, congestion levels, less accidents and increase of the share of alternative modes etc. As this measure is a feasibility study the real impact on these indicators can't be measured. Nonetheless to use this study to show the possible benefits of such a scheme to stakeholders and citizens to create awareness an estimation of the possible impact will be carried out as a part of the feasibility study itself.

Measure 7.4 Freight delivery restrictions

- Less commercial vehicles in the city centre

New type of regulation, that is, more restrictive regulation (if it is going to be obeyed) and other measure related activities on the measure 7.4, will have a positive impact by limiting number of trucks, lorries and vans entering the city centre. This impact will be measured on the measure level.

- Acceptance level

An increased acceptance on the freight restriction through intensive interaction with stakeholders will be measured. As this is an IP objective this will be measured on measure level to provide conclusions on the IP level.

- More available parking spaces

Fewer trucks and other commercial vehicles in the city centre during the day time period will result in more parking spaces available. As the main objective however is to decrease the number of vehicle movements, as the main source of nuisance, the focus will be on measuring the number of movements and not the number of available parking spaces. The number of parking spaces available can also be easily affected by measures directed on car use and therefore more difficult to extract.

Selected indicators

In the table below an overview is given of all the evaluation tasks and indicators for the measures of IP4 Traffic mobility management in dialogue with stakeholders.

Table 17: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
3.2-ZAG Study of congestion charging and dialogue on pricing	▪ Measurement of: – Awareness about the necessity of congestion charging policy – Investment costs – Maintenance costs – Operating costs – Revenues of fuel taxes – Congestion charging payment – Revenues from congestion charging – Operation times* – Number of accidents* – Number of PT users* – Emission, noise and congestion levels*	▪ Increase in stakeholder awareness of the need for congestion charging policy. → Target group: stakeholders ▪ Cost and benefit analysis (* these indicators will be estimated by taking into account the data collected from the other measures). → Target group: Potential users
7.4-ZAG Freight delivery restrictions	▪ Measurement of: – Acceptance level – Total number of goods vehicles moving into the demo area out of the allowed time	▪ Raising the acceptance of city freight delivery policy among stakeholders (shopkeepers and delivery companies) ▪ Decrease in delivery vehicles in the city centre. → Target group: stakeholders

Details of the evaluation activities

The evaluation activities for the measure 3.2-ZAG Study on congestion charging and dialogue on pricing will be based mainly on expert estimations that are going to be supported by traffic modelling. This

is because implementation isn't planned during ELAN so there will not be real impact. The objective is to show the positive aspects of this kind of regulation and possible impacts on the environment which should ensure necessary support for future deployment.

Apart from survey about stakeholders' acceptance of a new freight delivery policy, evaluation activities on the measure 7.4 will investigate real-life situation, that is, whether there is a decrease of number of lorries in the city centre during the day time period. This way data on stakeholders' acceptance and actual data from the site will be collected.

Details for Business as usual and up- scaling

No Business as usual and up- scaling analysis will be conducted for these measures.

C CBA

- 3.2-ZAG Study of congestion charging and dialogue on pricing

As a part of feasibility study about congestion charging in the City of Zagreb, several CBAs will be carried out. This CBAs will be used in the decision making process of the local authorities on best and most feasible solution for a congestion charging implementation. The evaluation report will contain only the CBA results for the selected solution.

Table 18: Overview of CBA indicators for the measure 3.2-ZAG Study of congestion charging and dialogue on pricing

AGENTS	COSTS	BENEFITS
PT operator		Increase in the number of PT users
PT users		Shorter travel times
Car users	Congestion charging payment	Shorter travel times thanks to decrease in congestion
Local authorities	Investment cost Operating costs Maintenance costs Decrease in revenues of fuel taxes	Congestion charging income Decrease in emissions Decrease in noise
Households		Decrease in emissions Decrease in noise

4.1.4.3. Data collection

In the table below an overview is given of the data collection that will take place for IP4 Traffic mobility management in dialogue with stakeholders.

Table 19: Data collection inventory for the City of Zagreb

INDICATORS	LEVEL	FOCUS	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
Awareness level of con-gestion charging policy	M/IP		Before/after	Survey	Index	Major stake-holders	Month 10 / 27	ZFOT
Acceptance level of deliv-ery restriction policy	M/IP		Before/after	Survey	Index	Major stake-holders	Month 10 / 27	ZFOT
Total number of goods vehicles moving into the demo area out of the al-lowed time	M		Before/after	Recording	Number of vehicles/day	City centre	Month 10 / 28	ZFOT
Investment costs	M	F	After	Estimating	Euro	Investment costs	Month 36	ZFOT
Maintenance costs	M	F	After	Estimating	Euro	Maintenance costs	Month 36	ZFOT
Operating costs	M	F	After	Estimating	Euro	Operating costs	Month 36	ZFOT
Revenues of fuel taxes	M	F	After	Estimating	Euro	Revenues of fuel taxes	Month 36	ZFOT
Congestion charging pay-	M	F	After	Estimating	Euro	Transport	Month 36	ZFOT

INDICATORS	LEVEL	FOCUS	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
ment						costs		
Congestion charging in-come	M	F	After	Estimating	Euro	Operating revenue	Month 36	ZFOT
Travel times	M	F	After	Estimating	Minute	Congestion charging zone	Month 36	ZFOT
Number of accidents	M	F	After	Estimating	Number, Euro	Congestion charging zone	Month 36	ZFOT
Number of PT users	M	F	After	Estimating	Number	PT vehicles	Month 36	ZFOT
Emission, noise and con-gestion levels	M	F	After	Estimating	Euro	Congestion charging zone	Month 36	ZFOT

Details on the data collection

Selected indicators, relevant to the data collection activities, for this integrated package and related measures are categorised into three groups: operational data, traffic data and attitude and behaviour surveys. Categorisation of the indicators is as follows:

- Operational data
  - Total number of goods vehicles moving in the demo areas

    The data for this indicator will be gathered by video image processing and counting on the field. Video image will be provided by data collection activities on the measure 8.2. This will be carried only on the selected spots within corridor during one week (Monday to Friday).
  - Investment, Maintenance and Operating costs*
  - Revenues of fuel taxes*
  - Congestion charging payment*
  - Congestion charging income*
  - Number of PT users*
  - Emission, noise and congestion levels*
- Traffic data
  - Travel times (for cars and PT vehicles)*
  - Number of accidents*
- Attitude and behaviour surveys
  - Awareness level of congestion charging policy and Acceptance level of delivery restriction policy

    The plan is to do two small surveys only among major stakeholders involved with the work on these two measures. The target group will be city traffic and transport management department, ZG parking company (subsidiary of Zagreb Holding), shopkeepers, delivery companies, big supply chains etc. Because this will be a relatively small inquiry it can be done directly at joined activities with aforementioned stakeholders and measure leaders (during workshops, on the meetings etc.).

    Both surveys will have to have some common questions regarding traffic management and related policies in Zagreb so the results can be combined on the IP level.

* These indicators will have to be estimated. The reason for this estimation relies in the fact that implementation of congestion charging (measure 3.2) will not be executed within CIVITAS ELAN activities. The objective of that measure is to carry out the feasibility study. This is also why the PERIODICITY in the Table 19 is set to ''after'' data only.

In order to do this estimation traffic modelling will be used as well as the data from other measures. Furthermore, other group of indicators used for the CBA (Investment, Maintenance and Operating costs, Revenues of fuel taxes, Congestion charging payment and Revenues from congestion charging) will also be estimated based on the examples and experiences from other European cities (Stockholm, London etc.).

4.1.5. Integrated package 5: Safe and secure Public Transport

4.1.5.1. Description

A Objectives and scope

IP objectives

By introducing new low-floor trams and buses which provide better accessibility for seniors and disabled persons, as well as introducing inside-vehicle surveillance system and improving communication with specific target groups, this IP aims to:

- Improve safety and security conditions in PT;
- Decrease the number of accidents and attacks in PT.

Measure related objectives

- 5.3 Safety and security for seniors
  - Improve safety of senior citizens in public transport;
  - Reduce the number of accidents involving senior citizens using public transport.
- 5.8 Security improvement in PT
  - Improve security conditions in public transportation;
  - Decrease in number of attacks towards PT personnel;
  - Decrease in damage on PT vehicles.

B Overview of the measures

- 5.3 Safety and security for seniors

For seniors it is important to organize their lives independently and to participate safely in urban transport. This will be addressed within the CIVITAS ELAN project by implementing feedback communication, training and awareness raising oriented activities. These will mainly focus on public transport, being the most important transport mode for seniors apart from walking. The seniors will be given opportunity to express their views, comments and recommendations thus providing the public transport operator with valuable information on improvements that are needed in order to remove barriers for senior passengers. This will lead to a dedicated training scheme for drivers and front desk staff, which will be implemented within this measure as well.

- 5.8 Security improvement in PT

The activities in this measure will contribute to safer, secure and increased use of public transportation in Zagreb. As the first step, a survey will be carried out. This will serve to identify black spots and safety / security situation within the public transport. This will include consultation with ZET staff (planning and operation) and citizens. The role of citizens will not be limited to state their concerns; they will also be involved in developing concrete solutions.

C Innovative aspects

Targeting specific user groups, regionally – Innovative communication, training and awareness raising concepts are planned in order to improve safety and independent mobility of seniors. This type of activities directed towards specific target groups (senior population of PT users) has never been applied prior to ELAN.

D Research and technical development

In most accidents in public transport (approximately 65%) older people are involved, particularly when leaving or entering the vehicle. In order to prevent this, a dedicated passenger training scheme for older people will be developed and launched. Smaller groups (10-15 persons) will be trained in theoretical and practical sessions how to use public transport safely and independently. Furthermore, “black spots” regarding security standards in PT will by located.

E Situation before CIVITAS

Whilst being a growing user group, seniors are not particularly considered in urban transport policies in Zagreb at the moment, even though in most accidents within public transport (approximately 65%) seniors are involved, particularly when leaving or entering the vehicle. Therefore, there is a need for action in order to cope with the manifold needs and requirements of seniors.

Vehicles in public transport (trams, buses, trains) are occasionally subject to vandalism by passengers. The risk for vandalism is especially high when football rowdies make use of the PT at times of “important” football games. Also drivers are sometimes victims of assault. These incidents cumulate at nighttimes: All this contributes to lower usage of public transport, particularly by women.

F Inter-relationships with other measures

Safety and security conditions in public transport will be improved by implementing the measures within this integrated package. By raising security and safety standards these measure will also have an impact on image of public transport company as well as an impact on the number of users (investigated within the measure 2.6 Promotion of electronic PT tariff system).

4.1.5.2. Evaluation activities and indicators

A Evaluation activities and indicators on IP level

Expected possible impacts

The expected possible impacts of the IP 5: Safe and secure Public Transport, are as follows:

- Decrease of number of accidents and attacks

This is the most important impact of this IP and it will be measured on the IP level by keeping track of number of accidents and the attacks in PT.

- Better public perception of safety and security conditions

New, safer and more secure PT vehicles together with open dialogue with citizens about new standards in PT service will contribute to better public perception about safety and security conditions. This will also be measured on the IP level.

- Modal shift towards PT and increase of number of PT users

Due to the better safety and security standards this IP could have an impact on the number of PT users and could contribute to the modal shift. Other measures and IPs will have the same impact so this is why the modal split and number of users will be evaluated on the city level.

Selected indicators

In the table below an overview is given of the evaluation activities and indicators on IP level for the IP 5: Safe and secure Public Transport.

Table 20: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 5: SAFE AND SECURE PUBLIC TRANSPORT	▪ Combining results of different measures to come to conclusions on IP level: – Perception of PT safety – Perception of PT security – Safety and security in PT: ▪ Number of accidents in PT ▪ Number of attacks in PT	▪ Change of perception of PT users about safety and security as a result of change in safety and security conditions. ▪ Decrease in accidents and attacks in PT. → Scope: ELAN-corridor

Details of the evaluation activities

According to the main objectives of this integrated package, certain safety and security standards must be raised. Therefore, by combining the data gathered from surveys (subjective perception) and different type of traffic data (number of accidents and attacks), conclusions will be made regarding traffic safety and security conditions.

B Evaluation activities and indicators on measure level

Expected possible impacts

5.3-ZAG Safety and security for seniors

- Improved safety

The improved safety conditions will have a positive impact on the safety standards of the PT. As an overlap with measure 5.8 exists this impact will be measured on the IP level taking into account all safety improvements carried out on the PT infrastructure.

- Improved security conditions

Also here an overlap is noticable with measure 5.8 and therefore it was decided to bundle the outcomes of both measures on the IP level. Consequently the impact wil be measured on the IP level.

5.8-ZAG Security improvement in PT

- Decrease of number of damaged vehicles

This will be measured on the measure level because only one measure is actually dealing with the security in PT. New surveillance system in trams and buses should reduce this number due to better security conditions.

Selected indicators

In the table below an overview is given of all the evaluation tasks and indicators for the measures of IP 5: Safe and secure Public Transport.

Table 21: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
5.3-ZAG Safety and security for seniors	▪ Measurement of: – Number of injuries and deaths caused by accidents in PT – Perception of PT safety	▪ Reduction of accidents in PT. ▪ Improvement of the subjective feeling of PT safety especially among senior population. → Target group: PT users
5.8-ZAG Security improvement in PT	▪ Measurement of: – Perception of PT security – Damaged vehicles – Number of attacks toward PT employees	▪ Improvement of the subjective feeling of PT security. ▪ Decrease in the amount of damage on the PT vehicles. ▪ Decrease in the number of attacks toward PT employees and the amount of inflicted damage. → Target group: PT company and its users

Details of the evaluation activities

As it was stated before, evaluation activities will help to reach the conclusions about PT safety and security. To support these conclusions chosen indicators will ensure data collection about public perception and actual data from the field. Additionally, amount of damage inflicted to the PT vehicles will be recorded.

Details for Business as usual and up- scaling

No Business as usual and up- scaling analysis will be conducted for these measures.

C CBA

No CBA analysis will be conducted for these measures.

4.1.5.3. Data collection

In the table below an overview is given of all the data collection activities carried out by the city of Zagreb within the IP5 Safe and secure Public Transport.

Table 22: Data collection inventory for the City of Zagreb

INDICATOR	LEVEL	FOCUS	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
Damaged vehicles	M		Yearly	Recording	Number	PT fleet	February	ZET
Perception of PT safety	M/IP		Before/ after	Surveys	Index	100 PT users	Month 14 / 36	ZFOT
Perception of PT security	M/IP		Before/ after	Surveys	Index	100 PT users	Month 14 / 36	ZFOT
Number of injuries and deaths caused by acci-dents in PT	M/IP		Yearly	Recording	Number	Corridor	February	ZET/ ZFOT
Number of attacks toward PT employees	M/IP		Yearly	Recording	Number	Corridor	February	ZET

Details on the data collection

Selected indicators, relevant to the data collection activities, for this integrated package and related measures are categorised into two groups: traffic data and attitude and behaviour surveys. Categorisation of the indicators is as follows:

- Traffic data
  - Number of damaged vehicles

    This number is regularly monitored and recorded by public transport company.
  - Number of injuries and deaths caused by accidents in PT

    This will be requested from the city police department. They record the data about the number of accidents by transport mode type.
  - Number of attacks toward PT employees

    There is record about suffered attacks (physical or verbal) because drivers and other staff have an obligation to fulfil the forms about the incident after the suffered attack. Exact figures about these events cannot be collected because not all attacks are reported.
- Attitude and behaviour surveys
  - Perception of PT safety and Perception of PT security

    All the data necessary for these indicators will be collected with one survey – QoS in public transport survey. This survey will be developed by the ZFOT with the help of other ELAN cities.

    The survey will be carried out twice by the ZFOT with the help of other partners in Zagreb. The target group are PT users. Since this will be one comprehensive survey, covering several indicators related to several measures and IPs, it will be carried out during one month period on several spots (on PT stops, CIVITAS ELAN FORUM, via telephone).

4.1.6. Integrated package 6: Changing travel behaviour

4.1.6.1. Description

A Objectives and scope

IP objectives

By intensifying dialogue with students, employees and other citizens and conducting a marketing campaign the main objectives of this integrated package are:

- Change the modal split among students and employees.

Measure related objectives

- 4.4 Mobility management for large institutions
  - Increase the average number of passengers in cars by 20%;
  - Increase cycling by offering “test bicycles” to employees;
  - Increase the number of persons commuting by alternative modes by 10%.
- 4.8 Improving cycling conditions
  - Increase the number of students regularly using bicycles from 10 to 20%;
  - Increase the number of city employees commuting by bicycle from 3 to 10%.
- 4.11 Comprehensive mobility dialogue and marketing
  - Increase the share of public transport and other alternative means of mobility in the city and its surroundings;
  - Disseminate the information to the general public.

B Overview of the measures

- 4.4 Mobility management for large institutions

The main objective of this measure is promotion of more sustainable commuting, which includes car pooling, public transport, cycling and walking. The measure is oriented towards employees and other users within large organizations (i.e. hospitals, factories, universities, schools, municipal and other administrations etc.). At least eight dedicated travel plans will be set up for different organizations.

Using personal cars for common journeys by several people represents an innovative way of transportation compared to the usual use of personal vehicles. The use of a single vehicle by several passengers in mutual accordance can be regarded as turning individual means of transportation into some mode of collective transportation. Establishing contact between possible users via a website shows acceptance of technological achievement in everyday life.

- 4.8 Improving cycling conditions

This measure aims at bringing forward cycling and it will contribute to the development of a sustainable cycling policy in Zagreb. This will be done by providing the necessary infrastructure for cyclists (cycling lanes), thus improving availability and their safety. Furthermore, the role of citizens will not be limited to state their concerns; they will also be involved in developing concrete solutions through a dedicated marketing campaign. Moderate climate, attractive urban space (ELAN corridor) and a high number of students have facilitated the decision to further develop this clean, energy efficient and healthy transport mode in Zagreb.

- 4.11 Comprehensive mobility dialogue and marketing

This measure needs to ensure participation of cyclist as well as general public by creating a forum. Including this target group into the processes of decision-making will also make them responsible and supportive of the decisions reached. The idea is to develop trust between the users and authorities, and to involve citizens in developing concrete solutions. Exhibitions, lectures and workshops on subjects pertaining urban development will take place within the forum. Within CIVITAS-ELAN special attention is given to mobility issues.

C Innovative aspects

New conceptual approach, nationally – This is the first time in Croatia that citizens' engagement will play a major role in strategic transport planning process (e.g. last modal split survey in Zagreb was conducted back in 1998).

Targeting specific user groups, regionally – Prior to ELAN there was not any kind of comprehensive marketing campaign aimed at students and employees, stimulating them to make a modal shift towards cleaner modes.

D Research and technical development

A survey will be made analyzing the travel behaviour of employees in larger organizations and entities along the ELAN corridor. Planning of this modal split survey includes sample stratification by several criteria. A marketing campaign and a "clever commuting" webpage will be designed and aimed not only toward employees but also towards students. In order to change travel behaviour among citizens several workshops will be conducted, showing them the benefits from using alternative modes of transport.

E Situation before CIVITAS

Since the political transition back in the 1990ies, access to individual vehicles for all has dramatically increased, and many people enjoy the comfort of travelling in their own private car. This comfort is, however, questionable in case of congestion and traffic jams that daily occur in the cities, and on access roads. That is why increased use of alternative transport is absolutely necessary.

At present car pooling is based in principle on personal arrangements, and no measure has been taken to introduce more users to car pooling as an innovative aspect of urban transport. Since many large systems, like business parks, hospitals, PT depots, university campuses etc., are often situated away from city centre, long trips *to* and *from* work are necessary on a daily basis for most employees and users.

So far cycling is not treated equally and it only has a limited role in Zagreb. However, since recently it has been steadily increasing and slowly gaining on importance. This is also due to an active cycling scene with citizen driven organizations like BICIKL (among others), closely cooperating with the City of Zagreb.

F Inter-relationships with other measures

As mentioned before, this integrated package is related to IP 2: Stimulating intermodal journeys. The IP 2 aims at providing the necessary infrastructure to make cycling equally attractive as other modes of transport. This IP is expected to change the travel behaviour, thus increasing the number of cyclists.

Concerning the activities outside of CIVITAS, ODRAZ and the Institute for International Relations are conducting the research about nongovernmental organization (NGO) involvement in decision making process and harmonisation of Croatian and EU policies and regulations. The research started in January 2009 and the results are expected by October 2009.

4.1.6.2. Evaluation activities and indicators

A Evaluation activities and Indicators on IP level

Expected possible impacts

The expected possible impacts of the IP 6: Changing travel behaviour, are as follows:

- Modal shift among students and employees

Working on mobility management, creating solutions, encouraging the use of bicycles and public transport will have an impact for the selected target group of this IP (students and employees). So the results of a separate modal split survey will be combined on the IP level to detect this change.

- Improved air quality

Shift towards cleaner modes and increased vehicle occupancy (mining fewer cars on the streets) will have an impact on the air quality. This will be measured on the city level because also other measures will contribute to this goal.

Selected indicators

In the table below an overview is given of the evaluation activities on IP level for the IP 6: Changing travel behaviour.

Table 23: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 6: CHANGING TRAVEL BEHAVIOUR	▪ Combining results of different measures to come to conclusions on IP level: – Modal split within corridor	▪ To achieve modal shift towards alternative modes among students and employees. → Scope: ELAN-corridor

Details of the evaluation activities

At current state Zagreb's main street connecting the city centre with the south part of the city (*Savska cesta* road = ELAN corridor) is on its capacity limit. Traffic congestion and travel times are constantly increasing due to the traffic demand. Therefore, this IP aims to change the citizen behaviour to encourage them to use bicycles and to change their perception about the cleaner and energy efficient modes. In order to detect this kind of behavioural changes, a modal split survey will be carried out for different interest groups:

- Students at dormitories and faculties gravitating to the corridor
- Employers within the institutions along the corridor.

Results of these surveys will then be combined in order to reach the conclusion about the modal shift on this integrated package level. They will be also comparable to the ones on the city level. This will help us to better realize the impact on the modal split on both levels.

B Evaluation activities and indicators on measure level

Expected possible impacts

The expected possible impacts of these three measures in this IP are as follows:

Measure 4.4 Mobility management for large institutions

- Increased occupancy and the number of common journeys

This will be measured on the measure level because measure 4.4 is dealing with creating travel plans for large institutions. Travel plans have to include new concepts like car sharing and car pooling so this impact is very much expected.

Measure 4.8 Improving cycling conditions

- Better health of the citizens

This impact is very hard to measure if not impossible, but it is not wrong to assume that more cycling should contribute to better health of the citizens, at least by decreasing the number of hart related diseases. But this would mean going too far with the measure impacts so this will not be measured.

Measure 4.11 Comprehensive mobility dialogue and marketing

- Better public perception

Throughout the workshops and training sessions, cycling should be promoted as an equal transport mode to other (motorised) modes, thus changing the public perception about cycling. The impact of this marketing campaign will be measured on the measure level.

- Increased level of public involvement

Throughout workshops, training sessions, round table events and forums, which will take place during the entire project life-cycle, the level of public involvement will be increased. Public participation is very much needed while creating new mobility solutions so the level of public involvement will be investigated on the measure level by conducting the surveys.

Selected indicators

In the table below an overview is given of all the evaluation tasks and indicators for the measures of IP 6: Changing travel behaviour.

Table 24: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.4-ZAG Mobility management for large institutions	▪ Measurement of: – Modal split-vehicles within institutions – Vehicle occupancy – Common journeys	▪ Change modal split within institutions. ▪ Increase average vehicle occupancy by introducing transport plans. ▪ Increase the number of common journeys by introducing transport plans. → Target group: Employees in the corridor

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.8-ZAG Improving cycling conditions	▪ Measurement of: – Modal split-vehicles among students – Cycling attractiveness level	▪ Increase of bicycle usage. ▪ Change the perception about cycling traffic as equal mode of transport to other modes. → Target group: Students and employees within corridor
4.11-ZAG Comprehensive mobility dialogue and marketing	▪ Measurement of: – Number of conducted training sessions & workshops and number of participants – Level of public involvement – Quality of service	▪ Increase the level of public involvement by conducting training sessions and workshops during the project life cycle. ▪ Change the citizens' perception about QoS and attractiveness of cleaner and energy efficient modes (PT and cycling) through intensive dissemination activities. → Target group: citizens in the corridor

Details of the evaluation activities

Within the measure 4.4 Mobility management for large institutions several transport plans will be developed for the large institutions in the corridor, encouraging employees to participate in common journeys, thus raising vehicle occupancy. A selected set of indicators will help to keep track of average vehicle occupancy and the number of common journeys.

Measure activities for the measures 4.8 and 4.11 are closely linked because the objectives are more related to the project dissemination. Through a marketing campaign and extensive communication scheme with citizens the goal is to raise the awareness about cycling as equal transport mode to other (motorized) modes of transport. This will be done by conducting a series of public workshops and training sessions throughout the entire ELAN life cycle. Evaluation of these activities will be done by recording the number of participants and the number of sessions, then investigating their perception about energy efficient modes and finally conducting the survey about the quality of service.

Details for Business as usual and up- scaling

No Business as usual and up- scaling analysis will be conducted for these measures.

C CBA

No CBA analysis will be conducted for these measures.

4.1.6.3. Data collection

In the table below an overview is given of all the data collection activities carried out by the city of Zagreb within the IP6 Changing travel behaviour.

Table 25: Data collection inventory for the City of Zagreb

INDICATOR	LEVEL	FOCUS	PERIODIC-ITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPONSI-BLE
Quality of service	M		Before/ after	Surveys	Index	100 users	Month 14 / 36	ZFOT
Cycling attractiveness	M		Before/ after	Surveys	Index	100 users	Month 14 / 36	BICIKL
Cycling safety	M		Before/ after	Surveys	Index	100 users	Month 14 / 36	BICIKL
No. of conducted training sessions & workshops and number of participants	M		Yearly	Recording	Number	All partici-pants	January	ODRAZ
Level of public involvement	M		Before/ after	Surveys	Index	CIVITAS ELAN Forum	Month 9 / 37	ODRAZ
Modal split-vehicles within institutions	M/IP		Before/ after	Questionnaire	% by mode	100 employ-ers	Month 12 / 32	ZFOT
Modal split-vehicles among students	M/IP		Before/ after	Questionnaire	% by mode	100 students	Month 12 / 32	ZFOT
Average occupancy	M		Before/ after	Measurement	Persons / vehicle	Corridor	Month 8 / 32	ZFOT
Number of ‘’car pools’’ in institutions	M		Before/ after	Questionnaire	Number	8 institutions	Month 8 / 32	ZFOT

Details on the data collection

Selected indicators, relevant to the data collection activities, for this integrated package and related measures are categorised into three groups: traffic data, attitude and behaviour surveys and process and stakeholder interviews.

- Traffic data
  - Modal split-vehicles within institutions and Modal split-vehicles among students

    As a scientific institution and measure leader for measure 4.4, the Faculty of Transport and Traffic Sciences (ZFOT) will be the main responsible institution for this survey. Ten students will be included in conducting this survey and data input.

    The initial data will be collected with a survey among ZFOT's students. Afterwards, a survey in large institutions, faculties and student dormitories within or gravitating to the corridor will be carried out.
  - Average occupancy

    The data for this indicator will be measured directly on the field by manual road side counts during one week period (Monday to Friday).
  - Number of ''car pools'' in institutions

    Employers in the selected institutions in the corridor will be kindly asked to answer if they travel to work in any kind of car pool arrangement.
- Attitude and behaviour surveys
  - Quality of service

    This data will be collected with *QoS in public transport* survey. This survey will be developed by the ZFOT with the help of other ELAN cities. The survey will be carried out twice by the ZFOT with the help of other partners in Zagreb. The target group are PT users. Since this will be one comprehensive survey, covering several indicators related to several measures and IPs, it will be carried out during one month period on several spots (on PT stops, CIVITAS ELAN FORUM, via telephone).
  - Cycling attractiveness and Cycling safety

    Initial data will be provided by *Survey about cyclist's behaviour and acceptance of cycling in Zagreb* conducted by NGO BICIKL but further inquiry is needed because the part about the safety is not included in this survey. The important thing is to find out user perception on these matters (especially cycling safety) so the target group should be cyclist, but general public (potential users) should be included as well because it is also relevant to detect changes in their perception. Survey will be carried out twice by the NGO BICIKL on the selected spots in the corridor.
  - Number of conducted training sessions & workshops and number of participants

    ODRAZ will keep record of the number of different types of sessions carried out and the number of participants. These sessions are a part of ELAN dissemination activities and will be conducted within CIVITAS ELAN FORUM.
- Process and stakeholder interviews
  - Level of public involvement

    During the workshops and training sessions on CIVITAS ELAN FORUM, while working with stakeholders, ODRAZ will investigate the level of public involvement on the decision making process. Target group and sample size will be all participants of the FORUM activities.

4.2. City/corridor level

4.2.1. Objectives and scope

At the city level, the particular interest of all measures consists in increasing the use of collective and alternative transport modes and reaching a turning point in the modal split of urban transport.

Within the city of Zagreb the emphasis for reaching this goal is focused on the improvement of the public transport by increasing the attractiveness and effectiveness of this PT system. Nevertheless also the efforts done for increasing the use of non-motorised transport modes contribute to this goal. This does not merely includes infrastructural improvements to create more attractive public spaces, but also organisational measures and tailored mobility management.

The stimulation of all citizens and stakeholders through a good dialogue and awareness rising will also help them to change and allows the local authorities to develop solutions in a participatory approach.

A second objective at the city level is to improve air quality and reduce noise levels. CIVITAS-ELAN contributes to this objective through:

- Environmental objectives
  - Put in use clean public fleet vehicles (energy efficient trams, new buses running on bio-diesel) to decrease emissions
  - Introduce new biodiesel waste collection vehicles in order to decrease emissions
- Mobility objectives
  - Develop mobility management schemes and car pooling for large institutions
  - Improve transport infrastructure to attract more cyclists and pedestrians in order to reduce traffic congestion
  - Improve QoS of PT in order to increase the number of passengers
  - Limit the number of commercial vehicles entering the corridor.

4.2.2. Key Impacts

4.2.2.1. Modal split

In order to collect data for modal split, it is planned to carry out a survey. The main task of this survey will be to determine the ratio of different transport modes in the total journey from the origin (O) to the destination (D). 'Journey' is defined as transport (including walking) of people from O-D with the exact purpose.

The list of transport modes and purposes that will be included in the survey is shown in the next table.

Table 26: Overview of the transport modes and purposes included in the modal split survey

Transport modes	Purpose
Walking (more than 100 meters) Cycling Motorbike Car: ▪ Driver ▪ Passenger	School/Faculty Work Business (i.e. hospital, bank) Shopping Leisure Home

Transport modes	Purpose
PT: ▪ BUS ▪ Tram ▪ Train	Other

4.2.2.2. Number of PT users

Numerous activities in the ELAN should contribute to the increase of number of public transport users. Actions like the acquisition of the new PT vehicles (trams and busses), implementation of the new systems (tariff system and information system), establishing better safety and security standards will contribute to the higher number of users.

4.2.2.3. Air quality

Almost all ELAN measures will help to improve the air quality in the corridor by introducing clean vehicles into the public fleets, stimulating „green“ modes (cycling and walking), promoting the use of the public transport services and using new mobility solutions like carpooling. In order to detect change in the air quality this indicator will be measured on the city/corridor level.

4.2.2.4. Noise level

Similarly to the air quality, several measures will have an impact on the noise level. A positive impact is expected due to the various ELAN objectives like reducing the number of commercial vehicles entering in the city centre during the daytime period, reducing the noise levels of the public fleet vehicles (public transport and waste disposal vehicles), stimulating walking and cycling, discouraging the use of individual vehicles by prioritising PT vehicles and promoting multimodal journeys. This impact will be measured on the city/corridor level.

4.2.3. Data collection

In the table below an overview can be found of the data collection ativ

Table 27: Overview of the data collection activities on the city level

INDICATOR	LEVEL	PERIODICITY	METHOD	DATA COL-LECTION UNIT	SAMPLE SIZE	TIMING	RESPON-SIBLE
Modal split	City	Before / after	Survey	% by mode	500	Month 12 / Month 32	ZFOT
Number of PT users	City	Before / after	Recording	Number	PT vehicles	Month 8&9 / 20&21	ZET/HZ INFRA
Air quality	City	Continuous	Measurement and simulation	g/m^3	Corridor	Quarterly	ZFOT
Noise level	City	Before / after	Simulation	dB	Different spots in the corridor	Month 12 / 36	ZFOT

Details on the evaluation activities

- Traffic data
  - Modal split-vehicles

    The survey design will be carried out by ZFOT. First, sample size, i.e. sampling fraction, will be determined in order to meet the requirements of the possible use of a particular sample, whose answers truly reflect the population. The sample will be derived by dividing the population into seventeen non-overlapping classes (there are seventeen districts in Zagreb). Second stratification will be based on the partition of every defined class into four sub classes (there are statistical data for population separated in four age groups in Zagreb and its districts). The aforementioned means that the predetermined sample size of 500 citizens of Zagreb will contain the given percentage of citizens, which belong to the concerned district (under belonging to the concerned district, citizens who live in the concerned district are implied). Within class of belonging to the concerned district, a given percentage of citizens will be from individual age groups. Calculation of the required number of citizens which belong to a particular class or subclass is based on the statistical data for Zagreb.

    Regarding the method of data collection, it will be conducted by partners' employees in Zagreb. They will be asked to fill out the questionnaire for themselves and for their family, neighbors and relatives. Beside employees, students of the Faculty of Transport and Traffic Sciences will be asked to fill out a questionnaire for themselves and for their family (if they live in Zagreb) and for their neighbors and relatives as well. Apart from that, the questionnaire can be filled out by anybody who visits CIVITAS ELAN FORUM during a determined time period. Students of the Faculty of Transport and Traffic Sciences (10 students) will be included in collecting the rest of the questionnaires, if the data collected by previously described methods aren't satisfactory. In that case, they will use personal interviews and telephone surveys for collecting data.

    Regarding the creation of the questionnaire or question types, specific types of questions will be created for this purpose. It will probably be a big table, i.e. a combination of various types of questions like multiple choice, numeric open end and text open end.

- Operational data
  - Number of PT users

    Both public transport companies are keeping track of the number of sold tickets. Several citizen groups (students, elderly and disabled persons) are entitled to a free PT pass. The number of passengers with "free ticket" will be estimated using the modal split data (the average number of daily journeys using PT for the abovementioned groups) and the sample stratification.

    After complete implementation of the electronic ticketing system (Spring 2010), number of PT users will be recorded in the log files. This will then be a more accurate method for data collection.

  - Air quality

    The data necessary for determining the air quality and also for evaluating the changes will be provided by the Ministry of Environmental Protection, Physical Planning and Construction and its branch National network for Continuous Air Quality Monitoring. The location of their measuring station is shown on the picture below (red dot).

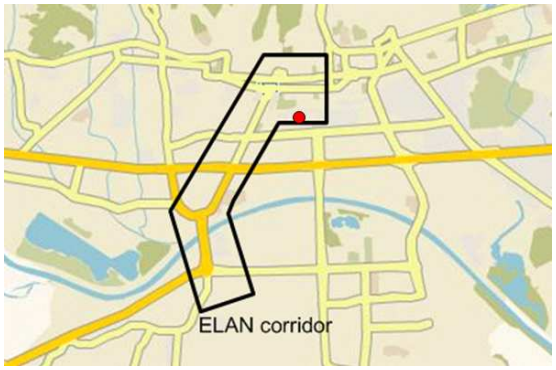

Figure 5: Position of the air quality measuring station

This measuring station monitors Sulphur dioxide (SO_2), Nitrogen dioxide (NO_2), Carbon monoxide (CO), particle matters PM10, trioxide (O_3), BTX (benzene, toluene, ethyl-benzene), UV-B radiation as well as temperature, humidity, wind speed and direction.

Other data source will be traffic model developed by the ZFOT team within the measure 8.2. The software is VISSIM – Emissions model EnvPro 8 and VISUM – Environment module pollution calculation HB EFA. This data source will be especially useful for up-scaling and business as usual analysis for certain measures.

– Noise level

Noise level measurements will be simulated with the VISUM – Environment module calculation of noise emissions RLS. The base will be traffic model developed within the measure 8.2.

5. In- depth process evaluation

In this chapter only the focus measures that are subject to the in- depth process evaluation are described. For these measures the process of implementation will be analysed very closely to obtain a full understanding and overview of the implementation process.

The non-focus measures will not be described here however some basic process evaluation will be provided for these measures based on a fill- in form filled in by the ML's on a yearly basis.

There are seven measures selected for the in- depth process evaluation analysis within the city of Zagreb:

- 1.3 Energy recovery system for trams
- 1.14 Clean public transport strategies
- 1.15 Clean public fleet vehicles
- 2.6 Promotion of electronic PT tariff system
- 3.2 Study of congestion charging and dialogue on pricing
- 7.4 Freight delivery restrictions
- 8.2 Public transport priority and traveller information.

All measures in the integrated package 1: Implementing the use of clean vehicles in public fleets (1.3, 1.14, and 1.15) will have a major impact on the nationwide use and production of alternative fuels. This is why the implementation process of these measures is selected for the in- depth process evaluation.

Measures 3.2 Study of congestion charging and dialogue on pricing and 7.4 Freight delivery restrictions are selected because there is a relatively high risk of failing to implement them. Therefore, from the very beginning of the implementation process for both measures there is a high necessity for involvement of stakeholders. This will be done by creating intensive communication schemes and developing an open dialogue with interested parties.

Measures 2.6 Promotion of electronic PT tariff system and 8.2 Public transport priority and traveller information have an intense innovative aspect due to the fact that new technologies will be introduced to the traffic and transport system, thus improving the overall Quality of Service (QoS). In order to select and introduce these kinds of new technologies, a support from all stakeholders involved is necessary.

5.1. Measure 1.3 Energy recovery system for trams

5.1.1. Description

See the chapter on Impact evaluation.

5.1.2. Process stages

In order to reduce energy consumption and to make tram journeys more comfortable for users, ZET will purchase 70 new energy efficient trams during the ELAN. These trams are the product of Croatian consortium (TŽV Gredelj Ltd. and Končar Group) and they are built according to the ZET's technical specifications. Introduction of these new trams into a daily exploitation will be monitored through several stages:

- Fleet modernisation planning[6]

[6] Fleet modernisation planning is an ongoing process that was started back in the 2005 by ZET.

- Specification of technical requirements
- Financial construction
- Call for tender
- Vehicle acquisition and driver training
- Data collection
- Conclusions.

This resulted into the following timeline:

Table 28: Expected timeline for the measure 1.3 Energy recovery system for trams

Stage	Before ELAN	year 1	year 2	year 3	year 4
Fleet modernisation planning					
Specification of technical requirements					
Financial construction					
Call for tender					
Vehicle acquisition and driver training					
Data collection					
Conclusions					

5.1.3. Methodology for the process evaluation

All of the 70 new trams are already put into operation during the first year of the CIVITAS ELAN. This means that only at the end of the first ELAN year it is necessary to report on the implementation process. Thus, the stakeholder interviews will be conducted by the end of year one and the aim will be to investigate all the stages of the before mentioned process.

Special attention will be paid to the foregoing timeline and defined phases in it because this is, without a doubt, an example of a good cooperation of several stakeholders and the result is successfully accomplished project.

5.2. Measure 1.14 Clean public transport strategies

5.2.1. Description

See the chapter on Impact evaluation.

5.2.2. Process stages

In order to reduce fuel consumption and to make bus fleet more comfortable and environmental friendly, ZET will modernise the fleet by purchasing new vehicles (CNG and bio diesel buses). Introduction of these vehicles into a daily exploitation will be monitored through several stages:

- Fleet modernisation planning[7]
- Specification of technical requirements
- Financial construction
- Call for tender
- Vehicle acquisition and driver training
- Data collection
- Conclusions.

This resulted into the following time line:

Table 29: Expected timeline for the measure 1.14 Clean public transport strategies

Stage	Before ELAN				year 1				year 2				year 3				year 4			
Fleet modernisation planning																				
Specification of technical requirements																				
Financial construction																				
Call for tender																				
Vehicle acquisition and driver training																				
Data collection																				
Conclusions																				

5.2.3. Methodology for the process evaluation

Similarly with the measure 1.3, the majority of the new buses are already operational in the first year of the CIVITAS ELAN. If the measure implementation goes as it was originally planned all the busses should be implemented and in use by the end of year two. For this reason the interviews with stakeholders will be conducted twice, that is, at the end of first and second year of the ELAN.

[7] Fleet modernisation planning is an ongoing process that was started back in the 2005 by ZET.

5.3. Measure 1.15 Clean public fleet vehicles

5.3.1. Description

See the chapter on Impact evaluation.

5.3.2. Process stages

In order to reduce fuel consumption and to make the waste disposal fleet more environmental friendly, CISTOCA will modernise the fleet by purchasing new vehicles using alternative fuels. Introduction of these vehicles into a daily exploitation will be monitored through several stages:

- Fleet modernisation planning[8]
- Specification of technical requirements
- Financial construction
- Call for tender
- Vehicle acquisition and driver training
- Data collection
- Conclusions.

This results into the following expected timeline:

Table 30: Expected timeline for the measure 1.15 Clean public fleet vehicles

Stage	year 1				year 2				year 3				year 4			
Fleet modernisation planning																
Specification of technical requirements																
Financial construction																
Call for tender																
Vehicle acquisition and driver training																
Data collection																
Conclusions																

5.3.3. Methodology for the process evaluation

Again, as it is stated for the measures 1.3 Energy recovery system for trams and 1.14. Clean public transport strategies the planning process for this measure had been originally started before ELAN. But, unlike the rest of the before mentioned measures, the vehicle acquisition process in this measure will take longer to complete. Considering the fact that this is a similar measure to the other two, detection of drivers and barriers could potentially be easier because of the „lessons learned“ experience in other measures of IP 1. The work with stakeholders will be carried out through interviews by the end of each year.

[8] Fleet modernisation planning is an ongoing process that was started back in the 2007 by CISTOCA.

5.4. Measure 2.6 Promotion of electronic PT tariff system

5.4.1. Description

See the chapter on Impact evaluation.

5.4.2. Process stages

In order to make payment of transport service simpler, especially for passengers who use services from more than one operator, a unified charging system will be implemented. This process stages will be monitored through:

- Specification of technical requirements
- Tariff systems analysis
- Financial construction
- System acquisition and installation
- Data collection
- Conclusions.

This resulted into the following timeline:

Table 31: Expected timeline for the measure 2.6 Promotion of electric PT tariff system

Stage	year 1				year 2				year 3				year 4			
Specification of technical requirements																
Tariff systems analysis																
Financial construction																
System acquisition and installation																
Data collection																
Conclusions																

5.4.3. Methodology for the process evaluation

Participation of different stakeholders will be ensured through public workshops and interviews. With at least one workshop about the usage of the new tariff system will be presented to the end users. With this approach the promotion of the new system should be more effective and should provide better results. During this process and according to the expected timeline interviews with key stakeholders will be conducted.

5.5. Measure 3.2 Study of congestion charging and dialogue on pricing

5.5.1. Description

See the chapter on Impact evaluation.

5.5.2. Process stages

Any kind of introduction of additional payment obligations for transport infrastructure is almost sure to encounter rejections from most of the stakeholders. This is why the process of conducting a study on congestion charging needs to involve interested parties from the very beginning. The process is therefore decomposed into several stages:

- Concept of work
- Definition of congestion charging zone
- Identification of stakeholders
- Data collection and analysis
- Proposing preliminary solutions (in dialogue with stakeholders)
- Conducting a study
- Presentation of results
- Conclusions.

This resulted into the following expected timeline:

Table 32: Expected timeline for the measure 3.2 Study of congestion charging and dialogue on pricing

Stage	year 1				year 2				year 3				year 4			
Concept of work																
Definition of zone																
Identification of stakeholders																
Data collection and analysis																
Proposing preliminary solutions																
Conducting a study																
Presentation of results																
Conclusions																

5.5.3. Methodology for the process evaluation

As a part of process evaluation, local workshops for the measure 3.2 Study of congestion charging and dialogue on pricing will be organised. The intention is to involve major stakeholders into the process of conducting the study because their participation is needed in order to decrease the risk of failing to introduce acceptable solutions. The measure needs to investigate and propose strategies for introducing congestion charging scheme in Zagreb. The risk is present because any kind of additional payment for the use of infrastructure will most certainly encounter the rejection of citizens.

Furthermore, interviews with the major stakeholders involved with this study will be organised. The objective is to find out their point of view and recommendations in order to involve them into the decision making process, thus decreasing the risk of failing and setting up the good ground towards the implementation of congestion charging in Zagreb.

5.6. Measure 7.4 Freight delivery restrictions

5.6.1. Description

See the chapter on Impact evaluation.

5.6.2. Process stages

In order to reduce congestion by encouraging stakeholders (shopkeepers and delivery companies) to respect current restrictions regarding the freight delivery into the city centre, the process stages of this measure will have to be aimed towards raising their awareness level about the necessity of urban traffic management, and towards making them acquainted with the negative impacts of their current behaviour. Through intensive communication with stakeholders they will also be encouraged to propose solutions (e.g. additional window times).

Stages of this process will be:

- Concept of work
- Definition of zone of interest (zoning)
- Definition of measuring points (points in the zone of interest for delivery vehicles counting)
- Data collection and analysis
- Identification of stakeholders (shopkeepers and delivery companies)
- Creating communication scheme:
  - Public announcements
  - Initial contacts
  - Close cooperation
  - Team working
  - Trainings, workshops, interviews
- Proposed solutions
- Presentation of possible solutions
- Implementation
- Conclusions.

This resulted into the following expected timeline:

Table 33: Expected timeline for the measure 7.4 Freight delivery restrictions

Stage	year 1				year 2				year 3				year 4			
Concept of work																
Zoning																
Definition of measuring points																
Data collection and analysis																

Stage	year 1				year 2				year 3				year 4			
Identification of stakeholders																
Creating communication scheme																
Proposing solutions																
Presentation of possible solutions																
Implementation																
Data collection and analysis																
Conclusions																

5.6.3. Methodology for the process evaluation

As a part of process evaluation, local workshops for the measure 7.4 Freight delivery restrictions will be organised. The intention is to involve major stakeholders into the process of implementation because their participation is needed in order to decrease the relatively high risk of failing.

The Zagreb City Council has already established the freight delivery control by means of regulation. However, this regulation is not sufficiently respected and implemented, and delivery trucks further increase daytime congestion. Thus, the objective of measure 7.4 is to change the awareness of shopkeepers and delivery companies about this type of mobility management. This means establishing constructive dialogue through workshops, training sessions and stakeholder interviews. Furthermore, learning history workshop at the end of each ELAN year will be organized with key stakeholders. This should give a good oversight over measure drivers and barriers.

5.7. Measure 8.2 Public transport priority and traveller information

5.7.1. Description

See the chapter on Impact evaluation.

5.7.2. Process stages

As it was mentioned before, for the first time on the national scale this kind of technology (“intelligent crossings”) will be introduced in daily life. In order to make this happen, a cooperation of different stakeholders dealing with different tasks is necessary (data collection, modelling/simulating, system design, implementing and evaluating results).

The different stages of this process of introducing intelligent crossings are:

- Concept of work
- Field data collection
- Modelling “before” situation
- Data analysis
- Simulation of different scenarios (different signal plans)
- Demo location determination
- Defining equipment requirements and acquisition
- Demonstration

- Data collection and analysis
- Conclusions.

This resulted into the following expected timeline:

Table 34: Expected timeline for the measure 8.2 Public transport priority and traveller information

Stage	year 1				year 2				year 3				year 4			
Concept of work																
Field data collection																
Modelling “before” situation																
Data analysis																
Simulation of different scenarios																
Demo location determination																
Defining equipment requirements and acquisition																
Demonstration																
Data collection and analysis																
Conclusions																

5.7.3. Methodology for the process evaluation

Measure 8.2 Public transport priority and traveller information has an intense innovative aspect due to the fact that new technologies will be introduced to the traffic and transport system, thus improving overall Quality of Service (QoS). The implementation elements of this measure are:

- Innovative technology
- Necessity of stakeholder involvement.
- Challenge of establishing a network of intelligent crossings
- Improving QoS through better and reliable service and providing traveller information.

In order to develop solutions and to introduce this kind of new technology, a support from all stakeholders involved is necessary. To involve them, certain techniques will be introduced such as public workshops and stakeholder interviews. At the end of each year of ELAN, a learning history workshop will be organized with major stakeholders. Their participation should ensure higher level of stakeholder involvement and in some aspects better team work towards the mutual goal.

Part 4: Site Evaluation Plan for the City of Porto

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Site Evaluation Plan for the City of Porto

1. City context

The city of Porto is located in the North of Portugal and it is the heart of the country's second biggest metropolitan area - Porto Metropolitan Area. Porto is also the center for leisure, culture and social activities for the region. Its domains (41.6 km^2) are limited by the Douro River (South), by the Atlantic Ocean (West) and by the neighboring cities of Matosinhos (North), Maia (North) and Gondomar (East). In terms of population, in 2001 the city represented only 263 131 (17%) of a total of the 1.5 M inhabitants within the Porto Metropolitan Area. In fact, Porto's population has been declining over the last decades. The situation is the opposite compared to other municipalities of the agglomeration which evidences the existing suburbanization phenomena. In a regional context, Porto is the main urban centre in Northern Portugal and its agglomeration is the hub of the Northwestern Portugal conurbation, which ranges from Braga (North) to Aveiro (South) and comprises about 3 million inhabitants, It is also the most populated metropolitan area of the North-eastern Iberian Peninsula, which forms an "Euro region" that includes Northern Portugal and the Spanish region of Galicia with more than 6 million inhabitants.

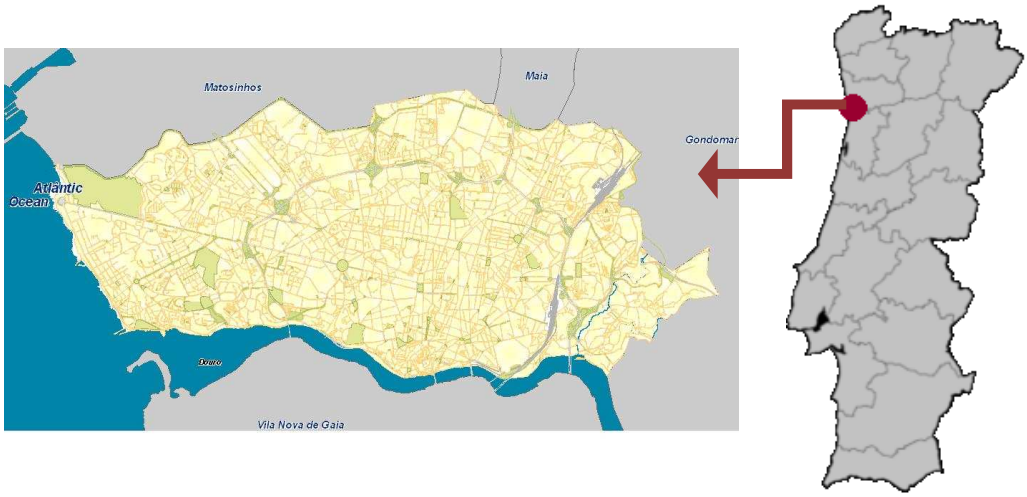

Figure 1 - The city of Porto

In terms of economical activity (2001 census), Porto has experienced the national trend for declining agriculture activity (0,4% of the employed people), while in the secondary sector there are 21,2% of the employed people and in the service sector there are 78,4% (34,4% in social and 40.0% in economical).

The main urban problem is the demographic decline and physical decay in the city centre. Both trends developed over the last decades are linked to several social and economical factors that have contributed to the progressive migration of population from the city centre to the suburbs. As a reflection of these problems the city faces serious mobility problems raised by the new mobility patterns (longer trips, urban sprawl, etc.).

1. Target Corridor

The Asprela corridor, in the northern part of the city, has been one of the fastest growing areas in Porto over the last decade, mainly because of the increasing number of educational institutions in the zone. One of the major hospitals of Porto, Hospital de São João, is located in this area, as well as several faculties of universities and of the polytechnics, and other large institutions. Overall there are about 50 000 people that enter daily in this area for working and studying, resulting in more than 100 000 trips per working day. This area is also a major entrance point for public and private transport to the city center.

Figure 2 – Asprela corridor in the city

This fact raises severe mobility problems associated with illegal car parking levels and traffic congestion, which happens in spite of the relatively good offer of public transport (buses, metro). It is believed that the unique demand patterns and existing sociological characteristics (young people, high qualifications) of the local users will facilitate the implementation of innovative mobility solutions. On the other hand, the physical characteristics of the area will facilitate the measurement and effectiveness of the proposed measures' impact evaluation.

The local transportation conditions in the corridor have been changing over the last years in terms of demand patterns and supply infrastructures, which makes it an interesting background for the CIVITAS-ELAN measures:

- Opening of a metro line with 3 stations within the corridor.
- Plans for an additional new metro line that will serve the corridor.
- Plan for a new Railway station in the corridor for a recent circular Train Line
- Important transport interchanges: Hospital S.João is a major bus node with connection to the metro and regional buses; the Asprela corridor is connected by several lines to the regional and sub-urban bus network.
- Closeness to major road infrastructures (North Highway; internal and external ring road); the Asprela corridor serves as access point to the city centre and suffers from congestion.
- Low percentage of cycling and walking also due to neglected walking conditions and inexistent bicycle lanes.

Table 1: Key characteristics for the city of Porto

Characteristics	City	ELAN- Corridor
Area		
Surface (km²)	41	3
Transport		
Car ownership (per 1000 inhabitants)	504[1]	N/A
% daily trips by mode of transport (home-work, home-school)		
- Car	42.1[3]	43.9[3]*
- Walk/cycle	26.7[3]	25.3[3]*
- Bus	27.8[3]	28.3[3]*
Society and economy		
Population	263 131[3]	12 000[3]
% unemployment	10.2[3]	8.8[3]*
% employed in service sector	78.4[3]	78.7[3]*
% pop over age 65	19.3[3]	18.9[3]*
% pop under age 14	13.1[3]	12.3[3]*
Energy and environment		
% estimated energy use – Transport	33[2]	N/A
% emissions of Carbon Diox-ide by road sector	36[4]	N/A

[1] National Institute of Statistics (INE), 2001

* Civil Parish of Paranhos

[2]City Council of Porto (CMP), 2004

2. Overview of all the evaluation activities

Below an overview can be found of all the evaluation activities carried out for the city of Porto during the project life cycle. The table includes information on the level at which the evaluation task will be carried out; Corridor level, Integrated Package-level or Measure level. It also indicates the basic evaluation tasks and the in-depth analysis that will take place for the measures.

Table 2: Overview table of the evaluation activities for the city of Porto

Corridor/ IP/Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA/ financial	In- depth Process evaluation
Corridor Level	Modal split Air quality Noise Public Transport	x				
IP 1	Developing an Efficient Transport System	x	x			
1.5-OPO	Light Weight Bus	x		x	x	x
3.5-OPO	Integrated accessibility planning in Asprela quarter	x				
6.4-OPO	Flexible Mobility Agency	x				
IP 2	Promoting the Effective use of Sustainable Transport	x				
4.14-OPO	The Mobility Shop	x				
8.8-OPO	Mobile Mobility Information	x			x	x
	Participatory Planning for New Intermodal Interchange[3]					
2.10-OPO	Participatory Planning for New Intermodal Interchange					x

[3] Only subject to in- depth Process Evaluation

3. Focus measures

For each city a selection of focus measures has been made. For these measures extra attention will be paid to all the evaluation activities but a strong focus will be on the CBA and/ or the in depth- process evaluation of these measures.

The following focus measures were selected for the city of Porto:

- 1.5 -OPO Light Weight Bus

This measure is a technological innovative measure in the city of Porto. It will focus on the development of a shuttle bus body using lightweight materials powered by biodiesel waste. As a result of this a new transport service will be introduced: a clean bus shuttle within the Asprela corridor.

An in-depth process and impact evaluation (before/after, cost benefits analysis, up scaling and in-depth process) will be carried out for this measure. A CBA is particularly interesting for this measure because the benefits will not occur at a financial level but in better air quality. The up-scaling analysis will allow us to know the impacts if instead of one light weight bus a complete fleet was to be introduced.

This measure is suitable for cost benefits analysis, up scaling and in-depth process evaluation.

- 2.10-OPO Participatory Planning for New Intermodal Interchange

The planning of the new interchange will be the first in the metropolitan area of Porto focusing on a strong involvement of all relevant stakeholders early from the planning phase, i.e. preparatory phase of a major infrastructure project. This project will also pay attention to the economical viability of the project (management), which is an aspect many times neglected in Portuguese reality.

As this measure will be not physically implemented, it is only possible to do an in-depth process evaluation

- 8.8-OPO Mobile Mobility Information

The 8.8-OPO measure is an innovative transport information service, based on existing technology but implemented in an integrated way. When a high level of success is reached within the CiViTAS project, this success could allow this product (service) to be part of a set of new products (services) of real time information. In this case it will be easy to transfer this service to other cities. For this reason this measure is selected for in-depth process evaluation and cost benefit analysis.

Table 3: List of focus measures for the city of Porto

MEASURE NUMBER	MEASURE TITLE	IN-DEPTH ANALYSIS		MOTIVATION					
		Cost benefit analy-sis	In – depth Process Evaluation	Towards greener towns and cities	Towards free-flowing towns and cities fluid cities	Towards smarter urban transport	Towards accessi-ble urban transport	Towards safe and secure urban transport	Key Motivation
1.5 OPO	Light Weight Bus	x	x	xxx	xx		xx		Technological innovative measure New transport service Cleaner vehicles
2.10 OPO	Participatory Planning for New Intermodal Inter-change		x	xx	x		xxx	x	Strong commitment with stakeholders Economical viability
8.8 OPO	Mobile Mobility Information	x	x	x	x	xxx	xx		Innovative service with a range in the city Easy to transfer

x relevant, xx very relevant, xxx highly relevant

4. Impact Evaluation

4.1. Measure and Integrated package level

4.1.1. Integrated package 1: Developing an Efficient Transport System

4.1.1.1. Description

A. *Objectives and scope*

IP objectives

In this package are all the “hard” measures that will be physically implemented like new transport services, renewal of the transport network infrastructure (roads, bus lanes, sidewalks, cycle lanes) and new policies of transport and traffic management in order to improve the supply of the transport system.

The mains objectives are:

- Reduce the traffic flow in order to improve the quality of circulation for all modes and the vehicles fuel efficiency;
- Improve the pedestrian and bicycle modes in order to increase these users ;
- Adding new and environmental sustainable options for daily transport by implementing a new clean shuttle service.

Measure related objectives

- 1.5-OPO Light Weight Bus
  - Solve the problem of reducing weight and production costs of urban buses through the implementation of a technology of modular bus construction;
  - Devise design methodologies that reduce production lead time through reduction of number of components, functional integration, and allowance for dismantling, easy repair and recycling;
  - Foster modal shift between transport modes;
  - Reduce CO_2 emissions.
- 3.5-OPO Integrated accessibility planning in Asprela quarter
  - Reduce the level of traffic congestion in the corridor;
  - Improve the Public Transport circulation;
  - Enhance the cycling and walking.
- 6.4-OPO Flexible Mobility Agency
  - Promote the use of bicycles as a way of transportation;
  - Decrease the use of private cars;
  - Optimise the use of public transport in a low demand situation.

B. *Overview of the measures*

- Measure 1.5-OPO Light Weight Bus:

This measure establishes a clean bus shuttle within the Asprela corridor. This measure will be focused on the implementation of an innovative technology to manufacture bus bodies using lightweight fibre reinforced composite materials that meet tough requirements of high static and dynamic performance, powered by biodiesel waste.

- Measure 3.5-OPO Integrated accessibility planning in Asprela quarter.

A general plan of intervention will be developed considering all modes of transport in a comprehensive transport planning perspective (including land-use, environmental and operational issues). The final work will propose specific measures that will be implemented and evaluated during the CiViTAS-ELAN project life time. The main idea is to create a successful sustainable mobility case study in the city that will help prove the effectiveness of the specific proposed measures when integrated in a global approach of transport planning.

- Measure 6.4-OPO Flexible Mobility Agency (part of the Mobility Shop):

This measure implements innovative means of transport by adding new and environmental sustainable options for daily transport (bike rental, car pooling and DRT). All these innovative services will be promoted through specific marketing campaigns in order to maximize user acceptance. These actions will be carried out with official municipality support and mobility shop logistical support.

C. *Innovative aspects*

- Use of new technology/ITS
  - Implementation of an innovative technology to manufacture bus bodies using lightweight fibre reinforced composite materials that meet tough requirements of high static and dynamic performance, powered by biodiesel waste.
- New mode of transport exploited:
  - Light Weight Bus within the Asprela corridor.
  - Bike rental service will allow bicycle usage to be enhanced as an effective and healthy means of transport that within the Asprela corridor.
  - DRT bus service will optimise transport resources and will constitute the first trial of such services in the city's transport reality.
  - Car pooling agency will be supported by a web-based platform and a web forum that will allow users to find other users for a joint ride and to share their experiences with the system. It will be the country's first experience in this field.
- New policy instrument:
  - Promotion of clean transport: by enhancing the cycling facilities, walking conditions, public transport priority systems and new transport policies in the Asprela corridor, the plan will assume a clearly innovative approach in the city mobility context, since there is no example of their implementation within the city and very few at a national level.
  - Improved intermodality: a special focus will be put on the integration of bikes with public transport as the parking facilities will be next to transport stops. Additionally, other features will be added, allowing for a "pick and ride" bike service to the PT users. Special facilities and regulations by the local PT operators will enhance and facilitate the use of bicycles in the Asprela corridor. This measure is related to measure 3.5–OPO "Integrated accessibility planning in Asprela quarter", which comprises the conception and construction of the first non-leisure cycle lane in Porto.
- Promotion of new products and methodologies:
  - Development and evaluation of the plan will use new computer simulation tools and new technical methodologies for the assessment of the solutions to be implemented.

D. *Research and technical development*

For the Clean Shuttle study concepts of materials available in the market or produced in other EU-funded projects will be carried out:

- Compare their properties with requirements of stiffness, crashworthiness and manufacturability for bus
- Identify the advantages and drawbacks
- Study the possible processing methods and select the most applicable processes for large structural components (e.g. resin transfer modelling, filament winding techniques);
- Full material characterization from available databases including mechanical properties, strain rate dependency, fire resistance, and acoustic performance form, an essential input for the overall design;
- Design of integrated load introduction functions in particular points of load transfer.

Testing and final developments of a new simulation tool of the Computer Department of the Porto's Science Faculty (FCUP-DCC) regarding the specific characteristics of the present study. The testing will use part of the traffic data collected for the development of mobility plan.

E. *Situation before CIVITAS*

- Measure 1.5-OPO Light Weight Bus:

Biodiesel is an alternative to petroleum based fuels; its production rate has been increasing over the last years. In Portugal there are several companies specialized in biodiesel fuel production. Biodiesel has been seen, by the public, as an environmentally friendly fuel, since its production is based in biomass (vegetable oils or animal fats).

- Measure 3.5-OPO Integrated accessibility planning in Asprela quarter.

The Asprela corridor faces severe mobility problems associated with illegal car parking levels and traffic congestion, which happens in spite of the relative good offer of public transports (buses, metro). The corridor is supplied by local and suburban buses and the recently finished yellow metro line has 3 stations in it. Still, the percentage of public transport users is relatively low due to the closeness to the main motorway system and the existence of free parking facilities, which on the other hand causes severe congestion traffic congestion problems. The congestion also affects the bus traveling conditions due to lack of bus priority facilities (bus lanes, priority at signals, etc) which also contributes for the low percentage of use of this mode of transport. On terms of clean modes, there is a very low percentage of other means of transport being frequently used to access the Asprela corridor. In fact, and due to the quick growth of the constructed corridor, the local walking conditions have been largely neglected and the cycling infrastructures are inexistent.

- Measure 6.4-OPO Flexible Mobility Agency (part of the Mobility Shop):

The special combination of institutions within the CIVITAS corridor, which are major universities, I&D centers and public services (see also Measure 4.14-OPO "The Mobility Shop"), evokes activities involving young, active and urban citizens who are very likely the main target group of public bicycle and car pooling schemes. Also, in corridor, there are appropriate urban conditions and a suitable topography to develop a cycling infrastructure with bike parking and lanes.

F. *Inter-relationships with other measures*

All CiViTAS-ELAN measures of Porto share the same objective that is to create a more sustainable mobility culture and to break with current negative trends relating to urban mobility within the corridor.

The three measures within this IP are interrelated as they are all measures with a physical implementation, directed on improving the (infrastructural) supply of the transport network within the Asprela corridor taking into account a wide range of sustainable travel modes.

4.1.1.2. Evaluation activities and indicators

A. *Evaluation activities and Indicators on IP level*

Expected possible impacts

The expected impacts for the IP 1 Developing an Efficient Transport System are:

- Decrease in energy consumption

The decrease in energy consumption per vehicle will be "measured" in IP level combining the results of different measures. A better vehicle fuel efficiency is expected a result of the improvement in road circulation responsibility of the mobility plan.

- Reduce traffic flows

The reduction of traffic flow in order to improve the quality of circulation for all modes and the vehicles fuel efficiency, it is one of the objectives of this integrated package. This indicator will be easily measured on IP level by manual and automatically traffic counting.

- Decrease congestion level

The decrease of congestion level will be measured in IP level. Due to new services of transportation, improvement the quality of circulation for all modes and new traffic policies, this set of measures has also as an objective reducing the congestion level.

- Increased use of pedestrian and bicycle modes

The increased use of pedestrian and bicycle modes will be not measure on IP neither in measure level. Several of CiViTAS measures will have impact on modal choice and it is difficult to distinguish the impact by each measure. This indicator will be measured on corridor level through modal split indicator.

Selected Indicators

In the table below the evaluation activities for the Integrated Package 1, Developing an Efficient Transport System, can be found. It concerns the evaluation activities that will be carried out on Integrated Package level.

Table 4: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 1: Developing an Efficient Transport System	▪ Combining the results of different measures to come to conclusions on IP level: – Fuel use ▪ Evaluation directly on IP level – Traffic Flows – Congestion Level	▪ The decrease of fuel use (for all modes) as a result of this integrated approach. ▪ Total decrease of traffic flows and congested level within the Asprela corridor by a combined strategy of a set of measures. → Scope: Asprela corridor

Details of the evaluation activities

- Fuel Use

The fuel use indicator is defined as the energy consumption per vkm travelled by vehicle type. This indicator will be used to measure the fuel use of light weight bus, the fleet of the two local road PT operators (STCP fleet and ANTROP) and private car within Asprela corridor.

- Traffic Flows

Traffic flow is the total number of vehicles passing a given point (road or turn), in a time period, expressed as vehicle/unit time.

- Congestion Level

Congestion Level is a condition on networks that depends of traffic level and road characteristics (ex. capacity), it will be described through travel time, vehicle speed, traffic queue, delay and number of stops. As demand approaches the road capacity (or of the intersections along the road), the congestion level increases.

Details of the Business as usual

- Business as usual

A BAU will be done for the traffic level and for the air quality in Asprela corridor. For this analysis, it will be necessary to know the traffic level and the air quality, if CiViTAS measures would not have been implemented, in the Asprela corridor, in 2012. This data will be obtained through monitored studies done in the past about traffic level and air quality.

B. *Evaluation activities and indicators on measure level*

Expected possible impacts

- Measure 1.5-OPO Light Weight Bus

Decreased fuel consumption and emissions

The decrease of fuel consumption and emission is expected as a result of the application of an light weight body. This impact will be measured through the performance comparison of the clean shuttle with a common vehicle.

Increased use of clean vehicles

The increased use of clean vehicles will be measured on this level, where it is possible to collect the number of shuttle users. An increase in the amount of users is expected as it is a new transport service that connects other public transport networks.

- 3.5-OPO Integrated accessibility planning in Asprela quarter

Improvement in the Quality of service for PT

Thanks to the mobility plan a better road circulation and PT road facilities will follow. Both results will contribute to a better PT service reliability in terms of timekeeping and frequencies. Also capacity improvements are expected with the introduction of the mobility plan. All these data will be collected on the measure level where it will be asked to the PT operators to give their timekeeping data, the number of received complaints about the timekeeping as well as the “capacity” provided.

Also the comfort of the PT stops will be improved and will contribute to the overall quality of service of the PT service. This will be measured on the measure level.

Improved infrastructure for all transport modes

The cycling and walking are the most sustainable modes of transportation. For this reason, the mobility plan will favour this modes. The infrastructural improvements of the cycling and walking network will be measured through indicators like: extension of cycling lane, sidewalk accessibility and extension, available cycle parking.

The implementation of bus lanes and improvements of the traffic lanes together with a traffic management will improve the overall efficiency of the traffic flows and reduce congestion. The congestion levels and traffic flows will be measured on the IP level as more measures contribute to these objectives. Nonetheless the extension of the bus lanes will be measured within this measure.

The introduction of the new parking policy will reorganise the supply of parking spaces this will be measured in terms of characterisation of parking supply in the Asprela corridor and the parking occupancy during peak hours for a sample.

Increased use of pedestrian and bicycle modes

The increased use of pedestrian and bicycle modes will not be measured on the measure level. Several of CiViTAS measures will have impact on modal choice and it is difficult to distinguish the impact between each measure. This indicator will be measured on corridor level through modal split indicator.

Improved traffic safety

The Mobility Plan includes the implementation of cycling facilities, enhance of walking condition and a new road circulation plan, which will improve the traffic safety. This expected impact will be measured on measure level.

6.4-OPO Flexible Mobility Agency

Increased the car pooling users

The objective of this project is to offer innovative and sustainable modes of transportation to the CiViTAS population. This indicator will measure the number of users of car pooling service. A gradual increase in the number of users is expected.

Increased the demand responsive transport users

The same reason as the before indicator, this indicator will measure the demand responsive transport users. It is expected that the number of DRT users increase along the time.

Selected indicators

Several evaluation activities will be carried out on measure level. An overview can be found in the table below.

Table 5: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.5-OPO Light Weight Bus	▪ Measurement of: – Operating (revenues and costs), Investments and Maintenance costs of Light Weight Bus – No. of users – Shuttle fuel consumption – Reduction on emissions ▪ Up- scaling	▪ CBA/ Financial analysis ▪ Evolution in number of shuttle users ▪ Decrease of fuel and emissions as a result of this technology → Target group: Public transport users

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
3.5-OPO Integrated accessibility planning in Asprela quarter	▪ Measurement of: – Sidewalk accessibility and extension – Parking level (private car, bike) – Extension of bicycle lane – Extension of bus lane – Comfort of the PT stops – PT Passenger Capacity – Injuries/deaths caused by accidents – Accuracy/ Dissatisfaction of PT timekeeping ▪ BAU	▪ Road Infrastructures (Traffic Lanes, Parking Spaces, Sidewalk, Bicycle and Bus lanes network,…) ▪ PT services ▪ Traffic Safety → Target group: All persons in the Asprela Corridor
6.4-OPO Flexible Mobility Agency	▪ Measurement of: – Operating, Investments and Maintenance costs of services (DRT, bike renting) – No. of users (DRT, car pooling) – Vehicle Occupancy (private car)	▪ Viability of services (costs) ▪ No. of Innovative means of transport user's → Target group: All

Details of the evaluation activities/ indicators

- Measure 1.5-OPO Light Weight Bus
  - Operating (revenues and costs), Investments and Maintenance costs of Light Weight Bus. The operating revenue of the shuttle is the income generated from passenger-km. The operating costs represent the costs for fuel and personal costs (drivers) for the vehicle service. The investment cost is the necessary initial expenditure to put the shuttle in operation. The maintenance cost is the cost to preserve the shuttle, typically includes the cost to perform repairs. As this measure consists of developing a new transport service, it is important to evaluate the economic performance of the shuttle. The indicator will be used for the cost and benefit analysis (in-depth evaluation).
  - Number of users of light weight bus will be measured in order to know the number of service users (acceptance) and its evolution. This indicator will be used for the up-scaling evaluation and CBA.
  - Shuttle fuel consumption will be measured since it is a new and innovative clean transportation service. Therefore it is important to follow the benefits.

- Reduction on emissions is expected for the shuttle due to the reduced weight of the vehicle and the type of fuel used in comparison with an common diesel vehicle. Emissions are defined as the average pollutants emissions per vehicle-km by vehicle type and fuel type (g/vkm).

- 3.5-OPO Integrated accessibility planning in Asprela quarter
  - Sidewalk accessibility and extension includes the characterization of sidewalk supply (extension, width, obstacle, area, state and material of floor) and the connection to the pedestrian crossings. The measure "3.5 -OPO Integrated accessibility planning in Asprela quarter" will have impacts on road infrastructures and pedestrian accessibility. This indicator will be used to measure the changes in pedestrian accessibility.
  - Parking level (private car, bike) The measure "3.5 OPO" is responsible for introducing a new parking policy including payiment schemes, re-sizing the current parking supply and fighting illegal car parking. The parking level indicator will be used to access the impacts of this measure. For private car, the indicator includes the characterization of parking supply (type of use, paid or unpaid, capacity, legal or illegal) in the CiViTAS corridor and the parking spaces available, in peak hour, for a sample. For bicycle, the indicator includes the measurement of bike parking spaces in the Asprela corridor.
  - Extension of bicycle lane. One of the objectives of "3.5-OPO" measure is to promote the clean transport by enhancing the cycling facilities. In this indicator will be measured the extension of the road which is intended to be used only by bicycles, before and after CiViTAS implementation.
  - Extension of bus lane. The "3.5-OPO" measure will implement bus priority systems (like bus lane), in a way of promoting public transport service. This indicator will measure the length of the part of the road which is intended to be used only by buses and priority vehicles.
  - Comfort of the PT stops is an indicator that evaluates the characteristics of the PT stops in terms of comfort such as number of seats in the stop, accessibility, number of services and information displayed in public transport stops.
  - PT Passenger Capacity is defined as the maximum number of passenger in a Transport service; this data will be collected by each public transport operator, before and after the implementation of the CiViTAS measures. It is expected that the promotion of PT, as part of the mobility plan, brings along some supply changes.
  - Injuries/deaths caused by accidents are defined as the recorded number of serious transport injuries and deaths. Injuries and deaths caused by traffic accident are one of important social costs linked with transport system. The safety aspect will be accounted for in the new mobility plan. A decrease in the number of injuries and deaths is expected thanks to CiViTAS project.
  - Accuracy of PT timekeeping is defined as the number or percentage of public transport services that arrive within an acceptable period around the scheduled times given by timetables. An improvement in PT circulation due to the mobility plan (3.5) is expected.
  - Dissatisfaction of PT timekeeping is defined as the number of public complaints about PT timekeeping that STCP operator receives from their customers.

- 6.4-OPO Flexible Mobility Agency
  - Operating, Investments and Maintenance costs of services (DRT and bike renting). The "6.4-OPO" measure will be responsible for launching innovative and sustainable services (DRT and bike renting) in Asprela corridor. For a complete picture of the financial viability of these two services, this indicator was selected. The definition of operating, investments and maintenance costs can be consulted in the first two indicators of this list.
  - Number of users of DRT and car pooling will be collected, by services operators, in order to evaluate the acceptance and evolution of number of user of these new modes of transportation.
  - Vehicle Occupancy (private car) has a direct impact on traffic flows, congestion levels, emissions, etc. This indicator is defined as the average number of passengers per private car.

Details for Business as usual and up- scaling

- BAU

N/A

- Up- scaling

An up-scaling analysis will be done for Measure 1.5 calculating the impact on emissions and fuel consumption if the complete PT fleet would consist of this type of vehicle.

4.1.1.3. CBA

CBA will be carried out for “Measure 1.5 Light Weight Bus”. This measure is a very innovative from technical perspective since it joins two technologies to increase the energy efficiency and decrease emissions. The development of this light weight bus frame assures a decrease of the fuel use of this vehicle. This feature together with the use of biomass as fuel will make this a clean vehicle. It will also be a new public transport service.

Table 6: Overview indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
PT operator	Investments Costs Operating Costs Maintenance Costs	Operating Revenues Fuel saving
PT users		Additional offer of transport services
Households		Environmental Benefits

4.1.1.4. Data collection

Plenty of data will be collected throughout the implementation of the measures. Below a detailed overview is given of all the data collected within IP 1 “Developing an efficient transport system”.

Table 7: Data collection inventory for the city of Porto

INDICATOR	LEVEL[4]	Focus[5]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Operating revenues of Light Weight Bus	M	F	continuous	Recording	euros/pass.km	corridor	27-42	STCP/FEUP-DEIG
Operating Costs of Light Weight Bus	M	F	continuous	Recording	euros/pass.km	corridor	27-42	STCP/FEUP-DEIG
Investments Costs of Light Weight Bus	M	F	continuous	Recording	euros/pass.km	corridor	27-42	FEUP-DEIG
Maintenance Costs of Light Weight Bus	M	F	continuous	Recording	euros/pass.km	corridor	27-42	FEUP-DEIG
Operating Costs of DRT	M		continuous	Recording	euros/pass.km	corridor	24-42	STCP/OPT
Investments Costs of DRT	M		continuous	Recording	euros/pass.km	corridor	24-42	STCP/OPT
Maintenance Costs of DRT	M		continuous	Recording	euros/pass.km	corridor	24-42	STCP/OPT

[4] M= Measure level

IP= Integrated Package Level

[5] The F refers wether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL[4]	Focus[5]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Operating Costs of bike renting	M		continuous	Recording	euros/pass.km	corridor	24-42	CMP
Investments Costs of bike renting	M		continuous	Recording	euros/pass.km	corridor	24-42	CMP
Maintenance Costs of bike renting	M		continuous	Recording	euros/pass.km	corridor	24-42	CMP
Operating Costs of DRT	M		continuous	Recording	euros/pass.km	corridor	24-42	STCP/OPT
PT fuel efficiency	IP/M	F	before / after	collected/ derived	L/ v·Km	corridor	12/36	STCP/ANTROP
Vehicle fuel efficiency	IP/M		before / after	collected/ derived	L/ v·Km	corridor	12/36	FEUP-SVC
Light Weight Bus fuel efficiency	M	F	after	Recording	L/ 1000km	sample	30	FEUP-DEIG
Reduction on CO emissions	M	F	after	Recording	%/1000km	sample	30	FEUP-DEIG
Reduction on NO_x emissions	M	F	after	Recording	%/1000km	sample	30	FEUP-DEIG
N.o of bike rent users	IP		continuous	Recording	no./year	corridor	24-42	CMP
No. of DRT users	M		continuous	Recording	pkm	corridor	24-42	STCP
No. of car pooling users	M		continuous	Recording	no./year	corridor	24-42	CMP/OPT
No. of shuttle users x km	M	F	continuous	Recording	users/time	corridor	27-42	STCP

INDICATOR	LEVEL[4]	Focus[5]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
No. of lower crossing	M		before / after	Recording	no., %	corridor	4/36	FEUP-SVC
Accuracy of PT timekeeping	M		continuous	Recording	%	corridor	8-42	STCP/ANTROP
Dissatisfaction of PT time-keeping	M		continuous	Recording	no.	corridor	8-42	STCP
Quality of the PT stops	M		before / after	Recording	No.	corridor	6-36	FEUP-SVC
PT Passenger Capacity	M		before / after	Recording	no.	corridor	6/36	STCP/FEUP-DEIG/ANTROP/Metro
Injuries/ deaths caused by accidents	M		before / after	Recording	no.	corridor	6/36	FEUP-SVC
Average vehicle speed - peak	IP/M		before / after	collected/ modelling	km/h	sample (> 10% network), corri-dor	14/36	FEUP-SVC
Average Journey times	IP/M		before / after	collected/ modelling	sec/route	sample (> 10% network), corri-dor	14/36	FEUP-SVC
Traffic Queue	IP/M		before / after	collected/ modelling	vehicles	sample (> 10% network), corri-dor	14/36	FEUP-SVC
Delay	IP/M		before / after	collected/ modelling	sec	sample (> 10% network), corri-dor	14/36	FEUP-SVC
No. Stops	IP/M		before / after	collected/	no.	sample (> 10% network), corri-	14/36	FEUP-SVC

INDICATOR	LEVEL[4]	Focus[5]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
				modelling		dor		
Parking spaces (private car)	M		before / after	Recording	no., %	corridor	2/36	FEUP-SVC
Illegal parking (private car)	M		before / after	Recording	no., %	sample	4/36	CMP/ FEUP-SVC
Parking spaces available in peak hour (private car)	M		before / after	Recording	no., %	sample	12/36	CMP/ FEUP-SVC
Bike parking spaces	M		before / after	Recording	no., %	corridor	4/36	CMP/ FEUP-SVC
Extension of Bus Lane	M		before / after	Recording	no., %	corridor	4/36	FEUP-SVC
Extension of sidewalk	M		before / after	Recording	%, metres, square metre	corridor	4/36	FEUP-SVC
Extension of bicycle lane	M		before / after	Recording	%, metres	corridor	2/36	FEUP-SVC
Average occupancy (private car)	M		before / after	Recording	Pers/veh	sample (>10% vehicles)	12/36	CMP/FEUP-SVC

Details on the data collection

Operational data

- **Fuel Consumption.** Data will be collected (in vehicle-Public Transport) and derived (from the traffic model-private cars). The indicator is used to compare vehicle fuel efficiency with and without measures.

  PT vehicle, data will be collected by each operator for all vehicles that travel in Asprela corridor. This data can be also derived by the traffic model.

  Shuttle (light weight bus), fuel consumption will be measured by entity responsible for its construction (FEUP-DEIG).

  Other Vehicles, data will be derived by the same traffic model.

- **Service reliability** reflects the PT performance against schedule times.

  Accuracy of PT timekeeping will be collected, by bus operator (STCP and ANTROP), for all buses that travel within Asprela corridor.

  Dissatisfaction of PT timekeeping The STCP (bus operator) will collect all complaint about PT timekeeping, during the CiViTAS-ELAN project. The sample is all STCP buses that operate in Asprela corridor.

- **PT Capacity**. Data collection will be done in two periods (before/after) by each PT operator, for all public transport services within Asprela corridor.
- **Transport safety.** Accident records will be collected for the full period of the project and for the previous 3 years to understand the accident rate trend before this project. FEUP-SVC will collect the accident data from public reports of "National Authority of Road Safety" of Portugal, for the Asprela corridor.
- **Parking Level** will be collected twice (before/after CiViTAS measures).

  Private car The characterization of supply will be done in Asprela corridor by FEUP-SVC.
  The parking occupancy will be carried out by sampling the Asprela corridor, consisting of 5 routes (total of 5.6 km of road). The survey should be done by direct observation, in two periods (7:30h-9:30h and 11:30h-14:30h) in a working day. The circuits were arranged to be covered at intervals of 30 minutes by the same person. This data collection is responsibility of FEUP-SVC and CMP

  Bicycle. The number of bike parking spaces will be collected by FEUP-SVC, for Asprela corridor through direct observation.

- **Bus Lane Network** (km) will be collected in two periods before and after CiViTAS measures, by FEUP-SVC, in Asprela corridor.
- **Sidewalk Level/ Accessibility** will be collected twice before and after the implementation of Mobility Plan designed by FEUP-SVC. This indicator will be collected by direct observation of all sidewalk extension in Asprela corridor.
- **Bicycle Lane Level** (km) will be collected in two periods, before and after the implementation of Mobility Plan designed by FEUP-SVC, in Asprela corridor. This indicator will be measured in City Council documentation, by FEUP-SVC.
- **Patronage.** Data will be collected in a continuous way to study the evolution of user's number.

  The number of users of bike renting will be collected by the Flexible Mobility Agency (CMP).

  The number of users of demand responsive transport (DRT) will be also collected by the Flexible Mobility Agency (CMP). The accounting of users will be done through booking or tickets validations.

  The number of users of car pooling will be also collected by the Flexible Mobility Agency (CMP/OPT).

  The number of users of light weight bus will be collected by the PT operator (STCP). The tickets validation or weighing equipment in the bus will be one of the possible methods of users accounting.

- **Quality of PT stops.** The PT stops evaluation will be made by filling up a table about PT stops characteristics. Data will be collected in two periods, before and after the implementation of Mobility Plan. All PT stops of Asprela corridor will be evaluated.
- **Reduction on Emission**. The light weight bus constructor, FEUP-DEIG, will be responsible for measure the CO and NOx emissions of the vehicle.

Traffic data

- **Traffic Flows** data will be collected twice, before and after the implementation of CiViTAS measures of integrated packages 1, from each type of vehicle.

  The traffic flows in peak hour will be collected on weekdays (Tuesday to Thursday) to provide typical average flows (morning/ afternoon). To measure the traffic flows will be used the roadside counting method, in two peak periods of two hours, in the morning between 07:45h-09:45h and in the afternoon between 17:00h-

19:00h. The target group will be general traffic and the domain will be placed at 34 places in Asprela corridor. The aggregation of traffic volumes should be used for periods of 15 minutes.

The average daily traffic (ADT) will be collected by a road transport counting equipment - Via Count II, The Via Count II consists of a Doppler radar with integrated data Flash RAM, a serial RS 232 interface and a battery 12V/17A. This equipment records vehicle speed, vehicle length, time between two vehicles and time/date of measured. This equipment will be placed in each of the 12 defined places in Asprela corridor, for a full week, in continuous recording. The target group is the general traffic. This data will also be used by the air quality team.

- **Congestion Levels** will be collected and/or derived before and after implementation of CiViTAS measures of integrated packages 1. Data will be collected on weekdays (Tuesday to Thursday) to provide typical average vehicle speed, average journey times, average delays and number of stop. It will be carried out for the same peak period of traffic flows. The target group is the general traffic.

  The average vehicle speed data will be modelled by microssimulation traffic software (FEUP-SVC). This indicator can be also measured with a GPS equipped car.

  The average journey times, delay, number of stops and traffic queue will be recorded as well as modelled with the microssimulation traffic software by FEUP-SVC. For data collection will be chosen some routes with the total length more than 10% of road network of Asprela corridor. The modelling data will be done for Asprela corridor in the traffic model.

Wider social and economic data

- **Operating Revenues** of Light Weight Bus will be provided by service operator (STCP). FEUP-DEIG will analyse this data in order to do the in-depth evaluation. The data will be collected in a continuous way since the implementation of the clean shuttle. The target group is light weight bus and the domain is the Asprela corridor
- **Operating Costs** data will be collected for the light weight bus, the DRT service and the bike renting. The data will be provided by each service operator assisted by the measure leader. The operating data will be used for financial analysis. The data will be collected in a continuous way since the implementation of each transportation service. The target groups are transport services operator. The domain is Asprela corridor.
- **Investments Costs** *(consult operating costs description)*
- **Maintenance Costs** *(consult operating costs description)*

4.1.2. Integrated package 2: Promoting the Effective use of Sustainable Transport Modes

4.1.2.1. Description

A. *Objectives and scope*

IP objectives

This package covers all the “soft” measures that are involved in the dissemination of transport services in order to influence the demand behaviour.

The main objectives are:

- Help people to plan and decide their trip based on the public transport information;
- Improve the use of PT through providing information;
- Solve problems for infrequent PT travellers (which bus to catch or stop to choose);
- Optimisation of trips.

Measure related objectives

- 4.14-OPO The Mobility Shop
  - become the CIVITAS-ELAN headquarters in Porto;
  - provide mobility management services to the local population;
  - develop marketing campaigns aiming to raise public awareness regarding mobility issues.
- 8.8-OPO Mobile Mobility Information
  - integrate real time information of several public transport operators working in the metropolitan area;
  - offer to the users mobile and fixed devices with GIS applications of intuitive usage.

B. *Overview of the measures*

- Measure 4.14-OPO The Mobility Shop.

This measure consists of implementing a local Mobility Shop (MS) within the Asprela corridor. The Mobility Shop will be responsible for public transport information, while being the support to innovative mobility services and the symbol of the CiViTAS-ELAN project in the corridor.

- Measure 8.8-OPO Mobile Mobility Information.

In the context of this measure, a support decision tool for mobility in public transport to help people to plan and decide on their trips will be developed, based on real time information. Such a tool and information will be available in mobile phones or other geo-referenced mobile equipment, allowing the user to select the best combination of transportation from the place of departure, which may not be the current location. The information will also be available on LCD displays placed in high places inside some institutions (such as hospitals, faculties, public transport stations, etc.).

C. *Innovative aspects*

- Use of new technology/ITS
  - Mobile mobility information will be based on existing technologies never tested in an integrated way and with the purpose to handle demanding situations such as: working on high performance levels based on real time information. It includes the design of a new process for the users and it brings up new challenges in the algorithms for real time situations and in the complex interfaces for the users.

D. *Research and technical development*

- Measure 4.14-OPO The Mobility Shop.

The research and development activities will be mainly related with the preparation and organization of the indispensable studies, which will define the structure of the MS as well as its services, its business plan, resources and final location.

- Measure 8.8-OPO Mobile Mobility Information.

In the phase of defining the Service Requirements and the Design and System Architecture, project activities will be carried out that guarantee the specification of the interfaces between the existing systems in order to provide the efficient integration of all the components that will be used. The proper algorithms and usability solutions adequate for the proposed objectives will be identified and developed. Also the requisites of the modules will be defined.

E. *Situation before CIVITAS*

- Measure 4.14-OPO The Mobility Shop.

Porto already has a Mobility Shop run in the City Council (CMP) located in the city centre. The project started with the city's participation in the European project MOST- Mobility Management Strategies.

Although with a limited budget, the Mobility Shop keeps up with the main responsibilities of informing and advising all people who seek mobility services in and from Porto. It also actuates on ticket selling, education and mobility awareness. These important tasks of the Mobility Shop will be maintained and applied via the new MS located in the Asprela corridor.

In the target corridor of the project a significant concentration of universities, I&D centers and public services coexist. This fact raises severe mobility problems and illegal car parking, which happens in spite of the relative good offer of public transports (buses, metro). It is believed that the unique demand patterns (strong seasonality, journey types, etc.) and existing sociological characteristics (youngsters, high qualifications) of the local users will facilitate the implementation of innovative mobility solutions.

- Measure 8.8-OPO Mobile Mobility Information.

The inhabitants of the metropolitan areas normally have a public transport system involving buses, tram, train or boat. Nowadays, it is not easy for a passenger to know all the information about all available means of transportation because most of the companies do not have efficient ways to disseminate their timetables and other information to their customers. Most of the time, people do not know what means of transportation are available in a certain area. And even if they do, it is not easy for the customer to know which destinations those means of transportation give access to and what the scheduled timetables are.

The transport systems in the metropolitan areas use location systems based on GPS that give information about real time location and speed. There are some stops that already have information about the estimated waiting time and, in some cases, it is possible to obtain that estimated waiting time thanks to SMS on a mobile phone. An example of this type of service is the SMSBUS system of STCP (www.stcp.pt) which was awarded in several occasions.

There is already some mobile equipment in the market that integrates the communication functionalities (voice and data, GSM or UMTS), allows the GPS location and also has a sophisticated and friendly interaction with the user. Although the market has only a few different models at a high price, a fast reduction of those prices is expected. It is also expected that the weight and energy consumption of this equipment will also be reduced in order to improve the autonomy, mobility and frequency of usage.

The geographical information needed for the proposed system and the base applications for the trip planning already exist for both fixed and mobile equipment. There are also systems that are based on planning information (lines and timetables) and that allow for trip planning (for example, in a fixed way, on the Internet, the *Itinerarium* system for services of STCP/Metro does Porto/CP).

Although the passive systems, such as *Itinerarium* (see www.itinerarium.net), accomplish the functionality requisites, they are still quite rudimentary in what concerns ergonomics and usability. The mobile systems are based on static information as it is not yet feasible to communicate updated geographical information. In both cases, the possibility of optimisation of the real-time integrated planning (measuring the quality of all the alternatives in a clear way for the user) brings up some research challenges on algorithms, usability and system architecture.

F. *Inter-relationships with other measures*

All CiViTAS-ELAN measures of Porto share the same objective that is to create a more sustainable mobility culture and to break with current negative trends relating to urban mobility within the Asprela corridor.

The MS project (measure 4.14) will be the physical support of innovative mobility services of measure 6.4.

4.1.2.2. Evaluation activities and indicators

A. *Evaluation activities and Indicators on IP level*

Expected possible impacts

- Facilitate the use of PT

This integrated package expects to promote and increase the effective use of sustainable transport through information services about PT services.

- Patronage and Satisfaction level

This integrated package of measure wants to offer to the population a set of information services. These services must be enable an intuitive usage in order to support the mobility needs of population. In order to measure this expected impact the number of users of each service will be monitored and a survey on acceptance and efficiency level of the new services will be carried out.

Selected Indicators

In the table below the evaluation activities for the Integrated Package 2, promoting the effective use of sustainable transport can be found. It concerns the evaluation activities that will be carried out on Integrated Package level.

Table 8: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 2: Promoting the Effective use of Sustainable Transport	▪ Combining the results of different measures to come to conclusions on IP level: – Surveys (questionnaires) concerning acceptance and efficiency level of the different services of information providing (Mobility shop and Mobile Mobility information) – Patronage (corridor level): crossing the information of the surveys with the number of users of Public transport could give some idea of the impact of these services	▪ Importance of public transport information within the Asprela corridor by a combined strategy of a set of measure → Scope: ELAN- corridor

Details of the evaluation activities/ indicators

- Surveys concerning Acceptance and Efficiency level of the different services of information providing

The acceptance level is defined as the percentage of the population interviewed who positively accept or approve the existence of a service/measure. A measure is classified as well accepted if the users know the measures and they are satisfied with its existence.

The efficiency level is defined as the percentage of users who are satisfied with the service/measure.

The acceptance level and the efficiency level are important indicators for monitoring the society opinion of the new services.

The data of IP indicators is collected by combining the results of different measures.

- Patronage of PT

The patronage of PT will be collected by crossing the information of the surveys (mobility shop and mobile information users) with the number of users of Public transport which could give some idea of the impact of these services. This indicator is important for monitoring the impact of these measures on catch new PT users.

B. *Evaluation activities and indicators on measure level*

Expected possible impacts

- 4.14-OPO The Mobility Shop

The use of Mobility Shop for travel planning

The aim of mobility shop is to provide mobility advices and transport services to the local population. The main purpose of this measure is to promote the use of Sustainable Transports. In this way, at measure level the impacts will be evaluated by the number of users of the service.

Facilitate the use of PT

Facilitate the use of public transport will be also measured on measure level where the satisfaction level of MS users be collected.

Increased use of PT

The patronage of PT will be measured on the measure level by crossing the information of the MS surveys with the number of users of Public transport could give some idea of the impact.

- 8.8-OPO Mobile Mobility Information

Increased Mobile Mobility Information users

In order to measure this expected impact , the number of mobile mobility information users will be monitored on measure level.

Facilitate the use of PT

In order to measure the facilitation of the use of public transport a usability analysis of the LCD system will be carried out.

Selected indicators

Several evaluation activities will be carried out on measure level. An overview can be found in the table below.

Table 9: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.14-OPO The Mobility Shop	▪ Measurement of: – Ticket Sale – No. of users and service – Satisfaction Level	▪ Evolution in number of MS users ▪ Efficiency of service → Target group: Sustainable transport users

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
8.8-OPO Mobile Mobility Information	▪ Measurement of: – Usability of LCD system – No. of Mobile Mobility Information users – Operating, Investments and Maintenance costs of services of mobility information	▪ Efficiency of service ▪ CBA/ Financial analysis → Target group: Public transport users

Details of the evaluation activities/ indicators

- Measure 4.14-OPO The Mobility Shop

  - Ticket sale The Mobility Shop will be able to sell public transports tickets (Metro, STCP and ANTROP). For each sold ticket, MS will receive a percentage. Although MS offer several services, the ticket sale is the only one with financial benefits.
  - Number of users (MS). This indicator will be collected in order to know the number of MS costumers and the evolution of demand. The number of costumer will be counted by category that includes the MS visitors, web-site visitors and phone calls.
  - Satisfaction Level is a measure of how products and services offered by the Mobility Shop meet or surpass the customer expectation. It is seen as a performance indicator. The public opinion is important to be surveyed in a way of services improvement.

- Measure 8.8-OPO Mobile Mobility Information

  - Usability of LCD system. After implementation of LCD system, the OPT will be prepare interviews on user satisfaction. The focus of the interview will be the satisfaction of costumers with the new service.
  - Number of Mobile Mobility Information Users This indicator will be collected in order to know the number of Mobile Mobility Information Users and the changing demand along the project. This indicator will be also used for the CBA.
  - Operating, Investments and Maintenance costs of services of mobility information The "8.8-OPO" measure will be responsible for launching an innovative information services (LCD and mobile services) in Asprela corridor. For a complete picture of the financial viability of the two service was selected this indicator.

Details for Business as usual and up- scaling

N/A

4.1.2.3. CBA

CBA will be carried out for "Measure 8.8 – Mobile Mobility Information" (LCD and mobile services) because it is an innovative service with a wide scope and easy to transfer for other cities.

Table 10: Overview indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
PT operator	Maintenance costs Investments costs Operating costs	PT Services dissemination (no. users)
PT users		Patronage

4.1.2.4. Data collection

Plenty of data will be collected throughout the implementation of the measures. Below a detailed overview is given of all the data collected within IP 2 “Promoting the Effective Use of Sustainable Transport”.

Table 11: Data collection inventory for the city of Porto

INDICATOR	LEVEL 6	Focus7	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Ticket Vending	M		continuous	collected	euros	corridor	12-42	CMP
Operating Costs of mobile mobility information	M	F	continuous	collected	euros	corridor	24-42	OPT
Investments Costs of mobile mobility information	M	F	continuous	collected	euros	corridor	24-42	OPT
Maintenance Costs of mobile mobility information	M	F	continuous	collected	euros	corridor	24-42	OPT
Mobility Shop visitors	M		continuous	collected	no./year	corridor	12-42	CMP
Mobile Mobility Information	M	F	continuous	collected	no./year	corridor	24-42	OPT
Mobility Services	IP/M		continuous	collected	users/time	corridor	24-42	CMP/OPT

[6] M= Measure level

IP= Integrated Package Level

[7] The F refers whether this data will also be used for the In- depth analysis of the focus measures

INDICATOR	LEVEL 6	Focus7	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Satisfaction	M		after	survey	qualitative	sample	36	CMP/FEUP-SVC
Service Efficiency	IP/M		after	survey	qualitative	sample	36	CMP/OPT
LCD system	M	F	after	survey	qualitative	sample	36	OPT

Details on the data collection

Operational data

- **Patronage** Data will be collected in a continuous way to study the evolution of number of users. The data collection will start since service/measure implementation. The target groups are the costumer of service for each measure.

  The number of users of Mobility Shop will be classified by category (visitor, website and phone) and by required service (information, ticket vending, innovative service). The data will be collected by the city council (manager of Mobility Shop).

  The number of users of Mobile Mobility Information will be recorded by OPT.

The number of users of Mobility Services is an indicator of integrated package level. The indicator is the arrangement of the two last indicators.

Traffic data

N/A

Wider social and economic data

- **Operating Revenues** of transport ticket sale in Mobility Shop. This data will be provided by Mobility Shop (CMP). The data will be collected in a continuous way since the implementation of the store. The target group is MS customers.
- **Operating Costs** data will be collected for Mobile Mobility Information. Data will be provided by measure leader (OPT). The data will be collected in a continuous way since the implementation of each information service. The operating data will be used for financial analysis (CBA). The target groups are transport services users. The domain is Asprela corridor.
- **Investments Costs** (consult operating costs description)
- **Maintenance Costs** (consult operating costs description)

Attitude and behaviour surveys

- **Satisfaction Level** with MS services. Survey (questionnaire) will be used as the method for satisfaction data collection. The target group is the costumers of MS. Data will be provided by measure leader (CMP) and evaluation team (FEUP-SVC), as soon as MS is implemented. These surveys will be done in the MS by interviewing at least 10% of the users and there will be also a questionnaire “on-line” in the Website.
- **Usability of LCD System**. LCD users will be interviewed to give their opinion about the service. The workers/students of the corridor will be interviewed by email and the other users will be interviewed face to face. This survey will be done only once by measure leader OPT. The objective of this survey is to get the users impression in order to improve the system. The survey will be done to a sample of 500 LCD system users.
- **Service Efficiency** is the combination of the two indicators: satisfaction level of MS and usability of LCD system will provide input to draw conclusions on the level of effectiveness and efficiency of the service. The results of the measures will be combined to come to conclusions on IP level.

4.2. Corridor level

4.2.1. Objectives and scope

A description of the main objectives and scope

- Reduce air pollution and nuisance in Asprela corridor;
- Make sustainable transport (PT, walking, cycling) a more attractive alternative to the car;
- Improving information on transport options;
- Test new mobility options;
- Enhance PT interchange.

4.2.2. Key Impacts

A description of the indicators that will be measured within the city's Aprela corridor

4.2.2.1. Modal split

Modal Split is a traffic/ transport term which describes the percentage of travellers using a particular type of transportation. It is the result of a mode choice by every person who wants to travel. Transportation modes include walk, bicycle, motorcycle, bus, metro, train and private car.

A journey is defined as a one way travel with a single motive. A journey can be split in trips if during the journey any transfer occurs. For each transfer, a new trip will be count.

All Porto CiViTAS measures will have an impact on the modal split including: new services of transportation, promotion of sustainable vehicles, new parking policy, etc. This indicator is very used since it gives the entire travel picture and it enables easy comparisons. All cities of CiViTAS will collect this indicator.

4.2.2.2. Air quality

The changes in air quality of the lower atmosphere are due to traffic and industry emissions, for instance. This change is reflected negatively on public health, wildlife, flora and even in the heritage.

All Porto CiViTAS measures aim to reduce the emission and the level of air pollutants through actions like promoting clean vehicles, reducing congestion levels or encouraging environmental friendly behaviour. The air quality indicator was selected, in order to measure the success of these policies,

4.2.2.3. Noise

Noise can affect people, the effects depend on the noise level. Several Porto CiViTAS measures will have indirectly an impact on noise level that includes promotion of sustainable means of transportation like walking and bicycle, innovative transport services, new parking policy, etc. This indicator will be used to measure the impacts of such actions on the noise level.

4.2.2.4. Public Transport

This indicator, the PT patronage is a way of measuring the level of acceptance of people to the use of PT.

All CiViTAS measures share the same of objective of increase the number of public transport users. Actions like creating new PT services, interchange infrastructure, new mobility plan or new services of public transport have directly impacts on patronage. This indicator will be used to measures the success of the project.

4.2.3. Data collection

In the table below an overview is given of all the data collection activities on the city corridor level

Table 12: data collection activities on the city/ corridor level

DATA COLLECTION ACTIVITY	LEVEL8	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Benzene (C_6H_6) levels	C	before / after	modelling	µg/m3	corridor	14/36	UFP
Nitrogen Dioxide (NO_2) levels	C	before / after	collected	µg/m3	corridor	14/36	UFP
Particulate (pm 10) levels	C	before / after	modelling	µg/m3	corridor	14/36	UFP
Particulate (pm2,5) levels	C	before / after	modelling	µg/m3	corridor	14/36	UFP
CO levels	C	before / after	modelling	µg/m3	corridor	14/36	UFP
Benzene (C_6H_6) traffic emissions	C	before / after	derived	Gg/v.km or Gg/km2	corridor	14/36	UFP
Nitrogen Dioxide (NO_2) traffic emissions	C	before / after	derived	Gg/v.km or Gg/km2	corridor	14/36	UFP
Particulate (pm 10) traffic emissions	C	before / after	derived	Gg/v.km or Gg/km2	corridor	14/36	UFP
Particulate (pm2,5) traffic emissions	C	before / after	derived	Gg/v.km or Gg/km2	corridor	14/36	UFP
CO traffic emissions	C	before / after	derived	Gg/v.km or Gg/km2	corridor	14/36	UFP

[8] M= Measure level; P= Integrated Package Level; C= Corridor level

DATA COLLECTION ACTIVITY	LEVEL8	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
CO_2 traffic emissions	C	before / after	derived	Gg/v.km or Gg/km2	corridor	14/36	UFP
Average Noise - L_{den}	C	before / after	derived	dB(A)	corridor	14/36	FEUP-SCC
Average Noise - L_n	C	before / after	derived	dB(A)	corridor	14/36	FEUP-SCC
Peak Noise	C	before / after	collected	dB(A)	corridor	14/36	FEUP-SCC
Dose Noise	C	before / after	collected	dB	sample	14/36	FEUP-SCC
No. PT trips	C	continuous	collected	no./year	corridor	6-42	STCP/ ANTROP/ Metro
Average modal split-PAX	C	before / after	survey	%	corridor	12/36	CMP/ FEUP-SVC/OPT

Details on the data collection

Operational data

- **Air quality** In Asprela corridor, the air quality issue will be evaluated by the traffic emissions and the pollution level. Different types of equipment are to be installed in the Asprela corridor:
  - specific equipment for pollution measurement like nitrogen dioxide and benzene;
  - a weather station for measurement of solar radiation, temperature, wind direction and velocity;
  - traffic counters (Via Count II), on the most important roads (11 locals), which will count vehicles 24 hours a day for a week and distinguish them in five classes.

  These data will be used in a simulation model that will provide results about other pollutions (carbon monoxide -CO and particulates - $pm_{2,5}$ and pm_{10}) and traffic emissions (benzene- C_6H_6, nitrogen dioxide – NO_2, carbon dioxide – CO_2, carbon monoxide - CO, particulates $pm_{2,5}$ and pm_{10}).

  The final result will be an air quality map for the Asprela corridor. This data will be collected by the University of Fernando Pessoa (UFP) and Transport Infrastructures Division of the Faculty of Engineering of University of Porto (FEUP-SVC). The target group is the vehicles in demonstration corridor.

  The air quality will be measured twice, before and after CiViTAS measures implementation, and in each time will be measured in two periods of year (Winter and Summer).

  The air quality is an impact that will be measured through eleven indicators including C_6H_6 levels and traffic emissions, NO_2 levels and traffic emissions, $pm_{2,5}$ levels and traffic emissions, pm_{10} levels and traffic emissions, CO levels and traffic emissions and CO_2 traffic emissions.

- **Noise**. In this project, regarding the above mentioned indicator, noise level will be measured and subsequently noise maps will be developed for the Asprela corridor.

  Data collection will take place twice during the project life time; the first measurement will be made before the implementation of measures and the second after. Each time, data collection will be made for two periods: daytime and nighttime. The average and peak noise (maximum sound level value) will be measured with static equipment, while the dose noise exposure (%) will be calculated through walking routes. This data will be collected by the Building Division of Faculty of Engineering of University of Porto (FEUP-SCC). The target group are the vehicles driving in the demonstration corridor.

  Noise is an impact that will be measured by indicators like average noise in daytime (L_{den}), average noise nighttime (L_n), peak noise and dose noise

- **Number of PT trips** The number of public transport trips is available at all times from the PT operators (STCP, ANTROP and Metro) database. However, it is only possible to know the number of trips that have origin in Asprela corridor, because a ticket validation is only required in the beginning of the trip. If people change line or operator, it is necessary to validate again and a new trip will be accounted for.

  Data collection will be done only for PT stops within the Asprela corridor. The number of Metro and STCP trips will be continuous collected since January 2009. The operator ANTROP will be responsible for data collection in two periods: before (2009) and after (2012) CiViTAS measures implementation.

  The target group are the PT users, in Asprela corridor.

- **Average modal split-PAX** Modal split will be collected by interviewing residents in Asprela corridor and questionnaires by mail to workers/students in the Asprela corridor. This data collection will be made in two periods: before and after the measures implementation.

  FEUP-SVC is responsible for organising a mobility home survey, in order to characterize the inhabitant's mobility of Asprela corridor, on a regular workday. The variables to be collected are: the number of trips, origin, destination, departure time, arrival time, travel reason, mode of transport, place of interchange and characterization of the person inquired. Sample size depends on city size and on level of statistical accuracy required. For this survey, the size of the sample was estimated for a population of 12 000 inhabitants, a 95% level of confidence and a 5% permitted error. The result was 376 interviews in Asprela corridor and the households were selected through random generation of coordinates using Microsoft Office Excel tool.

  OPT/CMP is in charge of planning the mobility survey for students and workers in Asprela corridor. For this survey, the size of population was estimated for a population of 30.000 persons, the result was about 1.500 interviews.

5. In- depth Process evaluation

The same approach for process evaluation will be used within all the CIVITAS Elan cities. This approach is described extensively in the first part of the CIVITAS ELAN Evaluation Plan.

In this chapter only the focus measures that are subject to the in- depth process evaluation are described. For these measures the process of implementation will be analysed very closely to obtain a full understanding and overview of the implementation process. A detailed fill in form will serve here as a basis to gather all the necessary information based on different techniques.

The non-focus measures will not be described here however some basic process evaluation will be provided for these measures based on a fill- in form filled in by the ML's on a yearly basis.

5.1. Measure 1.5OPO - Light Weight Bus

5.1.1. Description

See chapter impact evaluation

5.1.2. Process stages

- Preliminary Studies
  - A complete Survey and Database of Sandwich Material Concepts and Manufacturing Processes
  - Complete Definition of the Concept design of the vehicle
  - Technical Plan containing with the Targets specifications in terms of the manufacturing and assembling processes.
- Construction of the bus
  - Production of the body in-white made of composite materials with a novel manufacturing process
  - Assembling of different parts of the vehicle
- Light weight bus shuttle performance
  - Launch of the bus shuttle in Asprela corridor
  - Start of system testing
  - Overall results obtained by using Light weight bus shuttle

This results into the following expected timeline:

Table 13: expected process stages for the Measure 1.5OPO - Light Weight Bus

Stage	year 1				year 2				year 3				year 4			
Preliminary Studies and Conceptual Design																
Construction of the bus prototype																
Light weight bus shuttle performance																

5.1.3. Methodology for the process evaluation

The process evaluation will mainly focus on the deviations from the expected date to launch the vehicle in the Asprela region

- Completion time of the complete design of the vehicle
- Completion time of the production of the body-in-white
- Completion time of the assembling of the bus
- Barriers and drivers (in internal progress report)

- Learning histories

5.2. Measure 2.10OPO- Participatory Planning for New Intermodal Interchange

5.2.1. Description

5.2.1.1. Objectives and scope

- Encouraging and implementing a participatory development of the transport interchange design that will serve as guidance for a public tender for its construction
- Increasing the transport system efficiency
- Promoting an effective modal shift objective

5.2.1.2. Description of the measure

The construction of Porto's future North Transport multi-modal Interchange on the highly congested area of Asprela is an essential development already recognised in the Porto General Development Plan (PDM). The main goal of the proposed measure is to develop the conceptual project for the implementation of this infrastructure within the study corridor. The work will also include the launch of the competitive public tender for the design, construction and operation of the infrastructure. The construction phase is out of the range of CiViTAS-ELAN.

5.2.1.3. Innovative aspects

This project will be the first in the metropolitan area focusing on a strong involvement of all relevant stakeholders starting from the planning phase, i.e. preparatory phase of a major infrastructure project. A similar attempt has been made, but effectiveness of the measure did not accomplish its main goals mostly because of the non-involvement of the transport operators in the development part.

The involvement of all the relevant stakeholders in the transport field cooperating together in the same project represents an effective step forward in reaching more effective solutions and integrated transport services. It is also a strong indicator of their commitment and interest in this solution. This type of agreement is often difficult to accomplish within the local transport reality, thus it clearly represents an innovative accomplishment.

The requirements expressed by the stakeholders will have a strong emphasis on clean urban transport which is generally not being considered in these studies. These aspects concern walking accessibility, bicycle issues, park and ride schemes and logistical requirements for new fuels (e.g. space availability, filling station, etc).

The consideration of the financial perspective of the project will state the importance of the economical viability of the project, which is an aspect many times neglected in the previous Portuguese experiences in the matter.

5.2.1.4. Research and technical development

The planning and preparation works will focus on researching relevant information, requirements on transport interchange design and participatory planning involving all the stakeholders. The work will embrace the following general tasks:

- Best practices
- Previous works and studies (national, European and worldwide level)
- Selection of expertises in the area
- Promoting internal discussions and participation between the main stakeholders

Additionally, within the CIVITAS-ELAN-project, Porto wants to learn from Ljubljana and Gent, which have successfully planned and/or implemented a new intermodal transport interchange.

5.2.1.5. Situation before CIVITAS

The study corridor has been one of the most fast growing areas in the city over the last decade. In this corridor are North region central hospital, several schools, private and public universities and the polytechnic polo, as well as other large services. Overall there are about 50 000 people who enter this corridor daily for working. This is also a major area of entrance for public and private transport to Porto.

The transportation conditions in the area had developed in terms of demand and supply. The demand increased with the opening of larger educational institutions and residential areas over the last years, while the supply side changed in the following aspects:

- Metro system: over the last year, the yellow line of the metro (Gaia-City Centre-Asprela) was finished and three metro stations have been inaugurated. A new metro line between Asprela-Matosinhos will be constructed in a short-term and enhances the importance of the area in a Metropolitan Transport context and the need for integrated mobility solutions such as the future interchange.
- Bus: The local bus company (STCP) converted its operational network, electing Hospital S.João as a hub; due to its unique demand characteristics (high concentration of big institutions), it can be considered as complementing the other transport services within the corridor (metro and regional buses). Additionally, the regional and sub-urban bus network (operated by the ANTROP associates) provides a large number of services ending and/ or stopping in the corridor. The operators are ready to change their supply patterns due to the new situation once it is proven that they can gain operational efficiency. The main problems regarding a successful implementation of this measure are related to the inexistent physical conditions.
- Private transport: private transport within the corridor represents one very important part of the local traffic conditions. The closeness to major road infrastructures and the large amounts of free parking facilitates the access to the corridor, but this advantage has quickly been transformed into a highly concentrated congestion problem. Moreover, the local road network is largely used as an access to the city centre, a fact that increases the tendency for congestion that only multi-modal transport approaches can help solve.
- Others: there is a very low percentage of other means of sustainable transport being used to access the corridor. In fact, due to the quick growth of the constructed corridor, the local walking opportunities have largely been neglected and cycling infrastructure is inexistent.

5.2.1.6. Inter-relationships with other measures

All CiViTAS-ELAN measures of Porto share the same objective that is change the form of mobility in Asprela corridor.

5.2.2. Process stages

- Preliminary Studies
  - Technical Plan containing the basic requirements (location, minimum areas, loading-unloading capacities, etc) facing the current/ expected supply and demand at the interchange.
  - Business Plan: economical viability plan and investment conditions.
- Conceptual Design
  - Specifics requirements for interchange (areas, services to include).
  - Layout
- Public Tender for the conception, construction and operation of the future transport interchange

This results into the following expected timeline:

Table 14: expected process stages for measure 2.10OPO- Participatory Planning for New Intermodal Interchange

Stage	year 1				year 2				year 3				year 4			
Preliminary Studies																
Conceptual Design																
Public Tender																

5.2.3. Methodology for the process evaluation

The process evaluation will mainly focus on the stakeholder involvement

- Number of stakeholders
- Contributions made by the stakeholders
- Number of meetings/ interviews with stakeholders
- Barriers and drivers (in internal progress report)
- Learning histories

5.3. Measure 8.8OPO – Mobile Mobility Information

5.3.1. Description

See chapter impact evaluation

5.3.2. Process stages

- Initial Studies
  - Technical Specification containing the basic requirements for the system;
  - Design Analysis with possible final users.
- Conceptual Design
  - Specifics requirements for interface (services and transport's operators to include).
  - Public Analysis for the conception, construction and operation of the future system for mobility support.

This results in the following expected timeline:

Table 15: expected process phases for measure 8.8OPO – Mobile Mobility Information

Stage	year 1				year 2				year 3				year 4			
Initial Studies																
Conceptual Design																
Public Analysis																

5.3.3. Methodology for the process evaluation

The process evaluation will mainly focus on the stakeholder involvement and public opinion:

- Contributions made by the transport's operators
- Number of meetings with stakeholders
- Barriers and drivers (in internal progress report)
- Interviews with the public
- Learning histories

Part 5: Site Evaluation Plan for the City of Brno

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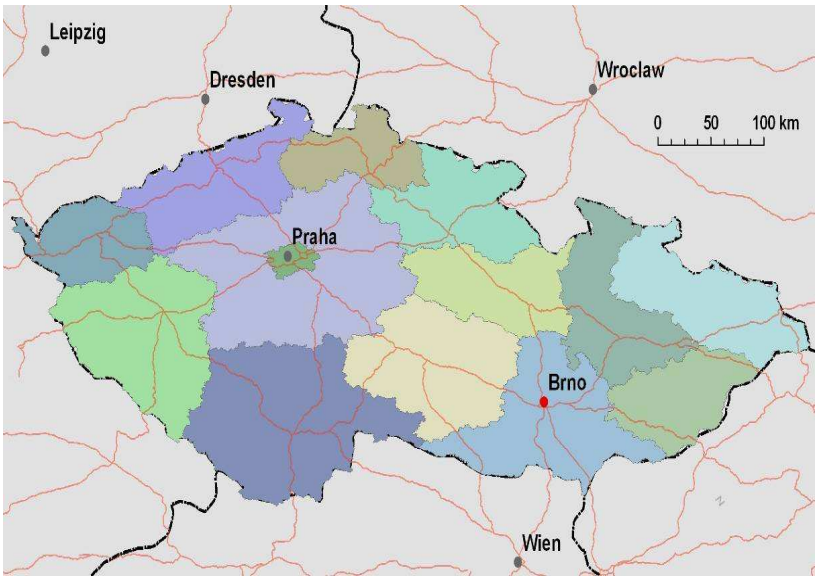
Site Evaluation Plan for the City of Brno

1. City context

Brno is situated in the centre of Europe and is the second biggest city in the Czech Republic with almost 400.000 inhabitants. It is the centre of the fourth largest region in the country - the South Moravian Region. It is situated at 190 – 425 m above sea level on 230 km^2 and its length is 21,5 km

Figure 1: Location of the city of Brno

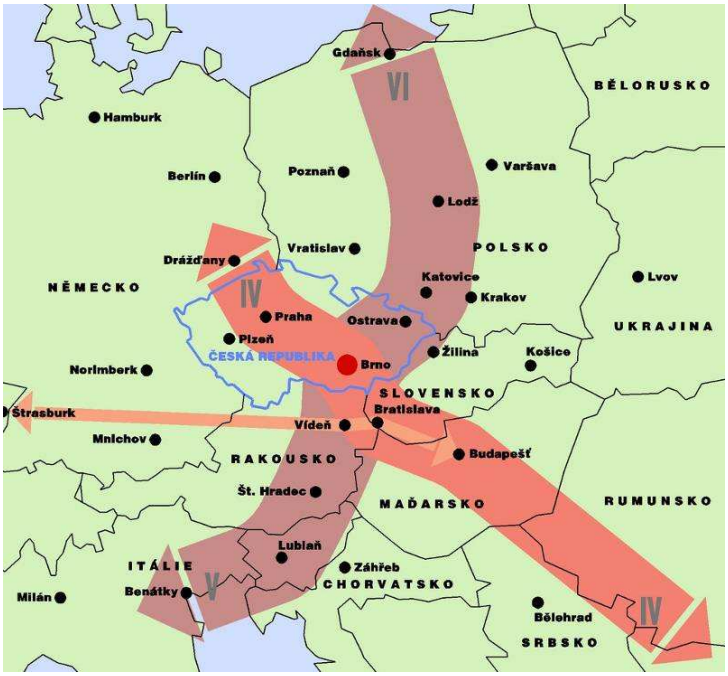


The city is situated at the crossroad of European multimodal corridors which belong to the TEN – T network. The location of the city enables very favourable accessibility (important motorways and railroads go through the city). There are regular flights taking off and landing on at the international airport in Brno.

The city of Brno is important as the second largest centre of education in Czech Republic. The number of students per inhabitants is the highest in the Czech Republic. There is over the 70,000 students at many famous universities (e.g. Masaryk University Brno, Brno University of Technology).

Brno is internationally known as a centre of fairs. The Brno Exhibition Centre belongs among other modern landmarks, its area is 667.000 m², the exhibition area is 191.000 m². In 2006 visited the exhibitions over 1 million visitors. Lately Brno supports strongly the development of science – especially medical science and technics – by building Technological Park and Campus next to the Bohunice hospital.

Figure 2: Brno and its position in the multimodal corridors



Brno is situated in the basin of Svratka and Svitava rivers. It is surrounded by a picturesque countryside, located between the Bohemian-Moravian Highlands and Protected Landscape Area Moravian Karst in the north and the Southern Moravian lowlands with its vineyards in the south.

Figure 3 Map of the city of Brno

The general information on the city and its economic characteristics is summarized in the table no. 1.

Table 1 General figures on the city and economy

General figures on the city and economy					
	Position	**Surface (km²)**	**GDP per capita (€) -year 2007**	**Unemployment (%) – year 2007**	**Wealth of the region (GDP/capita in Purchasing Power Standards PPS), EU=100 source = Eurostat 2006**
Brno	2nd city, regional capital	230	11 484 (South Moravian Region)	5,4	71 (South Moravian Region)

Sources: Czech Statistical Office

Brno had 370 592 inhabitants at the end of year 2008 of which 52,1% were women (as shown in the table no. 2). Number of inhabitants is rising steadily in the last years.

Table 2 Number of inhabitants in Brno (31st Sept. 2008)

Number of inhabitants in Brno on 31st December 2008		
Population	**Absolute**	**Relative (%)**
Women	193 004	52,1
Men	177 588	47,9
Total	**370 592**	**100,0**

Source: Czech Statistical Office (2009)

The development of city is significantly influenced by number of inhabitants and its structure. Since the beginning of nineties the changing industrial and social conditions have had very much of an impact on the population in Brno. Namely it concerns the stagnation of population in connection with population ageing. As it can be seen in the table no. 3, the share of population is higher in post productive age than in the pre-productive one.

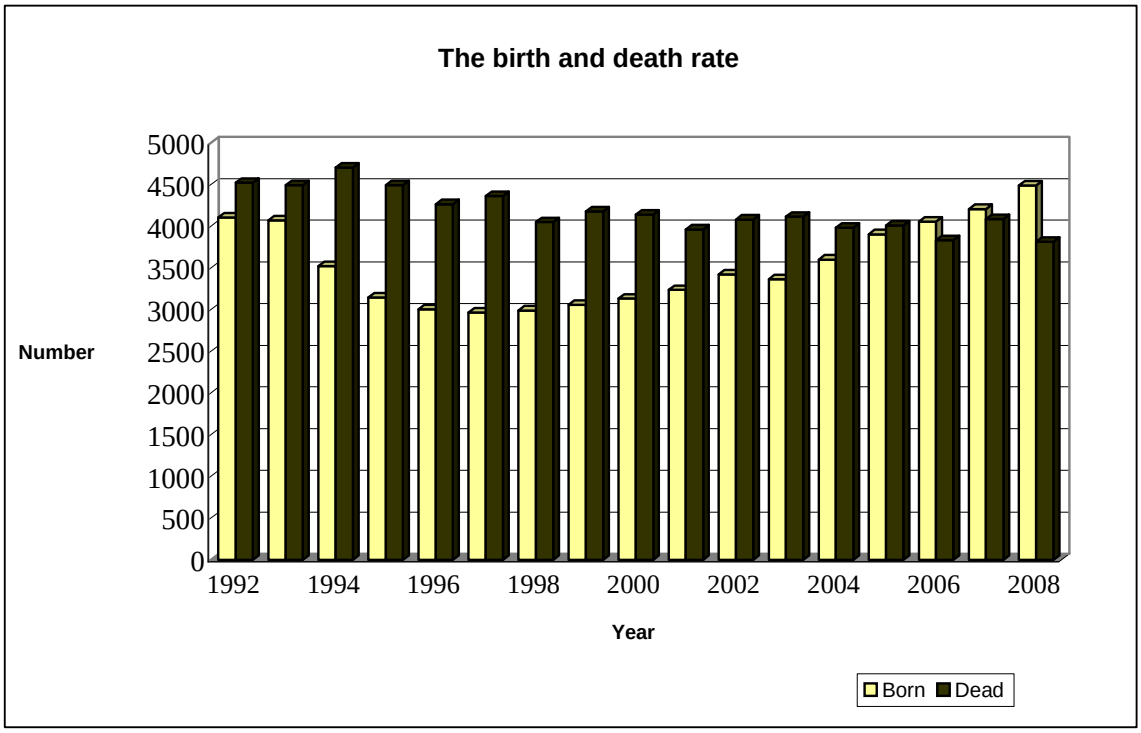
Table 3 Age structure of the population according to sex in Brno on 31st December 2008

Age structure of the population according to sex in Brno on 31st December 2008			
Sex	**Women**	**Men**	**Total**
Pre-productive age (0 to 14 years)	23 066	24 018	**47 084**
Productive age (15 to 64 years)	131 558	128 506	**260 064**
Post-productive age (65+)	38 380	25 064	**63 444**
Total	**193 004**	**177 588**	**370 592**

Source: Czech Statistical Office (2009)

The graph no. 1 shows the trend in birth and death rates. The difference between number of born and dead inhabitants has been shrinking, nevertheless at the beginning of new millennium there was still a decrease of population. This trend didn't change until 2006 when the number of born was higher than the amount of dead for the first time. This trend is in last years further strengthened by migration. The age structure still stays unfavourable though and the number of inhabitants in productive and post productive age is growing.

Figure 4: Birth and death rate in the city of Brno



Source: Czech Statistical Office (2001)

The overall balance of migration was 1385 inhabitants in year 2008 and there is more people moving into Brno than moving out (table no. 4). The level of geographical mobility is generally low in the Czech Republic. The differences in standards of living (economic growth and so on) among regions are not so much of an incentive for the labour force to migrate. This situation is strengthened by the fact that the housing market is rigid. Also the will of the Czech population to migrate is traditionally low.

Table 4: Migration in Brno in year 2008

Migrants in Brno in 2008			
Sex	**Women**	**Men**	**Total**
Immigrants	4254	5222	9476
Emigrants	3973	4118	8091
Balance	**281**	**1104**	**1385**

Source: Czech Statistical Office (2009)

Concerning the unemployment the rate in Brno is generally low compared to other parts of the country. At the end of September of this year, the rate was at a level of 8 %. The unemployment rate of women reached 9,3 % and it is more than a 1 p.p. difference between women and men (table no. 5). There are also some other groups of inhabitants who have specifically higher level of unemployment – especially Roma inhabitants and older people. Very high annual growth in unemployment (42 %) is an effect of the reaction of employers on the global economical recession.

Table 5: Unemployment rates in Brno on 30th September 2009

Unemployment rates in Brno on 30th September 2009			
Unemployment rates	**Women**	**Men**	**Total**
Relatively (%)	9,3	7	8
Absolutely			17243
Annual growth/fall (%)			42

Source: Ministry of Labour and Social Affairs (2009)

Urban Transport Structure

Brno is the centre of the economy in the South Moravian Region. Key strengths of the city are the good transport location in the European multimodal corridors, a highly educated and motivated labour force and a well-developed business support infrastructure.

During the preparation of the new development areas the city is putting an accent on the provision of a sustainable urban transport system to avoid the unequal increase of private car use and freight traffic.

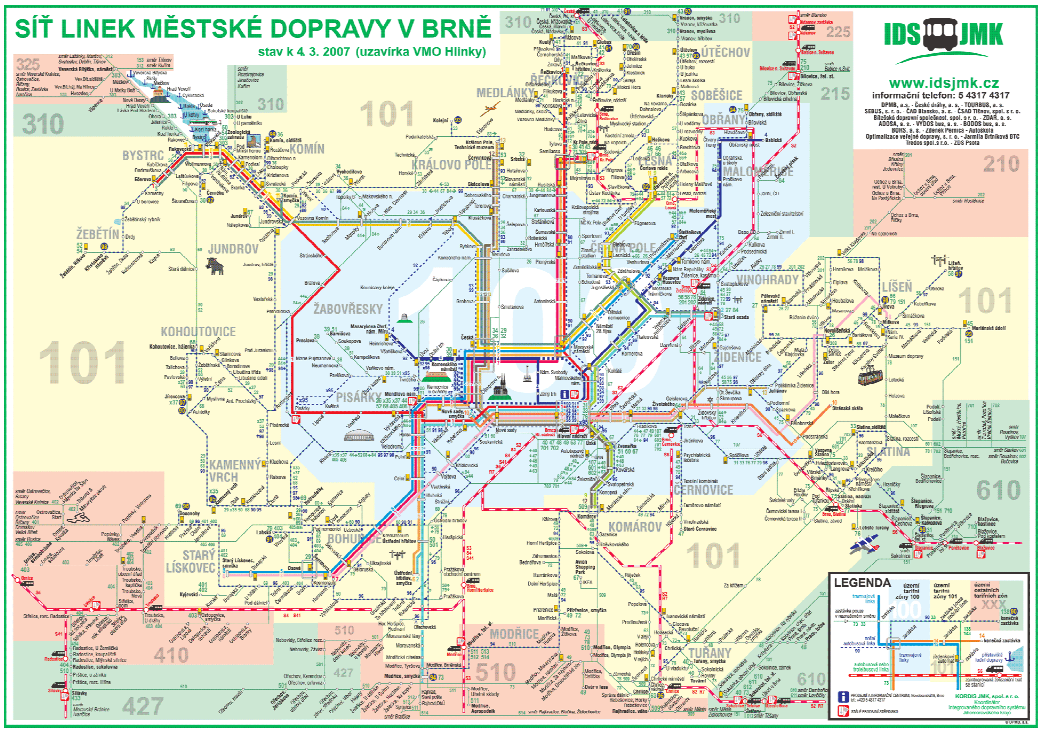
Important is to ensure adequate PT service in such growth areas, specifically by extending the tram system and a trolley bus lines. The areas within the Industrial Zone „Černovická terasa“ for example are connected with a railway line. More new industrial zones are planned next to the railway lines. The railway is an important transport provision for the daily commuters to these areas, while it does not play any role for freight transport. The railway is an important part of the Integrated Public Transport System of the South Moravian Region.

Public Transport (PT)

Thanks to its historical development the public transport system in the City of Brno is very well developed. The tram plays an important role in this system. The radial system of tramlines connects the commuter belts around the city with the centre. On 13 tramlines (the length of the network is 171 km) operate 318 vehicles, which transport 191,000,000 passengers per year. Another important element is the system of trolleybuses. The length of the network served by 11 lines is 94 km, 143 vehicles transport 45.000.000 passengers per year. These low pollutant systems of PT – tram and trolley bus – are the backbone of the PT system in the city centre. The additional system of the conventional buses serves the fringe areas of the city. The length of the network is 549 km, 300 vehicles are operating on 49 lines, transporting nearly 104,000,000 passengers per year.

The only operator is Brno City Public Transport Company, a joined-stock company (100% - City of Brno).

Figure 5: The extensive network of the public transport system in the city of Brno

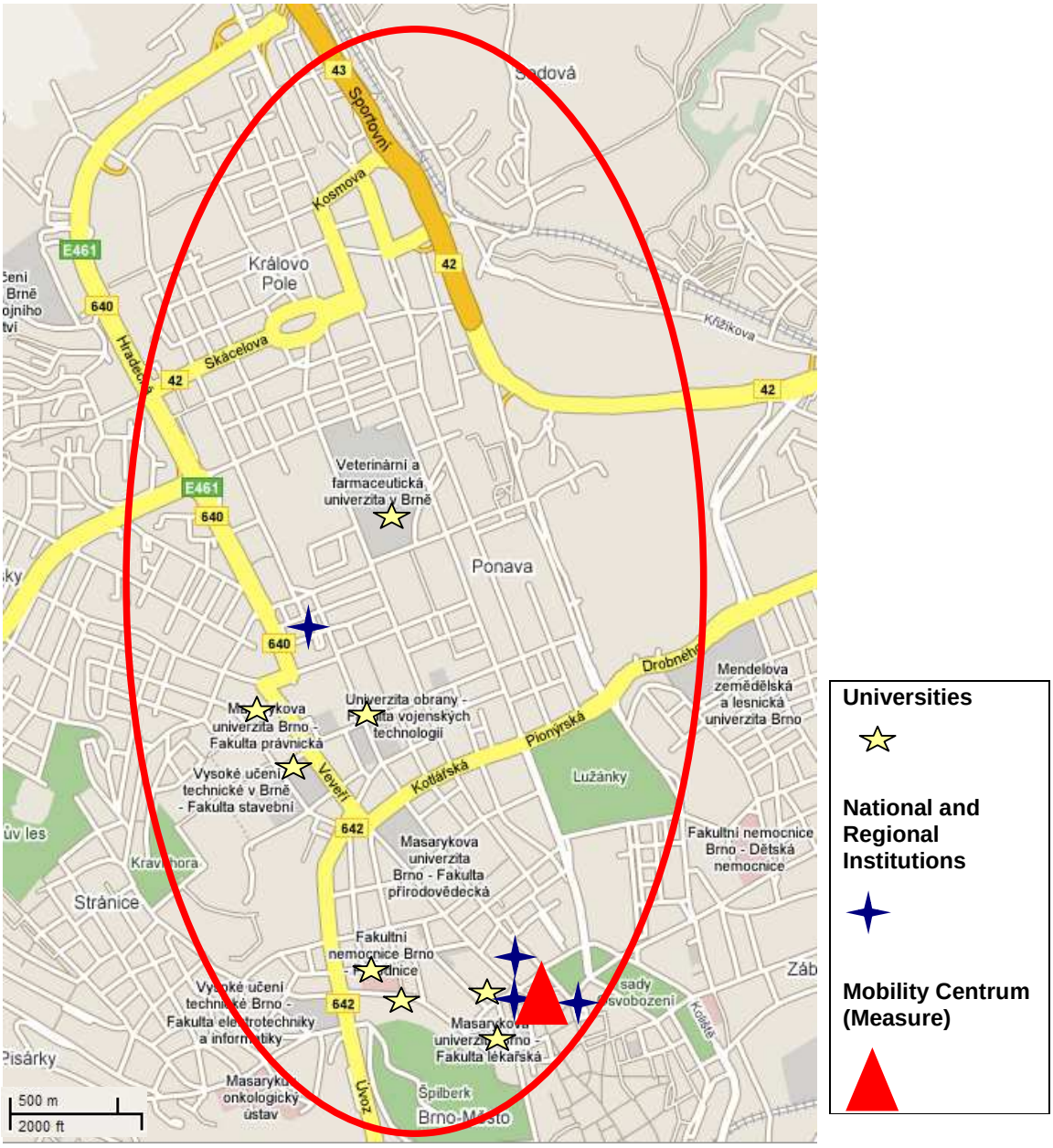


Even if the number of PT users is with 50% still relatively high, it is slowly declining. The city of Brno is together with its partners trying to stop this undesirable process.

2. Target Corridor

The demonstration corridor is located in the northwest part of the city. It begins near to the centre of the city and includes one of the most important interchange points (Česká). The corridor includes important institutions such as the Supreme Court of the Czech Republic, the Supreme Administrative Court, the Office of the South Moravian Region and also the majority of Universities in Brno. Approximately 100,000 inhabitants live within this area. The high density of Universities and Institutions is a key characteristic of this part of the city. Public transport plays the key role in the provision of transport services in this central area.

Figure 6: The city of Brno and location of CIVITAS ELAN corridor



Many students and also inhabitants are using trams and trolleybuses for their daily trips. For this type of vehicles a project for the optimization of electric energy consumption is proposed, that will be implemented within the corridor area. To improve the services for passengers a diagnostic system for vending machines will be installed, in the first phase also in this corridor.

The most important of Brno's measure is the building of the Integrated Mobility Centre (IMC) at Joštova Street near to the city centre and near to the one the most important interchange points in the city. IMC brings services to the area which can not only help the citizens but also visitors of the city with their questions on how to get around in the best and most sustainable way. They will receive information about PT travelling (route planner, tickets) in the city and in the region.

Within the corridor there will also be run a communication campaign with costumers. The main part of the suggested line that is to be operated by minibuses will be included in this corridor. Near to the Mobility Centre there is planned an interchange point for this special line.

Figure 7: The map of the city of Brno

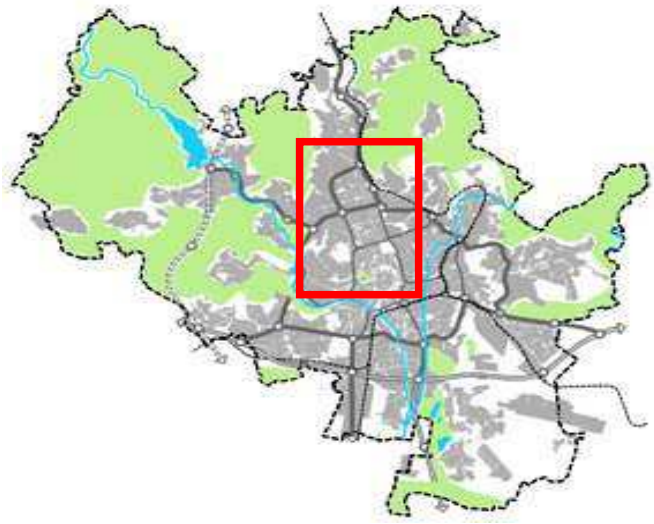


Table 6: Key characteristics for the city of Brno

Characteristics	City	ELAN- Corridor
Area		
Surface (km²)	230	n. a.
Transport (2006)		
Car ownership (per 1000 inhabitants)	Cca 484	n. a.
% daily trips by mode of transport		
- Car	35,6	n. a.
- Walk	9,3	n. a.
- Cycle	1,7	n. a.
- Bus	53,4	n. a.
Society and economy (31st Dec. 2008)		
% unemployment	5,75	n. a.
% employed in service sector	n. a.	n. a.
% pop over age 65+	63 444	n. a.
% pop over age (15-64)	260 064	n. a.
% pop under age (0-14)	47 084	n. a.
Energy and environment		

Characteristics	City	ELAN- Corridor
% estimated energy use – Transport	n. a.	n. a.
% emissions of Carbon Dioxide by road sector	n. a.	n. a.

3. Overview of all the evaluation activities

Below an overview can be found of all the evaluation activities planned during the project life cycle in the city of Brno. The table includes information on the level at which the evaluation task will be carried out; city/corridor level, Integrated Package level or Measure level and the type of evaluation task (basic and/or in-depth evaluation).

Table 7: Overview table of the evaluation activities for the city of Brno

IP/Measure Number	Measure Title	Basic Impact Evaluation			In- depth evaluation	
		Before/ after	BAU	Up-scaling	CBA/ financial	In- depth Process evaluation
City/ corridor	Modal Split Air quality	x				
IP	DECREASE IN USE OF ELECTRICITY AND FUELS	x				
1.4	Optimised energy consumption in tram and trolley bus network	x	x			
2.7	Improved service for disabled persons	x	x		x	x
IP	PROMOTING AND ENHANCING THE USE OF PUBLIC TRANSPORT	x				
4.12	Comprehensive mobility dialogue and marketing research – new transport services	x				x
4.13	Integrated Mobility Centre	x	x			
IP	TICKET VENDING MACHINE DIAGNOSTIC	x			x	
8.7	Ticket vending machine diagnostic	x			x	x

4. Focus measures

For each of the CIVITAS ELAN cities a selection of focus measures has been carried out. For these measures extra attention will be paid to all the evaluation activities but a strong focus will be on the CBA and in-depth process evaluation of these measures. The motivation behind this selection is described below.

2.7 Improving bus services for disabled persons

This measure is suitable for CBA because its outcomes and benefits will not occur only in financial benefits but mainly in better transport system for disabled persons and also partially parents with children in prams. The new connections and a possibility of minibuses usage by handicapped on call will contribute to better mobility of disabled persons in the city. Thus the outcomes will be measurable in CBA and it will be possible to identify if the expenditures on the measure were worthy and the acceptance of public transport by disabled is better as well as their mobility.

4.12 Comprehensive mobility dialogue and marketing research – new transport services

This measure is very innovative in the City of Brno and setting up a mobility dialogue through survey and Transport planning is suitable for in-depth analysis. Due to this, it will be possible to find out how effective this measure is and what are its barriers and drivers. However accordingly with its content, it is not possible to make an effective Cost-Benefit Analysis as long as its contribution to modal split and other desired outcomes will be in first years debatable.

8.7 Ticket vending machine diagnostic

The measure 8.7, Diagnostic system installed in vending machines has a primary goal to inform directly about any not-functioning machine to the controlling centre for ticket vending machines. This way the machine will get repaired as fast as possible. The benefits of this measure are multiple and have impacts on quality of service for passengers but also on public transport operator's income from tickets sold in vending machines. This measure is very suitable for CBA as long as the investment into implementation of such system can be confronted with its benefits.

Table 8: List of focus measures for the city of Brno

MEASURE NUMBER	MEASURE TITLE	IN-DEPTH ANALYSIS		MOTIVATION					
		Cost benefit analysis	In – depth Process Evaluation	Towards greener towns	Towards free-flowing towns	Towards smarter urban	Towards accessible	Towards safe and secure	Key Motivation
2.7	Improving bus service for disabled persons	x	x	xx		xx	xxx		Possibility to provide a detailed CBA Innovative measure "Green" measure Multiple positive outcomes for citizens
4.12	Comprehensive mobility dialogue and marketing research – new transport services		x	x		x	xx		Innovative measure Interesting for transferability
8.7	Ticket vending machine diagnostic	x	x			xx	x		Possibility to provide a detailed CBA Interesting for in-depth analysis

5. Impact Evaluation

5.1. Measure and Integrated package level

5.1.1. Integrated package 1: Decrease in use of electricity and fuels

5.1.1.1. Description

A. *Objectives and scope*

The first package titled Decrease in use of electricity and fuels integrates 2 measures aiming at the following objectives:

IP objectives

- Optimised electric power consumption in trolleybuses and trams
- Reduction of the pollution caused by the bus fleet

Measure related objectives

- Measure 1.4 Optimised energy consumption in tram and trolley bus network
  - Creation of remote heating control system in trams and trolleybuses
  - Reduction of public transport costs without negative impact on customers
  - Optimisation of electric energy consumption in trams and trolleybuses as a result of real-time monitoring of electricity supply from all substations and regulation of heating in vehicles in case of necessity
- Measure 2.7Improving bus service for disabled persons
  - Introduction of new low-floor minibuses and increased attractiveness of public transport for the disabled and wheelchair users
  - Increased attractiveness of public transport during off-peak hours and in the city centre
  - Increased customer satisfaction, accessibility and attractiveness of integrated public transport in the city of Brno
  - Lowered fuel consumption due to the use of environmentally friendly buses

B. *Overview of the measures*

- Measure 1.4 Optimised energy consumption in tram and trolley bus network

This measure aims at a decrease of negotiated amount of electric power which is quoted in the contract between electricity supplier and DPMB. This objective is supposed to be achieved due to the implementation of a new system in heating. It is planned to install the system which will enable vehicle heating system regulation according to the automatic command from the control centre in all trams and trolley-buses (up to 440 vehicles). This command will be transferred from the control centre to vehicles via radio network.

- Measure 2.7 Improving bus service for disabled persons

This measure aims at improving services for handicapped people through implementation of minibuses. These minibuses will operate on special lines designated mainly for the disabled and wheelchair users and in the city centre. These minibuses should be able to transport at least six wheelchairs at the same time. During the off-peak hours (in the evenings), they will also operate on low-demand lines where standard bus usage would not be effective. It is planned to introduce two lines for the disabled, which will meet in one interchange point in the city centre. At the weekends, it is

planned to use these minibuses also for trips of groups of the disabled (up to 5 buses, each for at least 6 wheelchair people) out of Brno.

C. *Innovative aspects*

- Cost-effective and energy-efficient use of electricity for trams and trolleybuses, installation of new parts for heating regulation for trams and trolleybuses
- Use of new technology for transfer data between vehicles and control centre
- Reduction of electricity consumption costs
- Connecting of heating system in vehicles to control centre. (And between substations and control centre.) The control centre will collect data from substations and calculate the expected consumption in each quarter of an hour. If necessary if will optimize the consumption in vehicles using the heating system
- Possibly decreased electricity production by power plants

D. *Research and technical development*

DPMB as a public transport operator is continuously seeking for ways of reducing operating costs using new modern technologies. The price making system for electricity supply initiated a thought of reducing these costs by measures with minimal impact on passengers. This goes along with conclusions and recommendations in the Green Paper which aim at reducing production and consumption of electric energy.

E. *Situation before CIVITAS*

The electricity costs are composed of costs for real consumption and costs for reserving electric capacity in case of need in peak hours. Quantity of electric power supply must be negotiated according to the expected consumption beforehand.

DPMB has to negotiate the delivery quota each year according to the expected consumption, but has to negotiate higher electric power by up to 13%, because exceeding the negotiated amount is heavily penalised. But on the other hand, DPMB has to pay the negotiated quote even if it does not reach the limit. This means that DPMB pays more than necessary as there is no system for the monitoring and regulating the electric energy consumption.

Monitoring has been partially implemented (in substations). The second part – the implementation is still missing and it is the aim of this measure.

F. *Inter-relationships with other measures*

The two measured integrated in the IP are inter-related one with another. The aim of both is Decrease in use of electricity and fuels. Obviously, this should not have a negative effect on passengers but rather have a positive one. But basically, the aims of these two measures are not so much related to other CIVITAS ELAN measures being implemented in Brno. The other measures focus more on dialogue and information provision (4.12, 4.13) and on increased level of service quality (8.7).

5.1.1.2. Evaluation activities and indicators

A. *Evaluation activities and Indicators at IP level*

Expected impacts

The expected impacts for IP 1 Decrease in use of electricity and fuels are following:

- Decrease in electricity and fuel use

  Both of the measures integrated in the package aim at a decrease in the use of either electricity or fuel. In the measure 1.4 the decrease concerns more the need to reserve the extra capacity whereas the measure 2.7 deals with the real decrease in fuel use as the minibuses use less fuel.

- Decrease in emission

  As both of these measures concern a fall in the use of energy (fuel or electricity), there is a clear link to air pollution and emissions. However, it is very costly to measure real emission of a minibus and that is why the decrease in emissions will be measured based on the information given by the producer of the minibus. On the other hand, the air quality will be measured at a city level. Taking into account the fact that so many stronger externalities influence the air quality it is not possible to assess the share of decreased emissions by the minibuses on the overall emissions. Within such an area as the city of Brno is, the expectation of impact of the replacement of 5 standard buses by minibuses on the air quality is rather low.

Selected indicators

In the table below an overview is given of all the evaluation activities for the IP 1 Decrease in the use of electricity and fuels.

Table 9: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 1: DECREASE IN USE OF ELECTRICITY AND FUELS	▪ Combining results of the different measures to come to conclusions on IP level: – Fuel consumption – Emissions	▪ Decrease in use of electricity (reserve capacity) ▪ Decrease in use of fuel ▪ Decrease of emissions → Scope: ELAN – city level

Details of the evaluation activities

To be able to conclude about achievement of the IP objectives it has been decided that a decrease in use electricity (a decrease in a need to reserve electric capacity), decrease in fuel consumption as well as emissions will be measured. Thus indicators were set as follows:

- Reserve capacity – the amount of electricity that has to be reserved at the company providing electricity supply for the tram and trolleybus operator especially for the increased electricity consumption in peak hours
- Vehicle fuel efficiency
- Emissions (CO, NO_x, particles)

These indicators were chosen for its clear link to the IP objectives, the rest of measurements concerning these 2 measures will be done at a measure level.

B. *Evaluation activities and indicators on measure level*

Expected impacts

Both measures separately will have an impact on:

- Costs reduction

  Obviously when both of the measures lead to the decrease in fuel and electricity consumption, it also leads to the costs reduction. DPMB can easily collect information and data on this issue.

- Public transport use by wheelchair users

  This is an expected impact of the measure 2.7. Minibuses are especially adapted for transport of wheelchair users and this will be measured in a rather simple way – by counting the number of transported people.

- Public transport use by parents with prams

  This might also be an impact of the measure 2.7 as the minibuses are low floor and thus it is much easier for parents with prams to get on the bus. However, the minibuses will operate only on the special lines and therefore it is rather difficult to estimate the share of prams on board. This will not be measured as the main focus of this measure is on wheelchair users.

Selected indicators

In the table below a detailed overview of all the evaluation activities on measure level for the measures of IP1 is given.

Table 10: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
1.4 BRN Optimized energy consumption in tram and trolleybus network	▪ Measurement of: – The reserve capacity – Measurement of the operating costs – Acceptance level – Temperature in vehicle ▪ BAU	▪ Reduction of the reserve capacity ▪ Cost reduction ▪ No negative impact on passengers - good passengers' acceptance → Target group: all passengers (a random sample) ▪ no excessive temperature falls in the vehicle → Target group: vehicle fleet

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
2.7 BRN Improving bus service for disabled persons	▪ Measurement of: – Operating costs – Vehicle fuel efficiency – Emissions – Acceptance level – Vehicle used by impaired – New connections in the city ▪ BAU	▪ Cost reduction ▪ Reduction in fuel use ▪ Emission reduction - CO emission, NOX emission, particles ▪ Good level of acceptance → Target group: wheelchair users ▪ CBA ▪ Number of new connections

Details of the evaluation activities

The evaluation activities linked to the measure 1.4 Optimized energy consumption in tram and trolleybus network will be carried out using the following indicators:

- Reserve capacity – mentioned above
- Operating costs – one of the crucial impact of the measure is aiming at operating costs because reducing the capacity of electricity that has to be reserved will have an financial impact
- Acceptance level – the public opinion about temperatures in the vehicles will be collected to enable a conclusion about the impact on passengers
- Temperature in the vehicles – real falls of the temperature in the vehicles will be measured during winter time after the implementation of the measure to enable to analyze the potential for the negative impact

The measure 2.7 Improving bus service for disabled persons will be measured using these indicators:

- Operating costs – the implementation of the minibuses into the system of the public transport in the City of Brno is supposed to have apart from others also a financial impact on operating costs
- Vehicle fuel efficiency – see above
- Emissions – see above
- Acceptance level – the acceptance of the measures among wheelchair users will be measured to gain a better knowledge about the needs of wheelchair passengers and their satisfaction with this measure
- Vehicle used by the wheelchair users – the real number of passengers served by previous standard buses and new minibuses will be counted to enable a comparison
- New connections in the city – the impact of the measures will also be in the public transport network because these minibuses may operate in location where the standard buses would not be able to operate, thus it will lead to the enrichment of the whole public transport stops network

Details for Business as usual

- BAU

Business-as-Usual Scenario will be elaborated for the measure 1.4 Optimized energy consumption in tram and trolley bus network with the aim of seeing the difference in real-consumption curve.

Business-as-Usual Scenario will be carried out also for the measure 2.7 Improving bus service for disabled people. However, the Business-as-Usual Scenario will not be done at an Integrated package level but for both measures separately because both of these measures address different kind of energy consumption.

C. *CBA*

A detailed Cost-Benefit Analysis will be elaborated for measure 2.7 Improving bus service for disabled persons. This measure is suitable for CBA because its outcomes and benefits will not occur only in financial benefits but mainly in better transport system for disabled persons and also partially parents with children in prams. The new connections and a possibility of minibuses usage by handicapped on call will contribute to better mobility of disabled persons in the city. Thus the outcomes will be measurable in CBA and it will be possible to identify if the expenditures on the measure were worthy and the acceptance of public transport by disabled is better as well as their mobility.

Following indicators will be used to carry out the CBA.

Table 11: Overview of indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
PT operator	purchasing costs	operation costs reduction higher vehicle efficiency
Handicapped PT users		higher quality of PT service – higher comfort number of new connections – larger space served by PT
Citizens		reduction of emissions

5.1.1.3. Data collection

The table below represents all the data collection activities for IP 1 Decrease in use of electricity and fuels that will take place during the project life cycle.

Table 12: Data collection inventory for the city of Brno

INDICATORS	LEVEL1	FOCUS[2]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
reduction of reserve capacity	M /IP		continuous	measurement of reserve capacity	W (%)	reserve capacity	throughout	DPMB
cost reduction of PT through better tariffs and improved energy efficiency in electricity consumption	M		continuous (especially Winters)	counting cost reduction	€/pkm	costs on reserve capacity	Winter 2008,2009, 2010,2011,2012	DPMB
survey on user acceptance	M		before / intermediate / after	questionnaires and enquiries	PT user	400 sampling based on strata quotas + 1100 internet questionnaires	questionnaires – 14th and 38th month enquiries – Spring 2009,	DPMB

[1] M= Measure level

IP= Integrated Package Level

[2] The F refers to whether this data will also be used for the In-depth analysis of the focus measures

INDICATORS	LEVEL1	FOCUS[2]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
						and enquiries in vehicles enquiries focused on the acceptance on the internet	2010, 2011	
temperature falls in the vehicle	M		before / intermediate / after	measurement of temperature fall	℃	10% of every type of vehicle (6 types of trams and 4 types of trolleybuses)	Spring and Autumn 2009, Winter 2009,2010,2011,2012	DPMB
cost reduction of PT provided by minibuses	M	F	before/ after	counting cost reduction	€/vkm	cost on fuel	before 11th and after 24th month	DPMB
pollution reduction	M / IP	F	before/ after	CO, NOx emission, particles reduction	g/vkm	all minibuses	before 11th and after 24th month	DPMB
reduction in fuel use	M / IP	F	before/ after	counting litres of fuel	l (MJ)	all minibuses	before 11th and after 24th month	DPMB
survey on impaired users' acceptance	M	F	after	questionnaires/ focus groups	impaired PT user	100/30	after 24th month	DPMB

INDICATORS	LEVEL1	FOCUS[2]	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
usage of minibuses by impaired	M		before / intermediate / after	counting number of use	impaired PT user	all minibuses	before 11th, between 11th and 24th and after 24 month	DPMB
number of new connections	M	F	before / intermediate / after	number of new connections	connection	all connections	before 11th, between 11th and 24th and after 24 month	DPMB

Details on the data collection

1.4 Optimized energy consumption in tram and trolley bus network

Operational data

- Energy consumption

Within this measure a crucial focus is put on reducing the reserved capacity by reducing electricity consumption in the vehicle during the peak-hours via short heating switching off. The real-consumption-monitoring curve and the reserve capacity curve will be compared.

  - Target group and sample size: Continuous measurement of the reserve capacity
  - Timing: The reserve capacity will be measured throughout the whole duration of the CIVITAS ELAN project
  - Responsible: DPMB

- Operating costs

The savings of electricity, namely of the reserve capacity, will have a significant impact on savings in operating costs too. Especially, the fees paid for exceeding the reserved capacity should be diminished.

- Temperature in vehicle

The temperature in vehicles will be measured to show an impact of the new system on real temperature in the vehicles. This will be accompanied by a survey that will report on the passengers' perception and acceptance. Temperatures will be measured in different types of vehicles in the winter season when the temperature usually falls bellow 3˚C and the heating system is on.

- Temperature falls in the vehicle
  - Target group and sample size: 10% of every type of vehicle (6 types of trams and 4 types of trolleybuses)
  - The location: DPMB vehicles operating within Brno
  - Responsible: DPMB

Attitude and behaviour surveys

- Acceptance level

A quantitative method of survey using the questionnaires accompanied by online enquiry will lead to an evaluation of this measure. The PT users will be asked about their comfort in relation to temperature in the vehicle. The aim of this measure is to regulate heating but not to have a negative impact on the PT user. This will be assessed by surveys.

- Survey on user acceptance
  - Target group and sample size: The target group for the survey is whole population of the city of Brno. The sample will be of an approximate number of 1500 respondents. The sampling procedure is done based on the strata quotas assessed within screening of socio-demographic structure of PT users according to gender and age. Around 1100 questionnaires are usually filled by the readers of the DPMB magazine and via internet, 400 questionnaires are filled by face-to-face data collection.
  - The location: The City of Brno
  - Timing: Data will be collected within a biannual DPMB survey. It takes place usually in the autumn, during the CIVITAS ELAN project the data collection will be carried out in October 2009 and October 2011.
  - Responsible: DPMB

2.7. BRN improving the bus service for disabled persons

Operational data

- Operating costs

The operating costs are expected to get reduced based on the lower fuel consumption as the minibuses have lower consumption per km.

Fuel consumption

The fuel consumption will be reduced by using the minibuses. The overall number of saved litres will be counted.

- Reduced emissions by modelling

As long as the minibuses have lower level of emissions, the overall lower emission polluting air will be counted based on km operated by the minibuses. For this, information given by the minibuses producer will be used as measuring minibus emission itself would not be too costly and time taking.

Traffic data

- Passenger movement (number of disabled persons)

To provide information on usage of special bus lines for disabled by wheelchairs users a number of wheelchair users will be counted on bus lines 81 and 82. The data collection before purchase of the minibuses will serve for a comparison with usage of the minibuses by the wheelchair users. The data collection will be carried out during certain chosen months.

- Number of connections

The minibuses can specifically operate in some areas of the city centre that are not accessible by the standard buses. At the same time the intention is to improve services for disabled and thus the number of bus stop and connection will increase.

Attitude and behaviour surveys

- Acceptance level

A combination of quantitative and qualitative methods will be used to assess the acceptance level of such transport solution by wheelchair persons. There will be a survey carried out in cooperation with the League for wheelchair users. Also a qualitative method (focus groups) will be used to assess the acceptance of the measure among wheelchair users.

  - Target group and sample size: The group of people questioned within the survey will be wheelchair users. Regarding the low number of transported wheelchair users a hundred of questionnaires will be distributed and collected. Such amount will be representative for the wheelchair population using PT.
  - The location: The City of Brno
  - Timing: Data will be collected after implementation of the measure which means after 24th month.
  - Responsible: DPMB

5.1.2. Integrated package 2 Promoting and enhancing the use of public transport

5.1.2.1. Description

A. *Objectives and scope*

Integrated package 2 focuses at Promoting and enhancing the use of public transport. It integrates two measures aiming both at increased awareness and acceptance of public transport and growth of public transport users.

IP objectives

- Increased awareness of PT
- Increased satisfaction by PT
- Increased number of PT users

Measure related objectives

- Measure 4.12 Comprehensive mobility dialogue and marketing research – new transport services
  - Increase of customer satisfaction
  - Higher knowledge on PT by customers
- Measure 4.13 Integrated Mobility Centre
  - Increased customer satisfaction, accessibility and attractiveness of integrated public transport in the City of Brno and the Southern Moravia Region
  - Increased level of communication with the customers
  - Increased ticket sale
  - Better comfort for passengers while changing PT lines

B. *Overview of the measures*

- Measure 4.12: Comprehensive mobility dialogue and marketing research – new transport services

Within this measure the transport plans for next four years will be prepared. The outcomes of sociological surveys will be incorporated into transport plans and the mobility dialogue will be established. The measure will identify ways for better communication with the PT users which could be used in more CEE and other middle sized cities

- Measure 4.13: Integrated Mobility Centre

The new integrated mobility centre is a totally new service in terms of size and scope and a similar example does not exist in Brno or the South Moravian Region. The integrated mobility centre will be built right in the city centre of Brno and the chosen CIVITAS corridor, just next to one of the biggest changing points in Brno, where 8 tram lines and 6 trolley lines are coming together.

C. *Innovative aspects*

Public participation in the process of transport planning is a completely new concept in Brno. The innovative aspects of the measure 4.12 are as following:

- Setting up a public participation process
- Finding ways of how to incorporate customer needs into the transport plans
- Finding a way to establish the “mobility dialogue in the city”
- Finding ways to improve the negative image of PT for the city inhabitants.
- Identifying reasons for not using PT and ways to change this approach.

- Finding the best practice applicable in other middle-sized CEE cities

The integrated new mobility centre is a totally new service in terms of size and scope and a similar example does not exist in Brno or the South Moravian Region.

The integrated mobility centre will be built right in the city centre of Brno and the chosen CIVITAS corridor, just next to one of the biggest junction point in Brno where 8 tram lines and 6 trolley lines are coming together.

- Increasing the awareness raising concerning public transport and other alternative modes of environmentally friendly ways of transport.
- Broadening the range of the mobility centre's services towards the city in general and regional information services; the centre will also be used for communication with citizens on new city development projects.
- Integrating of all sale outlets (previously three different ones with different services) into one point. This will also integrate all information and ticket distribution for bus drivers and retail shops.
- Integration of bus rental service.
- Integrating special ticket service for yearly tickets and target groups like pupils or old people.
- Integrating bicycle service station.
- New touch screen Internet information terminals with real time information and access to door-to-door info.
- Developing RTPI (Real time passenger information panels) that could be used in the historical centres of the CEE cities.

D. *Research and technical development*

IMC, prepared to be implemented within the CIVITAS ELAN project, is based on experience in EU cities similar to Brno in their size. The pioneer of Mobility centres is the City of Graz which built one also with subsidy from EU funds in 1997. These centres can be found also in other similar or smaller cities (e.g. Leipzig, Parma or Meinz).

The main aim of Mobility centres is to provide citizens and tourist with complex information on the transport - public, individual or cycling. Also there is an opportunity to inform citizens about transport development project of the city.

In Europe, these centres usually specialize on information provision about the city and additionally they also provide information about city surroundings.

As an example, a photo of mobility centre close to the train station from the city of Leipzig can be shown. Leipzig is from economic and size viewpoint quite similar to Brno. The picture bellow shows the inside configuration of the mobility centre in this city.

Figure 8: Mobility Centre in Leipzig

E. *Situation before CIVITAS*

Nowadays the demands on the quality of travelling are continuously growing. The customers' behaviour is quickly changing and their demands are bigger. Therefore it is really important to find out ways to improve the quality of travelling and flexibly integrate customer's demands in to the new transport plan. Through the transport plan the public transport service in the city will be ordered.

A number of innovations and new services will be implemented which will lead to quality improvements of transport information dissemination and increase of customers' satisfaction and their knowledge on public transport. The new integrated mobility centre should cover one of the most important junction points of the public transport in the city and meeting and communication points of Brno – Česka interchange.

F. *Inter-relationships with other measures*

These two measures (4.12 and 4.13) are inter-related and both aim at higher level of awareness and satisfaction with PT within population. These measure focus on accessing the PT users and their opinion on public transport. Only then the PT system might be effectively adapted to the needs of public and increase number of PT users and thus contribute to change in modal split.

5.1.2.2. Evaluation activities and indicators

Expected impacts

The expected impacts of the Integrated package 2 are following:

- Higher awareness and satisfaction

  Both of the measures are part of a communication with citizens. As long as citizens will have a chance to get more information in IMC and will have their say in preparation of Transport Plans, the expectation is that the IP 2 will lead to rather higher awareness and higher satisfaction with PT in the city of Brno. Data will be collected within surveys representative for the population of the city of Brno.

- Number of PT users

  Citizens will have the opportunity to get complete information about Integrated Transport System within Brno and the South Moravian Region and thus the expectation is that more of them will make use of it.

Selected indicators

In the table below an overview is given of all the evaluation activities for the IP 2 Promoting and enhancing the use of public transport.

Table 13: Evaluation activities and indicators on IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 2: PROMOTING AND ENHANCING THE USE OF PUBLIC TRANSPORT	▪ Evaluation directly on IP level: – Awareness and Satisfaction by PT – Number of PT users	▪ Increased awareness of PT ▪ Increased satisfaction by PT ▪ Increased number of PT users → Scope: ELAN – city

Details of the evaluation activities

The Integrated package level 2 focuses on improving the communication, marketing and thus increasing the use of public transport. For this reason two main evaluation activities will be carried out:

- Survey on awareness, acceptance and satisfaction
- Number of public transport users

In the table below a detailed overview is given of all the evaluation activities on measure level for the measures of IP 2 Promoting and enhancing the use of public transport.

Table 14: Evaluation activities and indicators on measure level

MEASURE	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
4.12 BRN Comprehensive mobility dialogue and marketing research – new transport services	▪ Measurement of: - Number of sold tickets	▪ Increased number of PT users
4.13 BRN Integrated Mobility Centre	▪ Measurement of: – Number of sold tickets (in the IMC) ▪ BAU	▪ Increased number of PT users

Details of the evaluation activities

To be able to see whether the number of passengers has grown, the indicator related to sold tickets will be used.

- Number of sold tickets – the overall number of PT tickets sold at all the selling places
- Number of sold tickets in the IMC – this is an indicator that will provide an information about usage of IMC by passengers

Details for Business as usual

- BAU

Business-as-Usual Scenario will be carried out for the Measure 4.13 to provide an insight into effectiveness of IMC. However, it will be basically based on sold tickets numbers and from methodological viewpoint will not work with increased awareness as such.

5.1.2.3. Data collection

The table below represents all the data collection activities for IP 2 Promoting and enhancing the use of public transport will be carried out in the city of Brno during the project life cycle.

Table 15: Data collection inventory for Brno

INDICATORS	LEVEL3	FOCUS	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Awareness and satisfaction with PT	M/ IP		before / after	questionnaires	PT user	representative	18th, 30th and 42nd month	SMB
Acceptance of Transport Plan	M		after	questionnaires	PT user	representative	42nd month	SMB
Increased number of PT users	M/ IP		before / after	number of sold tickets	sold ticket	all sold tickets	30th and 42nd month	SMB
Increased awareness about integrated public transport system	M/ IP		before / after	questionnaires	PT user	representative	24th and 36th month	SMB

[3] M= Measure level

IP= Integrated Package Level

Details on the data collection

Attitude and behaviour surveys

- Acceptance and satisfaction with PT

The quantitative method of a questionnaire will serve to assess and measure the acceptance of Transport Plans and awareness of this measure

  - Target group and sample size: This measure is focused on the whole population of the city of Brno and the size of sample will be statistically representative (over 1000 questionnaires).
  - The location
    The City of Brno
  - Timing: Data will be collected in the 18th, 30th and 42nd month and in the 24th and 36th month.
  - Responsible: The City of Brno

Operational data

- Number of sold tickets
  - The location: The City of Brno
  - Timing: Data will be collected in the 30th and 42nd month.
  - Responsible: The City of Brno

5.1.3. Integrated package 3: Ticket vending machines diagnostics

5.1.3.1. Description

A. *Objectives and scope*

The third package includes only one measure that stands alone with its aim to improve vending machine diagnostic and maintenance. The main focus of this measure is at quality of service and consequently increased customer satisfaction

Objectives

- Improvement of the system of vending machines maintenance
  - Improved quality of services in PT
  - Reduction of the time required for reparation of broken or damaged vending machines ("Dead Time")
  - Increased customer satisfaction with ticket vending machines
- Increased revenue from ticket selling

B. *Overview of the measures*

- Measure 8.7 Ticket vending machine diagnostic

Ticket vending machine diagnostic

The objective of this measure is to increase both the quality of service and the customer. The system of administration and maintenance of vending machines is based on periodical checks by maintenance workers or on announcements of out-of-order conditions by passengers. There is no information about the functionality until the regular check. A system of wireless modems will be installed in all vending machines, which will automatically (and on-line) send a message to the control centre in case of any problem. It will enable maintenance workers to solve the problem with defective vending machines quickly and efficiently.

C. *Innovative aspects*

The innovative aspects of the measure can be seen in approach of:

- Transferring data effectively and quickly from vending machines to the control centre
- Using wireless information and telecommunication technology
- Increasing the functionality of vending machines

D. *Research and technical development*

The proposal to implement this measure is feasible due to the fast development of information technologies and mainly the wireless data transfers. In many other branches the remote diagnostics of technical equipment status is used. Our company is using such technology in the substations. This development contributed to the data collection about technical status, in fact about the technical vending machines defects. The demands for good functioning of the system were consulted with the vending machines producer.

E. *Situation before CIVITAS*

DPMB, as the dominant PT operator in the city of Brno, operates 150 vending machines for ticket selling. At present, many problems concerning good functionality are being solved:

The system of administration and maintenance of vending machines is based on periodical checks by maintenance workers or on announcements of out-of-order conditions by passengers. Checks are done depending on the location of the vending machines – for example daily in the centre but weekly for some others. There is no information about the functionality until the maintenance workers come and check.

Apart from this, the information about the conditions of the vending machines (e.g. break down, lack of paper, even stolen machine) is missing. Thus it can happen that immediately after the departure of the maintenance workers, another problem occurs and the machine stays without repair until the next maintenance check. In the meantime the control centre receives notifications from passengers.

F. *Inter-relationships with other measures*

This measure focuses more on quality of service. Obviously, a good state and functioning of ticket vending machines contributes to the good image of PT operator and thus could be seen as contributing to modal split, on the other hand the measures in IP2 are more targeted at the PT users than this measure.

5.1.3.2. Evaluation activities and indicators

This measure has a very different focus than other measures of Brno and thus it stands alone and so the measure level and integrated package level coincide. Also as this measure aims to have some positive financial outcomes, a detailed CBA will be provided for this measure.

A. *Evaluation activities and Indicators at IP level*

Expected impacts

The impacts of this IP (measure 8.7) are following:

- Quality of service

  The wireless system is expected to shorten the “dead time” of vending machines and thus improve the quality of services. PT users will have higher opportunity to buy their ticket in the vending machines.

- Operating revenues

  This measure will expectedly have also an impact on the operating revenues.

- Higher customer satisfaction

  This is rather hard to estimate in advance but if the vending machines will less and for shorter time out of order, it may lead to lower number of complaint concerning vending machines. That is why the complaints will be counted.

Selected indicators

In the table below an overview is given of all the evaluation activities for the IP 3 Ticket vending machine diagnostics.

Table 16: Evaluation activities and indicators at IP level

	EVALUATION ACTIVITIES/ INDICATORS	CONCLUSIONS
IP 3: TICKET VENDING MACHINES DIAGNOSTIC	▪ Evaluation directly on IP level: – Quality of service – Operating revenues – Number of complaints – Number of defects of vending machines – "Dead Time" of vending machines – Number of tickets sold in vending machines	▪ Improvement of the system of vending machines maintenance ▪ Increased revenue from ticket selling (CBA) ▪ Quality of service – customer satisfaction ▪ Better quality of service ▪ Better quality of service – reduction of "Dead Time" ▪ Increased operating revenues → Scope: ELAN – corridor (for pilot functioning), then ELAN – city level

Details of the evaluation activities

This measure mainly aims at improving quality of the provided service whereas the measure will also have an impact on operating revenues. The other impact of this measure is expected in relation to customers' satisfaction.

- Quality of service

  The quality of service in the case of such measure will be measured

  – Number of complaints

  DPMB collects the numbers of complaints concerning the non-functiong of the vending machines. The expectation is that the number of complaints will be lower after the implementation of the measure.

  – Number of defects of vending machines: n hours when the vending machines is out of order.

  – "Dead time" of vending machines

  – Number of tickets sold in vending machines

- Operating revenues

  Operating revenues will be measured in number of ticket sold in the vending machines or precisely the amount of money from the vending machines.

- customers' satisfaction

  – Lower number of complaints

This is rather hard to estimate in advance but if the vending machines will less and for shorter time out of order, it may lead to lower number of complaint concerning vending machines. That is why the complaints will be counted.

5.1.3.3. CBA

Diagnostic system installed in vending machines has a primary goal to inform directly about any not-functioning machine to the controlling centre for ticket vending machines. This way the machine will get repaired as fast as possible. The benefits of this measure are multiple and have impacts on quality of service for passengers but also on public transport operator's income from tickets sold in vending machines. This measure is very suitable for CBA as long as the investment into implementation of such system can be confronted with its benefits.

Table 17: Overview of indicators and data collection activities for CBA

AGENTS	COSTS	BENEFITS
PT operator	▪ implementation costs ▪ operating costs ▪ maintenance costs	▪ higher customer satisfaction decrease in number of complaints ▪ dead" time on vending machines ▪ revenue number of sold tickets
PT users		▪ higher quality of service by decrease in number of defects

5.1.3.4. Data collection

The table below represents all the data collection activities for IP 3 Ticket vending machines diagnostics will be carried out in the city of Brno during the project life cycle.

Table 18: Data collection inventory for the city of Brno

INDICATOR	LEVEL 4	FOCUS	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
number of complaints	M	F	continuous	monitoring number of complaints	complaint	all complaints	throughout	DPMB
number of defects on vending machines	M /IP	F	continuous	monitoring number of defects	defect	all defects	throughout	DPMB
"Dead Time" of vending machines	M /IP	F	before / intermediate / after	measuring time	h	10 machines (pilot functioning) and 150 afterwards	Before 9th, between 9th and 24th (pilot functioning) and after 24th month	DPMB

[4] M= Measure level

IP= Integrated Package Level

INDICATOR	LEVEL 4	FOCUS	PERIODICITY	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
number of tickets sold in vending machines	M /IP	F	before / intermediate / after	counting tickets	ticket sold in vending machine	all tickets sold in vending machines	Before 9th, between 9th and 24th (pilot functioning) and after 24th month	DPMB

Details on the data collection

Operational data

- Number of defects
  - Target group and sample size: All the complaints will be collected.
  - Timing: Data will be collected throughout the project duration.
  - Responsible: DPMB

- „Dead time“ of vending machines

The data about the time of defect and time of reparation are to be collected for chosen month during the course of the project. Before intermediate and after data will be compared.

  - Target group and sample size: This measure is focused on the whole population of the city of Brno and the size of sample will be statistically representative (over 1000 questionnaires).
  - The location: The City of Brno
  - Timing: Data will be collected before 9th, between 9th and 24th months and after 24th month.
  - Responsible: DPMB

- Tickets sold in vending machines

These numbers will be collected and compared before, at intermediate stage and after the course of the project.

  - Target group and sample size: This measure is focused on the whole population of the city of Brno and the size of sample will be statistically representative (over 1000 questionnaires).
  - The location: The City of Brno
  - Responsible: DPMB

- Number of complaints

The complaints of PT users about not-functioning vending machines will be monitored throughout the course of the project and a comparison will be made based on data before and after implementation of the project.

5.2. City level

5.2.1. Objectives and scope

The main objectives on city level are:

- Decrease in use of electricity and fuels
- Promoting and enhancing the use of public transport.

These two main objectives are partially to be achieved due to implementation of measure within CIVITAS ELAN Project. However, the limits to the impact those measures might have are evident when taking into consideration the number and volume of measures.

5.2.2. Key Impacts

Based on the main objectives on city level that were described above, two key impacts can be defined on the city level. In relation to the first objective; Decrease in use of electricity and fuels, an obvious choice is to measure the impact on the air quality. In relation to the second objective; enhancing the use of public transport, the use of PT in relation to other transport modes was identified by the City of Brno as well as Brno Public Transport Company as a key impact on city level.

5.2.2.1. Modal split

The City of Brno has access to a study on Modal Split in Brno, unfortunately this is not using sufficiently reliable data. That is why the City of Brno decided to prepare another Modal Split study that will be carried out twice through the course of the project. The method used for data collection will be questionnaire and it will focus on the share of different modes of transport (walking, cycling, public transport and individual transport).

5.2.2.2. Air quality

The City of Brno has several stations measuring the Air quality in the city. Some of these stations do not belong to Brno but the collected data are accessible for the City. The measurements of CO, NOx and particles are usually done and these data are of high relevance to transport and air quality. That is why these indicators were chosen to provide information of a change of the air quality due to decrease of individual transport.

5.2.3. Data collection

In the table below a detailed overview is given of all the evaluation activities on city level.

Table 19: Data Collection Inventory for Brno

INDICATOR	LEVEL5	PERIODICITY	TYPE	METHOD	DATA COLLECTION UNIT	SAMPLE SIZE	TIMING	RESPONSIBLE
Modal Split	City	before / after	behaviour survey	questionnaire	inhabitant	representative	17th and 40th month	SMB
Emissions	City	continuous	operational	measuring emissions	CO, NOx, particles	city (12 emission stations)	throughout	SMB

[5] M= Measure level

IP= Integrated Package Level

Details on the data collection

- Modal Split
  - Target group and sample size: The group is composed of the whole population of the city of Brno (and possibly wider metropolitan area) and the size of sample will be statistically representative (over 1000 questionnaires).
  - The location: The City of Brno and possibly wider metropolitan area
  - Timing: Data will be collected in the 17th and 40th month.
  - Responsible: The City of Brno

- Air quality

The data on CO, NOx and particles are available on the long term basis where applicable the data will be used in week means or monthly means.

  - The location: The City of Brno
  - Timing: Data are collected throughout the project duration.
  - Responsible: The City of Brno

Figure 9: The location of measuring stations within the city of Brno

6. In- depth process evaluation

In this chapter only the focus measures that are subject to the in- depth process evaluation are described. For these measures the process of implementation will be analysed very closely to obtain a full understanding and overview of the implementation process.

The non-focus measures will not be described here however some basic process evaluation will be provided for these measures based on a fill- in form filled in by the ML's on a yearly basis.

As Focus measures and for the Process evaluation the following measures were chosen for the City of Brno:

- 2.7 BRN Improving bus service for disabled persons
- 4.12 BRN Comprehensive mobility dialogue and marketing research – new transport services
- 8.7 BRN Ticket vending machine diagnostic

6.1. Measure 2.7 Improving bus service for disabled persons

6.1.1. Description

See chapter on impact evaluation.

6.1.2. Process stages of the implementation phase

The process of the implementation results in the following expected timeline:

Table 20: expected process stages for the measure 2.7 Improving bus service for disabled persons

Stage	Year 1				year 2				year 3				year 4			
Tender preparation																
Tender																
Implementation																
Operation																

6.1.3. Methodology for the process evaluation

The process evaluation serves to collect data that are hard to capture within quantitative research and thus it will be carried out using several methods. These are a following:

- Questionnaires with open-ended questions
- Qualitative half-structured interview
- Focus Groups/ Learning History

6.2. Measure 4.12 Comprehensive mobility dialogue and marketing research – new transport services

6.2.1. Description

See chapter on impact evaluation.

6.2.2. Process stages of the implementation phase

The process of the implementation results in the following expected timeline:

Table 21: expected process stages for the measure 4.12 Comprehensive mobility dialogue and marketing research – new transport services

Stage	year 1				year 2				year 3				year 4			
Preparation – transport plans																
Implementation – transport plans																
Evaluation– transport plans																
Preparation – marketing research																
Implementation – marketing research																
Evaluation – marketing research																

6.2.3. Methodology for the process evaluation

The process evaluation serves to collect data that are hard to capture within quantitative research and thus it will be carried out using several methods. These are a following:

- Questionnaires with open-ended questions
- Qualitative half-structured interviews with key stakeholders
- Focus Groups/ Learning History

6.3. Measure 8.7 Ticket vending machine diagnostic

6.3.1. Description

See chapter on impact evaluation.

6.3.2. Process stages of the implementation phase

The process of the implementation results in the following expected timeline:

Table 22: expected process phases for the measure 8.7 Ticket vending machine diagnostic

Stage	year 1				year 2				year 3				year 4			
Architecture preparation																
Tender preparation																
Tender																
Implementation																

Stage	year 1				year 2				year 3				year 4			
Pilot project																
Operation																

6.3.3. Methodology for the process evaluation

The process evaluation serves to collect data that are hard to capture within quantitative research and thus it will be carried out using several methods. These are a following:

- Questionnaires with open-ended questions
- Qualitative half-structured interview with key stakeholders
- Focus Groups/ Learning History