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1. **INTRODUCTION**

1.1. **Context**

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 (DG TREN) and started in 2002. CIVITAS is seen as contributing to the European Commission’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:

- City-coordinated: it is a programme “of cities for cities”,
- Cities in the heart of local public private partnerships,
- Requirement of political commitment, and
- Cities as “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.
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)

### 1.1.2. 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 CO2, pollutant emissions and noise
• Improving efficiency & effectiveness of urban transport & modal balance

Next to ELAN, there are four other CIVITAS Plus collaborative projects funded by the European Commission and running in parallel to ELAN (Table 1.1).

Table 1.1: CIVITAS Plus demonstration projects

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<td>ELAN</td>
<td>Ljubljana, Gent, Zagreb, Porto, Brno</td>
</tr>
<tr>
<td>MIMOSA</td>
<td>Bologna, Funchal, Utrecht, Gdansk, Tallinn</td>
</tr>
<tr>
<td>MODERN</td>
<td>Craiova, Brescia, Coimbra, Vitoria-Gasteiz</td>
</tr>
<tr>
<td>RENAISSANCE</td>
<td>Perugia, Bath, Gorna-Orjahovitsa, Szczecinek, Skopje</td>
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1.1.3. CIVITAS ELAN

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 work plan for the CIVITAS Programme. Based on the cooperation agreement signed by the mayors of the five cities, a common mission statement for CIVITAS ELAN was 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.

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” the project not only contributes to better governance, it also transfers ownership of our policies into the hands of our citizens – and also reduces 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.

**Figure 1.2: The CIVITAS ELAN partner cities**

1.2. Project objectives

In responding to citizens’ needs, CIVITAS ELAN has identified headline objectives for each CIVITAS policy field (Table 1.2).
### Table 1.2: Headline objectives CIVITAS ELAN

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<thead>
<tr>
<th>Mobilising citizens, creating vital cities, ensuring health and access for all by:</th>
<th></th>
</tr>
</thead>
</table>
| **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** | • 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)  
  • 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 were implemented by 68 measures.
1.3. Project consortium

The CIVITAS ELAN project brings together five cities from five European countries. Ljubljana (Slovenia), Gent (Belgium) and Zagreb (Croatia) are the leading cities of which Ljubljana represents the New Member States and Zagreb a candidate country. Porto (Portugal) and Brno (Czech Republic) are the 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),
- 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, environmental 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 41 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.

Table 1.3 gives an overview of all CIVITAS ELAN partners.

**Table 1.3: Overview of the CIVITAS ELAN Partners**

<table>
<thead>
<tr>
<th>Beneficiary short name</th>
<th>Beneficiary name</th>
<th>Beneficiary No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COL</td>
<td>Mestna občina Ljubljana</td>
<td>1</td>
</tr>
<tr>
<td>LPP</td>
<td>Ljubljanski potniški promet</td>
<td>2</td>
</tr>
<tr>
<td>Beneficiary name</td>
<td>Beneficiary name</td>
<td>Beneficiary No.</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>TELARGO</td>
<td>Telargo d.o.o. Informacijske rešitve v prometu in transportu</td>
<td>3</td>
</tr>
<tr>
<td>UIRS</td>
<td>Urban Planning Institute of the Republic of Slovenia</td>
<td>4</td>
</tr>
<tr>
<td>UL</td>
<td>Univerza v Ljubljani</td>
<td>5</td>
</tr>
<tr>
<td>PI</td>
<td>Prometni institut Ljubljana d.o.o.</td>
<td>6</td>
</tr>
<tr>
<td>AIS</td>
<td>Agricultural Institute of Slovenia</td>
<td>7</td>
</tr>
<tr>
<td>REC SLO</td>
<td>Regional Environmental Center, Country Office Slovenia</td>
<td>8</td>
</tr>
<tr>
<td>JSI</td>
<td>Inštitut Jožef Stefan</td>
<td>9</td>
</tr>
<tr>
<td>SZ</td>
<td>Slovenske železnice</td>
<td>11</td>
</tr>
<tr>
<td>RC</td>
<td>Rupprecht Consult</td>
<td>12</td>
</tr>
<tr>
<td>GCC</td>
<td>Gent City Council</td>
<td>13</td>
</tr>
<tr>
<td>DLN</td>
<td>De Lijn</td>
<td>14</td>
</tr>
<tr>
<td>AWV</td>
<td>Agency Roads and Traffic (new name and abbreviation)</td>
<td>15</td>
</tr>
<tr>
<td>MMB</td>
<td>Maxmobiel</td>
<td>16</td>
</tr>
<tr>
<td>SM</td>
<td>Student and Mobility</td>
<td>17</td>
</tr>
<tr>
<td>CAMBIO</td>
<td>Cambio</td>
<td>18</td>
</tr>
<tr>
<td>UGENT</td>
<td>Gent University</td>
<td>19</td>
</tr>
<tr>
<td>TE</td>
<td>Tractebel Engineering</td>
<td>20</td>
</tr>
<tr>
<td>CMP</td>
<td>Câmara Municipal do Porto</td>
<td>21</td>
</tr>
<tr>
<td>FEUP</td>
<td>Faculdade de Engenharia da Universidade do Porto</td>
<td>22</td>
</tr>
<tr>
<td>STCP</td>
<td>Sociedade de Transportes Colectivos do Porto, SA</td>
<td>23</td>
</tr>
<tr>
<td>MP</td>
<td>Metro do Porto, SA</td>
<td>24</td>
</tr>
<tr>
<td>ANTROP</td>
<td>Associação Nacional de Transportadores Rodoviários de Pesados de Passageiros</td>
<td>25</td>
</tr>
<tr>
<td>OPT</td>
<td>Optimização e Planeamento de Transportes, S.A.</td>
<td>26</td>
</tr>
<tr>
<td>FCUP</td>
<td>Faculdade de Ciências da Universidade do Porto</td>
<td>27</td>
</tr>
<tr>
<td>UFP</td>
<td>Universidade Fernando Pessoa</td>
<td>28</td>
</tr>
<tr>
<td>SMB</td>
<td>Statutární město Brno</td>
<td>29</td>
</tr>
<tr>
<td>DPMB</td>
<td>Dopravní podnik města Brno</td>
<td>30</td>
</tr>
<tr>
<td>FGM-AMOR</td>
<td>Forschungsgesellschaft Mobilität - Austrian Mobility Research, FGM-AMOR, Gemeinnützige GmbH</td>
<td>32</td>
</tr>
<tr>
<td>ZAGREB</td>
<td>City of Zagreb</td>
<td>33</td>
</tr>
<tr>
<td>ZET</td>
<td>&quot;Zagrebački Holding&quot; Co., department &quot;ZET&quot;</td>
<td>34</td>
</tr>
<tr>
<td>HZ INFRA</td>
<td>HŽ Infrastruktura Development and Investment</td>
<td>35</td>
</tr>
<tr>
<td>CISTOCA</td>
<td>&quot;Zagrebački Holding &quot; Co., department &quot;ČISTOČA&quot;</td>
<td>36</td>
</tr>
<tr>
<td>ODRAZ</td>
<td>Non governmental organisation ODRAZ</td>
<td>37</td>
</tr>
<tr>
<td>BICIKL</td>
<td>Non government organisation BICIKL</td>
<td>38</td>
</tr>
<tr>
<td>ZFOT</td>
<td>University of Zagreb, Faculty of Transport and Traffic Engineering</td>
<td>39</td>
</tr>
<tr>
<td>DG</td>
<td>DIGIPOLIS</td>
<td>40</td>
</tr>
</tbody>
</table>
Further information on the city context of each city and their key characteristics can be found in Chapter 3, in the evaluation results for each city, Integrated Package and Measure.

### 1.4. Overview of the measures

Table 1.4 gives a list of all the implementation measures within CIVITAS ELAN.

<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Title</th>
<th>City of Gent</th>
<th>City of Ljubljana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2-GEN</td>
<td>Energy efficient city fleet management</td>
<td>1.7- LJU</td>
<td>Pure plant oil for vehicle propulsion</td>
</tr>
<tr>
<td>1.8-GEN</td>
<td>Extended biodiesel production</td>
<td>1.11- LJU</td>
<td>Hybrid and CNG bus implementation</td>
</tr>
<tr>
<td>1.9-GEN</td>
<td>Semi-public clean car fleet</td>
<td>1.12- LJU</td>
<td>Green procurement for public fleets</td>
</tr>
<tr>
<td>1.10-GEN</td>
<td>Introduction of hybrid vehicles</td>
<td>2.1- LJJU</td>
<td>Integrated high-quality mobility corridor</td>
</tr>
<tr>
<td>1.13-GEN</td>
<td>Clean public transport strategies (B30 &amp; emission control)</td>
<td>3.1- LJJU</td>
<td>Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels</td>
</tr>
<tr>
<td>2.2-GEN</td>
<td>Improved Public Transport service levels</td>
<td>3.3- GEN</td>
<td>Parking and public space management around train station and ELAN corridor</td>
</tr>
<tr>
<td>2.3-GEN</td>
<td>Collective taxi service</td>
<td>3.4- GEN</td>
<td>Pedestrian area enforcement access restrictions</td>
</tr>
<tr>
<td>2.4-GEN</td>
<td>Intelligent Park&amp;Ride enforcement</td>
<td>4.2-GEN</td>
<td>Mobility management for companies</td>
</tr>
<tr>
<td>2.9-GEN</td>
<td>Participatory re-development of main train station area</td>
<td>4.3-GEN</td>
<td>Mobility management for schools</td>
</tr>
<tr>
<td>3.3-GEN</td>
<td>Parking and public space management around train station and ELAN corridor</td>
<td>4.5-GEN</td>
<td>“The House of Bike” and bicycle activities</td>
</tr>
<tr>
<td>3.4-GEN</td>
<td>Pedestrian area enforcement access restrictions</td>
<td>4.7-GEN</td>
<td>Walking promotion</td>
</tr>
<tr>
<td>4.2-GEN</td>
<td>Mobility management for companies</td>
<td>4.10-GEN</td>
<td>Comprehensive mobility dialogue and marketing campaign</td>
</tr>
<tr>
<td>4.3-GEN</td>
<td>Mobility management for schools</td>
<td>5.6-GEN</td>
<td>Safe cycling corridor</td>
</tr>
<tr>
<td>4.4-GEN</td>
<td>“The House of Bike” and bicycle activities</td>
<td>5.7-GEN</td>
<td>Security enforcement in public transport</td>
</tr>
<tr>
<td>4.5-GEN</td>
<td>Walking promotion</td>
<td>6.2-GEN</td>
<td>Innovative car sharing</td>
</tr>
<tr>
<td>4.7-GEN</td>
<td>Comprehensive mobility dialogue and marketing campaign</td>
<td>6.3-GEN</td>
<td>Holistic event management</td>
</tr>
<tr>
<td>4.10-GEN</td>
<td>Route planner for bicycles</td>
<td>7.3-GEN</td>
<td>Institutional platform for city freight management</td>
</tr>
<tr>
<td>5.6-GEN</td>
<td>Safe cycling corridor</td>
<td>8.6-GEN</td>
<td>Sustainable multi-modal traffic management</td>
</tr>
<tr>
<td>5.7-GEN</td>
<td>Security enforcement in public transport</td>
<td>8.9-GEN</td>
<td>IT-based bicycle theft prevention</td>
</tr>
<tr>
<td>6.2-GEN</td>
<td>Innovative car sharing</td>
<td>8.10-GEN</td>
<td>Route planner for bicycles</td>
</tr>
<tr>
<td>6.3-GEN</td>
<td>Holistic event management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.3-GEN</td>
<td>Institutional platform for city freight management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.6-GEN</td>
<td>Sustainable multi-modal traffic management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.9-GEN</td>
<td>IT-based bicycle theft prevention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.10-GEN</td>
<td>Route planner for bicycles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In Table 1.4, the implementation measures are listed for each city, providing a comprehensive overview of the measures taken within the CIVITAS ELAN project.
The integration of measures from different policy fields into one comprehensive urban policy concept is one of the major innovations in CIVITAS. ELAN will strongly be following this approach. The following dimensions are considered in the project:

- **Stakeholder integration**: By ‘putting people first’, the cities in the CIVITAS ELAN-project does not only contribute to governance, but they also allow to transfer ownership of the policies into the hands of the citizens and thus reduce risk of failure. Through an encouraging policy, the cities win the minds and hearts of the citizens to initiate long-term changes in mobility patterns. CIVITAS ELAN puts therefore a special emphasis on stimulating a dialogue between policy makers/ implementers with the citizens and all mobility stakeholders in order to allow for a better involvement in decision-making processes. Some measures directly include...
a strong participative element, encouraging citizens and stakeholders to take part in planning and decision making processes.

- **Institutional integration**: In ELAN, the relevant institutions involved in mobility policy are committed to intensifying their cooperation over the next years, in order to implement mobility policy strategies in the most efficient way. The CIVITAS ELAN project plays an important role in accelerating this process.

- **Policy integration**: Different tools of urban transport together with land-use, energy, health and environment-related policies are developed and implemented in one integrated transport policy package. This means - for the project - that each measure is implemented in combination with other measures.

- **Spatial integration**: The five ELAN cities are all regional centres in terms of employment, higher education and economic activities, which generates strong transport flows between the city and the region. All cities include the regional dimension in many mobility planning aspects. The strongest element of spatial integration is indeed a “CIVITAS innovation corridor”, in each of the five cities, which has been identified as a focal point of mobility issues and activities within the project.

- **Modal integration**: Implementation in CIVITAS ELAN is concentrated on integrated mobility corridors, emphasising intermodality, developing innovative integrated mobility services, which not only include the integration of different public transport modes, but also the use of taxis and minibuses in low density areas as well as car sharing, car pooling and bike renting services.

- **Cross-site integration**: In each policy field, three or more cities work in similar areas in order to allow for a close cooperation of the actors across the sites. The partner cities are highly committed to making use of all opportunities to exchange experiences and transfer technologies. The work packages and in particular the common measures will serve as platforms for the exchange of knowledge and the transfer of good practices from one city to another.

- **Technological integration**: The integration of innovative technological tools into mobility policy measures facilitates their successful implementation (e.g. a car recognition system to improve the enforcement of access restriction and innovative information and communication technologies to improve the quality of flexible mobility services or traveller information services, etc.).
1.5. Structure of this report

The first chapter describes the context of the evaluation work referring to the CIVITAS programme and the specific aspects of the CIVITAS ELAN project.

The second chapter explains the overall evaluation approach of CIVITAS ELAN. Also the specific choices for CIVITAS ELAN are highlighted here, mainly to increase the efficiency and transparency of the evaluation. CIVITAS ELAN structured the evaluation work in Integrated Packages of measures referring to impacts for which the different measures are working strongly together to achieve this impact. In this way the impact of measures are reported on three levels: Measure level, Integrated Package level and Corridor/ City level. As part of the process evaluation, CIVITAS ELAN also focuses specifically on the way citizen engagement actions supported the implementations. Common Measures as themes where the cities did discuss the findings of the measures related to that theme were an important concept in CIVITAS ELAN to make conclusions on project level stronger.

The third chapter reports in detail the evaluation results for the five CIVITAS ELAN cities on Integrated Package level, on measure level and on Corridor/ City level. Both impact and evaluation findings are reported on each level.

The fourth chapter focuses on the results of the Citizen Engagement evaluation. Here different aspects of Citizen Engagement actions are discussed: the quality of the activities, the drivers and barriers during preparation, implementation and operation of the citizen engagement activities and the impact of the citizen engagement activities on the implementation process of the measure and on the general awareness and acceptance of sustainable mobility in the city. In this chapter only evaluation results on city level and on project level are reported. The evaluation results on measure level are reported in the MERTs in annex and in D10.14.

The fifth chapter brings together all findings to draw some conclusions on project level. Here CIVITAS ELAN brings together the findings of the evaluation on Measure level and Integrated Package level to come to significant comparative interpretations for the different type of measures and packages that CIVITAS ELAN implemented in the framework of the CIVITAS programme. Since this type of findings is one of the key objectives of the CIVITAS programme CIVITAS ELAN introduced the concept of Common Measures. This info is restructured here as well and combined with the Impact and Process Evaluation of the related measures.

In a second part of this chapter CIVITAS ELAN summarizes the findings of the measures around the 8 CIVITAS policy fields. Here the findings of the implemented measures under these policy fields are structured in relation to the context of implementation, the target groups and the impacts observed.

Finally chapter six draws general conclusions on the Evaluation Approach and the Results of the evaluation. In cooperation with the city representatives also general policy recommendations are added.
2. EVALUATION APPROACH

2.1. Evaluation framework

The evaluation framework was prepared in D12.1 the Final Evaluation Plan, prepared in November 2009. This deliverable presented a structured 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 gave a detailed overview of all the evaluation tasks that would be performed throughout the life cycle of the CIVITAS ELAN Project. It defined clear objectives of the measures that would be implemented in the CIVITAS ELAN cities and how the impact of these measures would be evaluated. It also paid 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 would be fulfilled, was explained in a 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 determination of responsibilities for each evaluation task in order to guarantee full awareness and reliability of the evaluation tasks.

2.1.1. Objectives

In CIVITAS ELAN 5 ambitious cities introduced 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 implementations 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 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.

2.1.2. Roles and responsibilities

Evaluation is a complex activity in which all partners worked together to have a clear understanding of the measures and the objectives, to define an efficient evaluation approach, to collect good data, analyse them and to draw relevant conclusions. Figure 2.1 shows in a schematic way the partners that were involved in this process.
Figure 2.1: Organisational scheme Evaluation CIVITAS ELAN

Measure Leaders (ML’s)
Each measure leader was responsible for the basic evaluation activities within his measure. In each of the cities close cooperation between the Site Evaluation Manager and the ML’s made sure that all the evaluation activities were in full agreement with the ML’s. Next to the evaluation activities on measure level the some ML’s were also responsible for the delivery of evaluation data for the integrated package level and city level according to what was agreed with the Site Evaluation Managers.

Site Evaluation Managers (SEM’s)
Site Evaluation Managers (SEM’s) were the key responsible persons for the evaluation on the CIVITAS ELAN site level. In each city they coordinated the evaluation on local level and worked closely with the Site Coordinators and the ML’s. The SEM’s also evaluated the CIVITAS ELAN project on the level of the city and the CIVITAS ELAN corridor and drew conclusions on the level of integrated packages of measures.

Project Evaluation Manager (PEM)
The Project Evaluation Manager Tractebel Engineering coordinated 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 worked in close contact with the Project Coordinator and Project Manager of CIVITAS ELAN. On CIVITAS Plus level the PEM worked with POINTER to come to an efficient and consistent evaluation approach.

POINTER
POINTER coordinated the evaluation on the CIVITAS Plus level and reported to the European Commission. They provided the guidelines and gathered the information for all the CIVITAS Plus projects.
2.2. Impact evaluation

2.2.1. 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.”

The aim of impact evaluation is to assess 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.

If relevant to draw relevant and correct conclusions, some of the measures are up-scaled. For most of the measures also a Business-As-Usual is described to make correct comparisons with the new situation due to CIVITAS ELAN. For the most important and significant measures, a cost-benefit analysis or a financial analysis is done.

2.2.2. Levels of impact evaluation

Impact evaluation in the CIVITAS- ELAN project is carried out on three levels:

- Measure level (M)
- Integrated Package level (IP)
- Corridor/City level (C).

Figure 2.2: Summary levels of evaluation CIVITAS ELAN

These levels are explained further hereunder starting with the Integrated Package level since this level structures the evaluation on Measure level into logical parts of the city policy.
2.2.2.1. Integrated Package (IP) level

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 public transport users what their perception is of the service level of the public transport services. Different measures however influenced this service level and extracting the exact impact of only one measure is difficult and even not desirable. Because of this, certain impact evaluation results were gathered on this level as it allowed 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 to separate or measure the impact of different measures individually. The impact of groups of measures may be greater than the sum of the impacts of individual measures. An example is the implementation of different measures affecting the quality of public transport. Although the impact from the different measures separately can be questioned to some extent, the combination of all the measures that contribute to the improvement of the public transport service is far more relevant and important. This can be easily measured through one overall survey on the quality of the services with the public transport users.

Table 2.1 gives an overview of all integrated packages of measures with their corresponding measures for each of the cities. These have no cross-city coherence, but were selected based on their common expected impacts on a number of indicators. A further description of the packages for each of the cities, along with a description of their common objectives against which they were evaluated, is described more in detail in Chapter 3 of this deliverable.

### Table 2.1: Overview of the CIVITAS ELAN Integrated Packages

<table>
<thead>
<tr>
<th>City/ IP/ Measure Number</th>
<th>Integrated Package/ Measure Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Gent</td>
<td></td>
</tr>
<tr>
<td>IP 1- GEN</td>
<td>Promoting and enhancing the use of clean vehicles</td>
</tr>
<tr>
<td></td>
<td>Energy efficient city fleet management</td>
</tr>
<tr>
<td></td>
<td>Extended biodiesel production</td>
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<td></td>
<td>Semi-public clean car fleet</td>
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<td></td>
<td>Introduction of hybrid vehicles</td>
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<tr>
<td></td>
<td>Clean public transport strategies (B30 &amp; emission control)</td>
</tr>
<tr>
<td>IP 2- GEN</td>
<td>Citizen engagement leading to changing Mobility Behaviour</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>City/ IP/ Measure Number</th>
<th>Integrated Package/ Measure Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.9-GEN</td>
<td>Participatory re-development of main train station area</td>
</tr>
<tr>
<td>4.2-GEN</td>
<td>Mobility management for companies</td>
</tr>
<tr>
<td>4.3-GEN</td>
<td>Mobility management for schools</td>
</tr>
<tr>
<td>4.10-GEN</td>
<td>Comprehensive mobility dialogue and marketing campaign</td>
</tr>
<tr>
<td>6.2-GEN</td>
<td>Innovative car sharing</td>
</tr>
<tr>
<td>6.3-GEN</td>
<td>Holistic event management</td>
</tr>
<tr>
<td><strong>IP 3- GEN</strong></td>
<td>Adjust car &amp; freight traffic by Traffic Management</td>
</tr>
<tr>
<td>2.4-GEN</td>
<td>Intelligent Park&amp;Ride enforcement</td>
</tr>
<tr>
<td>3.3-GEN</td>
<td>Parking and public space management around train station and ELAN corridor</td>
</tr>
<tr>
<td>3.4-GEN</td>
<td>Pedestrian area enforcement with automatic number plate recognition</td>
</tr>
<tr>
<td>7.3-GEN</td>
<td>Institutional platform for city freight management</td>
</tr>
<tr>
<td>8.6-GEN</td>
<td>Sustainable multi-modal traffic management</td>
</tr>
<tr>
<td><strong>IP 4- GEN</strong></td>
<td>Improving the Quality of collective transport</td>
</tr>
<tr>
<td>2.2-GEN</td>
<td>Improved Public Transport service levels</td>
</tr>
<tr>
<td>5.7-GEN</td>
<td>Security enforcement in public transport</td>
</tr>
<tr>
<td><strong>IP 5- GEN</strong></td>
<td>Stimulating Cycling and Walking conditions</td>
</tr>
<tr>
<td>4.5-GEN</td>
<td>“The House of Bike” and bicycle activities</td>
</tr>
<tr>
<td>4.7-GEN</td>
<td>Walking promotion</td>
</tr>
<tr>
<td>5.6-GEN</td>
<td>Safe cycling corridor</td>
</tr>
<tr>
<td>8.9-GEN</td>
<td>IT-based bicycle theft prevention</td>
</tr>
<tr>
<td>8.10-GEN</td>
<td>Route planner for bicycles</td>
</tr>
<tr>
<td><strong>City of Ljubljana</strong></td>
<td></td>
</tr>
<tr>
<td><strong>IP 1- LJU</strong></td>
<td>Making public transport in the corridor the most desirable transport mode</td>
</tr>
<tr>
<td>1.11- LJU</td>
<td>Hybrid and CNG bus implementation</td>
</tr>
<tr>
<td>2.1- LJU</td>
<td>Integrated high-quality mobility corridor</td>
</tr>
<tr>
<td>3.1- LJU</td>
<td>Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels</td>
</tr>
<tr>
<td>4.1- LJU</td>
<td>Individualized mobility marketing based on public involvement and inclusion in defining city transport policy</td>
</tr>
<tr>
<td>8.1- LJU</td>
<td>Public Transport priority at intersections</td>
</tr>
<tr>
<td>8.4- LJU</td>
<td>LJU Real time information for staff and passengers</td>
</tr>
<tr>
<td>8.5- LJU</td>
<td>E-ticketing and fare integration</td>
</tr>
<tr>
<td><strong>IP 2- LJU</strong></td>
<td>For vital, healthier and safer citizens in city transport</td>
</tr>
<tr>
<td>4.6- LJU</td>
<td>Comprehensive Cycling Strategy</td>
</tr>
<tr>
<td>4.9- LJU</td>
<td>Update of the Sustainable Urban Transport Plan</td>
</tr>
<tr>
<td>5.2- LJU</td>
<td>Safety &amp; security for seniors and public transport users</td>
</tr>
<tr>
<td>5.4- LJU</td>
<td>Safe routes to school</td>
</tr>
<tr>
<td>5.5- LJU</td>
<td>Reduces speed zones</td>
</tr>
<tr>
<td>6.1- LJU</td>
<td>Demand responsive service</td>
</tr>
<tr>
<td><strong>Other measures</strong></td>
<td></td>
</tr>
<tr>
<td>1.12- LJU</td>
<td>Green procurement for public fleets</td>
</tr>
<tr>
<td>1.7- LJU</td>
<td>Pure plant oil for vehicle propulsion</td>
</tr>
<tr>
<td>4.15-LJU</td>
<td>Sustainable Electromobility Plan</td>
</tr>
<tr>
<td>7.2- LJU</td>
<td>Sustainable Freight Logistics</td>
</tr>
<tr>
<td><strong>City of Zagreb</strong></td>
<td></td>
</tr>
<tr>
<td><strong>IP 1- ZAG</strong></td>
<td>Implementing the use of clean vehicles in public fleets</td>
</tr>
<tr>
<td>1.3-ZAG</td>
<td>Energy recovery system for trams</td>
</tr>
<tr>
<td>1.14-ZAG</td>
<td>Clean public transport strategies</td>
</tr>
<tr>
<td>1.15-ZAG</td>
<td>Clean public fleet vehicles</td>
</tr>
<tr>
<td><strong>IP 2- ZAG</strong></td>
<td>Stimulating intermodal journeys</td>
</tr>
<tr>
<td>2.5-ZAG</td>
<td>Intermodal high-quality mobility corridor</td>
</tr>
<tr>
<td>City/ IP/ Measure Number</td>
<td>Integrated Package/ Measure Title</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>4.8-ZAG</td>
<td>Improving cycling conditions</td>
</tr>
<tr>
<td>IP 3- ZAG</td>
<td>Improving QoS of public transport through innovative technologies</td>
</tr>
<tr>
<td>2.6-ZAG</td>
<td>Promotion of electronic public transport tariff system</td>
</tr>
<tr>
<td>8.2-ZAG</td>
<td>Public transport priority and traveller information</td>
</tr>
<tr>
<td>IP 4- ZAG</td>
<td>Traffic management in dialogue with stakeholders</td>
</tr>
<tr>
<td>3.2-ZAG</td>
<td>Study of congestion charging and dialogue on pricing</td>
</tr>
<tr>
<td>7.4-ZAG</td>
<td>Freight delivery restrictions</td>
</tr>
<tr>
<td>IP 5- ZAG</td>
<td>Safe and secure public transport</td>
</tr>
<tr>
<td>5.3-ZAG</td>
<td>Safety and security for seniors</td>
</tr>
<tr>
<td>5.8-ZAG</td>
<td>Security improvement in PT</td>
</tr>
<tr>
<td>IP 6- ZAG</td>
<td>Changing travel behaviour</td>
</tr>
<tr>
<td>4.4-ZAG</td>
<td>Mobility management for large institutions</td>
</tr>
<tr>
<td>4.8-ZAG</td>
<td>Improving cycling conditions</td>
</tr>
<tr>
<td>4.11-ZAG</td>
<td>Comprehensive mobility dialogue and marketing</td>
</tr>
</tbody>
</table>

City of Porto

| IP 1- OPO                | Developing an Efficient Transport System |
| 1.5-OPO                 | Light Weight Bus                        |
| 3.5-OPO                 | Integrated accessibility planning in the 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                | Promoting the use of public transport by communication and dialogue |
| 4.12-BRN               | Comprehensive mobility dialogue and marketing campaigns – new transport services |
| 4.13-BRN               | Integrated Mobility Centre                    |

Other measures

| 1.4-BRN                 | Optimised energy consumption in tram and trolley bus network |
| 2.7-BRN                 | Improved service for disabled persons          |
| 8.7-BRN                 | Ticket vending machine diagnostic              |

2.2.2.2. Measure level

For most of the measures also some impact evaluation results, related to their objectives on measure level, were 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 are both used as input for the Integrated Package Level and as a basis for specific conclusions for the measure individually.

All measures 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 contributed to the common objectives to increase safety within the corridor. This was reflected in the accident rates for the corridor. Also other measures contributed to this objective. On the measure level for this measure in particular it was 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 gave an idea on the safety perception of the cycle lanes etc.
2.2.2.3. Corridor/ City level

The evolution of certain important key indicators is seen independently from the CIVITAS ELAN measures within the entire city or the CIVITAS ELAN- corridor of each city. The aim is to describe some general trends.

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

Furthermore, it is possible that other non CIVITAS ELAN measures or external factors influenced these key indicators. Because these indicators were also 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 resulted in the indicator list of Table 2.2.

Table 2.2: List of indicators on city/corridor level

<table>
<thead>
<tr>
<th>Location</th>
<th>Type</th>
<th>Indicator</th>
<th>Type</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ljubljana*</td>
<td>Corridor</td>
<td>Modal split</td>
<td>Corridor</td>
<td>Corridor</td>
</tr>
<tr>
<td>Gent</td>
<td>Corridor</td>
<td>PT use</td>
<td>Corridor</td>
<td>Corridor</td>
</tr>
<tr>
<td>Zagreb</td>
<td>City</td>
<td>Air quality</td>
<td>City</td>
<td>Corridor</td>
</tr>
<tr>
<td>Brno</td>
<td>City</td>
<td>Noise level</td>
<td>City</td>
<td>Corridor</td>
</tr>
<tr>
<td>Porto</td>
<td>Corridor</td>
<td>Citizen engagement</td>
<td>Corridor</td>
<td>Corridor</td>
</tr>
</tbody>
</table>

*: In Ljubljana were all indicators on corridor-level evaluated within the measure 2.1-LJU 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, all indicators will be evaluated at the measure level immediately, and therefore no extra evaluation activities on the corridor level are needed.

2.2.3. Elements of Impact Evaluation

2.2.3.1. Baseline situation

For all measures a baseline or before situation was 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 are based on the results collected in the baseline situation; it also serves as the situation against which the business as usual scenario is compared to.

The description of the baseline situation is considered to be the absolute minimum to assess the effectiveness of the CIVITAS ELAN measures. Furthermore for plenty of measures one or more intermediate situations were measured, allowing 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 were implemented on a different timescale some distinction was be made in the impacts of the individual measures.

2.2.3.2. Business-as-usual scenario

If relevant, a business-as-usual scenario was 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 was useful to compare the ex-post situation not merely with the baseline situation but also with the business-as-usual scenario to avoid a misinterpretation of the impact of CIVITAS ELAN measures. 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 has 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 illustrates this.

2.2.3.3. Ex-post situation

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

2.2.3.4. 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 was done since it helps the interpretation of the results.

This analysis aimed at giving a clear estimation of the effects of a measure if it was implemented on the whole city rather than a certain zone/area/target group. It answers the question: ‘Which impacts can be expected if it were to be implemented in the whole city?’.

2.2.3.5. Analysis of costs and benefits

In order to meet the request from the European Commission for a thorough economic assessment with quantifiable results, for a number of measures a cost benefit analysis (CBA) or a financial analysis were carried out. Detailed data for this analysis were collected during the project. Preferably a CBA was carried out; only in the cases where no social benefits or costs could be assessed in a reasonable way, but a comparison of financial factors was nonetheless useful, a financial analysis was done.

Financial Analysis: this analysis gives more detailed information of all the financial costs and revenues relating to the implementation of the measure. It includes design costs, investment costs, operational costs, operational revenues, etc.

Cost Benefit Analysis (CBA): 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.

The indicators for these analyses were only 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.
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 km, freight ton km) 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.

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

### Table 2.3: Selection of CIVITAS ELAN measures subject to CBA

<table>
<thead>
<tr>
<th>City/ IP/ Measure Number</th>
<th>Measure Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2-GEN</td>
<td>Energy efficient city fleet management</td>
</tr>
<tr>
<td>1.10-GEN</td>
<td>Introduction of hybrid vehicles</td>
</tr>
<tr>
<td>1.13-GEN</td>
<td>Clean public transport strategies (B30 &amp; emission control)</td>
</tr>
<tr>
<td>4.5-GEN</td>
<td>“The House of Bike” and bicycle activities</td>
</tr>
<tr>
<td>8.9-GEN</td>
<td>IT-based bicycle theft prevention</td>
</tr>
<tr>
<td>1.11- LJU</td>
<td>Hybrid bus implementation</td>
</tr>
<tr>
<td>1.12- LJU</td>
<td>Green procurement for public fleets</td>
</tr>
<tr>
<td>5.2- LJU</td>
<td>Safety &amp; security for seniors and PT users</td>
</tr>
<tr>
<td>1.14-ZAG</td>
<td>Clean public transport strategies (CNG, biofuel and emission control)</td>
</tr>
<tr>
<td>1.15-ZAG</td>
<td>Clean public fleet vehicles</td>
</tr>
<tr>
<td>2.6-ZAG</td>
<td>Promotion of electronic public transport tariff system</td>
</tr>
<tr>
<td>3.2-ZAG</td>
<td>Study of congestion charging and dialogue on pricing</td>
</tr>
<tr>
<td>1.5-OPO</td>
<td>Light Weight Bus Shuttle</td>
</tr>
<tr>
<td>8.8-OPO</td>
<td>Mobile Mobility Information</td>
</tr>
<tr>
<td>2.7-BRN</td>
<td>Improving bus services for disabled persons</td>
</tr>
<tr>
<td>8.7-BRN</td>
<td>Ticket vending machine diagnostics</td>
</tr>
</tbody>
</table>

### 2.2.4. Indicators and data collection

#### 2.2.4.1. Indicators

An indicator is a quantitative parameter to measure achievement of objectives or to reflect the impact that a certain Measure or Integrated Package of Measures has.

In order to select the right indicators for measuring the impact, a bottom-up approach was used: first of all a selection was made of the objectives one wanted to reach by the implementation of a certain measure and the most relevant and significant expected impacts of the measure. Measures with the same potential impacts were combined in Integrated Packages. Based on this selection of impacts, indicators were chosen that could express these impacts and make it possible to draw relevant conclusions. Wherever possible, impacts were evaluated on measure level. However, this was not always possible, as the impacts of one measure could not be identified from the impact of other measures. In this case, the expected impact was evaluated on a higher level, like the level of the integrated package, corridor or city.
When impacts could not be measured due to other practical restrictions, a good reason and explanation were given. In most cases this was based on practical restrictions.

For each measure and integrated package of measures, a comparison between the Common Core Indicators by Guard (2006) and the expected impacts was carried out. The result of this comparison was that most CIVITAS ELAN indicators coincide with the list of Common Core Indicators.

Although in most cases this list could provide sufficient indicators to measure the CIVITAS 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. 3 types of deviations from the list could be distinguished:

- **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 were 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.

### 2.2.4.2. Data collection

The methodologies of collecting the data to determine the selected indicators are described in the evaluation results of each CIVITAS ELAN city, Integrated Package or measure. An overview of all the data collected throughout the project lifecycle is gathered in a data collection monitors per IP and Corridor/ City.

These inventories give information about:

- The type of data collected
- The level on which it is collected; Measure level, Integrated Package level, or Corridor/ City level
- The periodicity, when and how often it is 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.
2.3. **Process evaluation**

### 2.3.1. Definition and objectives

Process 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 has been hence directly benefiting the ELAN project by identifying and handling factors which influenced the sound measure implementation. It allowed quickly detecting and overcoming unexpected barriers. When problems were detected early enough in the implementation period, process evaluation allowed correcting the design of a measure. In addition, the identification of drivers of the implementation was 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 was another process evaluation objective. Also future projects or cities interested in taking up ELAN-tested measures are expected to benefit from this process evaluation aspect, as the lesson learned will help them to avoid similar problems.

### 2.3.2. General concept

**Figure 2.3: Approach process evaluation**

<table>
<thead>
<tr>
<th>INFORMATION OUTPUT FLOW</th>
<th>OBJECTIVES</th>
<th>TIMING</th>
<th>RESPONSIBLE</th>
</tr>
</thead>
</table>
| INTERNAL PROGRESS REPORT | • detection of barriers and drivers in the implementation process  
                           • update of risk contingency plan | three monthly | ML’s |
| PROCESS EVALUATION REPORT | general process evaluation reporting for non-focus measures  
                           general process evaluation information for non-focus measures | yearly | ML (+SEM) |
|                           | in-depth process evaluation reporting for focus measures  
                           more in-depth analysis for the focus measures | yearly | SEM (+ML) |
| WORKSHOPS ON "HOT TOPICS" | exchange of useful info and know how around “hot topics” | each year + 1 validation WS | PEM |
| STAKEHOLDER INTERVIEWS | • synthesis and highlights on the CIVITAS-ELAN implementation process  
                         • clear view on the barriers and drivers of the implementation process | year 3 | PEM |

- For all measures **Internal Progress Reporting** took place. A half yearly reporting was carried out on the measure, city and horizontal work package level. It gives information on the evolution of the
risks, barriers and drivers influencing the implementation process the measures. This information was subject to a first screening and can trigger a further analysis from the perspective of the Process Evaluation. This reporting could be seen as a kind of monitoring tool which allowed the PEM and SEM's to track valuable information on the implementation status of the measure.

- For all measures a **Process Evaluation Report** was made. This report, in the format proposed by POINTER was made up on the measure level. Depending on the status of the measure, being a focus measure or not, the form only contained basic process information or more in-depth process information. Both reports were provided once a year to POINTER.

- For certain interesting **themes or ‘hot topics’** covering different measures, CIVITAS ELAN organised **CIVITAS ELAN Workshops**. Knowledge transfer on practical approaches to tackle certain barriers or make optimal use of certain drivers was the main objective of these workshops.

- At the end of the project the Project Evaluation Management carried out **interviews with Measure Leaders** involved in the most interesting CIVITAS ELAN- measures (one interview in each CIVITAS ELAN city).

### 2.3.2.1. Internal Progress Reports

Reporting on the progress of the implementation of all measures was done in the Internal 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 was sent around in order to have a close monitoring on the progress of the implementation activities. The Internal Progress Reports were developed and used by the Project Management as input for the Intermediate and Periodic Progress Reports. They were only used internally within CIVITAS ELAN and were treated confidentially. 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.

### 2.3.2.2. Process Evaluation Reports

These reports were 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.

For both types of evaluation, the Process Evaluation Forms were provided by POINTER. Once a year, these Process Evaluation Forms were filled in for all measures by the Measure Leaders and the Site Evaluation Managers. They gathered this information through different techniques such as learning history, interviews, focus groups etc.

#### 2.3.2.2.1. In-depth Process Evaluation

In-depth Process Evaluation aimed at giving 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, etc. More important here than the result of the implementation itself, was the complete process of planning, implementation and operation that led to these results.

The aim of this in-depth process evaluation was 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;
- ‘stories behind the figures’.
This in-depth process evaluation was carried out for a number of measures for which this was particularly interesting. They were selected according the following criteria:

- Measures with a strong relation to one of the five pillars of the European Commission’s Green Paper “Towards a new culture for urban mobility” (more fluid, greener, smarter, safer, and more accessible)
- 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.

During the project lifetime, one additional criterion was added:

- Measures that were stopped or seriously amended, to analyse the reasons for the deviations from the DoW.

In this context and to come to comparable results POINTER provided a form that was 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.

Different techniques were 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 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.

**Table 2.4: Selection of CIVITAS ELAN measure subject to In-depth Process Evaluation**

<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2-GEN</td>
<td>Energy efficient city fleet management</td>
</tr>
<tr>
<td>1.8-GEN</td>
<td>Extended biodiesel production</td>
</tr>
<tr>
<td>2.2-GEN</td>
<td>Improved Public Transport service levels</td>
</tr>
<tr>
<td>2.3-GEN</td>
<td>Collective taxi service</td>
</tr>
<tr>
<td>2.4-GEN</td>
<td>Intelligent Park&amp;Ride enforcement</td>
</tr>
<tr>
<td>3.4-GEN</td>
<td>Pedestrian area enforcement access restrictions</td>
</tr>
<tr>
<td>4.5-GEN</td>
<td>“The House of Bike” and bicycle activities</td>
</tr>
<tr>
<td>6.3-GEN</td>
<td>Holistic event management</td>
</tr>
<tr>
<td>7.3-GEN</td>
<td>Institutional platform for city freight management</td>
</tr>
<tr>
<td>8.9-GEN</td>
<td>IT-based bicycle theft prevention</td>
</tr>
<tr>
<td>1.11- LJU</td>
<td>Hybrid bus implementation</td>
</tr>
<tr>
<td>2.1- LJU</td>
<td>Integrated high-quality mobility corridor</td>
</tr>
</tbody>
</table>
### Workshops/ interviews on specific topics (including common measures)

These workshops aimed at providing useful information on certain topics related to the implementation process. Typically these themes covered certain barriers/ drivers of the implementation process.

Workshops were organised on the following thematic fields:

- Risk assessment
- Cost benefit Analysis
- Up-scaling
- Integrated planning
- Clean vehicles/ biofuels
- Promotion of walking and cycling
- Stakeholder involvement/ citizen engagement
- Urban goods distribution.

For this there was a strong cooperation between the Evaluation Manager, the Dissemination Manager and the Scientific Coordinator. The target group for these workshops was mainly Site Evaluation Managers and Measure Leaders but also important stakeholders or other partners were sometimes invited. This was decided on a case-to-case basis.

### In-depth validation of implementation process findings

For a set of selected measures, an in-depth validation of the implementation process evaluation findings was carried out. 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. For this reason, the Project Evaluation Management organized interviews on measures in all five
CIVITAS ELAN cities with those who are actually involved in the implementation of a measure, i.e. measure leaders.

These interviews were carried out by the Project Evaluation Manager, having an independent view on the circumstances in the ELAN cities. He was supported by the Site Evaluation Manager for translation.

From every city, one measure was selected of which the measure leader was interviewed for the in-depth process evaluation. This selection is based on the planning and implementation process of the measure: all measures have faced challenges that had an impact on the implementation and should be analysed more in-depth to:

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

Table 2.5: Selected measures for in-depth validation of implementation process findings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measure Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1-LJU Integrated high quality mobility corridor</td>
<td>Sabina Popit, (COL)</td>
</tr>
<tr>
<td>2.2-GEN Improved public transport service levels/ 2.9-GEN Participatory redevelopment of main train station</td>
<td>Fabian Van De Velde (GCC)</td>
</tr>
<tr>
<td>2.7-BRN Improving bus services for disabled persons</td>
<td>Zdeněk Jarolín (DPMB)</td>
</tr>
<tr>
<td>7.4-ZAG Freight delivery restrictions</td>
<td>Kristijan Rogić (ZFOT)</td>
</tr>
<tr>
<td>2.10-OPO Participatory planning for new intermodal interchange</td>
<td>Bruno André Outeiro da Silva Pereira (CMP)</td>
</tr>
</tbody>
</table>
2.4. Evaluation of Citizen Engagement

2.4.1. Definition and objectives

Citizen engagement is considered as one of the core elements of CIVITAS ELAN, to raise the level of citizens’ responsibility for addressing mobility problems and implementing solutions (to influence the people’s behaviour and lifestyles).

Therefore, the evaluation team of CIVITAS ELAN developed a specific evaluation approach to evaluate citizen engagement. The main objectives of the evaluation are:

- Getting insight at which activities were implemented and how many people were reached,
- Evaluating the quality of the activities;
- Getting insight to drivers and barriers during preparation, implementation and operation of the citizen engagement activities;
- Getting insight to the impact of the citizen engagement activities on the decision making process of the measure and general awareness and acceptance on sustainable mobility;
- Contributing to cross-site evaluation and policy recommendations in citizen engagement.

The evaluation results are expected to be a useful source of information for other projects or cities that are willing to engage citizens. They will be able to benefit from the broad experience that has been developed during the ELAN project in the form of lessons learnt and recommendations considering citizen engagement.

2.4.2. General concept

For a number of measures, citizen engagement was evaluated for the entire project lifetime. The evaluation approach was developed by the CIVITAS ELAN evaluation team, in the form of an additional chapter in the Process Evaluation Forms.

The reporting was carried out by the Measure Leaders and the Site Evaluation Managers. They gathered this information through different techniques such as learning history, interviews, focus groups etc.

A number of measures have been selected for the evaluation of citizen engagement, based on the importance of citizen engagement in the implementation of the measure.

Figure 2.4: Selection of CIVITAS ELAN measures subject to the evaluation of citizen engagement

<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9-GEN</td>
<td>Semi-public clean car fleet</td>
</tr>
<tr>
<td>2.9-GEN</td>
<td>Participatory re-development of main train station area</td>
</tr>
<tr>
<td>3.3-GEN</td>
<td>Parking and public space management around main train station and ELAN corridor</td>
</tr>
<tr>
<td>4.2-GEN</td>
<td>Mobility management for companies</td>
</tr>
<tr>
<td>4.3-GEN</td>
<td>Mobility management for schools</td>
</tr>
<tr>
<td>4.5-GEN</td>
<td>“The House of Bike” and bicycle activities</td>
</tr>
<tr>
<td>4.7-GEN</td>
<td>Walking promotion</td>
</tr>
<tr>
<td>4.10-GEN</td>
<td>Comprehensive mobility dialogue and marketing campaign</td>
</tr>
<tr>
<td>5.6-GEN</td>
<td>Safe cycling corridor</td>
</tr>
<tr>
<td>6.2-GEN</td>
<td>Innovative car sharing</td>
</tr>
<tr>
<td>Measure Number</td>
<td>Measure Title</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>6.3-GEN</td>
<td>Holistic event management</td>
</tr>
<tr>
<td>7.3-GEN</td>
<td>Institutional platform for city freight management</td>
</tr>
<tr>
<td>2.1-LJU</td>
<td>Integrated high-quality mobility corridor</td>
</tr>
<tr>
<td>3.1-LJU</td>
<td>Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels</td>
</tr>
<tr>
<td>4.1-LJU</td>
<td>Individualised mobility marketing based on public involvement and inclusion in defining city transport policy</td>
</tr>
<tr>
<td>4.6-LJU</td>
<td>Comprehensive Cycling Strategy</td>
</tr>
<tr>
<td>4.9-LJU</td>
<td>Update of the Sustainable Urban Transport Plan</td>
</tr>
<tr>
<td>5.4-LJU</td>
<td>Safe routes to school</td>
</tr>
<tr>
<td>6.1-LJU</td>
<td>Demand responsive service</td>
</tr>
<tr>
<td>7.2-LJU</td>
<td>Sustainable Freight Logistics</td>
</tr>
<tr>
<td>2.5-ZAG</td>
<td>Intermodal high-quality mobility corridor</td>
</tr>
<tr>
<td>3.2-ZAG</td>
<td>Study of congestion charging and dialogue on pricing</td>
</tr>
<tr>
<td>4.11-ZAG</td>
<td>Comprehensive mobility dialogue and marketing</td>
</tr>
<tr>
<td>5.3-ZAG</td>
<td>Safety and security for seniors</td>
</tr>
<tr>
<td>7.4-ZAG</td>
<td>Freight delivery restrictions</td>
</tr>
<tr>
<td>1.5-OPO</td>
<td>Light Weight Bus Shuttle</td>
</tr>
<tr>
<td>2.10-OPO</td>
<td>Participatory Planning for New Intermodal Interchange</td>
</tr>
<tr>
<td>3.5-OPO</td>
<td>Integrated accessibility planning in the Asprela quarter</td>
</tr>
<tr>
<td>4.14-OPO</td>
<td>The Mobility Agency</td>
</tr>
<tr>
<td>6.4-OPO</td>
<td>Flexible Mobility Agency</td>
</tr>
<tr>
<td>8.8-OPO</td>
<td>Mobile Mobility Information</td>
</tr>
<tr>
<td>2.7-BRN</td>
<td>Improving bus services for disabled persons</td>
</tr>
<tr>
<td>4.12-BRN</td>
<td>Comprehensive mobility dialogue and marketing campaigns – new transport services</td>
</tr>
<tr>
<td>4.13-BRN</td>
<td>Integrated Mobility Centre</td>
</tr>
</tbody>
</table>
2.5. **Reporting**

The basic reporting of all evaluation work is done in a layered set of documents related to:

- Integrated Packages of Measures
- Measures
- Corridor/ City

These basic documents were produced and updated during the lifetime of the project. They are added in annex. Their summaries are included in Chapter 3 of this report.

**2.5.1. Evaluation results on Integrated Package level (IPMER)**

As mentioned before, in many cases multiple measures are strongly working together to achieve a common impact. Often it is difficult to disentangle the impact of the different measures since they are implemented in the same timescale for the same target group.

For this reason it is clearer to consider the impacts together and to give a more qualitative assessment of the importance of each of the measures in the package. Therefore, the evaluation results of each Integrated Package are reported in the Integrated Package Measure Result Template. Through expert ranking of the measures, the Site Evaluation Mangers, together with mobility experts familiar with this type of measures, rank the measures in order of importance on the observed impacts.

**2.5.2. Evaluation results on measure level (MERT)**

As a part of the Integrated package Result Template, the Measure Evaluation Result Templates (MERT) include the evaluation results that are specifically related to one of the measures. Not only the impact evaluation results are reported here, but also process evaluation results and, if relevant, evaluation results of Citizen Engagement. The template is based on the template provided by POINTER, but adjusted to fit the needs of CIVITAS ELAN, i.e. including the evaluation of Citizen Engagement.

**2.5.3. Evaluation results on corridor/ city level**

Evaluation results that are measured on the level of the corridor or city are reported in a separate template, the Corridor/ City Result Template. It contains mainly information on the modal split and air quality in the corridor.
2.6. Common measures

2.6.1. The concept of Common Measures

A common measure is common working field or shared challenge faced by all the CIVITAS ELAN cities and therefore relevant to discuss and work around together. This means that these measures have had no own implementations; the cooperation consisted 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.

Table 2.6 shows the common working fields that were selected in the CIVITAS ELAN project, and their main impact fields.

Table 2.6: Overview common measures and main impact fields

<table>
<thead>
<tr>
<th>MEASURE NUMBER</th>
<th>MEASURE TITLE</th>
<th>MAIN IMPACT FIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Energy</td>
</tr>
<tr>
<td>1.1 COM</td>
<td>Energy management for public fleets</td>
<td>x</td>
</tr>
<tr>
<td>2.8 COM</td>
<td>Participatory intermodal infrastructure planning</td>
<td></td>
</tr>
<tr>
<td>5.1 COM</td>
<td>Comprehensive safety and security strategies</td>
<td></td>
</tr>
<tr>
<td>7.1 COM</td>
<td>Integrated freight policy development</td>
<td>x</td>
</tr>
</tbody>
</table>

2.6.2. Evaluation in the common measures

As the focus of the common measures is the exchange of information, no actual implementation took place, so no impact evaluation could be carried out. The impact evaluation of the related measures took place on measure level, and conclusions are drawn on the level of the work packages. Evaluation of the common measures therefore consists of the process evaluation of the cooperation between the measure partners and the lessons learned from the exchange of information on the specific theme.

In most cases no extra data collection was carried out. Any additional data collection was organized in such a way that it could be integrated in the main data collection activities for the cities. For instance: in the common measure 2.8 Participatory intermodal infrastructure planning, the sociological survey was combined with other surveys carried out within the cities.

These findings are enriched with the outcomes of the meetings and workshops around these topics.

2.6.2.1. Roles and responsibilities

The Measure Leaders of the respective common working fields (Common Measure Leader CML) were responsible for these tasks and have described their approach in the Description of Work. They have gathered and analysed the results on the common working fields. These conclusions are reported Working Documents of the common Measures and will be summarized in the final evaluation report.

Responsibilities in this task are:

- Common Measure Leader: collection and analysis of the evaluation data of the related measures and eventually the collection of additional data on this theme. Measure Leaders: the
measure leaders of the related measures of the common measure did deliver input to the common measure leader on request and during the meetings and workshops organised for this purpose.

- Site Evaluation Managers and Project Evaluation Manager: contribution on the impact and process evaluation findings of the related measures. For the related measures, there was yearly process evaluation reporting in the Process Evaluation Reports (PER's) and there was regular impact evaluation reporting (timing depending on the measure) in the Measure Evaluation Result Templates (MERT's).
- City representatives: for all ELAN cities a representative participated in the workshops even if the city has no (CIVITAS ELAN) measure related to that theme. In this way all cities take full advantage of the learning opportunities of the common measures and gave feedback to the findings on the implemented measures in other cities.
- Project Management: the project management carried out an additional evaluation of the quality of the cooperation of partners and cities.

Table 2.7 gives an overview of the common measures, the related CIVITAS ELAN measures and the direct involved persons of the cities in the workshops.

### Table 2.7: Overview common measures & related CIVITAS ELAN measures

<table>
<thead>
<tr>
<th>Responsibilities</th>
<th>City</th>
<th>Name</th>
<th>Related CIVITAS ELAN measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1-COM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure Leader</td>
<td>Gent</td>
<td>Lies Helsloot</td>
<td>1.2-GEN</td>
</tr>
<tr>
<td>City representative</td>
<td>Brno</td>
<td>Petr Chabicovsky</td>
<td></td>
</tr>
<tr>
<td>2nd city representative</td>
<td>Brno</td>
<td>Zdeněk Jarolin</td>
<td></td>
</tr>
<tr>
<td>City representative</td>
<td>Ljubljana</td>
<td>Andrej Piltaver</td>
<td>1.12-LJU</td>
</tr>
<tr>
<td>City representative</td>
<td>Porto</td>
<td>José Pedro Ferreira</td>
<td></td>
</tr>
<tr>
<td>City representative</td>
<td>Zagreb</td>
<td>Miljenko Kovacevic</td>
<td></td>
</tr>
<tr>
<td><strong>2.8-COM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure Leader</td>
<td>Brno</td>
<td>Iva Machalová</td>
<td></td>
</tr>
<tr>
<td>City representative</td>
<td>Gent</td>
<td>Fabian Van De Velde</td>
<td>2.9-GEN</td>
</tr>
<tr>
<td>City representative</td>
<td>Ljubljana</td>
<td>Sabina Popit</td>
<td>2.1-LJU</td>
</tr>
<tr>
<td>City representative</td>
<td>Porto</td>
<td>José Pedro Tavares</td>
<td>2.10-OPO</td>
</tr>
<tr>
<td>City representative</td>
<td>Zagreb</td>
<td>Željka Pavlović</td>
<td>2.5-ZAG</td>
</tr>
<tr>
<td><strong>5.1-COM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure Leader</td>
<td>Zagreb</td>
<td>Davor Silov</td>
<td>5.3-ZAG; 5.8-ZAG</td>
</tr>
<tr>
<td>City representative</td>
<td>Brno</td>
<td>Zdeněk Jarolin</td>
<td></td>
</tr>
<tr>
<td>City representative</td>
<td>Gent</td>
<td>Mieke van Nieuwenhove</td>
<td>5.7-GEN</td>
</tr>
<tr>
<td>City representative</td>
<td>Ljubljana</td>
<td>Damjan Kregar</td>
<td>5.2-LJU</td>
</tr>
<tr>
<td>City representative</td>
<td>Porto</td>
<td>Adão Santos</td>
<td></td>
</tr>
<tr>
<td><strong>7.1-COM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure Leader</td>
<td>Ljubljana</td>
<td>Sabina Popit</td>
<td>7.2-LJU</td>
</tr>
<tr>
<td>Measure Leader support</td>
<td>Ljubljana</td>
<td>Blaž Jemenšek</td>
<td></td>
</tr>
<tr>
<td>City representative</td>
<td>Brno</td>
<td>Iva Machalová</td>
<td></td>
</tr>
<tr>
<td>City representative</td>
<td>Gent</td>
<td>Anja Heleyrn</td>
<td>7.3-GEN</td>
</tr>
</tbody>
</table>
2.6.2.2. **Process evaluation of the cooperation in the common measures**

The idea of cities working together on common measures is a crucial objective of CIVITAS ELAN. Therefore it is important to understand how this cooperation took place, and the barriers for their successful deployment. Therefore this cooperation process is evaluated, making use of an online questionnaire, in the shape of an interview in written form with all measure leaders and city representatives of the common measures. The results of the survey are the basis for a deeper analysis of the process, results and lessons learned from common measures.

2.6.2.3. **Process evaluation of related measures**

Process evaluation aims to reveal the barriers and drivers during the implementation of the related measures, and the consequences? What are the lessons learnt and which recommendations can be formulated on the working field of the common measure?

The main input for this are the process evaluation results of the measures that are related to the working field of the common measure. Also the different meetings and interaction within the team of the common measure are used to reveal the necessary information.

Besides summarizing these results, for some themes also a “hot topic workshops” was organised to come to stronger general conclusions for the theme of measures.
3. EVALUATION OUTPUTS PER CITY

3.1. Ljubljana

3.1.1. City description

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 corridors in the trans-European transport network. 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\textsubscript{X}, CO, CO\textsubscript{2}, and PM\textsubscript{10}) 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). These traffic streams are the origin of congestion 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 is studied in the project. Complementarily, the CIVITAS ELAN aims at changing 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 were also key elements of the project. The objective is to change citizens’ minds to reach the goal of better mobility and decreased emissions from the traffic in the urban agglomeration.

Table 3-1: Key characteristics for the city of Ljubljana (www.stat.si, 2007)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>City 2007</th>
<th>2011/12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface (km\textsuperscript{2})</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car ownership (per 1000 inhabitants)</td>
<td>528</td>
<td>519</td>
</tr>
<tr>
<td>% daily trips by mode of transport</td>
<td>57</td>
<td>39</td>
</tr>
<tr>
<td>- Car</td>
<td>57</td>
<td>39</td>
</tr>
<tr>
<td>- Walk</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>- Cycle</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>- Bus</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>- Combination</td>
<td>13</td>
<td>12</td>
</tr>
</tbody>
</table>

3 Corridor V: Venice – Triest/Koper – Ljubljana – Budapest – L'vov
Corridor X: Salzburg – Ljubljana – Zagreb – Beograd – Nis – Skopje - Thessaloniki
In Table 3-2 emissions (CO$_2$, NO$_x$ and particulate matter) for Ljubljana by economy sectors are given.

Table 3-2: CO$_2$, NO$_x$ and PM emissions in the City of Ljubljana by sectors (tons/year)

<table>
<thead>
<tr>
<th>Sector</th>
<th>CO$_2$</th>
<th>NO$_x$</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>104,940</td>
<td>191</td>
<td>5</td>
</tr>
<tr>
<td>Traffic and transport</td>
<td>595,980</td>
<td>2,942</td>
<td>180</td>
</tr>
<tr>
<td>Households and other</td>
<td>1,279,080</td>
<td>2,168</td>
<td>95</td>
</tr>
<tr>
<td>SUM</td>
<td>1,980,000</td>
<td>5,301</td>
<td>280</td>
</tr>
</tbody>
</table>

Source: Annual environmental report for the City of Ljubljana (2007)

Ljubljana’s public transport system was a typical example of an inefficient use, which is primarily related to the encouragement of an individual transport (passenger vehicles). Over the 10 year period before the start of the project, the share of working population driving to work by car has more than doubled - from 40% to 85%. This traffic situation contributed to the rapid growth of commercial centres located on the city outskirts (e.g. BTC, Rudnik). Combined with the limited ability of the city centre to meet shoppers’ demand for car access; this led inevitably to a decrease in the number of visitors and a reduction of the importance of the city centre for various leisure and cultural activities, such as going to the cinema, theatre, exhibitions, walking, shopping, dining, etc. Despite this problem of intense car traffic, no collective effort existed to 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 had 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 providing reliable solutions for the optimisation of transport in the city centre of Ljubljana.

3.1.2. The CIVITAS-ELAN strategy

3.1.2.1. The CIVITAS corridor/area in the city

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, the citizens who use their own cars instead of public transport or other alternative transport modes inside the town 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, occupy most of the 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 is the corridor throughout the city centre, which is planned on the level of the new Ljubljana Municipality spatial plan.

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 3.1.

Figure 3.1: Ljubljana demo corridor

3.1.2.2. The CIVITAS integrated packages of measures

For the city of Ljubljana the Evaluation team of CIVITAS-ELAN identified 3 integrated packages of measures grouping a wide range of measures with the objective to change the mobility situation in the city focusing on the corridor.

Table 3-3: Measure overview Ljubljana

<table>
<thead>
<tr>
<th>City/ IP/ Measure Number</th>
<th>Measure Title</th>
<th>Impact evaluation</th>
<th>CBA</th>
<th>Focussed process evaluation</th>
<th>Evaluation of Citizen engagement</th>
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<tbody>
<tr>
<td>City of Ljubljana</td>
<td></td>
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</tr>
<tr>
<td>IP 1- LJU</td>
<td>Making PT in the corridor the most desirable transport mode</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.11- LJU</td>
<td>Hybrid bus implementation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.1- LJU</td>
<td>Integrated high-quality mobility corridor</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3.1- LJU</td>
<td>Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4.1- LJU</td>
<td>Individualized mobility marketing based on public involvement and inclusion in defining city transport policy</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>8.1- LJU</td>
<td>Public Transport priority at intersections</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.4- LJU</td>
<td>LJU Real time information for staff and passengers</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.5- LJU</td>
<td>E-ticketing and fare integration</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IP 2- LJU</td>
<td>For vital, healthier and safer citizens in city transport</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>4.6- LJU</td>
<td>Comprehensive Cycling Strategy</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5.2- LJU</td>
<td>Safety &amp; security for seniors and PT users</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4- LJU</td>
<td>Safe routes to school</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5.5- LJU</td>
<td>Reduces speed zones</td>
<td>X</td>
<td></td>
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<tr>
<td>6.1- LJU</td>
<td>Demand responsive service</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1.12- LJU</td>
<td>Green procurement for public fleets</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.7- LJU</td>
<td>Pure plant oil for vehicle propulsion</td>
<td>X</td>
<td></td>
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<tr>
<td>4.9- LJU</td>
<td>Update of the Sustainable Urban Transport Plan</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>4.15-LJU</td>
<td>Sustainable Electromobility Plan</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7.2- LJU</td>
<td>Sustainable Freight Logistics</td>
<td>X</td>
<td></td>
<td>X</td>
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</tr>
</tbody>
</table>

### 3.1.3. Summary of evaluation results

Here we summarize the results of the detailed evaluation of the measures in the city.

First the findings on the level of the Integrated Packages of measures are discussed. These are the impacts for which the different measures are working strongly together to achieve this impact. In many cases it is also difficult to disentangle the impact of the different measures since they are implemented in the same timescale for the same target group. For this reason the impacts are considered together and a more qualitative assessment is given of the importance of each of the measures in the package. This is done through an expert ranking of the measures in which the Site Evaluation Managers together with mobility experts familiar with this type of measures rank the measures in order of importance on the observed impact.

Further the impacts which are specifically related to one of the measures are discussed and conclusions are drawn per measure.
The detailed information is presented in the Measure Evaluation Result Templates (MERT) in annex of this report. Also these MERTs are structured in this way: first the aspects to be discussed on the level of the Integrated Packages of Measures and further the related Measures.

### 3.1.3.1. Integrated Package 1: Making PT in the corridor the most desirable transport mode

#### 3.1.3.1.1. Evaluation on Integrated Package level

**Integrated Package description**

To solve the problem of increased pressure of private car transport on the city centre, a number of measures are combined to achieve an effective mobility corridor through the city centre. This corridor crosses 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.

The main goal for this corridor is to achieve a shift towards public transport by making it more efficient, comfortable and reliable. Transport in the city centre (corridor) would be reorganised in a way to reduce travel times, congestions, air and noise pollution, etc.

The measures that form this Integrated Package are:

- **M1.11-LJU** Hybrid and CNG bus implementation:
  - Demonstration and field testing of hybrid drive buses and CNG driven buses, as alternatives to the conventional diesel engine only buses.

- **M2.1-LJU** Integrated high-quality mobility corridor:
  - This measure was planned as the development of high-quality mobility North-South corridor going through the city centre and towards neighbouring municipalities, integrating a variety of measures and transport modes.
  - The implementation of the corridor will be realised after the CIVITAS ELAN project lifetime. Therefore, the focus of this measure is on studying the impact of the different designs of the implementation of the corridor, through the use of traffic models.

- **M3.1-LJU** Implementation of a sustainable congestion charging scheme in cooperation with actors on national and regional levels:
  - The final goal of the measure was to achieve a formal agreement on a congestion charging scheme for the Ljubljana region between relevant decision makers at local, regional and state level and stakeholders. In order to achieve that, several technical studies on suitable congestion charging options were made. That would help the decision process to implement the congestion charging scheme after the CIVITAS ELAN lifetime.

- **M4.1-LJU** Individualised Mobility Marketing Campaign (IMMC) based on public involvement and inclusion in defining city transport policy:
  - Analysis of the public opinion regarding the transport in Ljubljana
  - Individualised mobility marketing campaign to change the travel habits of the citizens
  - Implementation of the mobility shop
  - Distribution of a sustainable mobility brochure to all households in Ljubljana

- **M8.1-LJU** PT priority at intersections:
  - Equipment of 15 traffic lights in the CIVITAS-ELAN corridor with the technology Zigbee to enable to modify traffic light intervals with the aim to increase the average speed of buses.

- **M8.4-LJU** Real time information for staff and passengers:
  - Installation of 58 LED displays which provide the passengers with the information about the timing of bus arrival at the bus stops.

- **M8.5-LJU** Fare integration and a common PT portal:
  - Integration of the ticketing system of two bus transport service providers (urban and suburban bus company).
  - Improvements of PT information accessibility, both stationary as posters at the bus stops and electronic using the Google Transit web based planning platform and other means of PT travelling data.
The main deviation on the integrated package 1 level was the following:

The physical reorganisation of the corridor (M2.1-LJU) was not realised. This was replaced by a study in which the new situation was simulated in order to understand the functioning of a reorganised corridor. As a result of this, the measures of IP1 were implemented without real integration among them.

**Evaluation approach**

With the cancellation of the corridor implementation (M2.1-LJU), the scope of the integrated impact evaluation was diminished. The combined impact of the measures on modal split and PT use was evaluated on IP-level, but the main impacts of the measures were evaluated on measure level, and only some observations on IP-level were made. The potential impacts of the implementation of the high-quality mobility corridor (M2.1-LJU) were modelled for two variants (Variant 1: yellow lanes on the existing road profile; Variant 2: yellow lanes on a broadened road profile). On integrated package level the focus was on process evaluation, which helped to identify the key barriers for the corridor implementation and helped to try to find a way to overcome the barriers, as well as to use the drivers to progress with the implementation process.

**Impact evaluation**

**Key result 1 – Potential for improvements in transport system**

Although some of the measures could not be fully realised, they have provided a taste of what they could bring if they were fully implemented (the test closure of corridor during the EMW 2011, ticket integration within the city and regional buses, better image of the PT as a result of hybrid/CNG bus implementation and LED displays installations...).

**Key result 2 – Basis for city Transport Policy**

Measures such as the high-quality mobility corridor (M2.1-LJU) and the study on congestion charging (M3.1-LJU) have initiated the discussions that eventually led to the elaboration of the Transport Policy of Ljubljana – which addresses these issues on a city level.

**Key result 3 – Increase in PT satisfaction**

The results show an increase in PT satisfaction by up to 20.5%. This indicates that although the high quality PT corridor has not been implemented, there are important improvements in PT service:

Hybrid & CNG buses – the measure has helped to recognise that the PT company strives to reduce the impacts to the environmental as well as to decrease the noise levels. This is particularly relevant not only for the PT users, but also to the other users of urban space pedestrians, cyclists, etc.

Real time information for passengers – the first impressions were below the expected ones, but once the malfunctions of the system was eliminated, the LED display system was well accepted among the public, which is also reflected in the improvement of the image and operation of the PT service.

Congestion charging – although not implemented, the citizens have probably recognised, that the higher use of the PR could contribute to an improvement of the congestion situation in the city as well as to tackle the traffic related air pollution issues.

The PT planning portal has also shown that this was a measure that was lacking in the city, because now, the occasional PT users can obtain more reliable data on schedules, timetables, routes, etc.

**Key result 4 – No increase of PT in modal split**

Although IP1 was expected to increase bus usage in the corridor, the modal share decreased slightly (13.5% to 13.2%). On the other hand, combined modes increased from 9.8% to 11.8%, and it can be assumed that this disappointing result can be attributed to the fact that the high-mobility corridor was not implemented (M2.1-LJU). The PT usage frequency increased significantly - by approximately 150% for intercity buses, while the train and city buses use shows a slight decrease in a daily use, while weekly and monthly use has increased by 3-9%. The decrease in daily train and city bus use same is also evident from the modal split data, where train use has decreased by approximately 55%.

**Key result 5 - Increase in number of PT users by LED displays**
The number of PT passengers strongly fluctuated during the project lifetime, with small increases and decreases over the years. However, the results also show that the number of PT users has risen immediately in September-December 2010, after the implementation of LED displays (M8.4-LJU), while the subsequent decrease might be the result of the lower level of accuracy of LED displays than expected by the users.

The main specific results related to the implemented measures are the following:

**Key result 6 – (Potential) reduction in fuel consumption and emissions by corridor**

The results of the traffic corridor model results show that approximately 4% of lower fuel consumption can be expected (due to the uncertainty of the model the target of 5% cannot be assessed) when the Variant 2 of the High quality mobility corridor would be implemented. Variant 1, on the other hand shows a potential increase in fuel consumption by 2%.

In terms of fuel consumption of the alternative propulsion systems for buses (M1.11-LJU) it has been observed, that the tested hybrid buses did not prove to be a good alternative if fuel consumption is concerned (the fuel consumption was lower, not taking into consideration the passenger capacity). A direct comparison among conventional diesel bus and CNG fuelled bus is not possible due to a different fuel type, however, considering the economic and environmental aspects, operational fuel costs and CO$_2$ emissions are around 14% lower, making CNG buses a very attractive alternative.

**Key result 7 – (Potential) reduction in air pollution**

The model results for the potential implementation of the corridor (M2.1-LJU) have shown that a reduction between 1.8-3.9% reduction of CO, NOx, VOC emissions during the morning and afternoon peaks can be expected. The emission target values were only partly achieved (ca. 50% of the target for Variant 2; not achieved for Variant 1), mostly due to the increased congestion in the afternoon-outbound direction. Corridor design should be revised in this regard.

The emissions of CNG buses have shown to be lower than those of the diesel and hybrid alternatives, with very low PM$_{10}$ emissions (quantifiable targets in terms of 3% reduction were exceeded in terms of NO$_x$, HC and PM$_{10}$, substantially achieved for CO$_2$ and not achieved for CO emissions). As the CNG fuel has a comparably lower price to the diesel (D2) fuel the overall economy is very high and external costs are very low, rendering it the best alternative among all three.

**Key result 8 – (Potential) reduction in noise level**

The noise was measured during the normal traffic burden in September 2008 (Before) and in September-November 2011 (BaU). The After status was measured during the European Mobility week 2011 where the closure of Slovenska Street was implemented as intended if the measure would be fully implemented. The impact of road closure is somewhat inconclusive. The most significant impact of the closure of the Slovenian street on the noise levels is observed during the night (up to -5 dB(A)). During the day, the noise is most likely attributed by the public transport system (still running through the centre) and a vibrant pulse of the city.

**Key result 9 – (Potential) improved travel time/speed/congestion**

The model results for the potential implementation of the corridor have shown that regarding the travel times show a reduction of approximately 4 minutes for cars and 7 minutes for public transport buses for the Variant 2 can be expected. Variant 1 shows an increase of travel times for cars for approximately 1 minute, while the travel times for buses are similar to “Before” status. In terms of travel speed the Variant 1 shows a decrease of travel speeds for up to 9 km/h, while Variant 2 shows an increase in up to 5km/h for public transport buses. The target values have been reached/ exceeded only for Variant 2.

The results for the PT priority related indicators show an average decrease of travel time by 1%, which is considered as no change.

**Key result 10 – High acceptance/awareness/perception for some measures**

The results show a general decrease of support by 2-23% for the measures implemented by CIVITAS ELAN. This could be the result of measures not being implemented (the survey is based on the general support, not directly related to the implementation). This is the case for the yellow PT lanes (M2.1-LJU) and congestion charging (M3.1-LJU).
The results for the acceptance level of the PT LED display service (M8.4-LJU) show a large acceptance of the measure (approximately 80%), however the acceptance has dropped slightly during the project. A possible reason could be the punctuality issues of shown information, which were not on a level that was expected by the users. On the other hand, the perception of quality for the LED displays improved by 10-14.5% in the period between March 2011 and May 2012.

A strong support for the alternative technologies for bus propulsion (M1.11-LJU) was recorded. The related survey has shown a strong support and positive attitude (at about 80-90 %) towards new technologies introduced (both CNG and hydraulic hybrid buses), thus the quantifiable targets (of minimum 50 % of public transportation users) were exceeded.

Also, a survey on perception of the quality of the Mobility shop service (M4.10-LJU) shows a high level of satisfaction (91.7-100%).

**Process evaluation**

**Barrier 1 – Lack of transport strategies**

The lack of vision and failure to implement the spatial strategic plans combined with unclear political standpoint about the implementation of the corridor (whether to choose the 2+2 lane profile, dedicated bus lines, Barjanska road construction, etc.). There was also strong objection to ideas of changing road usage by closing a part of the corridor for private cars. Also there was the important political condition that the M2.1-LJU would not be implemented before some other non-CIVITAS related traffic measures are implemented, for example the completion of the inner ring road and Roška – Njegoševa bridge (traffic experts’ opposition controls the implementation of the corridor, because they state, that the establishment of the dedicated PT lanes on the corridor will cause even greater congestions. The construction of the inner ring is therefore the solution to redistribute the cars from the corridor to the other roads). As decisions were changed and not taken in a timely manner, the process was slowed down and planning was difficult. Additional work and costs were needed, and the implementation was delayed.

Since the physical implementation of the corridor was the pre-condition for a successful integration within the IP1, other measures could not function or could function with a minimised efficiency.

**Barrier 2 – Lack of communication/ cooperation between COL departments**

Inexperienced of different departments with project work in COL, time consuming data collection and gathering of information makes the coordination of work difficult and inefficient. There was also a lack of cooperation by COL departments and national agencies (i.e. agency for environment, that issues the environmental and construction confirmations). Also, limited communication with specific measures inside the local consortium prevented the information to be presented timely and effectively. This interfered with the planned dynamics of the corridor implementation which has finally brought it to a halt. To overcome this barrier, the CIVITAS ELAN team was involved in PR collegiums and political/expert circles.

**Barrier 3 – Bureaucratic barriers/ lengthy administrative processes**

The process of issuing the building permit of P+R south is still on-going due to lengthy flood protection analysis for that particular area. Without the construction of the P+R the corridor itself would not bring the desired results in terms of attracting the commuting car drivers to change to the PT in the centre of Ljubljanā.

**Barrier 4 – Corridor related measures facing changes and delays in implementation**

There were also problems with other CIVITAS measures within the corridor: priority at intersection has been declared as too expensive which was a major obstacle in the implementation process (a long delay occurred); hybrid bus technologies did not meet the expectations (problems/issues with malfunction of new technologies, environmental benefits not evident from the first set of testing); poor accuracy of the real time information for public transport (technical issues affecting the accuracy of displayed information). All of this has established the negative platform for future implementation of new technologies.

**Driver 1 – Support from some political representatives at local level**
The appointment of a new vice-mayor for the communication and quality of life encouraged and promoted the measures and brought also a new approach towards related issues at COL. This mainly includes finding alternatives for better transport solutions through the preparation of city wide transport policy of COL. Work became easier and faster cooperation between COL departments improved.

**Driver 2 – Indirect requests for such traffic reduction measures from the outside CIVITAS**

The CIVITAS initiative worked parallel to the European and national directives and programs on air, noise and health (an operational program PM$_{10}$, operational program for the noise, European alert on air quality). The rising problem with air pollution, particularly not met demands of air quality standards on the local and regional level (PM$_{10}$) and the related legal process of the EU, is a strong driving force calling for action and a no disputable argument in favour for the debate about different restrictive measures to be implemented. In Ljubljana poor air quality is the main reason for the proposed implementation of the congestion charging scheme.

**Driver 3 – Presentation of good practices**

The closure of Slovenska street (a part of CIVITAS corridor) during the EMW 2011 resulted in a significant decrease in air pollution. This was a showcase of good practice and was well accepted by cyclists and pedestrians: cycling NGOs showed their input/ support for the permanent closure of Slovenska street. The measure positively affects the attitude towards sustainable transport options and increased support for closure of city centre as a positive measure has been observed afterwards.

Dissemination of sustainable traffic measures at various PR events combined with multiple media coverage of CIVITAS ELAN events also slowly led to an increase in support for changes in transport culture and policy.

**Lessons learned**

**Lesson 1 – Increase in support for sustainable transport**

Even though the corridor has not been physically implemented, the process of implementation and the surrounding political discussions has helped Ljubljana to gain a change in ideology concerning the transport related issues – a shift towards the increased support for the sustainable modes of transport. This new thinking on the level of city administration is adopted by the newly confirmed City transport policy (adopted by the city council in September 2012).

**Lesson 2 – Need for planning/ implementation of the related measures on the IP level**

IP level coordination should also be applied from the beginning of the project to make evaluation easier and more focused (so that the parameters are more related, also the forms of data for different measures should be made more comparable). The precondition for a successful integration of measures of IP1 was the establishment of a corridor (M2.1-LJU). Since the physical implementation of the corridor was replaced by a traffic study, the integration on a corridor level was not possible.

**Lesson 3 – Political support is needed**

Political representatives must believe in the project and work in its favour throughout the mandate; the measures must be viewed within a long–term framework and must be adopted as a part of the city planning not as something that city is being forced to do. Political support for the measures/project must be clear and set in advance. In addition, it is recommended that there exists a strategic/higher level document to provide the guidelines for implementation of the project. In this way the discrepancies between measures/actions are eliminated. Implementation should be carried out on a strategic level with subtle/partial changing of travel habits. Also, a feasibility study for the implementation of the proposed project (a set of preliminary analysis/expert opinions to gather the viewpoints) should be performed.

**Lesson 4 – Gain public interest**

Public interest should be gained from the very beginning and gradually (for the controversial topics such as this one); one such example is through the activities of NGOs, also by helping to overcome the political and administrative barriers. Also, discussions with stakeholders must begin as soon as possible; to plan the measures including their inputs and viewpoints in order to avoid possible problems at later stages. Moreover, better planning of the sequences of the citizen engagement campaigns would be crucial; start generally – with a brochure that addresses the most general public – then move towards the individualised actions. In the most inner circle (face-to-face discussions), the appropriate communication tactics/approaches should play the most important role.
Lesson 5 – Manage media attitude/viewpoint

The information can be seen as extremely negative or as extremely positive in such controversial cases; the media coverage has decided to report the information from the negative perspective (glass half empty), while on the other hand the media should be asked to provide the information from a positive aspect (glass half full).

Lesson 6 – Appropriate department in the city administration to lead the measure

The departments for spatial planning and/or the department for transport related issues would be appropriate for the planning of the integrated package of measures. If they are in charge of the planning as well as the implementation the approach would be more holistic. At the same time barriers concerning the lack of involvement/cooperation would be excluded.

3.1.3.1.2. Measure 1.11: Hybrid bus implementation

Measure description

In this measure, the PT company LPP purchased and tested on the field 5 hydraulic hybrid type buses (utilizing both diesel and hydraulic engines) and 20 CNG type buses (both EURO 5 compliant).

The measure activities included also training of all LPP bus drivers to promote better driving styles and activities towards the public perception.

There were deviations from the original plan:

- CNG buses: originally it was planned to test and purchase five different electric hybrid bus technologies/vendors, but due to the unavailability of the buses on Slovenian market, their very high informative prices and global financial crisis, the plan was changed and CNG buses were added to the measure. This delayed the implementation process to some extent, implying a shorter exploitation period of the hybrid and CNG buses.

Evaluation approach

The evaluation consisted of comparing different types of buses on their social acceptance, pollution levels and costs. The reference case was the conventional 12 m long diesel bus (EURO 3 compliant): the B-a-U was defined as a potential EURO 5 compliant diesel bus. These were compared with the two types of buses that were implemented in this measure: hybrid and CNG buses, both EURO 5 compliant. Also a Cost Benefit Analysis was carried out on the different types of buses.

The short exploitation period of the hybrid and CNG buses caused the unavailability of reliable field maintenance costs data, so estimates had to be made.

The awareness of the public transportation users about recognition and acceptance of the new environmental friendly buses was measured via questionnaires/surveys while being physically exposed to the new buses.

The driver training was evaluated by monitoring the fuel use before and after the training.

Impact evaluation

Key result 1 – Cleaner and more energy efficient bus technology leads to reduction in external costs

In terms of the overall external costs and comparable passenger capacity bus performance, the hybrid bus and CNG bus have about 88% and 32% of the external costs of the reference case (EURO 3 diesel bus), respectively. The main external costs savings come from newer technology (EURO 5 compliant) and lower fuel consumption.

Key result 2 – Hydraulic hybrid buses perform best when disabling hybrid technology

The exploitation and testing results of the hybrid buses clearly show that best energy (fuel) efficiency is obtained when disabling the braking energy recovery system, meaning that the hybrid drive technology considered here does not have any sense. The pollution from the EURO 5 compliant diesel driven hybrid bus is much lower in comparison to the conventional EURO 3 compliant diesel bus. All
environmental quantifiable targets (3% reductions in pollutants emissions) were exceeded. Fuel consumption is also 10-20% lower, so the quantifiable targets for fuel consumption rate and fuel costs (20% reduction) were substantially achieved. However, the hybrid bus has only about 2/3 of the passenger capacity in comparison to the reference conventional diesel engine only bus and is much smaller, thus is only economical for low passenger demand lines. When considering passenger capacity, the quantifiable targets are not achieved. The CBA analysis shows that the initial investment cost in the hybrid bus(es) will not be compensated during lifetime (up to 20 years).

Key result 3 – Good performance of CNG buses
The CNG bus showed lower pollution results than the diesel and hybrid alternatives, with very low PM₁₀ emissions (quantifiable targets in terms of 3% reduction were exceeded in terms of NOₓ, HC and PM₁₀, substantially achieved for CO₂ and not achieved for CO emissions). As the CNG fuel has a comparably lower price to the diesel fuel the overall economy is very high and external costs are very low, rendering it the best alternative among all three. The quantifiable target in terms of 20% reduction of fuel cost was substantially achieved. The CBA analysis showed that the net present value will be positive in about 6-7 years, while the net present value of the conventional diesel bus will be positive in 8 years.

However, there are additional uncertainties regarding the maintenance costs and realistic (considering the CNG fuel supply chain) greenhouse gas emissions. Other external costs being very low, the greenhouse gas and remaining noise pollutions are dominant.

Key result 4 – High social acceptance
The surveyed persons showed strong support and positive attitude (at about 80-90%) towards new technologies introduced (both CNG and hydraulic hybrid buses), thus the quantifiable targets (of minimum 50% of public transportation users) were exceeded.

Key result 5 – No distinct impact of the training of the LPP bus driver on the economic and environmental friendly style of driving
The actual fuel consumption records after following the driving training, either at the individual or at the overall LPP bus fleet levels, do not show any significant change. At this point it is unclear whether this is due to the monitoring, and/or, (more likely) that the training campaigns do not have any lasting effect on the performance and behaviour of the drivers as a group.

Process evaluation

Barrier 1 – Change of LPP budget
Due to changed priorities within LPP in combination with the financial crisis, the LPP's budget for the purchase of new buses in 2010 was reduced in October 2009. Purchases of new hybrid buses stopped in October 2009 at least for 2010; a public tender for 20 CNG buses was prepared instead, with financial obligations in November 2011 (financial barrier rendered overcame in 2011). The change in measure content resulted also in a limited time for data collection, for example for maintenance costs.

Barrier 2 – Technical issues with hybrid buses
The hydraulic systems of the hybrid buses received in May 2010 were technically improperly manufactured: hydraulic oil was leaking, which caused two fires. This was solved by the vendor in October 2010.

Barrier 3 – Hybrid buses not yet commercially available on the market
Therefore hybrid buses could not be purchased within available timeframe and the process of purchase was halted in October 2009.

Barrier 4 – Delay in construction CNG filling station
The construction and permitting of the filling station was delayed for about 2 months, due to the unrealistic timing (less than a year was foreseen for construction) and due to non-responsiveness of the problems of the construction company (replaced by another construction company).

Driver 1 – Strategic decision towards environmental friendly vehicles
A strategic decision of COL and LPP top management was taken to use CNG as a fuel for at least for half of the public fleet in Ljubljana. Also expected benefits in lower fuel consumption, lower emissions, and an improved environmental friendly image, motivated the PT operator to work on the measure.

Lessons learned

Lesson 1 – Benefits of CNG buses

This measure was the first implementation of hybrid and CNG buses in Slovenia. Good results showed that the CNG bus technology has a potential to be replicated in other Slovene cities.

Lesson 2 – Advance study of technologies

The process of purchasing and implementing the buses faced a lot of barriers, which could be eliminated by thoroughly examining the CNG/hybrid (or new propulsion technologies in general) bus market before the start of the implementation. This could have avoided the surprise lesson that the enabled hybrid drive actually increases the fuel consumption. Its minimum fuel consumption is lower than when using a conventional diesel bus, however hybrid bus has only 2/3 of the passenger capacity, so when considering also capacity, its performance is worse.

Lesson 3 – Planning (and expected implementation) needed interim consolidation.

The hybrid buses were not purchased according to the planning. Within the measure duration, LPP's management reached a decision towards CNG driven bus fleet (part of it) following COL’s policy and strategy on environmental friendly vehicles. For a successful implementation and evaluation, a good insight into LPP's decision-making process/system in relation to ELAN measures and activities is necessary. A clear and transparent decision-making process is crucial for this.

3.1.3.3. Measure 2.1: Integrated high-quality mobility corridor

Measure description

This measure was planned as the development of high quality mobility North-South corridor going through the city centre and towards neighbouring municipalities, integrating a variety of measures and transport modes. It would introduce the public transport lanes (Yellow lanes) through the entire length of the corridor with a Park-and-Ride (P+R) service at each end of the corridor. It begins at the northern part of the town where Dunajska road crosses the motorway ring and where nearby P&R Stožice is located. Further in southbound direction the corridor crosses the northern part of the city’s inner road ring and runs along Slovenska road through the city centre towards the end of Barjanska road.

Since the measure implementation was facing severe barriers, it was decided (in the 4th Amendment of the project) to replace the physical implementation of the corridor with a traffic model, in order to confirm the impacts of the model implementation, as the basis for the preparation of the final design and technical documentation that is needed for the implementation of the corridor.

There were deviations from the original plan:

- **Corridor not implemented**: After long discussions with the political top at the City of Ljubljana, it was decided not to implement the high quality mobility corridor in the lifetime of the CIVITAS ELAN project. The reason behind it was primarily the fear of public opposition to such big-impact measures.
- **P+R south not constructed**: the P+R would serve as a southern intermodal point for the corridor, but because of the national spatial planning requirements regarding the flood protection of the designated area, the process was delayed and brought to a halt. This also played a crucial role in preventing the corridor to proceed with the implementation.
- **Modal split results are excluded** because the corridor was not implemented and had, therefore no impact on the modal split. Modal split is analysed on the city level instead.
- **Development of two mobility management plans**: for the new administrative building of the Ministry of Foreign Affairs (implemented) and for the Municipality of Ljubljana (not implemented due to delays in planning/construction).

Evaluation approach
Since there was no implementation in real-life for this measure the focus was on process evaluation. The potential impacts of the corridor were modelled, comparing 2 design alternatives to the existing situation:

- Variant 1: implementation of yellow lanes on the existing road profile: 1 yellow lane and 1 regular lane in 1 direction
- Variant 2: implementation of yellow lanes on broadened road profile in a central section of the corridor, only: 1 yellow lane and 2 regular lanes in one direction.

The parameters which were studied in the model are: fuel consumption, travel times and speeds, emissions and costs of implementation. Since it is a micro simulation model, no estimates on modal share are made.

Public acceptance of the corridor implementation was recorded to monitor the potential changes in travel habits as a result of public discussions regarding the measure.

**Impact evaluation**

**Key result 1 – Decrease in fuel consumption**

The results of the model show, that approximately 4% of lower fuel consumption can be expected (due to the uncertainty of the model the target of 5% cannot be evaluated with certainty) when the Variant 2 of the High quality mobility corridor would be implemented. Variant 1, on the other hand shows a potential increase in fuel consumption by 2%.

**Key result 2 – Decrease in emissions**

For all emissions, the model shows the best results for Variant 2, with a decrease of almost 2% for CO, NOx and VOC. In Variant 1 on the other hand, an increase of 1.7% is expected. The emission target of a 5% decrease was only partly achieved for Variant 2, and not achieved for Variant 1, mostly due to the increased congestion in the afternoon-outbound direction. Corridor design should be revised in this regard.

![Table 3-4: Difference in emissions compared to baseline](image)

<table>
<thead>
<tr>
<th></th>
<th>Variant 1</th>
<th>Variant 2</th>
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<tbody>
<tr>
<td>CO</td>
<td>+1.7%</td>
<td>-1.9%</td>
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<tr>
<td>NOx</td>
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<tr>
<td>VOC</td>
<td>+1.7%</td>
<td>-1.8%</td>
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**Key result 3 – Decrease in travel times/speed**

The results regarding the travel times show a reduction of approximately 4 minutes for cars and 7 minutes for public transport buses for the Variant 2. Variant 1 shows an increase of travel times for cars for approximately 1 minute, while the travel times for buses are similar to the existing situation. In terms of travel speed the Variant 1 shows a decrease of travel speeds for public transport buses for up to 9 km/h, while Variant 2 shows an increase in up to 5km/h. The target values have been reached only for Variant 2.

**Key result 4 – Decrease in acceptance of dedicated bus lanes**

Introducing a separate yellow lane regardless of the impact on fluidity of cars is supported by more than half of the population (57.3% in 2012), reflecting the significant level of support for the transition to public transport. However, the acceptance of the yellow lanes implementation has slightly decreased (-6%), which could point on the fact that the traffic conditions in the city have improved.

**Process evaluation**

**Barrier 1 – P+R in flood zone**
The limitation of funding in COL led to problems with the purchase of the land for the P+R; no consensus with the land owners has been achieved yet, and time consuming negotiations with landowners were delaying the implementation process.

**Barrier 2 – Lack of transport strategies within the city administration**

There was a lack of vision and failure to implement the spatial strategic plans, combined with unclear political standpoint about the implementation of the corridor (whether to choose the 2+2 lane profile, dedicated bus lines, Barjanska road construction, etc.). There was also strong objection to ideas of changing road usage by closing a part of the corridor for private cars. Also there was the important political condition that the measure would not be implemented before some other non-CIVITAS related traffic measures are implemented, for example the completion of the inner ring road and Roška – Njegoševa bridge. As decisions were changed and not taken in a timely manner, the process was slowed down and planning was difficult. Additional work and costs were needed, and the implementation was delayed.

**Barrier 3 – Spatial constraints in the southern part of the corridor**

Space is limited near Barjanska street at southern part of corridor due to a Roman Wall (bottle-neck effect); there is not enough space for dedicated bus lines within the present traffic regime; a decision to change traffic regime at a wider traffic scale and higher level is needed; the barrier was actually an absence of decision on inner ring regime and left-turning problem at the adjacent crossroad.

**Barrier 4 – Lengthy administrative processes**

The process of issuing the building permit of P+R south is still on-going due to lengthy flood protection analysis for that particular area. This long process of adopting spatial planning documents/permissions for the construction of the P+R slowed down the planning and implementation process.

**Driver 1 – Political and public support**

At the political level, especially the mayor and vice mayor supported the project. This encouraged and promoted the measures, so work became easier and faster. Also surveys showed clear public support for the introduction of the corridor and the Slovenska street closure for personal car traffic.

**Driver 2 – Indirect requests for traffic reduction measures from the outside CIVITAS ELAN partners**

The CIVITAS initiative worked parallel to the European and national directives and programs on air, noise and health: an operational program PM$_{10}$, operational program for the noise, European alert on air quality.

**Lessons learned**

**Lesson 1 – Positive results for implementation of yellow lanes on broadened road profile**

The model was a good indication for the expected impacts of the implementation of the corridor. Variant 2 proved to be clearly the best solution. But despite the increase in travel speeds and reduction of travel times, the targets for fuel consumption and pollution are not fully achieved. This suggests that other measures for reduction of the flow of private cars to the city should be considered – e.g. congestion charging, etc.

**Lesson 2 – Increase in support for sustainable transport**

Even though the corridor has not been physically implemented, the process of implementation and the surrounding political discussions has helped Ljubljana to gain a change in ideology concerning the transport related issues – a shift towards the increased support for the sustainable modes of transport. This new thinking on the level of city administration is adopted by the newly confirmed City transport policy (adopted by the city council in September 2012).

**Lesson 3 – Gain public interest**

Public interest should be gained from the very beginning and gradually (for the controversial topics such as this one); one such example is through the activities of NGOs, also by helping to overcome the political and administrative barriers.

**Lesson 4 – Manage media attitude/viewpoint**
The information can be seen as extremely negative or as extremely positive in such controversial cases; the media coverage has decided to report the information from the negative perspective (glass half empty), while on the other hand the media should be asked to provide the information from a positive aspect (glass half full).

Lesson 5 – Political representatives must believe in the project and work in its favour throughout the mandate

The measures must be viewed within a long–term framework; they must be adopted as a part of the city planning not as something that city is being forced to do. Political support for the measures/project must be clear and set in advance; the feasibility study for the implementation of the proposed project should be made.

3.1.3.1.4. Measure 3.1: Implementing a sustainable congestion charging scheme

Measure description

The final goal of the measure was to achieve a formal agreement on a congestion charging scheme for the Ljubljana region between relevant decision makers at local, regional and state level and stakeholders. In order to achieve that, several technical studies on suitable congestion charging options were made. Three totally different technical approaches were proposed. The first is the cordon type solution encountering two-level cordon, the outer cordon on the outer ring and the inner cordon on the inner ring. The second is the satellite type control system and the third is the vignette system. All three systems are commented from the point of their actual applicability for Ljubljana including advantages and disadvantages. Dialogue events were organized to discuss a possible congestion charging scheme with stakeholders at local, regional and national level and to include citizens in the process.

There were deviations from the original plan:

- **No implementation**: The initial goal of the measure was to come to a formally agreed implementation plan for congestion charging in the Ljubljana region ready for implementation by the end of the project. This was changed and there will be no implementation of congestion charging within the project life time. The most suitable solution was included in a document of COL dealing with Traffic regime in Ljubljana.
- **Mobile exhibition cancelled**: because the City District Councils did not accept the idea of a separate exhibition, the exhibition was held in conjunction with eight already planned events organised by the local communities, dealing also with other topics than congestion charging.
- **Extension of survey**: because of poor participation at the dialogue events, the survey of awareness and acceptance was extended to the city level.

Evaluation approach

Since the result of the measure is focused on preparing a study for congestion charging scheme implementation, the evaluation is oriented towards measuring and monitoring the impact of the measure on the awareness and acceptance level concerning the related congestion problems and proposed solutions. Two different types of public opinion surveys were carried out: one surveyed citizens on city level and another targeted regular citizens within the Individualised Mobility Marketing Campaign (M4.1-LJU).

Impact evaluation

**Key result 1 – Awareness of urban transport problems**

Participants of the dialogue events are highly aware of urban transport problems: 87% of questioned participants in May 2011 and 83% in February 2012. The general public is less aware of these problems (air pollution and congestion): 84.9% in 2009 and 63.8% in 2012. This decrease in awareness levels could indicate that the state regarding the perception of these parameters has improved during the project lifetime. The data that supports this is the change in modal split which has
decreased for private car use (decrease by 15%), but has increased significantly for walking (increased by 18%) and specially cycling (increase of 27%).

Key result 2 – Accepting the selected scheme
For the most suitable congestion charging scheme for Ljubljana a proposal on the basis of two measures was made: (a) the introduction of a new City vignette for the entire urban area within a ring and (b) the introduction of a workplace tariff to be paid by employers offering free parking places for their employees if the first measure would not bring proper results. 23% of the questioned participants of the dialogue events in May 2011 and 20% of the questioned participants in February 2012 agreed to implement congestion charging. The results from the surveys to the general public show very similar acceptance of proposed measures related to the implementation of selected congestion charging schemes.

Process evaluation

Barrier 1 – Lack of political support
COL did not want to implement the city centre congestion charging before all other measures for improvement of the traffic situation in Ljubljana are exhausted.

Barrier 2 – Lack of finances
The “Oh no, congestion again!” campaign/workshops were not very successful, which is probably related to the low budget that had been planned for this.

Driver 1 – Rising problem with air pollution
Particularly not met demands of air quality standards on the local and regional level (PM₁₀) and the related legal process of the EU is a strong driving force calling for action and a no disputable argument in favour for the debate about different restrictive measures to be implemented. In Ljubljana poor air quality is the main reason for the proposed implementation of the congestion charging scheme.

Driver 2 – Construction sites in the city centre are causing additional congestions
Ljubljana stands in the middle of a new development, building, rebuilding, arranging, constructing. Three new bridges over Ljublanica river (two smaller and one bigger) within the core of a city are currently being built, one underground parking is in construction. Construction sites need special traffic arrangements for the access and operation of heavy vehicles and building machines. All of this is causing additional congestions and influences the perception of car drivers that something has to be done to lessen the problem of congestion and prolonged travel times.

Lessons learned

Lesson 1 – Vignette system most suitable
The study has shown that the most suitable congestion charging scheme for Ljubljana would be, (a) the introduction of a new City vignette for the entire urban area within a ring and in addition (b) the introduction of a fee to be paid by employers, which offer free parking places for their employees if the first measure would not bring proper results. The reasons that lead to the proposed solution were the following: a classic cordon scheme would be inappropriate because the physical dimension of the city is too small for the introduction of a large cordon system to operate on 31 entrance point on the circumference of the ring. Another point of view is that the inner city centre is already closed for cars. However the existing free parking facilities within the city ring are the main driving force for the prevailing car use, as the promotion activities/workshops have shown.

Lesson 2 – Don’t base approval of the system on citizen support
The citizen engagement was not fully accomplished and it will be very difficult to implement a congestion charging scheme in Ljubljana just based on approval of citizens. A good example is the closure of the city centre for all traffic, also the PT. At first citizens were against the closure, but it was done anyway and now the acceptance of this measure is very high. A similar model should also be used for the congestion charging – implement the best solution for a period of 6-12 months and evaluate relevant indicators before/after, but for this a strong political support of local authorities is needed.
Lesson 3 – Sufficient finances needed
 Measures of which success is heavily based on outreach campaigns should be sufficiently financially supported. The very modest finance planning for promotion activities might be the reason for low success of the “Oh no, congestion again!” campaign/workshops. Professional marketing approach in running such campaigns in future should be planned on a larger scale, including the engagement of all main media.

3.1.3.1.5. Measure 4.1: Individualised mobility marketing

Measure description
In this measure an individualised mobility marketing campaign (IMMC) was organised, aimed to reach 2000 persons in the process of a more generalised mobility marketing (by the distribution of brochures), while 976 individuals (selected out of the previous 2000) were approached with a face-to-face interview-discussion in order to present the new developments concerning the sustainable transport in Ljubljana and to initiate possible changes in their travel habits towards the more sustainable means of transport. In order to further broaden the scope of the campaign, a mobility shop was also established in the centre of the city of Ljubljana in February 2012 and is operating within a Tourist Information Centre. Dissemination of information i.e. production and distribution of announcements concerning the sustainable transport (newspaper, leaflets, e-mails to various institutions, firms, stakeholders etc.) was also an important part of the campaign. As a part of this, a brochure was also designed and printed and is intended to be distributed to all registered households in Ljubljana.

There were deviations from the original plan:
  • The IMMC was implemented with a significant delay due to the fact that several measures in Ljubljana or were implemented with significant changes and delays or were not implemented within the CIVITAS ELAN lifetime (M1.11, M2.1, M4.9, M6.1, M7.2, M8.1, M8.5)
  • Reduction of the IMMC sample from 5000 to 2000 candidates (500 for deep communication campaign)
  • Broadened scope of the IMMC from the corridor level to the city level because of the low initial interest to participate
  • The Mobility shop and a publishing of a Mobility brochure were added to the measure.

Evaluation approach
Evaluation indicators were evaluated by two types of surveys:
  • Longitudinal survey by University of Ljubljana: in the first survey, 1069 households in the corridor were included (Jan 2009) and 1245 households in the second survey (May 2012). Specifically, the questions address the type/kind of transport mode respondents usually use for the various activities, transport mode to work/school, rate of transport systems usage, average travel times, number of kilometres driven by car per year, support to CIVITAS ELAN measures (implementation of yellow lanes, PT displays, congestion charging, reduced speed zones and hybrid/CNG buses).
  • IMMC survey: based on results of the first survey a targeted sample of individuals/households/micro enterprises was identified to participate in the Individualised Mobility Marketing Campaign (IMMC). The sample for the IMMC was selected on a basis of “quality mobility behaviour”. In both phases of the IMMC (Before-November 2011 + After-April 2012) 976 individuals were approached. It included some similar questions as the survey in the corridor: type/kind of transport mode respondents usually use for the various activities, transport mode to work/school, rate of transport systems usage, average travel times and willingness to change mobility behaviour.

Besides these two surveys, the number of users of the Mobility Shop is continuously monitored and classified by required service (information, ticket vending and IMMC service) and their satisfaction level of the Mobility Shop was surveyed by a questionnaire.
Apart from the modal split indicator, the evaluation of this measure was difficult to conduct, because other demonstration aspects have been constantly running into problems/changes (IMMC, Mobility shop, mobility brochure). For instance, the IMMC was deployed later than planned, and could therefore present no significant impact in terms of traffic situation improvement. Although, the selected indicators should give the relevant results, the unfavourable circumstances of the IMMC execution (winter time) did not allow for the demonstration to be done as initially planned (with 18 months of measure lifetime – for people to really adopt the new travel habits, as they were promoted through the campaign).

**Impact evaluation**

**Key result 1 – Modal split**

The results of the modal split for the IMMC sample do not show very encouraging results in terms of success of the campaign – car usage has increased by almost 150%, walking has decreased to approximately half of the “Before” situation. The change for the better in terms of sustainable mobility is evident in train and bicycle use. These results can be explained by the short period between Before (November 2011) and After (April 2012) state, which does not allow the full year cycle to be evaluated. Other reasons for limited success of the IMMC can be associated with the unfavourable weather conditions during the campaign (winter) might have resulted in a lower impact than targeted. The modal split results on the corridor show an increase in favour of sustainable means of transport from 54% to 60.6%, but with large differences between the various modes: cycling and walking increased by 27% and 17% respectively (the targets have been achieved), while the car use has reduced by approximately 14%. The PT usage has remained constant (the target has not been achieved).

**Key result 2 – Willingness to change habits**

19.2% of the surveyed citizens declared explicitly, that they will change the travel habits because of IMMC; a good 50% have declared that they are reconsidering the future use of currently used transport mode (car, bicycle, public transport, train, walking, and taxi). The target of 25% was mostly not achieved, mostly due to the fact that the improvements in the traffic arrangement that were supposed to lead to a change were not implemented.

**Key result 3 – Smaller distances driven per year**

Results show a significant reduction in the highest classes of number of kilometres driven/ year: 13-28% (the target has been achieved), as well as in a class between 5.000-10.000 km/ year (the reduction here being 9%). On the other hand, the share of respondents covering between 10.000-20.000 km/ year increased, probably due to the reduction in the highest classes (the targets have not been achieved). Also the share of respondents in the lowest class (less than 5.000 km/ year) has increased by almost 6%. One thing worth mentioning here is also, that the share of respondents not owning a car has increased from 11.7% to 12.6%, which accounts for approximately 9% relative reduction. These decreases in numbers are mainly a result of the decreased financial status in Slovenia in the last 2 years.

**Key result 4 – The frequency of usage of PT has significantly increased**

For approximately 150% for intercity buses, while the train and city buses use shows a slight decrease in a daily use, while weekly and monthly use has increased for 3-9%. The decrease in daily train and city bus use is also evident from the modal split data, where train use has decreased for approximately 55%. This increase is related to the decreased car use, which may again be a result of weaker financial capabilities of the population.

**Key result 5 – Decreased support for CIVITAS ELAN project/measures**

The results show a decrease of support by 2-23% for the measures implemented by CIVITAS ELAN. This decrease is the strongest for the measures not being implemented (yellow lanes, congestion charging and reduced speed zones). The target level of 10% increase has not been achieved. This decrease in acceptance might be explained by the fact that the implementation of the measures has stagnated and the public has not observed any significant changes in the final 2 years of the project. Furthermore, dissemination of the measures was not able to reach the expected amount of users since the majority of the measures have not been implemented in the foreseen timeframe.

**Key result 6 – High quality of Mobility Shop service**

A survey on perception of the quality of service (satisfaction level) was conducted for the mobility shops (all 3 locations). Satisfaction level of Mobility shop service provided inputs to draw conclusions
on the level of effectiveness/efficiency of the service. The results show a high level of satisfaction 91.7-100% satisfaction (very good and excellent categories combined).

Key result 7 – Popularity of the Mobility Shop growing

The number of visitors of the Mobility Shop has been exponentially increasing from February to July 2012, but this can be in the first place attributed to the increased rate of tourists in Ljubljana. To decrease the influence of the tourism season, another analysis for only the local visitors was made; the results show a relatively steady number of visitors (approx. 600-700/month for the local visitors – Ljubljana citizens), with a slight peak in April (if the tourist season – June, July – is disregarded). Nevertheless, the target of 200 visitors per month has been exceeded by far.

Process evaluation

Barrier 1 – Delays and changes in related measures implementation

Due to the delays in implementation of the measures which would be used as a marketing content, the start of IMMC was delayed as well and the IMMC was facing problems of “what to market”; As a result, the IMMC approach was redesigned: the campaign has transferred from corridor level to the city level.

Driver 1 – Good public responses

Good acceptance of CIVITAS ELAN measures among the local population (good response to first public opinion survey).

Driver 2 – Rising of public awareness

Public awareness to problems related to public and individual transport in the city was gradually raised, after informing 2000 individuals about good practices

Lessons learned

Lesson 1 – Time planning has proven to be very important

Some sequences of executing a campaign cannot be looked at as the individual actions. Since the poor success of the IMMC can primarily be attributed to the unfavourable dynamics (delays, cancellations) in implementation of the measures, which were supposed to be marketed within the campaign (i.e. M1.11-LJU, M2.1-LJU, M4.9-LJU, M6.1-LJU, M7.2-LJU, M8.1-LJU, M8.5-LJU), the IMMC would be planned differently, leaving more time for the participants to adopted the measures which would consequently lead to the changes of their travel habits.

Lesson 2 – Complex preparation

The preparation of IMMC is an extremely complex and long-term procedure which needs more time and resources in order to engage even more population in the process of transport rearrangement.

3.1.3.1.6. Measure 8.1: Public transport priority at intersections

Measure description

The main objective of this measure was to give the priority at intersections for the public transport buses in the CIVITAS-ELAN corridor by equipping the PT fleet and the traffic lights by the communication technology Zigbee; consequently the average speed of the bus fleet on the CIVITAS-ELAN corridor was expected to increase, and idling and fuel consumption to be reduced, especially during traffic peaks / rush hours.

During the project lifetime, 15 crossroads on the CIVITAS corridor and 210 buses have been equipped with the PT priority system.
There were deviations from the original plan:

- **Selection of intersections was constantly changing.** First it was planned that the PT priority system is implemented at the 15 intersection in sequential order. This would have the greatest impact on the increased speed of buses, reduced travel times and reduced fuel consumption. Afterwards the selection of the crossroads has been changed due to the technical issues on some of the selected traffic light systems.

- **Changes of the evaluation approach:** The comparison of fuel consumption for a selected sample of 5 buses all running on the same line with the same driver with the PT priority system switched on/off was planned. However, just before the start of the testing, Telargo requested the change of the sample of buses, because on some of them the Zigbee system was not installed/or was not functioning properly. Because of this new arrangement the comparison of the fuel consumption parameters is not possible for the entire duration of the testing period.

- **Indicators excluded** – due to a late implementation of the measure (or related measures) the following indicators were excluded from evaluation process:
  - Passenger satisfaction: due to the delay in measure implementation (September 2012), the operation period was too short to provide any results about the passenger satisfaction (data for the indicator could not be collected).
  - New passenger attraction: due to the delay in measure implementation (September 2012), the operation period was too short to provide any results about new passenger attraction (data for the indicator could not be collected).
  - Investment/maintenance and operating cost of intersection system: contribution to CBA for the corridor. Due to the cancellation of corridor implementation (M2.1-LJU) and due to the very late implementation of the PT priority system to allow for any relevant benefits, the indicator was excluded.
  - Vehicle fuel efficiency – fuel consumption: Because different sample of buses was used for Before and After status, the data for the fuel consumption are not directly comparable. Therefore the fuel consumption indicator was excluded from the analysis.

**Evaluation approach**

The evaluation of the measure was focused on following indicators:

- Punctuality/success rate of traffic light triggering – the indicator is measured by a number of information packages sent by the traffic light priority system in the buses for arrival / departure event vs. acknowledgment packages (indicating that the request for public transit priority was received by the traffic light and that the green light interval was extended for the PT).

- Punctuality of PT – number and percentage of buses arriving on time – real time information for PT presents an estimated time of arrival (ETA) information (in minutes) which is calculated by the system (based on GPS data and applicable ETA algorithms). Information is triggered with Zigbee modules installed in buses and at the intersections, which were recorded by the system.

- Average travel times/Average travel speed – the data is recorded by the use of GPS system installed on buses. The data is collected continuously for all buses in the PT fleet.

- Vehicle fuel efficiency – the vehicle fuel efficiency was determined on a basis of the fuel consumption recorded continuously by the PT company for each bus in the fleet. The fuel consumption was compared for the situation of PT priority system switched on and off.

- Education of personnel – Training was held for the traffic light control operators – operating and maintenance training on the dedicated short range communication module, function, connectivity, installation and maintenance procedures; training involved also testing development board usage and public transit priority traffic light triggering / logs recording and analysis.

**Impact evaluation**

**Key result 1 – High level of punctuality/success of traffic light triggering**

The average ratio between the number of sent information packages arrival / departure event vs. acknowledgment (ACK) packages (ACK packages indicate the request for public transit priority was received and triggering executed (i.e. green light interval extended for the PT) shows a very high level of system performance. over 95% of tested traffic light triggering operations have been successful.
The target values have been exceeded. However, this is only the technological aspect of the measure – to achieve significant impact in regard with the transport parameters, the system will have to be optimised (implementation of the PT priority system throughout the corridor/city).

**Key result 2 – Increased percentage of buses arriving on time**

The results show a significant improvement in accuracy of arrivals. Since the data on travel speed and travel times remains relatively constant (almost no impact is evident), this can be attributed to the location of bus stops in a relation to the location of PT priority intersections. Since the traffic light priority (TLP) installed intersections are scattered, this could result that the punctuality is increased on those bus stops, which improves the general schedule adherence. It could be stated, that the target levels have been achieved in full.

**Key result 3 – Very small reduction of travel times and no change in travel speed**

The data about the travel times show that buses with TLP engaged had shorter trips on average, however the change is negligible (up to 1% – the targets have not been achieved). There is a big variation in trip travel times in the same direction as above (South-North), however in this case the longer trips occurred on the first two working days. Also travel times of buses with TLP show no improvement. We may conclude that the variations between different days are quite big and/or there are not enough data to draw statistically significant conclusions.

**Key result 4 – Education/ training of personnel held only for the traffic light operators**

The training was attended by all 4 persons in charge of the system operation. The trainings of PT drivers were not performed, due to a delayed system implementation.

**Process evaluation**

**Barrier 1 – Administrative issues**

Public procurement process at MOL was delayed due to the insufficient involvement of stakeholders and decision-makers from the responsible departments of COL.

**Barrier 2 – Technological issues with system operation**

At the start of the implementation, the punctuality of traffic light triggering was an issue that prevented the system from performing as it was expected. Namely, the triggering of traffic lights does not happen early enough to allow the system to prolong the green interval for PT buses. This was a consequence of the selection of crossroads in a not sequential order.

**Barrier 3 – Costs exceed the foreseen budget**

The traffic light operator insists to exchange controllers and not just to upgrade them – costs of exchange exceed the budget. This resulted in additional delay in measure implementation – due to the lengthy negotiations the system was implemented just before the end of the project. This prevented the measure to be brought to life and be recognised as beneficial to the PT users. Also, it resulted in a poor data collection.

**Driver 1 – Cooperation activities with other international projects and programmes**

A contact was established with the partners from CIVITAS Archimedes project (Monza) which helped to exchange of experiences regarding the PT priority implementation.

**Driver 2 – Good cooperation with traffic light operator and traffic light controller software developer**

This prevented the further complication in conceptualising the system to be implemented at the intersections. Also the technological issues were addressed regularly.

**Driver 3 – High interest of the City of Ljubljana to implement the PT priority system**

They state that the idea was there for a while, and that they needed something like the CIVITAS project to help accelerate the work in this field.
Lessons learned

Lesson 1 – Implement priority system in sequential order
The first evaluation results are not encouraging. Since the intersections on which the PT priority system is installed are not in a sequential order the system performs poorer than it was expected.

Lesson 2 – Realistic timing for implementation
The implementation of a PT priority system has a high risk of incurring technological and administrative issues, because it is a new system. In order to avoid delays, it is recommended to foresee sufficient time in the original timing in order to be fully operational.

3.1.3.1.7. Measure 8.4: Real time information for staff and passengers

Measure description
This measure consisted of installing 58 LED information displays at bus stops, using direct communication technology (Zigbee).

There were deviations from the original plan:

- **Investment and maintenance costs indicator excluded** – the indicator was planned to be included into the CBA analysis of Corridor (measure 2.1-LJU “Integrated high quality mobility corridor”) to evaluate whether the PT operator and city gained benefit with attraction of new passengers. Since the corridor (M2.1-LJU) has not been physically implemented within the CIVITAS ELAN project, this indicator has lost its relevance and has been removed from further analysis.

- **Large P+R display implementation** – The measure implementation initially involved 33 bus stops to be equipped with remotely managed LED information displays for real-time information about the estimated time of bus arrivals with one large roadside display at the P+R. The latter was later cancelled and replaced by the installation of additional 25 LED displays at bus stops.

Evaluation approach
The evaluation of the measure was focused on following indicators:

- **Public acceptance, satisfaction and Perception of quality of service** – indicator measured acceptance of new real-time information system and if improvements, new type of information is desired by users. Two surveys were conducted within the measure:
  - Survey 1: Carried out by the University of Ljubljana in January 2009 (“Before” status) and again in May 2012 (“After” status), conducted on a sample of 1069 and 1245 households, respectively. The sample consists of the general population in the CIVITAS ELAN corridor area.
  - Survey 2 – carried out by Telargo (measure leader) and includes the PT users. The sample size was 214 in March 2011 (“Before” status) and 206 persons in May 2012 (“After” status).

- **Punctuality of LED displays** – number and percentage of buses arriving / departing in accordance with the displayed information - LED displays present estimated time of arrival (ETA) information (in minutes) which is calculated by the system (based on GPS data and applicable ETA algorithms); data collection was performed on long distance and short distance predictions. Apart from ETA also arrival/departure was presented. Information (arrival/departure) was triggered with Zigbee modules installed in buses, which were recorded by the system. The accuracy information concerning time and number of arriving/departing bus, was also controlled on the field by TELARGO and PT operator, LPP, by comparing the data recorded by the system and the data from the on-field observations.

- **New passenger attraction**: counting the number of fares recorded by counting the number of fares recorded by the validations by the contactless ticketing system. Due to the unavailability of data for the selected 2 PT stops the number of passengers was evaluated on a city level (all fares of the Ljubljana PT system).
Impact evaluation

Key result 1 – Increased reliability and accuracy

The results for the accuracy of timekeeping show an increase of 3.4% in accuracy of announced arrivals and 23.3% increase of accuracy of announced departures. The average accuracy of arrival and departure announcements in June/July 2012 were approximately 85% and 77%, respectively. The targets of 90% reliable information have been substantially reached.

Key result 2 – Improved perception of quality of service

After the implementation, the perception of quality has increased by 10-14.5% in the period between March 2011 and May 2012. The targets of 10% increase in the perception have been reached. This might be the result of the increase of accuracy of the displays.

Key result 3 – Acceptance level

The results of a survey, carried out by the University of Ljubljana in January 2009 and again in May 2012, show a large acceptance of the measure (approximately 80%), however the acceptance has dropped by almost 2% towards the 2012. A negligible increase in acceptance score was also observed in the acceptance of LED display service from the survey conducted by Telargo in the period March 2011-May 2012 (by 0.04 or 0.8% relative change). On the other hand, if only the categories 4 and 5 are considered (that relate to the statements “I agree + I fully agree with the statement that the because of the LED service I tend to use the PT more often”), a significant improvement in satisfaction can be observed (by 14% in relative figures). The targets of 10% increase in acceptance level have not been reached. A possible reason could be the punctuality issues of shown information, which were not on a level that was expected by the users. The expectations regarding the acceptance were too high; the public likes the displays, but they expect higher level of accuracy to be fully acceptable.

Key result 4 – No increase in number of passengers

The results show that in the case of comparison between 2010/11 to the 2009 (Baseline – Before status), the increase of passengers in months October-December was significant (up to 27.5%); however in the following months the PT usage is showing a decline. On a yearly basis, the increase of 5.4% can be observed. The results also show that the number of PT users has risen immediately after the implementation of LED displays (September-December 2010), while the subsequent decrease might be the result of the lower level of accuracy of LED displays than expected by the users. This period also coincides with the beginning of school year, which contributes to the increased use of the public transport. These factors cannot be completely ruled out.

The target level of 25% increase has been achieved in only months October-December 2010, however in all other compared periods the targets have not been achieved, with the exception of October-December 2011, when the targets were achieved substantially (in a range of 50-75%). It should be noted, that it was perhaps a bit too optimistic to expect 25% increase in PT usage just because of the LED display implementation. Other factors also play an important role in transport mode selection (prices, travel times, accessibility, etc.).

Process evaluation

Barrier 1 – Insufficient planning

The insufficient spatial planning reflected in selection of not the best micro-locations for electronic displays at two bus stops.

Barrier 2 – Long purchase procedures

Public procurement procedure has proved to be very time consuming, which caused delays in measure implementation.

Barrier 3 – Technical issues affecting the accuracy of displayed information

The LED display shows the information with a delay/ poor accuracy, so a person can be waiting for a bus that has already left the station. This led to a decreased acceptance of the measure, but was improved in a later stage.
Driver 1 – Financial contribution by the City of Ljubljana
The city was willing to contribute financially to the purchase and implementation of the LED displays (budget secured to execute public tender and procure required equipment).

Driver 2 – Public support for the measure
Positive reactions to the demonstration of a test display helped to accelerate the implementation of the rest of planned LED displays. Also, there was a very positive feedback on the implementation of first 24 electronic displays. This high support for the measure resulted in the up-scaling of the measure to other bus stops in the city.

Lessons learned
Lesson 1 – Expectation management
The issues that were depicted by the drop of acceptance level of LED display could be attributed to the fact that people were immediately expecting the system to work with 100% accuracy. The expectations regarding the acceptance were probably too high; in general the public like the displays, but they expected a higher level of accuracy. An important lesson in this regard is that when you implement the new technology, make sure that it works properly, or use additional dissemination activities for explaining the circumstances surrounding the early phases of operation – i.e. prepare the public for possible problems that may occur in newly established systems.

3.1.3.1.8. Measure 8.5: E-ticketing and fare integration

Measure description
The measure is focused on making the usage of public transport (PT) more user friendly by:

- integration of the ticketing system of two bus transport service providers (urban and suburban bus company).
- expansion of city contactless card Urbana selling and recharging point to the Ljubljana train station.
- improvements of PT information accessibility, both stationary as posters at the bus stops and electronic using the Google Transit web based planning platform and other means of PT travelling data dissemination like maintenance of an on-line database for real-time web-based applications (e.g. for smart phones). The PT planning portal is operational since September 2011 and can be accessed directly from http://transit.google.com, http://maps.google.com, and both operators’ web pages (http://www.jhl.si/lpp and http://www.slo-zeleznice.si).

There were deviations from the original plan:
- Ticketing system compatibility testing was not possible – The integration or homogenization of the paying system was impossible due to commercial interests of different providers, resulting in inability to unify both Slovenian Railway (Slovenske Železnice (SŽ)) and Ljubljana public bus company (Ljubljanski potniški promet (LPP)) ticketing systems and fares. The measure tasks, objectives and targets were consequently significantly changed and the CBA was cancelled.
- The number of visits to the Google Transit web application was not made available by the service provider (Google Company) – After the implementation, Google turned down the request for disclosing the number of hits (or visits) to the GT site where at least one of the sought itinerary addresses was in Ljubljana region. The PT portal acceptance measurement was changed by adding a dedicated survey question regarding the usage of the PT portal to the comprehensive survey within the 4.1-LJU measure.

Evaluation approach
The impact evaluation was mainly based on the usage of the measure, like the number of tickets sold in the SZ selling point, the number of integrated bus service users and usage of the PT portal. Unfortunately, after the significant deviation from the original plan, the “before” data (e.g. the contactless cards technology review, the fare integration data acquisition database, the train users’
satisfaction survey results etc.) were mostly unusable for the newly defined measure objectives’ evaluation.

The impact on modal shift and user satisfaction are evaluated on Integrated Package and corridor level.

Impact evaluation

**Key result 1 – High use of PT planning service**

Almost one quarter of survey respondents are using the PT planning service Google Transit at least occasionally after nine months availability (since September 2011).

**Key result 2 – High acceptance of bus service integration**

The ticketing system integration by two bus service providers, urban (LPP) and suburban (Bus d.o.o.), was very well accepted by the regular PT users from suburban area, with on average 34,000 users per month and an increasing trend of additional 600 users per month.

**Key result 3 – Urbana sales below expectations**

The selling of Urbana contactless cards and their recharging is below expectations (the targets were half-achieved), but the sales volume increases at a slow rate of 14 € per month on average. The poor result depicts the exclusion of railway PT service provider from the ticketing system integration.

**Key result 4 – Equipment of bus stations**

All 130 bus stations in Ljubljana are equipped with new station-specific timetables.

Process evaluation

**Barrier 1 – Delay on standard preparation form of integrated public transport ticketing system on the national level**

The Ministry of Transport has postponed implementation to 2013, which is after the end of CIVITAS ELAN. No legal foundation and unified standards for the electronic integrated ticket has been prepared yet, rendering actual implementation of the original plan impossible.

**Barrier 2 – Commercial interests**

Both partners / PT operators employ different IT subcontracting companies, which made it difficult to integrate the ticketing systems due to commercial interests and resulting in burdened negotiations. The integration or homogenization of the paying system was impossible for this reason.

**Driver 1 – Outdated ticketing systems**

The modernisation of both ticketing systems by the introduction of contactless card tickets by both partners was crucial for further integration.

Lessons learned

**Lesson 1 – Adequate and in-depth planning is crucial**

The legislative and standardisation baselines should have been clear before measure definition.

**Lesson 2 – Scale-up potential**

The results and experiences of the demo urban and suburban bus service ticketing and tariff integration can be used as a precursor for further integration on a regional and national level.
3.1.3.2. Integrated Package 2: For vital, healthier and safer citizens in city transport

3.1.3.2.1. Evaluation on Integrated Package level

Integrated package description

This Integrated Package aims to:

- provide safer transport in general and for specific target groups
- improve public health status by promoting and providing healthier/safer modes of transport
- offer PT fleet and infrastructure more accessible and secure for elderly and impaired.

The following measures are implemented as part of the CIVITAS ELAN project:

- **M4.6-LJU: Comprehensive Cycling Strategy:**
  - Comprehensive Cycling Strategy document
  - Establishment and governance of the City Cycling Platform
  - Interactive cycling map
  - Promotion of cycling through workshops and public events.

- **M5.2-LJU: Safety & security for seniors and PT users**
  - Installation of a video surveillance system in the buses
  - Training courses to assist elderly passengers
  - Workshops for elderly drivers defining safety & security measures

- **M5.4-LJU: Safe routes to school**
  - Web portal containing the safe routes for 49 schools
  - Traffic safety warden service for 4 schools
  - Speed enforcement (radars)

- **M5.5-LJU: Reduces speed zones**
  - Reduced speed zones and pedestrian areas were implemented throughout the city centre
  - Speeding enforcement system (installation of preventive radars) was established

- **M6.1-LJU: Demand responsive services**
  - Analysis of the public transport needs for impaired people
  - Tracking and communication system in 124 regular buses
  - Implementation of the Kavalir service (2 electric vehicles for 4 passengers) between the pedestrian area and the regular bus stop

There were some major deviations from the original plan:

- **No purchase of special vehicles for disabled people:** as the analysis indicated that it was more important to improve the accessibility of the regular buses no special vehicles were purchased. Instead a Tracking and communication system was installed in 124 regular buses which will also be equipped with ramps for wheelchairs (outside of CIVITAS ELAN).

- **Elements of the SUTP in Ljubljana Transport Strategy Plan:** the city council of Ljubljana did not accept the SUTP as a self-standing document. Instead, some parts of it have been adopted in the Ljubljana Transport Strategy.

Minor deviations from the original plan are reported on measure level.

Evaluation approach

The evolution of improvements regarding the safety and security were monitored directly and indirectly by measuring:

- the number of users of the transport modes for which the accessibility was improved (special groups of PT users – impaired persons, elderly) and of the transport modes that had an impact on public health (cyclists, pedestrians)
the 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. The indicators included the number of accidents involving cyclists, pupils (7-14 years of age), users of pedestrian/ reduced speed areas and senior users of PT.

- perception/ acceptance of safety and quality of service, which included the indicators such as acceptance of safety improvements in the vicinity of schools, the perception of safety/ security in PT.

Impact evaluation

Key result 1 – Improved safety

Different indicators show an improvement of the safety in the city of Ljubljana:

- The decrease of accidents involving cyclists on the yearly basis has decreased by 18% in absolute figures, even though the number of cyclists has increased (the target of 20% decrease has almost been reached); on the other hand, taking into consideration the number of trips, the number of injuries and death is basically constant (there is a very minor reduction of 2.2 injuries/1.000.000 cyclists trips).

- The results show that the reorganisation of the motorised city streets into pedestrian area can contribute significantly to the improvement of safety in the city centre. The reduction by 36% in minor injuries can be observed in 2011, while the data for severe/major injuries is statistically not strong enough to draw any firm conclusions.

- The results show that the average number of reported injuries increased during the project (in 2009 and 2010), perhaps due to a more open communication with the PT operator, but then in 2011 the number of reported injuries dropped by 18% – since the “After data” is represented by year 2011, it can be concluded that the target was exceeded.

- The number of solved damage claims has reduced by up to 67% compared to the average from 2004-2008.

- A significant decrease in the average speed is observed (0.4-9.9 km/h or 1-20%) which contributes positively to increased transport safety. Only in Podutiška street the average speed increased with 4.5km/h or 11%, but here the speed limit was changed from 40km/h to 50 km/h. In this way the average speeds are now below the speed limit, whereas before, the speed limits were exceeded.

Key result 2 – Accessibility of safer/healthier transport modes increased significantly

The measures have shown, that small improvements can mean a lot in terms of making the PT and other forms of transport more accessible to the public. The number of users of the safer/healthier transport modes increased a lot:

- An increase in the number of cyclists on the corridor and city wide is recorded between 2 and 20% (the target of 20% reduction was thus achieved on 1 out of 3 measuring points, otherwise the targets have not been achieved).

- New impaired users have been observed using the public transport features for the impaired people on the buses, but without registering into the system. Only a limited number of impaired passengers (17 persons) are registered users. These users did use public transport already before the implementation of the Tracking and communication system. In this way the target value of 30% increase was not achieved. The reason might be that due to a very late implementation of the system, the dissemination activities could not attract new users that would register into the demand responsive software system.

- The number of Kavalir users, has increased significantly since the start of its implementation (the target has been exceeded).

- The willingness of drivers to assist the impaired and elderly citizens has increased from 50% to 95% (target of 15% was exceeded), which immediately results in the higher accessibility of the PT for these groups of users.
Key result 3 – Increased satisfaction/perception of safety
The indicators show an increased perception of safety in all aspects:

- None of the regular and occasional registered users of the Demand Responsive system reported any negative element which indicates their satisfaction. In this way the target has been exceeded.
- The customer satisfaction with Kavalir (M6.1-LJU) increased for 4% within one year (June 2011 – August 2012), but the satisfaction level was exceeding already the target value of 75% immediately after implementation (score 4.42 out of 5 (88.4% acceptance)).
- The survey that was conducted by the LPP shows an increase by 12% of the perception of safety/security by the elderly when using PT service.
- The acceptance of the safety measures for the safety of pedestrians has increased from 9.4% to 23.4%; however, the acceptance of the soft measures has reduced in a range from 10-31%.

Key result 4 – City transport policy adopted
A sustainable vision on the transport strategy/policy of the City of Ljubljana has been adopted recently. As a result of this a holistic addressing of the transport safety and health issues is expected in future.

Process evaluation

Barrier 1 – Dependence of the measure on the existing traffic network lay-out
Some safety measures cannot be implemented if the existing lay-out of the streets does not allow that.

Barrier 2 – Limited resources
Some safety related measures are not the main priority when financing is concerned. For example, the special vehicle for impaired people as part of the public transport service was not bought, because of lack of resources. The demand responsive service for impaired people is limited to regular bus lines. Also, the cycling infrastructure was lagging behind the new parking garages in the city.

Barrier 3 – Insufficient capacities for complex understanding of user requirements and for an adequate integrated planning of traffic
The needs for safety related measures are high, but the city is not yet ready for their implementation/execution e.g. the action plan with detailed and prioritised measures is not prepared yet and this is not a part of the new transport policy of the city. Also these issues are addressed separately for each mode (PT, cycling, pedestrians, etc.). No general policy regarding safety has been prepared yet.

Barrier 4 – Issues with hardware
Current hardware solutions (e.g. bus homologation/capacity; there is only one place designated for a disabled people in wheelchair per bus; poor cycling infrastructure; dangerous street crossings) represent a barrier if the safety needs to be addressed quickly and efficiently. This prevents the service to be used efficiently – e.g. if a place for the disabled persons is already occupied a passenger in the wheelchair has to wait for another bus.

Driver 1 – Recognition of the problem
The City of Ljubljana and LPP (PT operator) recognized the problem that impaired/disabled/elderly people are not treated equal as the general public. A good basis exists for strong cooperation with impaired/disabled/elderly people on individual basis – case to case.

Driver 2 – Acceptance of the approaches for increasing safety and health
The general public as well as the operators gave a very positive response. They have been pleased because the safety on buses will be increased also for them and the vandalism cost will be decreased.

Driver 3 – Strong support from the City of Ljubljana for increasing safety
The city departments participated actively in measures for increased transport safety in the city.
Driver 4 – Exchange of experiences and lessons learned with other cities

The exchange of experiences between the CIVITAS ELAN cities is contributing to a positive change e.g. the approval of a new sustainable transport strategy.

Lessons learned

Lesson 1 – Integrated planning of measures in interaction with evaluation

Evaluation of a package of measures is difficult, if the measures are not planned in an integrated approach, i.e. if the aim is to increase safety in general a specific tasks should be identified as a part of the greater goal, not individually as is the case here. An IP measure leader (or a “supervisor”) on the IP level should be introduced. Also, the role of the IP measure leader with regard to the evaluation needs to be defined clearly.

Evaluation planning should also be involved parallel to the measure planning – prior to the project confirmation, also on the integrated package level. Not everyone knows how evaluation works and what is needed. The measure leaders are not experts in evaluation. The planned evaluation procedure does not always work according to plan, it needs to be flexible.

Lesson 2 – Agreements on data availability or collection needed in early stage

Before applying for such a project/measure, the available datasets should be checked in order to assure their availability for the future needs. If data are not available or are not in the appropriate form, agreements about data collection with relevant departments, agencies, stakeholders, partners, etc. should be made as early as possible.

Lesson 3 – Communication strategy at the start

Communication strategy must be made in the beginning of the project/measure implementation; the promotion should be based on a final product; easy access to the information.

Lesson 4 – Stakeholder/citizen engagement crucial

Especially for safety and security measures a strong involvement of citizens and stakeholders is a basic element of success. Constant contact with the users of the demand responsive service (M6.1-LJU) enabled the PT company to continuously modify the service according to the users’ needs.

Lesson 5 – Public transport training successful

Workshops on how to use the PT safely, which were organised continuously proved to be a great success in attracting new passengers with disabilities: how to enter the bus, how to use the contactless card, where is the best location on a bus for wheelchair users, etc.

3.1.3.2.2. Measure 4.6: Comprehensive cycling strategy

Measure description

The aim of the measure was to produce the Comprehensive cycling strategy that would lead to improvement of cycling conditions in Ljubljana, after its implementation. Its elements define quality conditions on Ljubljana cycling network, address safety issues, accessibility and priority of cycling, the strengthening of the promotion to improve its current status, link existing cycling paths, etc. The strategy provides clear objectives, priority measures, their implementation timetable, human and financial resources.

Besides the compilation of the Comprehensive cycling strategy document, the measure activities consisted of the establishment and governance of the City Cycling Platform, the design of the interactive cycling map and promotion of cycling through workshops and public events.

There were deviations from the original plan:

- Since the Cycling strategy was not formally adopted by the City Council within the lifetime of the project the impacts are also limited; instead, the cycling strategy was used as a basis for the cycling chapters of the City transport policy.
Evaluation approach

As the main aim of the measure was to promote cycling, the evaluation focused on measuring the cycling rate, by permanent automatic cycling counter and measuring the modal split, within the survey of M4.1-LJU. However, the contract for automatic counting of cyclists was not prolonged after June 2011, so more recent data are unavailable. This resulted in a lesser impact of the measure – it is evident (from an on-field observations, surveys), that the number of cyclists has risen, but unfortunately there is no data to support this decision.

Besides this, the workshops were evaluated based on the number of participants, as too many workshops were organised to distribute questionnaires on all workshops.

Impact evaluation

As the cycling strategy was not implemented, the after state is primarily a result of the effort of the cycling coordinator and his collaboration with the main stakeholders at COL independently of the Cycling strategy. These included: promotions, events, consultations for implementing the cycling infrastructure, etc. The increase in cycling could therefore be associated with the individual action as opposed to the result of the cycling strategy.

Key result 1 – Strong increase of cycling rate, based on the number of journeys

The results of the modal split analysis (based on a survey from the M4.1), has increased by 27.2%, even though this was not registered by the automatic counters (due to the shortage of data for the period July 2011/12). The increase could be also attributed to the newly implemented bicycle sharing scheme in Ljubljana (not a part of CIVITAS ELAN), which has shown the people that cycling can be an efficient and therefore attractive mean of transportation. A general image of cycling has improved in general after the introduction of the bike sharing scheme.

Key result 2 – Increase in the number of cyclists on the corridor and city wide

The increase is recorded between 2 and 20% in the city, which relates to the targets set. The increase observed in the field (occupancy of the cycling routes, bicycle stands, etc.), between 2011 and 2012, might show even a larger increase, if measured, however due to the problems related to the counting of the cyclists (please see above) this cannot be confirmed.

Key result 3 – Decrease in the number of accidents resulting in injuries and death

The decrease of accidents involving cyclists on the yearly basis has decreased by almost 20% in absolute figures, even though the number of cyclists has increased; on the other hand, taking into consideration the number of injuries and death the number is basically constant (there is a very minor difference of 2.2 injuries/1.000.000 cyclists trips). However, given the counting error, due to the fact that only the 1st half of the year 2011 is taken into account, the uncertainties are too big to give a definite result regarding the rate of injuries.

Key result 4 – Cycling website

The results show that the cycling webpage has turned into a great success, which is evident from the results – i.e. the expected 2375 visits have been exceeded by more than twofold (the total of 6820 unique visits of the webpage have been recorded by the webpage counter since its implementation in April 2010)

Key result 5 – Acceptance/satisfaction with the cycling related workshops for stakeholders

Aggregating the results of the workshop, a very high level of satisfaction can be observed (the target levels have been exceeded). The majority of categories (relevance of topics, meeting the expectations have exceeded 80% satisfaction. The lower level is observed in regard with the category “Meeting the goals”, where an extremely low level of satisfaction (25%) in one of the workshops (“Training of the city officials regarding the cycling related issues and citizen engagement” held on 10.3.2012) has resulted in a decrease in score for the entire category, when averaged for all workshops. The low acceptance was a result of the fact that cycling was not perceived/ recognised as an important mode of transport, by the City of Ljubljana Traffic department officials.
Process evaluation

Barrier 1 – Negative perception of cycling

Cycling is perceived as an inferior transport mode by the city council, which led to weak cooperation from Transport department of COL. All work of the Transport department is oriented towards car-based transport; the city sees the Comprehensive cycling strategy as an unreachable goal and does not acknowledge it as the basis for their work. Only a small amount of the city budget is devoted for improving cycling conditions, therefore also the measure implementation is suffering from the issues related to these reasons. For this reason, the urban cycling NGO community that represents the interest of urban cyclists has only a limited influence on the transport policy in Ljubljana and the need for cycling measures is not acknowledged.

Barrier 2 – Lengthy process of approval of the cycling strategy by the City council

The transport strategy of COL was developed in April 2010 and has been only recently adopted by the city council as a part of the Transport policy of COL. Before this, there was no cycling strategy as a basis for cycling related measures/actions executed by the city; some of the actions that were executed within the measure were based on the unofficial cycling strategy.

Driver 1 – Threat of EU sanctions/penalties for polluted air

Awareness on car mobility problems and limits in the city has resulted in searching for other transport alternatives such as cycling. There is a shared sense of urgency to improve transport and mobility within the city, which led to the development of the city Transport policy.

Driver 2 – Citizens incentives for improvements in cycling related issues

The strategic urban plan and detailed implementation plan of COL was developed while involving cyclists as stakeholders and by the exchange of experiences and lessons learned with other cities. The comprehensive cycling strategy developed within this measure is part of a transport strategy of COL and the majority of suggestions related to cycling were taken into account.

Driver 3 – Establishment and successful operation of cyclist platform of COL

This led to an increase in number of cyclists and an improved image of cycling.

Lessons learned

Lesson 1 – Establishment of the Cyclist platform

A Cyclist platform is a useful tool to assure a multi stakeholder engagement in preparation and design of Comprehensive Cycling Strategy of COL that is aimed to improve conditions for cycling and promote cycling in the city. The Cyclist Platform created a field for NGOs, independent experts and interested individual cyclists to take an active standing in defining issues, as well as activities and tasks and their priorities of CCS COL. Engagement of stakeholders created trust, positive attitude and enabled the stakeholders’ contribution of valuable knowledge for improving city traffic and mobility policy.

Lesson 2 – Use more innovative techniques than workshops

Workshops usually attract only the “already convinced” ones. The future events should be organised in a way that the persons who have used a bicycle in the past, but are currently using other modes of transport, to return to using a bicycle for their daily trips, and not just for the recreational purposes (as is the case in Slovenia – a lot of people see cycling as sport and not as a mode of transport). Also the events should be aimed at those that see the bicycle as an inferior transport mode compared to a car. Such events would be something like the “bicycle day” or similar.

Lesson 3 – Interactive cycling map on Geopedia

This had been established with a purpose to suit user needs by providing relevant information on cycling in the city based on citizens’ input and thus to create a better “virtual” environment for cyclist in Ljubljana. The map has shown to be a popular and useful online tool, its improvement and continuous updating. Cyclists are using it, but they have to be additionally stimulated/ motivated to participate in the forums or submit their suggestions.
3.1.3.2.3. Measure 5.2: Safety & security for seniors and PT users

Measure description
In this measure an indoor video surveillance system is installed on buses to prevent vandal behaviour on buses and to enforce measures against them. The indoor video surveillance systems were purchased in several steps and each time they were installed in the vehicles a few days after delivery. The last installation was done at the end of March 2010. By now 89 vehicles (70 were initially planned) are equipped with the video surveillance system. The system is used to analyse dangerous situations and weak/critical points/situations on the buses more precisely as well as to define corrective actions and implement them.

Drivers received training focusing on specific needs of elderly users of PT and on the use of the video surveillance system. Altogether 16 training sessions were organised for the PT staff regarding the optimisation of the PT service for the elderly. Also, the elderly PT users received trainings in the form of three interactive workshops where they can co-define measures for their safety & security improvement. The purpose of the workshop was to introduce and share issues of elderly people and drivers regarding the use of public transport. Opinions were carefully followed and potential improvements were discussed. In the practical part of the workshops, the elderly were also shown how to ride a bus with to avoid injuries in case of incidents/unexpected events such as quick stopping, evasive driving actions, etc.

An information campaign on the introduction of the system in the public passenger traffic in Ljubljana has also been launched. Two newspaper interviews were given, in different times of the year, to the two main/most popular newspapers in Slovenia. The articles were about the promotion of safety and security on public transport on the buses of LPP with the use of surveillance systems.

There were no deviations from the original plan, besides the installation of a higher number of cameras than originally planned.

Evaluation approach
The evaluation of the measure was focused on security in buses; the perception and awareness of security was measured by a survey and by recording the customer complaints. Customers can complain via telephone, e-mail, in written form by regular post, personally or in a book of complaints and praises. Some complaints are also forwarded from the City of Ljubljana to the operator. In addition, the PT operator is recording all cases of major accidents on buses and injuries suffered by PT users. Compensations paid by insurance company to PT users injured by accidents are used to evaluate the number and severance of injuries and number of solved damage claims caused. Also the willingness of drivers to assist elderly people was evaluated by a written questionnaire. The costs of the video surveillance system and trainings of bus drivers are taken into account in a financial CBA. Finally, a financial CBA was carried out to establish a rationale of the surveillance system installation/operation.

Impact evaluation
Key result 1 – Injuries of PT users
The results show, that the average number of reported injuries increased during the project (in 2009 and 2010), perhaps due to a more open communication with the PT operator, but then in 2011 the number of reported injuries dropped by 18% (target was exceeded). The number of solved damage claims has reduced compared to the average from 2004-2008. This number fluctuates strongly over the years without apparent reason.

Key result 2 – Increased perception of security when using PT service
The survey that was conducted by the LPP shows an increase by 12%. Also 86% of the respondents were aware of the surveillance system. The target of 10% was exceeded, but the number of respondents is too low to draw statistically significant conclusions.
Key result 3 – Complaints of PT users
All complaints and praises from different sources are at the end summarised. The results show, that the complaints of PT users – complaints increased by almost 50%, but on the other hand also praises increased by 70%. The target was not achieved, but this can indicate a higher level of awareness regarding the security and safety issues on PT buses.

Key result 4 – Significant increase in assistance from drivers
Drivers who attended the trainings were asked if the training helped them to change their attitude. The willingness to assist impaired people increased from 50% to 95% (target of 15% was exceeded).

Key result 5 – Reduction in vandalism costs
Results show, that costs of vandalism on buses were reduced by 11% (the target of 15% reduction was almost achieved). Presence of video cameras on buses evidently reduces vandalism costs and acts of violence, which justifies the investment costs, so CBA results were positive.

Process evaluation
Barrier 1 – Complex legislation-protocol to use camera records in case of violence
Records may be kept for only 48 hours and then they have to be erased. In case of a violent act a formal proposal is required to be able to use the record in case of a trial. In between records, this act can be erased.

Barrier 2 – Lack of legal enforcement
The legislation in Slovenia is not very strict to people that are caught in vandalism act, so it is possible that the vandalism rate will increase again after some period.

Driver 1 – Support of bus drivers
The drivers were pleased with the cameras because this would increase also the safety on buses for them and the vandalism cost would decrease.

Driver 2 – Reduction of costs
Presence of video cameras on buses evidently reduces vandalism costs and acts of violence, which justifies the investment costs.

Driver 3 – Displays in buses
Equipping the buses with displays allowed drivers to directly monitor the interior and the surrounding of buses.

Lessons learned
Lesson 1 – Mix of measures to reduce vandalism
To reduce vandalism more effectively, the implementation of cameras is not enough. A strong dissemination activity about implemented cameras followed by strict sanctions to vandals is recommended.

3.1.3.2.4. Measure 5.4: Safe routes to school

Measure description
The measure is aimed at enhancing the traffic safety of the pupils (7-14 years of age) on their way to and back from school. To achieve this, a web portal containing the safe routes for 49 schools was designed, the traffic safety warden service was developed and organised as a constant service at 4 out of 49 schools (run by 13 volunteers) and street signalisation and preventive radars for the reduction of vehicle speeds in the vicinity of schools were put in operation.
There was a deviation from the original plan:

- **New indicator:** to complement the indicator “No. of speed limit violations in the vicinity of schools”, the indicator “Monitoring the average vehicle speed in the vicinity of elementary schools” was added. This was done due to the fact that the data between 2008 and 2012 were not comparable (due to the changes in vehicle speed limits in the selected road sections during the measure lifetime).

**Evaluation approach**

The following indicators were evaluated:

- **Speeding violation/ average speed:** speeding violation results are not compatible/directly comparable because during the project lifetime the speeding limits in the majority of measuring points have been changed. To confirm this, the analysis of the average speed has been added as an indicator to the evaluation approach. Issues such as these should be avoided; however it was all done in favour of increasing safety on site. The changes in the evaluation approach (additional Average vehicle speed indicator) helped to make a successful evaluation of this parameter.

- **Acceptance:** The beginnings of this measure were somewhat difficult (changes of ML, etc.), which made the stakeholders difficult to reach. As a result of this the survey for the before state was not done early in the project; instead a survey was made to retrospectively ask the parents, teachers and pupils about the acceptance of the measures that were implemented through time.

- **Signalisation data:** the department that was responsible for gathering and reporting the data has split up in 2010, and the data sources have become scattered and difficult to collect after that period, especially for the horizontal signalisation. Therefore the data shows inconsistency in the figures in regard to the selected timeframe.

- **Number of accidents:** accident data were collected, but the sample considered is statistically too low to allow for identifying trends.

**Impact evaluation**

**Key result 1 – Decrease in traffic speed**

During the project lifetime the speeding limits in the majority of measuring points have been changed. The analysis of the average speed shows a significant decrease in the average speed (0.4-9.9 km/h or 1-20%), which contributes positively to increased transport safety.

**Key result 2 – Inconclusive results on street signalisation**

Some indications of street signalisation (traffic signs – “children on the streets”, “30/40km/h speed limit”; street surface signalisation; speed bumps) show an increase, however the majority of signalisation parameters show extremely large decreases (over 40%). Targets regarding the street signalisation were not fully achieved. The result of this may be an error in data provision/presentation, as the signalisation that once was installed is usually not removed, which would in this case explain the data.

**Key result 3 – Increased acceptance of the measures**

The acceptance of the “hard” safety measures by the parents is ranging from 59-65.6% for various safety improvements (an increase of 9.4% to 48.4% can be observed between 2009 and 2011); the target level of 75% acceptance has been substantially achieved. The acceptance of the “Safe routes to schools web portal” is somewhat lower – ranging from 15% (“before”) to 35.5% (“after”) (the targets have not been achieved, but the trends show a significant improvement). The acceptance by the traffic mentors themselves is higher, between 60-90%. The target is reached is exceeded for all measures, except for the web portal.
Process evaluation

Barrier 1 – Lower number of volunteers than expected

Although potential new volunteers were regularly invited through our workshops attended by school’s representatives (potential volunteers: parents or grandparents) and our experts (constant volunteers), the interest, at the time, was not even close as it was expected.

Barrier 2 – Lower level of cooperation between leading and some of the principle participants

This mainly affected the data provision and processing. The data collection was therefore slow and was causing delays in measure evaluation. Lower individual motivation level by some of the
occasional participants led to lower or in rare cases no response from schools regarding participation in data collection (data such as the description of dangerous points in the vicinity of schools required for portal updates)

**Barrier 3 – Dependence of the measure on traffic network on particular school routes**

Some safety measures could not be implemented because the existing spatial situation did not allow that.

**Barrier 4 – Data problems**

There were difficulties to access data archives and forms of available statistical data were difficult to process/compare, thus causing delays in measure evaluation.

**Driver 1 – Strong political support**

The City of Ljubljana specifically supports activities to increase children safety: this led to the establishment of a constant road safety service to 4 schools.

**Driver 2 – Dissemination activities**

Organized workshops, meetings, conferences and activities on the subject helped to accelerate the preparation of the measure.

**Lessons learned**

**Lesson 1 – Success of measure**

The efforts put on this part of the measure were not without any success – starting by including 2 pilot schools and 6 constant volunteers; at the moment CIVITAS-ELAN team in Ljubljana cooperates with 13 volunteers, working within school traffic service on 4 elementary schools.

**Lesson 2 – Attract volunteers**

Citizens are highly motivated to participate as volunteers in a short time period, but it is extremely hard to interest to participate in a daily – twice a day – base through the whole school year; More efforts should be put into finding and motivating new volunteers to join the team, like expanding the communication network, stronger, more aggressive communication for acquiring volunteers and more presentations at parents council/elderly citizens homes.

**Lesson 3 – Improve safety**

Even though the safety measures undertaken within this measure have significantly decreased the vehicle speeds in the vicinity of schools, the “zero injured pupils” objective was not reached. This points to the fact that stricter measures than required by the traffic safety standards are needed; this might also be an indication that the standards should be revised.

### 3.1.3.2.5. Measure 5.5: Reduced speed zones

**Measure description**

The aim of this measure was the redesign and reconstruction of public spaces and streets to reduce the transport safety and public health by gradually limiting the vehicle speed limits in the city centre and by widening the pedestrian zone.

In relation to this, the dialogue with residents was improved to define the limited access regime that best suits their needs as well as the general public interest. The extension of pedestrian and reduced speed zones also helped in spreading a message about how highly the citizens of Ljubljana value healthy environment and clean air.

The CIVITAS-ELAN measures input is important in terms of bringing the initial idea for the implementation of reduced speed zones, even though most new arrangement of public spaces were realised with COL’s funding outside the CIVITAS-ELAN project.
There were deviations from the original plan:

- **Evaluation indicators added:** Speeding violation data are not compatible. Namely, during the project lifetime the speeding limits in the majority of measuring points have been changed. It can be seen that the changes were primarily aimed at the reduction of the speeding limits, thus increasing the traffic safety. To confirm this, the analysis of the “Average speed in the reduced speed zones” has been added as an indicator.

- **Replacing reduced speed zones with pedestrian zones:** The initial plan for this measure was the large-scale implementation of the reduced speed zones of 30 km/h speed limit in order to reduce the safety and health of the citizens. Later it was decided by COL that for reaching these goals, the implementation of pedestrian zones would be more appropriate. A part of the intended 30km/h zones were transformed into pedestrian zones.

### Evaluation approach

The indicators used in the evaluation relate to the following:

- Number and extent of new pedestrian zones
- Number of traffic accidents and traffic violations as well as the average vehicle speed in the reduced speed zone areas (recorded with stationary radars)
- Acceptance of the rearranged traffic system by stakeholders (survey to shopkeepers, residents and pedestrians).

### Impact evaluation

#### Key result 1 – Increase in pedestrian/reduced speed zones

During the project lifetime a wide area in the centre of Ljubljana has been turned into a well-designed and efficient pedestrian zone: more than 70 city streets have been transformed, however only one street was directly associated with CIVITAS ELAN (the others were funded outside of ELAN project), although it introduced the initial idea for the implementation of reduced speed zones. The pedestrian areas in the city centre have been increased by 450%. The target of an increase by 30% has been exceeded.

Also the rest of the road network has been revised with new one-way roads and streets in accordance with the objectives and strategies of traffic calming. The results also show that the reduced speed zones (30 km/h) have been increased by 12%. The target values estimated the 30% increase for the reduced speed zones, but since the majority of streets planned for 30 km/h were later changed into the pedestrian areas (speed limit for vehicles that are allowed to enter is 10km/h), these results can be added to the count of pedestrian streets – it can be stated that the targets have been achieved for this indicator as well.

#### Key result 2 – Speed limit violations reduced

Speeding violation data for Before/After status were not directly comparable. Namely, during the project lifetime the speeding limits in the majority of measuring points have been changed – towards the reduction of the speeding limits, thus increasing the traffic safety. A study of the intermediate results (2010-2011) was conducted in addition, in order to allow for a more focused interpretations, but also to allow for a detailed comparison of the results. A significant reduction of speed violations (by 68.37% in total number of violations)) in 2011, compared to 2010, could be associated to the intensified City traffic wardens. Drivers have probably been more cautious due to media announcements about the new radars as well.

#### Key result 3 – Average vehicle speed in reduced speed zones is reduced

The results of the average vehicle speed in the reduced speed zones show a decrease (0.4-9.9 km/h or 1-20%; average decrease is 5.2 km/h or 12%), which contributes positively to increased transport safety. The targets have been achieved.

#### Key result 4 – Reduction of number of traffic accidents in pedestrian areas

The results show that the reorganisation of the motorised city streets into pedestrian area can contribute significantly to the improvement of safety in the city centre. The reduction by 33% in minor injuries can be observed in 2011, while the data for severe injuries is statistically not strong enough to draw any firm conclusions. The target of zero severely injured due to traffic accidents have not been achieved – the target values were set too high, since the traffic accidents can occur with other means...
of transport besides the private cars. This was the case here. Although the number of accidents decreased, the number of accidents involving cyclists has increased, since the cyclists are allowed in the pedestrian zone. If these cars would be taken out of the equation and if cyclists had the opportunity to travel through the city centre on designated cycling paths, the target values would probably be easily achieved.

Key result 5 – High acceptance by stakeholders

The majority of the surveyed stakeholders have praised the general improvement of the image of the city, public transport, new traffic arrangements, lower noise levels, air quality and positive attitude they have regarding the changes. More complaints than praises were only seen regarding the reduction of parking spaces (with the exception of residents’ responses) and freight delivery services. The average score for all categories is highest for the shopkeepers (71.6%) and the residents (70.8%), but also for the pedestrians passing by (66.5%) the target level of 50% acceptance has been exceeded.

Process evaluation

Barrier 1 – Difficulties with data collection

The system for measuring speed, violations and accidents was not established; data sources are scattered, currently there is no centralised data archive at COL. This does not allow the efficient use of data and consequently causes delays in measure evaluation.

Barrier 2 – Initial problems with acquiring permits for the implementation of the measure

Since the majority of the areas that are under this measure is near to a river, the permits on a national level were required (water is under national jurisdiction). At the beginning of the measure implementation the barriers related to this issue emerged.

Barrier 3 – Strong initial opposition by stakeholders

During the implementation of the measure there was a strong opposition by the residents and shop-owners, which resulted in delayed the implementation of the measure because consensus needed to be reached first; currently the barriers are too many activities in a single urban space (e.g. pedestrians, cyclists, freight delivery, restaurant gardens/terraces…). To create understanding of the impacts of the measure, individual discussions were held with the shopkeepers and residents. This resulted in less opposition and greater acceptance of proposed measures.

Barrier 4 – Attacks on city wardens

City wardens were attacked for issuing parking penalties in reduced speed zones. To deal with this, security guards were appointed for accompanying the wardens and self-defence lessons for the city wardens were organised.

Driver 1 – High political support

Extended political interest-increase in reduced speed/pedestrian zones and the fact that cars are being forced outside city centre gives more opportunities to further enlarge pedestrian zones.

Driver 2 – High public acceptance/support

Removal of motorised traffic from the city centre is very well accepted by the public. Also the new public spaces that were created are very well accepted by the public. The majority of city’s events now take place in these areas (fairs, cultural events, etc.).

Driver 3 – Alternative for removed parking spaces was found

The construction of the new large parking garage in the city centre, which is also available for the inhabitants (reserved parking spaces for a minimal monthly parking fee) has reduced the negative first reactions towards the closure of the city centre for motorised traffic.

Lessons learned

Lesson 1 – Achieving better quality of life in the city

The realization of these new arrangements in the centre of Ljubljana is helping to achieve a better quality of life in the city, providing the city with qualitative urban public areas, uniting the whole area
and enabling a smooth flow of foot traffic. It is also contributing to an increase in trade, tourism and catering services in the city centre (gardens) and indirectly reducing traffic pollution (noise and air pollution).

**Lesson 2 – Strong political support**

This comprehensive interdisciplinary project of implementing restricted traffic areas, restricted speed zones and pedestrian zones in the centre by rearranging and reconstructing the public utility infrastructure was enabled through strong political support, a great deal of media engagement, a professional approach and good management.

**Lesson 3 – New ideology in the city**

There is no doubt that the entire project CIVITAS-ELAN project has influenced a new, sustainable approach and brought to Ljubljana new ideas on mobility of people. The same is true for measure 5.5-LJU. More emphasis on citizen engagement and new dynamics to implementation are some of these contributions. With an active participation of all stakeholders many misunderstandings and possible opposition to changes have been avoided, good practices from other CIVITAS cities have been introduced and false solutions excluded. However, with the new stationary traffic arrangements and the construction of the parking garage under Kongresni trg (Congress square), the citizens are positively accepting the new arrangements for public areas as well as the restricted speed zones, traffic calming zones and pedestrian zones in Ljubljana. The reaction of inhabitants of the pedestrian zones and shopkeepers in the Breg pedestrian area had a rather negative opinion about the pedestrianisation at the beginning. Already during the construction and due to meetings with stakeholders it started to change. When the construction was finished the reactions of inhabitants and all other are now very positive and flattering.

### 3.1.3.2.6. Measure 6.1: Demand responsive services

**Measure description**

The measure was about providing mobility service to impaired people who are now lacking such a service. An efficient organisational solution and of state-of-the art technology (via tracking system) with passenger-operator (driver) communication by means of a new software was to be developed and applied. The main activities within the measure were:

- To study transport needs of disabled people by a survey among associations of impaired people with communication and moving disabilities
- Implementation of a tracking and communication system (equipment and software), which is basically a tool for expressing service demand on 124 out of 217 buses.
- Testing of the tracking and communication system on a special electric vehicle named Kavalir (“Gentleman” in English translation), as a connection between the pedestrian zone and regular bus line to improve the mobility for other PT users, mostly elderly and persons with difficulties with walking. Operation is on demand, however outside the system that is applied in PT buses. Users call Kavalir drivers directly by a cell phone. Within the project, dissemination on this service was extended as well.

Deviations from the original plan were experienced:

- **Special vehicle** – Special vehicle was not purchased. The proposal for this change was made in the third project amendment.
- **Proposal for legislative action on national level** – a proposal to adopt legislative solutions at national level that would grant impaired people their constitutional right to equal access to transport public services was cancelled. During preparation of the CIVITAS ELAN proposal it was overlooked that an EU action plan for equal possibilities of impaired people on national level in Slovenia already existed. It was later also adopted on local level in city of Ljubljana so there was no need any more to adopt legislative solutions.
- **Kavalir** – Two special vehicles called Kavalir were used for testing tracking and communication system.
- **No Cost Benefit Analysis** – Only 17 persons – 7 regular and 10 occasional – use this system. These 17 persons are the ones who were using PT buses even before implementing measure 6.1.
This is the reason why CBA appears meaningless – the measure did not bring any improvement in Demand Responsive Service yet.

Evaluation approach

During implementation of the measure the evaluation was focused on the following indicators:

- **Acceptance of new PT service by impaired people** – publicity campaign served to advertise demand responsive service of PT for impaired people. The goal was to integrate them into everyday life. Acceptance of the demand responsive service of PT by impaired people was measured and assessed with a survey in the form of a questionnaire (“Before”) or telephone interviews (“After”) among the 17 impaired persons who expressed interest for the participation in the survey. This survey was combined with the survey of perception of quality. Acceptance of the new PT service by impaired people, the software tool and of Kavalir in pedestrian zone was measured also by number of users.

- **Perception of quality of service** – satisfaction of users was assessed by surveys – questionnaires and discussions-meetings. The surveys were done among impaired people who were members of different associations of impaired people in the area of Ljubljana. They were asked about the acceptance of the service, and their perception of quality/drivers assistance. To measure the success of driver trainings, the drivers anonymous filled out a questionnaire to measure if the training changed their willingness to help impaired people.

- **Assistance of drivers to impaired people** – The aim of using this indicator was to measure the success of trainings for drivers. The drivers attending the trainings (all of the LPP bus drivers) anonymously filled out a questionnaire aimed at identifying whether the training changed their willingness to help impaired people.

- **Investment/maintenance cost and Operating costs/revenues** – Investment/maintenance cost and operating costs served as a basis for a cost benefit analysis for the Kavalir shuttle instead of the special vehicle (due to the cancellation of a special vehicle purchase within the 3rd amendment, the CBA for the special vehicle was not performed).

Because of the limited use of the service, the benefits are not quantifiable yet and the CBA was cancelled.

Impact evaluation

**Key result 1 – Increase in use of Kavalir, but not for software based demand responsive service**

Before the full implementation of the demand responsive service (in January 2012), 17 impaired people were using the PT service, while only 3 of them being registered in the system. After the full implementation and operation of the software tool this number increased and all 17 impaired persons are using the software based demand responsive service are registered users (August 2012). Basically, the acceptance of demand responsive service by impaired people did not change: altogether 17 persons before and also after (target value of 30% increase was not achieved). The reason might be, that due to a very late implementation of the system, the dissemination activities could not attract new users that would register into the demand responsive software system (the target has not been achieved). However, new users have been seen to be using the PT features for the impaired people, but without registering into the system (wheelchair users can use the PT web service to learn, when the low floor bus will be arriving at the bus stop). The number of Kavalir users on the other hand increased significantly, from 70 users per day to 300 users per day (the target has been exceeded). It can be assumed that the increase would be less significant without CIVITAS. Part of the increase is the impact of the related dissemination within CIVITAS and the partnership between COL and LPP, which enabled that the shuttle was allowed to access in the entire pedestrian area.

**Key result 2 – Users satisfied with new services**

None of the 17 regular and occasional users reported any issues that required further attention. This is interpreted as a 100% satisfaction. The target has been exceeded. The customer satisfaction with Kavalir increased by 4% within one year, and the satisfaction was exceeding the target value of 75% immediately after implementation (score 4.42 out of 5).
Key result 3 – Improved attitude of drivers
The assistance of drivers willing to assist impaired people increased from 50% to 95% (target of 15% was exceeded).

Process evaluation

Barrier 1 – Ramps for wheelchairs
The bus ramps are not remote driven so a driver needs to step out of the bus to make a ramp operational. Existing law, rules and regulations forbid that the bus driver leaving his/her working place. Therefore, the persons who escort impaired people need to operate the ramp. Deviations from bus time plan, because of prolonged boarding and departure time in cases of lowering the bus ramp, are not included as permissible in the decree. For this reason, the bus driver cannot leave his working place (steering wheel) to lower the boarding ramp. 1/2 of the buses in the existing bus fleet are not low floor, so those buses cannot be used by impaired people in wheel chairs.

Barrier 2 – Available but unused audio technology
Audio announcer of stations is often not used or to quiet. The sequence of the stations announced is often mixed up. For people with hearing problems or deaf people it is hard to follow at which bus station they currently are at night when the audio announcer is not used properly.

Barrier 3 – Bus homologation/capacity
There is only one place designated for a disabled people in wheel chair per bus. When this place is taken a person in a wheel chair has to wait for another bus. 108 LPP busses are still inappropriate for demand-responsive service needs – due to the design of the entry/exit points on the bus itself, wheelchairs cannot access the bus; as a result, LPP must be informed 1 day in advance that the journey with a person in wheelchair is planned, so they can organise the low-floor bus on that particular line. This can become a problem, when a high number of passengers start using the demand-responsive-service, or can be a barrier when up-scaling the measure.

Barrier 4 – Poor response/cooperation from measure partner
The communication system for organizing the fares for the disabled persons was initially installed only on 20 buses from 217, due to the poor response/ cooperation from Telargo. Later, with additional effort the system was upgraded to all buses. The communication between partners involved was insufficient and deadlines were not held – this caused delays in implementation of the measure on regular bus lines.

Driver 1 – Recognition of the problem by the PT operator, willingness to help
LPP recognized the problem that impaired/disabled people are not treated equal as people that are not disabled. A good basis exists for strong cooperation with impaired/disabled people on individual basis – case to case.

Driver 2 – Easier access to information
This is achieved through the announcement of bus arrival via short text message (SMS), improvement of bus fleet; Bus arrival and bus type (low floor) is announced, which helps a lot and makes it also easier for impaired/disabled people to use a bus. Bus fleet is constantly improved by replacing old buses with new-low floor buses.

Driver 3 – Upgrade of bus fleet with low floor buses
A low floor buses has no steps between one or more entrances and part or the entire passenger cabin. Being low floor improves the accessibility of the bus for the public, particularly the elderly and those in wheelchairs.

Driver 4 – PT service for impaired is free of charge
Certain categories of impaired/disabled people can use a bus free of charge. A good alternative to taxi and to transport provided by organizations, which is not always possible, this resulted in an increased use of the service.
Lessons learned

Lesson 1 – Planning of the measure was poor
Pre-activities in terms of checking actual needs for demand responsive service were omitted. Results of the survey caused major change of the measure.

Lesson 2 – Implementation of measure
Successful implementation of the measure is crucial before any dissemination/communication with the public; since the measure was not successfully implemented in time, LPP did not provide any information about the service to the interested public until the end of the project (when the system was fully operational). This may be the reason why there are still only 17 users of the system.

Lesson 3 – Workshops
Continuously organising workshops on how to use a bus have a potential of attracting new passengers with disabilities. There the following topics were covered: how to enter the bus, how to use Urbana contactless card, where is the best location on a bus for wheelchair users, etc.). Also trainings for bus drivers can significantly increase their awareness of the needs of impaired people.

Lesson 4 – Communication strategy
The communication strategy must be developed in the beginning of the project/measure implementation; the promotion should be based on a final product; easy access to the information.

3.1.3.3. Other measures

3.1.3.3.1. Measure 1.7: Pure plant oil vehicle propulsion

Measure description
The measure implementation involved demonstration and field testing of converted diesel engines in order to use pure (100%) plant oil (produced by the farmers) instead of mineral oil (diesel D2) or biodiesel (B100) fuels. That involved successful conversion of three vehicle engines (two tractors and one off-road vehicle) and one stationary laboratory diesel engine in order to use pure oil (in addition to conventional fuel).

The actual need for the measure comes from a lack of a practical demonstration of pure plant oil attractiveness, considering the aspects of the economy and environmental pollution. Field testing, subject to agricultural work seasons/peaks should provide practical insight into fuel consumption, engines wear and internal deposits, exhaust gases composition (pollution), reliability as well as maintenance costs – all related to the actual "real life" exploitation (e.g., distances driven, working hours) in relation to conventional fuel (diesel – "business as usual") and various qualities of alternative fuel (pure plant oil).

Evaluation approach
The evaluation consists of testing the different types of fuel on their performance related to the abovementioned aspects as emissions, fuel consumption, fuel quality and maintenance costs. Pure plant oil is compared with mineral diesel oil, and bio-diesel fuel.

Impact evaluation
Key result 1 – Economic viable
The heat of combustion for PPO is about 1% lower in comparison to D2 fuel on per volume basis (about 7.6% lower in comparison on per weight basis). The PPO fuel consumption is about 4 to 10% higher (in comparison to D2, considering the per volume basis) as measured at the laboratory engine (at controlled conditions). Considering the prices of the fuels, this supports the assessment that the PPO is an economic alternative to the D2 or B100 fuels.
Key result 2 – No expected problems in maintenance
For all engines, scales formation due to fuel burning, as well as engine oil quality during use is comparable or even better while using PPO of both high and low quality in comparison to D2 fuel. However, this is also due to the fact that engine oil was preventively replaced at double frequency in comparison to D2 fuel use conditions. In overall, the uncertainty and additional preventive maintenance costs due to PPO use were proved to be low.

Key result 3 – Lower emissions
The pollutant emissions are for all engines at the comparable or even lower concentrations when using PPO fuel in comparison to D2 or B100 fuels. Results are dependent also on the engine’s speed and here a further refinement of the engine's ignition system is possible in the future – system shall consider both speed and type of the fuel. That should further improve the combustion of the fuels.

Process evaluation
Barrier 1 – Duty tax on use of pure plant oil in vehicles
This tax is deemed unfair considering that there is no tax on bio-diesel use in vehicles and no tax on pure plant oil use from cogeneration plants (electrical and thermal energy production) for energy purposes. We consider this as impeding laws, rules, regulations and their application. Despite the political promises and high words the related authorities at the national level do not change the tax rules.

Barrier 2 – Public perception on expected conflict on oil as food/fuel
There is a perceived conflict between key stakeholders due to the possible conflict between food and fuel. However, this is only perception, as in PPO production the oil cake is a by-product of a valuable animal food ingredient.

These barriers were overcome by the presentation of the measure results at fairs, seminars and media coverage (e.g., TV prime time coverage about measure event), as well as presentations during visit of the government representatives at the AIS.

Driver 1 – Expected end user economic benefits
By accurate economic planning and market analysis the requirements for measure implementation were determined.

Driver 2 – End user needs are well understood
User needs concerning energy dependence were thoroughly analysed and user requirements were well understood.

Lessons learned
Lesson 1 – Future implementation
The use of the pure plant oil is a viable alternative to the use of the conventional diesel or pure biodiesel fuels in the diesel engines of the agricultural engines (e.g. tractors) or vehicles. The recognition and use of the PPO as alternative fuel for agricultural engines by the farmers (especially through their own rape seed production) was gaining importance during the measure duration. However, to use pure plant oil for practical applications, social/political/perception issues need to be solved, as well as the uncertainty from the impact of future oil, biofuels, food prices and CO₂ emissions prices. This means that political issues (duty tax policy in Slovenia) and dialog/persuasion with authorities is at present more important than technical issues within the measure for wider acceptance of the PPO use as fuel for vehicles.
3.1.3.3.2. Measure 1.12: Green procurement for public fleets

Measure description
The measure focused on complete renewal of the city vehicle fleet by renting 60 new vehicles, including 10% hybrid vehicles, and purchasing 45 additional bicycles to be used by the city administration for daily business trips. The hybrid vehicles were allocated to one department (City inspection) whereas other vehicles and the new bicycles were distributed to all twenty departments scattered in ten different locations in Ljubljana. An integral part of the measure was also the organisation of eco driving courses for city administration staff.

The measure was implemented by a public tender that included selling the old vehicle fleet and renting the new one. The purchasing of bicycle fleet and organisation of eco driving courses were additional tasks defined in the amendments and carried out in 2011 and 2012.

There were deviations from the original plan:
- The first plan was to replace the old fleet by purchasing, which was later changed to fleet rental.
- The purchasing of additional city bicycles was added to the measure, so the evaluation approach needed to be adjusted as well.
- The eco driving courses for city administration staff were added to the measure due to shown interest of the city administration staff.

Evaluation approach
The following aspects were analysed in the impact evaluation:
- Acceptance: hybrid vehicles acceptance by the drivers and general public and the acceptance of bicycles for daily use were measured by a survey. “Before” acceptance of bicycle usage was not available because the measure amendment. However, as only 5 of the respondents were employees of the city administration, the impact of the city bicycles on this indicator cannot be determined.
- City vehicle fleet performance was evaluated based on CO$_2$ emission indicator, average fuel consumption and fuel type, and also based on formal marks like average EcoScore and average EuroNorm rank. The old city-owned vehicle fleet data were very difficult to obtain in a format comparable to the new rented city fleet data, so an attempt was made to compile the data from the old fleet’s records, by which the yearly consumption and costs data were gathered and compared to the new fleet data.
- Costs city vehicle fleet: because the new city fleet was rented instead of purchased, problems arose regarding the data acquisition since these are business sensitive data (e.g. the price per month per vehicle only depends slightly on distance travelled; as such the actual maintenance and operational costs are “hidden” in the overall price, and were not directly comparable to the previous fleet (or baseline) data. So, the direct comparison of servicing and maintenance costs, not to mention investment costs, of the “old” and the “new” vehicle fleet was not possible.
- Costs and benefits were compared for two scenarios: a “regular” city fleet without hybrid vehicles and a complete hybrid vehicle city fleet.
- Bicycle usage was not known for all city departments, so the available usage data were extrapolated to these departments.
- Costs and benefits of the bicycle fleet were compared to using cars for short business trips, comparing maintenance costs with fuel savings, health benefits and pollutant emission reduction benefits.

Impact evaluation
Key result 1 – Increase of bicycle usage
45 new bicycles were purchased in July 2011, to double the previous 47 bicycles in the fleet. The use of bicycles by the COL administration employees has increased significantly. The bicycle fleet contributes annually an estimated 9000 km driven by bicycle instead of fuel-driven vehicle, and the
bicycle usage trend is increasing by 12% annually (both in number of users and total distance travelled).

Key result 2 – Cost effectiveness of bicycle fleet investment

The investment in the new bicycle fleet was 9937 € with an annual estimated maintenance cost of 3220 €, but the benefits are estimated in an amount of 9970 € per year, which covers for 60% of the investment cost already in the first year through health benefits, environmental benefits and reduction in fuel consumption.

Key result 3 – Raised awareness regarding eco-driving

The initial goal of 12 employees (the drivers of hybrid vehicles) attending the Eco driving course was exceeded almost three fold. The courses were performed in spring 2012, so the actual effects could not be evaluated, but the expected impact is lower fuel consumption both in private driving and business use of vehicles.

Key result 4 – Better environmental performance of the new vehicle fleet

The new vehicle fleet including six hybrid vehicles was operational since July 2009. Comparing “before” and “after” situations, the average fleet fuel consumption went down for about one litre per 100 km per vehicle or roughly 10%. The average EcoScore went from 49.0 ("before") to 65.4 ("after"), and the average EuroNorm rank went from 1.63 to 4.11, signifying the effectiveness regarding pollutant emissions. Average CO₂ emission of the “before” fleet was estimated to be 250 g CO₂ / km, and of the “after” fleet 216 g CO₂ / km, non-hybrids contributing 222 g CO₂/km, and hybrids only 142 g CO₂/km. Considering the actual 730 000 km travelled each year, this means a reduction of CO₂ emission of 14% or 25 tons yearly for the whole fleet. If all vehicles were hybrid, the reduction would have been 54 tons of CO₂ yearly.

Key result 5 – Cost effectiveness of hybrid vehicles not demonstrated

The average vehicle fleet age was reduced by nine years, increasing the yearly cost (including operational and maintenance costs) by 145 000 €. The rental price is however almost double for hybrid vehicles due to higher price tag (Hybrids: 462 €/month, non-hybrids: 260 €/month). Considering all relevant factors (e.g. monetised impacts of lower pollutant emission and lower fuel costs), the hybrid vehicles are still 27% more expensive than non-hybrid vehicles.

Key result 6 – Bipolar acceptance of hybrid vehicles

The trend in attitudes towards the use of hybrid vehicles was twofold:

- the general public opinion was less supportive in 2012 than in 2009 (a decrease of 3% of the respondents supporting or strongly supporting the hybrid technology, and an increase of 11% of respondents against the hybrid technology); the 75% target was achieved;
- the hybrid vehicle users are by 12% more aware and supportive of the benefits of the hybrid technology than they were before the measure implementation (from 43% to 55%, but the 75% target was not achieved).

People that do not support hybrid vehicles attribute this mainly to the remaining dependence to fossil fuels; another reason is the fuel consumption of hybrid vehicles (comparing the hybrid vehicles to the new diesel engines shows a similar rate of fuel consumption, but the prices of the diesel vehicles are much lower than of the hybrid vehicles).

Process evaluation

Barrier 1 – Insufficient technical planning and analysis to determine requirements of measure implementation

The data acquisition format and reporting responsibility was not defined well in advance, resulting in problems with data gathering, especially for the “old” vehicle fleet. Also, after the measure leader change and after the amendments’ additional tasks in 2011, the data format was changed and not followed properly, e.g. the agreed bicycle usage (in all COL departments) recording forms were not used by some departments of the COL administration.
Driver 1 – Strong involvement and support of COL management, enhanced by the citizens’ support

There was a lot of local support and sustainable development vision in both CIVITAS ELAN project leadership and COL top management. Also, strong citizens’ and users’ support was evident from the results of surveys.

Lessons learned

Lesson 1 – Positive results of implementation of a bicycle fleet for city administration staff

This promotes cycling, reduces travelling time especially during the rush hours, and reduces the use of fuel-driven travelling, effectively reducing fuel usage.

Lesson 2 – Long term consideration before replacing the car fleet

A thorough analysis of the trends in “greening” the city vehicle fleet is necessary to avoid relatively short-term solutions. Rental of city vehicle fleet enables the use of newer vehicles (with higher EcoScore marks and EuroNorm ranks), effectively reducing the noise and fuel consumption. However, the hybrid fleet did not prove to be more efficient than the newer diesel fuelled vehicles, especially considering the rental costs.

Lesson 3 – Expert input during the technical planning:

A thorough analysis of the trends in “greening” the city vehicle fleet is necessary to avoid relatively short-term solutions. During the measure implementation and operation, the trends were shifted from petrol – hybrid propulsion to even more energy and environmentally efficient diesel, diesel – hybrid, and electric propulsion vehicles.

3.1.3.3.3. Measure 4.9: Update of the Sustainable Urban Transport Plan

Measure description

The work performed within the measure serves to update and transform the existing transport strategy in Ljubljana into a modern SUTP according to standards gained from recent EU projects (e.g. PILOT, BUSTRIP) and EC activities (within the context of the thematic strategy on the urban environment) in this field. The SUTP is developed in a participatory process involving citizens and stakeholders. The principal gaps of and add the missing elements to the existing mobility related plans were identified, and the draft of the SUTP for the adoption and approval has realistic objectives and targets to guarantee its timely and effective implementation.

Updating process of SUTP in Ljubljana would also have an important coordinative role within the ELAN project. It will set a framework for implementation and coordination of all planned measures in Ljubljana. The opportunity of the CIVITAS network was used to include foreign experts’ inputs into SUTP preparation.

Furthermore, a Slovenian SUTP manual was developed and disseminated to stimulate its preparation and adoption in other cities.

There were deviations from the original plan:

- **Delay in status analysis** in the beginning of the project due to the delay in establishing the external advisory board which helped to initiate the key problems of the current traffic situation in Ljubljana.
- **Rejection of the SUTP as a self-standing document;** the City of Ljubljana administration decided that the SUTP will not be accepted by the city council as a self-standing document. Instead, some parts of it have been adopted by the COL transport policy.

Evaluation approach

The SUTP is expected to bring the whole range of improvements in the city transport, as well as in citizens’ behaviour and environmental quality. 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. As these changes will only be noticeable after the CIVITAS ELAN project lifetime, the evaluation approach will consist of process evaluation (indicating the main barriers and drivers) and measuring the acceptance of the measure.

Impact evaluation

The foreseen impact evaluation for this measure consisted of the approval of the proposed SUTP by the City Council, however due to the cancellation of the SUTP and development of the parallel document (devised by the City outside CIVITAS ELAN), the comparison between both documents is made and evaluated.

One of the main identified impacts of the SUTP presented here is that even though the measure was cancelled, it encouraged the city to create a separate transport policy – adopting several elements/topics from SUTP.

Process evaluation

Barrier 1 – No tradition in comprehensive SUTP

The complexity of sustainable urban transport planning is hard to understand and accept by the stakeholders, the emphasis is still on hard measures and big (spot) projects; there is no holistic/systematic approach.

Barrier 2 – Lack of ownership

SUTP was considered as a CIVITAS ELAN measure, not as a policy document from the city itself; it is not adopted as a transport strategy on the city level, since the city has started preparing a second Transport strategy, independent from CIVITAS ELAN

Barrier 3 – Insufficient involvement of key actors from COL

The representatives from the transport department of COL have not participated in any of the measure related workshops, even though they had been invited. Therefore it is difficult to reach a consensus in terms of setting the goals, objectives and the work plan in general.

Driver 1 – New conceptual approach

CIVITAS ELAN package of measures is the main driver for sustainable transport solutions in Ljubljana. CIVITAS initiative offers the possibility to bring foreign experts to strengthen SUTP process.

Driver 2 – Public support for actions towards sustainable solutions

There is a noticeable participation of the civil initiatives (NGOs) and an increased interest of other municipalities for SUTPs.

Driver 3 – CIVITAS funding

CIVITAS funds allow in-depth and independent work on the SUTP, which otherwise would not have been possible.

Lessons learned

Lesson 1 – Include the stakeholders into the measure planning:

By including the city administration from the higher levels already in the planning phase of the measure, different viewpoints about the content of the measure may be avoided.

Lesson 2 – Start the dissemination with the concrete proposals among the stakeholders as soon as possible

The presentation of draft SUTP to the stakeholders has created a strong reaction; afterwards the cooperation and communication with the most important actors at COL has improved, however this lead to a separate transport strategy, made by COL.
Lesson 3 – External advisory board to fill the gap of knowledge and tradition in SUTP process
Combining Advisory Board with CIVITAS ELAN workshops allows better communication with stakeholders and with COL departments, which resulted in a better communication in the phase of SUTP draft preparation.

Lesson 4 – SUTP brought a new way of thinking to the city administration
The draft SUTP has shown the stakeholders what a transport strategy is and the methodology behind the preparation of such a document. It also encouraged the city to start preparing a separate transport strategy, adopting several elements from the SUTP, which has proved to be a significant step forward in terms of change of mentality regarding the transport issues.

3.1.3.3.4. Measure 4.15: Sustainable Electromobility Plan

Measure description
This measure consisted of the development of a Sustainable Electromobility Plan (SEP), according to EC directives and best practices in Europe and beyond. The following activities were performed:

- Electromobility stakeholders (citizens, electric vehicles users, electric vehicles associations, electric vehicles equipment manufacturers, public bodies, etc.) have been identified in the first step. There was a high importance to encourage all stakeholders to take a part in collective SEP decision-making to ensure maximum transparency, to strengthen local political culture and to create broad public ownership of the SEP.
- Two workshops have been organised within the measure: The 1st workshop was held for development of a common vision, definition of objectives and setting of target, policies, measures and required budgets. The 2nd workshop was held for the presentation of the SEP and collection of feedback from the stakeholders – recommendations and comments.
- A draft SEP has been submitted for approval of the City Council – by formally adopting the plan and ensuring its approval one cycle of the SEP process was to be concluded. This serves as an important step that ensures the legitimate status of the policies defined in the plan, but it equally secures accountability and acceptance. However, the document was not approved as a self-standing document, but as a part of the City-wide Transport Policy.

There were deviations from the original plan:

- **The training on SEP development for other Slovenian municipalities was cancelled:** the training will be organised after adoption of SEP by the COL administration which is expected after the end of the CIVITAS ELAN project. However, all the materials for the training have been elaborated and may be subject of only minor modifications before the organization of the training.
- **Leaflet – presentation of the SEP for the non-expert public cancelled:** The SEP information leaflet was submitted to COL for comments and approval on 11 September 2012; the leaflet publication was cancelled due to the unresponsiveness of COL – the project has ended before the leaflet was approved.
- **Approval of SEP:** The Sustainable Electromobility Plan (SEP) was not approved as a self-standing document, but as a part of the City-wide Transport Policy.

Evaluation approach
Evaluation of this measure has been designed as an in-depth process evaluation – identification of barriers and drivers – regarding development of the Sustainable Electromobility Plan, which has proved appropriate for the measures where the impacts will be visible only after some time of operation, after the end of the project lifetime.
Impact evaluation

Key result 1 – High acceptance among the stakeholders

The acceptance among the stakeholders was high (100% - the target has been exceeded). The vast majority of the survey respondents also agreed that the results of the workshops were useful and provided a good basis for further work in this area. Some more concerns have been expressed on the issue of the positive impact of the workshop on the specific traffic conditions in Ljubljana, but the general assessment of the future development remains optimistic. However, it should be noted that the majority of the participants were supporters of electromobility prior to the workshops. The scope and intensity of the debate and active participation is evident from a large number of proposals (25 topics were outlined) for further developments in the electromobility in Ljubljana.

Process evaluation

Barrier 1 – Cooperation among partners

There was a delay in establishment of COL working group for electromobility in Ljubljana due to a disagreement between the measure leader and COL related to impact of electromobility. This was solved by a preliminary meeting between the measure leader and COL representatives to define project procedures and goals what led to accelerated and effective execution of further work. Also, it helped to unify opinions on measures that are acceptable for COL and in line with COL general traffic strategy.

Barrier 2 – Poor response of measure partners

Due to a poor/slow response of COL to the content proposals to be included into SEP and problems with inner coordination at COL, the actions that were planned did not happen (organisation of workshops, responses to draft SEP, etc.)

Barrier 3 – Lack of standardisation

Technology is rapidly evolving and there is a lack of standardisation of vehicles and charging infrastructure. The development of charging infrastructure is (mostly) driven by equipment manufacturers, but no business models for massive commercial exploitation have yet been introduced and tested. As a result, they do not accept non-standard plugs and sockets. The impact of local communities on national legislation and especially on technical standardisation is very limited. The standards are defined mostly by international bodies (such as the IEC). Because the electric vehicles market is still in its infancy, there is a low density of charging stations

Driver 1 – Subsidy scheme implemented

A subsidy scheme for purchase of electric vehicles was implemented by the government; there was also a ministerial decision that the electric vehicles charging stations may be constructed and connected to the grid using a simplified procedure.

Driver 2 – Electric vehicles charging as promotion

Free charging of electric vehicles due to the promotional nature of the existing charging stations; this attracts the citizens, that are not so familiar with the concept of electromobility and also serves as a general dissemination approach (passers-by start to question themselves, why are these vehicles allowed in the pedestrian zone – some electric vehicles charging stations are in the pedestrian zone intended for the electric freight delivery vehicles)

Driver 3 – Interest from the public

There was a good response from the interested public to the workshops: a large number of suggestions and comments were received that were included in the revised SEP.

Lessons learned

Lesson 1 – Long term impact

The results of the implementation of the measures introduced in the SEP will not be evident during ELAN project lifetime. The measures are long-term oriented, for most of them preliminary studies are necessary (and also planned as a part of the SEP measures) while the implementation is planned for
2013 or later. Therefore, the lack of standardisation and experiences in massive usage of electric vehicles is not endangering the progress of activities within this measure. However, due to mentioned deficiencies in standardisation and business models development, the implementation of some measures foreseen by the SEP and planned in the period until 2020 may be delayed. This is the case for those measures which require the involvement of third parties (not only the COL administration) such as the implementation of a public charging infrastructure.

**Lesson 2 – Coordinate stakeholders**

More time than foreseen is needed for the organisation of all stakeholders groups. Up to now, regular contacts with all potential stakeholders were established. The focus is on the Distribution System Operators (DSOs) and other business partners where proposals for the regulation on the field of electromobility will be collected. Within DEVs a section for infrastructure was established with a commitment to coordinate the business partners and to communicate the technical and business process issues with COL.

### 3.1.3.3.5. Measure 7.2: Sustainable freight logistics

**Measure description**

Within this measure a computer simulation model is developed which shows the expected environmental impacts (reduction of the number of delivery trips and emission savings) of the freight delivery consolidation scheme in the pedestrian zone of the City of Ljubljana, if the measure was implemented in reality.

Furthermore, a national web portal for supporting sustainable city logistics is developed and includes the following:

- general information on sustainable freight logistics,
- examples of good practices from various cities,
- online surveys and questionnaires (important information is collected from stakeholders as well as opinions and suggestions about delivery policies),
- an interactive map which calculates delivery routes to the city centre (online routing tool),
- online forum where important issues are discussed,
- member area for submission of ideas and new projects which will promote sustainable city logistics.

An online routing tool for freight deliveries in Ljubljana, as a part of the internet web portal, includes an online calculation of optimal routes to the city centre and calculation of optimal routes in the pedestrian zones to help the delivery companies in optimising the deliveries.

In order to promote the web portal together with the on-line routing tool, as well as to receive the feedback regarding the measure 2 workshops with the stakeholders were organised (the “Workshop on the efficient driving” and the “Sustainable freight delivery conference/workshop”).

There were deviations from the original plan:

- The implementation of the proposed consolidation scheme has been rejected by the city of Ljubljana; in the 4th amendment – the implementation of the measure was replaced by establishment of a national web portal for supporting sustainable city logistics. Also a computer simulation/model was developed to show the potential environmental impacts of the proposed consolidation scheme (reduction of the number of delivery trips and emission savings).
- Based on the former, the impact evaluation has not be done (the results of the simulation model were assessed); CBA has not be done; the following indicators were excluded from the appraisal of a simulated (virtual) implementation of the measure – load factors, time, operating revenues, operating costs.
Evaluation approach

Since the implementation of the freight delivery consolidation scheme has been cancelled, the impact evaluation of this aspect of the measure was simulated and modelled. The model gave information on freight delivery vehicle emissions – CO₂, NOx, PM₁₀, as well as the expected reduction in fuel consumption and the number of runs/freight delivery vehicles entering the pedestrian area.

The acceptance of the web portal was evaluated counting monthly visits and with an online survey (also a part of the web portal).

The acceptance of the consolidation scheme was evaluated based on a survey made within the measure 4.1-LJU “Individualised mobility marketing campaign”, conducted on 1069 (before) /1245 (after) households in the CIVITAS ELAN demo corridor. Additionally, surveys from the freight delivery web portal and workshops were also used.

Impact evaluation

Key result 1 – Emission savings

The model results show, that with consolidation implemented, the CO₂ emissions are reduced by 5.34 kg/day or 17.6%. NOx emissions are reduced by 26 g or 18%. Emissions of particulate matter PM₁₀ are reduced by 1.3 g or 17.8%. Fuel consumption decreases by 2.2 litres per day or 17.7%. Based on annual data from the consolidation of goods on the pedestrian area 1 420 kg of CO₂, 7 kg of NOx emissions, 0.34 kg of particulate matter PM₁₀, and 595 litres of fuel could be saved. The levels of emissions after consolidation of deliveries would be reduced by 17 to 18%, which means that the objective of the project CIVITAS ELAN would be achieved.

Key result 2 – Reduction of freight movements

The results indicate that a reduction in the number of freight movements of 18% can be expected. As the difference with the target value (20%) is low, it can be stated that the results of the transport model have reached the set target of reducing the number of runs in the pedestrian area of the city centre of Ljubljana.

Key result 3 – Decrease in the number of kilometres driven

This decrease is estimated at approximately 18000, which accounts for 34.3% reduction. The number of kilometres driven by electric vehicles is not taken into consideration.

Key result 4 – Reduction in fuel consumption

The implementation of a consolidated freight scheme is expected to lead to a reduction of approximately 18% in fuel consumption can be expected if the consolidation scheme is implemented – the target of 10% was exceeded.

Key result 5 – Low acceptance

The acceptance rate for the consolidation of freight deliveries by the general public has decreased since the beginning of the project from 28.3% to 25.6%, which is far below the set target of 60%. This could be attributed to the fact, that the general public does not perceive the freight delivery transport in the centre of the city as problematic, and therefore perceive the changes of the freight delivery system as unnecessary.

The results of the acceptance of the consolidation scheme alternatives by the stakeholders show a high level of acceptance 67.5-100% (the target levels of 60% have been achieved), however the results possess a significant amount of uncertainty in terms of depicting the true acceptance rate of the stakeholders, since the response rate was poor (only 8 out of 50 questionnaires were returned).

The sample in the web survey to assess the acceptance of stakeholders was statistically too low for acquiring definite results (only valid 4 responses out of 6 respondents). The results for the acceptance by the public show a large acceptance of the web portal as well as large acceptance/awareness of the freight delivery related problems, namely over 86% find the current situation as inappropriate. However it should be taken into account that the sample of the respondents included mainly the interested public. Moreover, the result show an increased acceptance regarding the taxation of non-clean vehicles (31.7%) and slightly increased rate of acceptance of the consolidation scheme (29.3%), compared to the general public survey results (taxation – 13.7%; consolidation – 25.6%).
Key result 6 – High use of web portal

The number of web portal visitors per month has significantly increased since the first month of use – from 1230 visits/month in March 2012 to over 4000 visits/month in August 2012. The comparison of results for web-portal visits on month-by-month basis show some fluctuation, but it can be established that the target level of 20% monthly increase has been reached/exceeded.

Process evaluation

Barrier 1 – Technical problems in establishing a web portal

Data for the web portal (e.g. Google maps) were incompatible, and data about the number of freight vehicles not provided by COL. The accuracy and detail of the simulation was under question.

Barrier 2 – Lack of interest by the traffic department of the City of Ljubljana

As the decision maker in this case, COL was not interested to participate in events and not interested for consolidation and organisation of the measure. There was no contact person at COL responsible for the implementation of the measure. The unwillingness/ reluctance of some COL departments that are not directly involved in CIVITAS measures affected the progress of the measure implementation. As a result the implementation of the consolidation scheme was cancelled.

Driver 1 – Interest by stakeholders

Research deliveries and traffic flows in the distribution area have been performed successfully. The measure has a basis to be implemented, except the political/organisational barriers.

Driver 2 – Exchange of experience

In several meetings and workshops experiences and knowledge for implementing the measure were exchanged. This led to a better planning, but unfortunately no one from the COL Traffic department was present at the workshop.

Driver 3 – Motivation for continuation with the measure

The measure leader (PI) was willing to continue with activities in the field of efficient distribution of goods, by transferring the issues to the virtual environment and extending communication with stakeholders (shop-owners, pedestrian zone users, etc.). The necessary modelling tools and expertise were available as well.

Lessons learned

Lesson 1 – Portal has been proven as a good starting point for the measure implementation

The portal helped to gain interest from the interested public/stakeholders; increase in general public awareness regarding the problems associated with delivery services in the city centre. The results obtained by the surveys made before the implementation of the web-portal have shown that citizens are not aware of the problems or they don’t see any other possibility but bringing the goods into the shops by vans. After introducing other possibilities through the web portal (consolidation centre, ecological vans, distribution by bicycles), they agreed that Ljubljana should go greener in freight delivery and some solutions would be well accepted.

Lesson 2 – Survey turned into information provision campaign

The on-field study proved to be a very efficient way for spreading information about the measure contents, since the measure partners have used the opportunity of analysing the status – which was primarily based on counting the delivery vehicles as well as on direct interviews with the couriers/shop keepers about the quantities and the types of the delivered – for the measure related dissemination.

Lesson 3 – Modelling is an appropriate tool

Simulation models (if designed properly) can serve as a useful tool for assessing the impact of planned projects/developments, as it was proven by this case. The model results have also provided us with an important foundation for the future discussions regarding the actual implementation of the consolidation scheme in the city centre.
3.1.3.4. Evaluation results on corridor level

Description of the measures

The measures within CIVITAS ELAN in Ljubljana were designed to bring the necessary improvements in terms of traffic reorganisation in order to strengthen the vitality in the city primarily through the reduction of air pollution and by the use of travel modes that are beneficial to the individual health (walking, cycling).

The main idea in this regard was to establish a high quality mobility North-South corridor going through the city centre and towards neighbouring municipalities, integrating a variety of measures and transport modes. It would introduce the designated public transport lanes (“Yellow lane”) through the entire length of the corridor with Park-and-Ride (P+R) service at each end of the corridor. The aim was to reduce the traffic generated air pollution by attracting the citizens/commuters to use the public transport, by showing that it can be fast and efficient. Also, cycling and walking were promoted with the same goal.

Since the measure implementation was facing severe barriers, it was decided (in the 4th Amendment of the project) to replace the physical implementation of the corridor with a traffic model, in order to confirm the impacts of the model implementation. This was to be the basis for the preparation of the final design and technical documentation that is needed for the implementation of the high quality mobility North-South corridor.

Figure 3.4: Corridor in Ljubljana

In addition, the Sustainable Urban Transport Plan (SUTP) was elaborated, in order to provide a holistic and strategic basis for the continuation of traffic improvements in the long run. However, even though the adoption of the SUTP by the city council was rejected, it was the initiation of a development of a City of Ljubljana Transport Policy. This document has in turn shown even larger support for the enhanced use of the PT, than it was the case in the SUTP document.
Besides this, several other complementary measures were implemented throughout the project in different domains. Besides the yellow lanes in the corridor, smaller measures to encourage PT use were implemented, like the introduction of hybrid and CNG buses (M1.11-LJU), public priority at intersections (M8.1-LJU), improved information on PT at bus stops and on the Google Transit web platform (M8.4-LJU & M8.5-LJU), a tracking and communication system for disabled people as a tool for expressing service demand (M6.1-LJU), the integration of the ticketing systems of urban and suburban bus company (M8.5-LJU), selling and recharging point of the city contactless PT card in the Ljubljana train station (M8.5-LJU).

Also various efforts were made to improve safety and security in transport, like a video surveillance system in buses (M5.2-LJU), extension of the pedestrian area (M5.5-LJU), measures to reduce speed and a traffic warden service near schools (M5.4-LJU),

To support these measures visible on the field, numerous dissemination and citizen engagement activities took place: large scale and individualised mobility marketing (M4.1-LJU), a Mobility Shop (M4.1-LJU), the organisation of a city cycling platform with several cycling related stakeholder workshops (M4.6-LJU), a cycling website with an interactive cycling map (M4.6-LJU), training to drivers and elderly people on the use of public transport (M5.2-LJU), a web portal with safe routes to schools (M5.4-LJU), a study on transport needs of disabled people (M6.1-LJU), a web portal on city logistics (M7.2-LJU),

In the field of mobility planning, a comprehensive cycling strategy (M4.6-LJU) and a sustainable electromobility plan (M4.15-LJU) were developed. Although these documents were not officially approved, important elements were also included in the Transport Policy of the City of Ljubljana 2020. Studies were performed on the potential impacts of congestion charging (M3.1-LJU) and a consolidated freight scheme (M7.2-LJU).

There were deviations from the original plan:

- **Corridor not implemented**: The physical reorganisation of the CIVITAS corridor (M2.1-LJU) was not realised. This was replaced by a study in which the new situation was simulated in order to understand the functioning of a reorganised corridor. Namely, after lengthy discussions and negotiations with the political top at the City of Ljubljana, it was decided not to implement the high quality mobility corridor in the lifetime of the CIVITAS ELAN project. The reason behind it was primarily the fear of public opposition to such big-impact measures. This resulted in the fact that the integration of measures within the IP1 was not possible. The project management was informed about this well in advance (April 2010). In the process of finding a possible solution, a meeting with the Mayor of Ljubljana was also organised to discuss the possible implementation of the corridor for the demonstration purposes. The arrangement could not be made.

- **P+R south not constructed**: the P+R would serve as a southern intermodal point for the corridor, but because of the national spatial planning requirements regarding the flood protection of the designated area, the process was delayed and brought to a halt. This also played a crucial role in preventing the corridor to proceed with the implementation

- **Sustainable Urban Transport Plan as a self-standing document was rejected by the city council**: the rejection of the SUTP as a self-standing document means that the city has not been prepared for the totally new approach to planning for a sustainable transport; parts of the proposed SUTP have been later adopted by the COL transport policy, which was elaborated without the direct involvement of CIVITAS ELAN partners.

**Evaluation approach**

Since there was no implementation in real-life for the measures that were directly associated with the air quality improvement on a large/city-wide scale, the impacts of their potential implementation were simulated by the 1 week closure of the central part of the CIVITAS ELAN corridor for private cars (Slovenska street) and by the computer simulation/model of the designated PT lanes implementation. The latter was developed to compare the potential impacts of the 2 proposed corridor implementation scenarios (variants). A comparative analysis was done for the indicators that refer to the air pollution: CO, NO, and VOC.

Modal split was also recorded to monitor the changes in travel habits as a result of public discussions regarding the city wide changes related to mobility. For the other related measures the focus was on process evaluation.
Impact evaluation

Key result 1 – Decrease in air pollution emissions after simulated closure of central part of the corridor

By comparing the air quality during the test closure of the central part of the corridor with the air quality of the rest of the measuring period of 2011, the target value of 5% decrease of pollutant concentrations has been exceeded by far. This has proved that from the air pollution standpoint, the closure of the city centre for the car traffic could result in significant environmental and public health benefits.

- **NOx pollution**: The air pollution measurements during the closure of Slovenska street during the European Mobility week (from 16-22 September 2011) show a significant reduction of NOx – by 40%. The remaining quantities of the NOx can be attributed to the public transport and taxis, which were allowed to use the closed section of the street, as well as to other sources of NOx (adjacent traffic, industry). Other external factors were excluded, since the comparison with the control measurement location shows, that the concentrations of NOx thorough the city remained relatively constant during the whole period.

- **PM$_{10}$ pollution**: The air pollution measurements during the closure of Slovenska street during the European Mobility week (from 16-22 September 2011) show a significant reduction of PM$_{10}$ – by 21%. The remaining quantities of the PM$_{10}$ can be attributed to the public transport and taxis, which were allowed to use the closed section of the street, as well as to other sources (adjacent traffic, wood heating in the city centre area). Other external factors could not be entirely excluded, since there was a drop-out of data at the control measurement location between 18-22 September.

Key result 1 – Disappointing results from computer simulated corridor implementation

For both variants, the pollution indicators show unfavourable results (targets not fully achieved), which could point to the fact, that other measures for reduction of the flow of private cars to the city should be considered besides the hard measures (implementation of mobility corridor) – e.g. soft measures, congestion charging, etc.

- **CO**: the results show a potential decrease of CO emissions, if Variant 2 is implemented. The reduction of up to 3.9% (maximum value) or -1.9% (combined for all modelled sections of the corridor; morning and afternoon peak) can be observed; on the other hand, an increase by up to 2% is expected for Variant 1.

- **NOx**: the results show a potential decrease of NOx emissions, if Variant 2 is implemented. The reduction of up to 3.8% (maximum value) or 1.8% (combined for all modelled sections of the corridor; morning and afternoon peak) can be observed; on the other hand, an increase by up to 2% is expected for Variant 1.

- **VOC**: the results show a potential decrease of VOC emissions, if Variant 2 is implemented. The reduction of up to VOC up to 3.8% (maximum value) or 1.8% (combined for all modelled sections of the corridor; morning and afternoon peak) can be observed; on the other hand, an increase by up to 2% is expected for Variant 1.

Key result 3 – Modal split

The modal split results on the corridor show an increase in favour of sustainable means of transport from 54% to 60.6%, but with large differences between the various modes: thanks to improvements in the cycling infrastructure, and the implementation of a bike sharing scheme, cycling and walking increased by 27% and 17% respectively (the targets have been achieved), while the car use has reduced by approximately 14%, probably due to the decrease in car ownership and increase in fuel prices. The PT usage has remained constant (the target has not been achieved).

Key result 4 – Elaboration of Transport policy of the City of Ljubljana

Measures such as 4.9-LJU, 2.1-LJU, 4.6-LJU and 3.1-LJU have initiated the discussions that eventually lead to the elaboration of the Transport policy of the City of Ljubljana – which addresses these questions on the city level.
Process evaluation

Barrier 1 – Corridor not implemented

The fear of public opposition to such big-impact measures resulted in the cancellation of physical implementation of the corridor within the lifetime of the project. In the process of finding a possible solution, a meeting with the Mayor of Ljubljana was also organised to discuss the possible implementation of the corridor for the demonstration purposes. The arrangement could not be made. Since the implementation of the corridor was the pre-condition for a successful integration within the IP1, other measures could not function or could function with a minimised efficiency.

Barrier 2 – Preconditions for corridor implementation

Construction of inner ring is a precondition for corridor implementation (it shows that COL see the implementation of the corridor as a barrier). Traffic experts’ opposition controls the implementation of the corridor, because they state, that the establishment of the dedicated PT lanes on the corridor will cause even greater congestions. The construction of the inner ring is therefore the solution to redistribute the cars from the corridor to the other roads. The general attitude towards the importance of car flow in traffic planning instead of the mobility (flow of people) is evident in this case.

Barrier 3 – Lack of transport strategies

The lack of vision and failure to implement the spatial strategic plans combined with unclear political standpoint about the implementation of the corridor (whether to choose the 2+2 lane profile, dedicated bus lines, Barjanska road construction, etc.). There was also strong objection to ideas of changing road usage by closing a part of the corridor for private cars. Also there was the important political condition that the measure 2.1-LJU would not be implemented before some other non-CIVITAS related traffic measures are implemented, for example the completion of the inner ring road and Roška – Njegoševa bridge. As decisions were changed and not taken in a timely manner, the process was slowed down and planning was difficult. Additional work and costs were needed, and the implementation was delayed.

Barrier 4 – Corridor related measures facing changes and delays in implementation

There were problems with other CIVITAS measures within the corridor: priority at intersection has been declared as too expensive which was a major obstacle in the implementation process (a long delay occurred); hybrid bus technologies did not meet the expectations (problems/issues with malfunction of new technologies, environmental benefits not evident from the first set of testing); poor accuracy of the real time information for public transport (technical issues affecting the accuracy of displayed information - for example, the LED display shows the information with a delay/poor accuracy, which lead to a decreased perception of quality of service. All of this has established the negative platform for future implementation of new technologies.

Barrier 5 – Lack of understanding of complexity of transport planning

Insufficient capacities for complex understanding of user requirements and for an adequate integrated planning of traffic, combined with no tradition in comprehensive transport planning, results in the fact that the majority of transport planning is still on hard measures – the majority of concern is on the big (spot) projects; there is no holistic/systematic approach. As a result of this, many measures in Ljubljana have been implemented as individual efforts to tackle the problems of the traffic in the city, but these measures have failed to bring the added value, that was expected in terms of integration of these measures. The example of this is the IP1.

Driver 1 – Indirect requests for such traffic reduction measures from the outside CIVITAS

The CIVITAS initiative worked parallel to the European and national directives and programs on air, noise and health: operational program PM$_{10}$, operational program for the noise, European alert on air quality. Rising problem with air pollution, particularly related to not meeting demands of air quality standards on the local and regional level (PM$_{10}$) and the related legal process of the EU is a strong driving force calling for action and a no disputable argument in favour for the debate about different restrictive measures to be implemented. Besides this, air pollution measurements during the test closure of Slovenska Street during the EMW 2011 have shown a significant decrease in air pollution – this served as a good example on how the better air quality in the city can be achieved. High expectations from the public for a better environment in the city centre were also a strong driver for sustainable traffic measures to be implemented.
Driver 2 – Sustainable transport measures are being implemented also outside CIVITAS ELAN

The appointment of a new vice-mayor for the communication and quality of life brought also a new approach towards related issues at COL. This mainly includes finding alternatives for better transport solutions through the preparation of city wide transport policy of COL (which includes the elements/proposals of CIVITAS ELAN measures).

Driver 3 – Positive changes due to the transport policy

The transport strategy/policy of COL has been adopted recently and a consequence of the implementation of a sustainable vision of deputy vice mayor, exchange of experiences and lessons learned with other cities is contributing to a positive change. As a result of this a holistic addressing of the transport safety and health issues is expected in future.

Driver 4 – Improved image of sustainable transport modes

The public transport has gained a better reputation/image among the citizens, although this has not helped in the increased PT use. Also, the increase in number of cyclists improved the image of cycling and had thus helped the cyclist to be recognised as equal traffic participants.

Lessons learned

Lesson 1 – Showcase of good practices

Although some of the measures could not be fully realised, they have provided a taste of what they could bring if they were fully implemented (the test closure of corridor during the EMW 2011, ticket integration within the city and regional buses, better image of the PT as a result of hybrid/CNG bus implementation and LED displays installations...).

Lesson 2 – Political representatives must believe in the project and work in its favour throughout the mandate

The measures must be viewed within a long–term framework; they must be adopted as a part of the city planning not as something that city is being forced to do. Political support for the measures/project must be clear and set in advance; the feasibility study for the implementation of the proposed project should be made. In addition, a strategic/higher level document must have existed prior to the implementation to provide the guidelines for implementation of the project (such as the Transport policy that has only recently been adopted by the City Council of Ljubljana). In this way the discrepancies between measures/actions are eliminated. Implementation should be carried out on a strategic level with subtle/partial changing of travel habits – measures and actions should be linked. Also, a set of preliminary analysis/expert opinions to gather the viewpoints about the matter in question should be performed.

Lesson 3 – Increase in support for sustainable transport

Even though the corridor has not been physically implemented, the process of implementation and the surrounding political discussions has helped Ljubljana to gain a change in ideology concerning the transport related issues – a shift towards the increased support for the sustainable modes of transport. The path to this new ideology on the city level was a difficult one, but at the end it has resulted in the elaboration and adoption of the City transport policy (adopted by the city council in September 2012).

Lesson 4 – Gain public interest

Public interest should be gained from the very beginning and gradually, especially for controversial topics. An example is through the activities of NGOs, also by helping to overcome the political and administrative barriers. Also, discussions with stakeholders must begin as soon as possible; to plan the measures including their inputs and viewpoints in order to avoid possible problems at later stages. Moreover, better planning of the sequences of the citizen engagement campaigns would be crucial; start generally – with a brochure that addresses the most general public – then move towards the individualised actions. In the most inner circle (face-to-face discussions), the appropriate communication tactics/approaches should play the most important role.
3.1.4. Conclusions & recommendations

Discussions about the city’s sustainable transport policy have been very intensive during the project. The biggest challenge was that some key stakeholders, including mobility experts and decision makers, were not yet ready for innovative solutions. Much effort was needed to convince people to change their travel habits and to shift from car to sustainable modes of transport, but in the end CIVITAS ELAN clearly contributed to raising awareness on sustainable transport. An example where public involvement helped to overcome the barriers was the City Cycling Platform where stakeholders were brought together to discuss various cycling issues.

However, the measure that was expected to have the largest influence, the high-quality mobility corridor, was not implemented during the project, because of strong opposition. Instead, the city focused successfully on smaller steps towards sustainable mobility, like real-time information displays at bus stops, the extension of the pedestrian area, a demand responsive service for elderly in the city centre, the introduction of hybrid vehicles and public bicycles in the public fleet and a PT portal.

Within CIVITAS, a range of key documents have been drafted as well, defining strategic and operational objectives for the regulation of sustainable transport in the city. Important elements of these documents have been included in the City Transport Strategy that was recently adopted. This future transport vision is an important step towards facing transport challenges in an integrated way and aims to elaborate further on the work within CIVITAS ELAN.
3.2. Gent

3.2.1. City description

Gent, sandwiched between Brussels, Bruges and Antwerp, is Belgium’s third-largest city (in numbers of inhabitants). The city’s population is estimated at 247,262 inhabitants\(^4\). 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 67,000 university and college students registered in Gent\(^5\). 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.

Mobility in Gent

Gent is the core city of a metropolitan area of about 515,000 inhabitants. Every day, about 148,500 people commute to Gent and 94,500 people commute from Gent. The city itself has 247,000 inhabitants and over 67,000 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.

Table 3.5: Key characteristics for the city of GENT

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>2008</th>
<th>2010/2011/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface (km²)</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car ownership (per 1000 inhabitants)</td>
<td>370</td>
<td>208</td>
</tr>
<tr>
<td>Households with 1 or more cars</td>
<td>67,588</td>
<td>96,597</td>
</tr>
</tbody>
</table>

\(^4\) City of Gent; 1 Jan 2011

\(^5\) Student official 2009

\(^6\) source: stadsmonitor 2008/CIVITAS survey 2012
### CIVITAS ELAN Final Evaluation Report (Deliverable D10.11)

#### CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2010/2011/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>% daily trips by mode of transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Car</td>
<td>46</td>
<td>50</td>
</tr>
<tr>
<td>- Walk</td>
<td>6.9</td>
<td>6.3</td>
</tr>
<tr>
<td>- Cycle</td>
<td>19.9</td>
<td>26.2</td>
</tr>
<tr>
<td>- Bus/Tram/Train</td>
<td>23.2</td>
<td>16.1</td>
</tr>
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</table>

#### Society and economy

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2010/2011/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>239 905</td>
<td>247 262</td>
</tr>
<tr>
<td>% unemployment</td>
<td>10.04</td>
<td>8.1</td>
</tr>
<tr>
<td>unemployed</td>
<td>11 082</td>
<td>12 960</td>
</tr>
<tr>
<td>% pop over age 65</td>
<td>17.1</td>
<td>17.3</td>
</tr>
<tr>
<td>% pop under age 17</td>
<td>18.9</td>
<td>21.3</td>
</tr>
</tbody>
</table>

#### Energy and environment

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2010/2011/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>% estimated energy use – Transport</td>
<td>11.8</td>
<td>15</td>
</tr>
<tr>
<td>% emissions of Carbon Dioxide by road sector</td>
<td>25</td>
<td>19</td>
</tr>
</tbody>
</table>

### 3.2.2. The CIVITAS-ELAN strategy

#### 3.2.2.1. The CIVITAS corridor/area in the city

The CIVITAS-ELAN corridor in Gent stretches from The Loop (a developing large fairground); 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.

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7 source: leefbaarheidsmonitor 2006/CIVITAS survey 2012
8 source: DPM status 2008/2011
9 source: gent in cijfers
10 source: Emis 2007/2010
11 source: VMM lozingen in de lucht 2007-2010
Figure 3.5: Concept corridor
The corridor is one of the most dynamic areas in Gent, with the fairground area being developed (more leisure and retail activities), the on-going redevelopment of the railway station area (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 is refurbishing 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 was one of the important challenges for the CIVITAS-ELAN project.

In the northern part of the corridor, at the Korenmarkt, the existing old trolleybuses were 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 is decreased by means of an automatic number plate recognition system. Only cars on a 'white list' get access. Goods distribution is also 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 is redeveloped entirely to provide smooth access for the main tramline 1. Ramp metering, redesign of the road with specific attention towards pedestrians and cyclists are important elements of this redevelopment.

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

Table 3.6: Key characteristics for the ELAN corridor

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>2008</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface (km²)</td>
<td>8.6</td>
<td>8.6</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car ownership (per 1000 inhabitants)¹²</td>
<td>396</td>
<td>?</td>
</tr>
<tr>
<td>Households with 1 or more cars</td>
<td>8.717</td>
<td></td>
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<tr>
<td>% daily trips by mode of transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Car</td>
<td>34.2</td>
<td>32.4</td>
</tr>
<tr>
<td>- Walk</td>
<td>5.7</td>
<td>19.9</td>
</tr>
<tr>
<td>- Cycle</td>
<td>29.4</td>
<td>26.5</td>
</tr>
<tr>
<td>- Bus/Tram/Train</td>
<td>28.6</td>
<td>28.4</td>
</tr>
<tr>
<td>Society and economy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>29 525</td>
<td>28 800</td>
</tr>
<tr>
<td>% unemployment</td>
<td>N/A</td>
<td>6.5</td>
</tr>
<tr>
<td>un employed</td>
<td>1 256</td>
<td>1 421</td>
</tr>
<tr>
<td>% pop over age 65</td>
<td>18.3</td>
<td>19.1</td>
</tr>
</tbody>
</table>

¹² source: stadsmonitor 2008
¹³ source: leefbaarheidsmonitor 2006
¹⁴ source: DPM status 2008
¹⁵ source: Sociaal-economisch profiel van Gent 2004
3.2.2.2. The CIVITAS integrated packages of measures

For the city of Gent the Evaluation team of CIVITAS-ELAN identified 3 integrated packages of measures grouping a wide range of measures with the objective to change the mobility situation in the city focusing on the corridor.

Table 3-7: Measure overview Gent

<table>
<thead>
<tr>
<th>City/ IP Measure Number</th>
<th>Measure Title</th>
<th>Impact evaluation</th>
<th>CBA</th>
<th>Focussed process evaluation</th>
<th>Evaluation of Citizen engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 1- GEN</td>
<td>Promoting and enhancing the use of clean vehicles</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2-GEN</td>
<td>Energy efficient city fleet management</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.8-GEN</td>
<td>Extended biodiesel production</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.9-GEN</td>
<td>Semi-public clean car fleet</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1.10-GEN</td>
<td>Introduction of hybrid vehicles</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.13-GEN</td>
<td>Clean public transport strategies (B30 &amp; emission control)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP 2- GEN</td>
<td>Citizen engagement leading to changing mobility behaviour</td>
<td>X</td>
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<td></td>
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<tr>
<td>2.9-GEN</td>
<td>Participatory re-development of main train station area</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4.2-GEN</td>
<td>Mobility management for companies</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3-GEN</td>
<td>Mobility management for schools</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.10-GEN</td>
<td>Comprehensive mobility dialogue and marketing campaign</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2-GEN</td>
<td>Innovative car sharing</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6.3-GEN</td>
<td>Holistic event management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP 3- GEN</td>
<td>Adjust car &amp; freight traffic by traffic management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4-GEN</td>
<td>Intelligent Park&amp;Ride enforcement</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3-GEN</td>
<td>Parking and public space management around train station and ELAN corridor</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4-GEN</td>
<td>Pedestrian area enforcement access restrictions</td>
<td></td>
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</tr>
<tr>
<td>7.3-GEN</td>
<td>Institutional platform for city freight management</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8.6-GEN</td>
<td>Sustainable multi-modal traffic management</td>
<td>X</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
## 3.2.3. Summary of evaluation results

Here we summarize the results of the detailed evaluation of the measures in the city.

First the findings on the level of the Integrated Packages of measures are discussed. These are the impacts for which the different measures are working strongly together to achieve this impact. In many cases it is also difficult to disentangle the impact of the different measures since they are implemented in the same timescale for the same target group. For this reason the impacts are considered together and a more qualitative assessment is given of the importance of each of the measures in the package. This is done through an expert ranking of the measures in which the Site Evaluation Managers, together with mobility experts familiar with this type of measures, rank the measures in order of importance on the observed impact.

Further the impacts which are specifically related to one of the measures are discussed and conclusions are drawn per measure.

The detailed information is presented in the Measure Evaluation Result Templates (MERT) in annex of this report. Also these MERTs are structured in this way: first the aspects to be discussed on the level of the Integrated Packages of Measures and further the related measures.

### 3.2.3.1. Integrated Package 1: Promoting and enhancing the use of clean vehicles

#### 3.2.3.1.1. Evaluation on Integrated Package level

**Integrated package description**

Within this integrated package, measures work together to achieve the common objective to improve the air quality (reducing emissions) by reducing (fossil) fuel consumption and cleaning up local vehicle fleets through:

- Stimulating a sustainable market for fuels as an alternative to mineral oil as
  - Electric cars in the city and cambio fleet (M1.2-GEN and M1.9-GEN)
  - CNG vehicles in the fleet of Max Mobiel (M1.9-GEN)
  - Hybrid buses in the PT fleet (M1.10-GEN)

16 Only costs of the development and maintenance costs of the bicycle route planner are described.
- LPG vehicles in the fleet of the private taxi company V-tax (M1.9-GEN)
- Preparation to integrate B30 in the fleet. Due to several barriers, this part of the measure is cancelled (M1.2-GEN, M1.8-GEN and M1.13-GEN)

- Optimising the energy use of the fleet by
  - Providing ecodriving trainings (M1.2-GEN and M1.9-GEN)
  - Reduction of car fleet and stimulating car sharing (M1.2-GEN)
  - Reducing energy use of heating and ventilation of trams (M1.13-GEN)
  - Following up the tire pressure of the city fleet (M1.2-GEN)
- Exchanging knowledge between the measure leaders of this integrated package and other ELAN cities (M1.1-COM).

**Evaluation approach**

On integrated package level, the evaluation was focused on understanding which actions of the measures of this integrated package were most successful and on drawing conclusions on the global impact of the measures together. Here the following targets were defined:

- Decrease of the fuel consumption by 5% to 10%.
- Decrease of emissions (green gasses and air pollutants) of the (semi) public fleet by 5%.
- Reduction of fossil fuel use by 5% to 10%.

Additionally the contribution of the knowledge exchange between the measure leaders of this integrated package to the success of the measure(s) is discussed.

**Impact evaluation**

**Key result 1 – The fuel consumption of the whole (semi)public fleet is decreased**

Comparing the fossil fuel consumption with the fossil fuel consumption with the business-as-usual situation, in which we keep the fuel consumption of the total fleet equal to the situation before CIVITAS and the km driven equal to the situation after CIVITAS, the consumption is reduced by 0.4 l/100km or by 1.7%. This means that the target of the reduction of the fuel consumption by 5% to 10% is not achieved due to the fact that still a large part of vehicles were not replaced yet during the CIVITAS project. But when analysing the impact of the CIVITAS measures on the fleets separately, we can mention that the target is achieved:

- the fossil fuel consumption of the city fleet is reduced by 3.3%
- the fossil fuel consumption of the cambio fleet is reduced by 14.7%
- the fossil fuel consumption of the fleets of Max Mobiel and V-tax is reduced by 26.4%
- the fossil fuel consumption of the public transport fleet is reduced by 7.4%

**Key result 2 – Decrease of greenhouse gas emissions by 5% and decrease of air pollutant emissions ranged between 2% to 12%**

Greenhouse gas emissions reduced by 5.1% comparing the emissions with the business-as-usual situation. This means that the target of the decrease of the green gas emissions of the (semi)public fleet by 5% is fully achieved. For the air pollutant emissions also a reduction is noticed for NO\(_x\) (-1.9%), CO (-12.3%) and PM (-3.6%). This means that the target of the decrease of the air pollutant emissions as CO of the (semi)public fleet by 5% is fully achieved; the decrease of other air pollutant emissions as NO\(_x\) and PM is partly achieved due to the fact that still a large part of vehicles were not replaced yet during the CIVITAS project.

**Key result 3 – Reduction of fossil fuel use by 250,000 litres (or 7%)**

Comparing to the to the business-as-usual situation, in which we keep the fuel consumption of the total fleet equal to the situation before CIVITAS and the km driven equal to the situation after CIVITAS, the total fossil fuel use is reduced by 250,000 litre or by 7% which is in between the target of 5% to 10%. The share vehicles not or partly depending on fossil fuel is increased by 4%.

**Key result 4 – Ecodriving trainings led to reduction fuel consumption by 7%**

Providing ecodriving training for car drivers resulted in a reduction of 7% of the fuel consumption, so the target is achieved. But unfortunately, the long term the impact of the ecodriving trainings were
negligible at the city of Gent and Cambio. For this reason, it is recommended to maintain the ecodriving trainings and to follow up in detail the driving behaviour of the drivers.

**Key result 5 – Hybrid vehicles reduce fuel use, costs and emissions**

The 20 new hybrid buses resulted in significant savings in fuel usage 16.3%, fuel costs (3 112 118 EUR or 17.3%) and a reduction of 17.2% of emissions compared to a standard articulated bus.

**Key result 6 – Cambio sharing system incorporated in city fleet**

The car-sharing concept CAMBIO was introduced in the city fleet, resulting in a lower number of vehicles and a more conscious usage of the city employees.

**Process evaluation**

**Barrier 1 – It is not so easy to change the attitude towards sustainable mobility**

Changing the overall attitude towards new ideas for mobility was a challenge. Although several managers of the city departments were initially not convinced on the importance of it, the city fleet manager convinced them of a refreshing approach of their mobility solutions, meaning: less cars, other ways of transport, car sharing (cambio or own cars),…

**Barrier 2 – Bio diesel (B30) legal barrier and uncertainties**

As long as the B30 is not an approved fuel in Belgium and little is known of the impact of bio diesel on engines, the discussions on sustainability of bio diesel will be on-going. Also car manufactures and fuel suppliers keep reserved to stimulate the use of bio diesel. For this reasons B30 can only be distributed in a closed circuit of registered partners. Requirements on the engines in the purchasing phase of new vehicles help to overcome this barrier.

**Barrier 3 – No filling stations for alternative fuels**

No or rare general availability of B30 filling stations, CNG filling stations and electricity charging stations in Belgium. This results further in additional negative elements: extra costs for installation of the filling station(s) and inefficient use of car fleet (extra km need to be driven to tank alternative fuels…). Extra efforts should be done to install extra filling/charging stations breaking the circle of having not enough demand – not many stations – not many new vehicles.

**Driver 1 – Some vehicles are already B30-proof**

Thanks to the purchase criteria for new vehicles of the city of Gent, developed before CIVITAS, approximately 80 passenger vehicles are B30-proof (because of provisions in the tendering procedure). Unfortunately, this resulted not in enough demand for biodiesel to motivate a filling station needed to make the implementation of B30 would go on.

**Driver 2 – Cooperation between partners to install filling station for alternative fuels**

Good cooperation with the city of Gent and Cambio to install electric charging station on premises of the city of Gent or in underground parking garages and with the city of Gent and Max Mobiel to install GNC filling station at premises of Max Mobiel.

**Driver 3 – Knowledge exchange between the fleet managers in the CIVITAS**

Knowledge exchange between the fleet managers stimulates the implementation of a set of measures as e.g. providing ecodriving trainings in the city of Gent, Cambio, in the cities of Ljubljana and Zagreb; work out of the sustainable purchase strategy at the City of Gent, Cambio and De Lijn.

**Lessons learned**

**Lesson 1 – A combination of specific measures has a significant impact on cleanliness of the fleet**

Increasing cleanliness of the fleet requires a combination of measures each working on different aspects of the fleet, the usage of the fleet and the general travel behaviour of the employees:

- Work out of a sustainable purchase strategy. It is required that in the tendering procedure, a selection criterion based on the environmental aspects (CO₂ emission, Euronorm or
ecoscore\textsuperscript{17}) has been included. In this procedure it is also required to mention that the standard vehicles need to be B30 proof.

- Providing ecodriving trainings as the driving behaviour of the drivers has a big influence on the fuel consumption as anticipated driving is crucial for maximum energy recuperation. For this reason more extra attention need to be paid on this aspect. More education needs to be organized and more follow up of driving behaviour needs to be done.
- Follow up of the tyre pressure of the vehicles as insufficient tyre pressure leads to increase of fuel use. The insufficient tyre pressure also leads directly to a waste of fuel and faster deterioration of tyres. Both of them have a very negative impact on the environment.
- Removal of vehicles with low mileage from the fleet and at same time stimulating use of bike, public transport and car sharing system as Cambio.
- Optimising energy use on trams by the reduction of cold air import, the inside temperature in winter period and the ventilation in function of outside temperature and when doors are open.
- Introducing hybrids, CNG and electric vehicles in the fleet.

Lesson 2 – Monitoring use and fuel consumption of the fleet

A detailed monitoring system, preferably including GPS tracking devices, will be very useful to increase the cleanliness of the fleet. Based on this monitoring system the fleet manager can decide how many and which types of vehicles need to be purchased. The fleet manager can also follow up the tyre pressure or organise ecodriving lessons and follow up the results over a longer period with regular feedback to the driver or can decide to remove the vehicle with low mileage from the fleet and to stimulate the use of car sharing system as Cambio. This will be resulting in more savings year after year.

Lesson 3 – Installation of filling stations for alternative fuels on large scale

To stimulate the use of alternative fuels, it is required to install on a large scale public filling station of CNG, electricity, B30… On the other hand, the construction of new stations is more difficult to justify when the demand and the number of vehicles are low. To break this circle, extra budgets and specific stimuli are needed.

Lesson 4 – Communication/involvement of fleet managers and car and bus drivers of alternative vehicles

Knowledge exchange between fleet managers stimulates the implementation of a set of measures in their fleet which leads to increase of the cleanliness of the total fleet. Interviewing hybrid bus drivers or electric car drivers stimulates driving with those alternative vehicles, especially when their feedback was used to optimise the vehicles or the integration of the alternative vehicle in the fleet (here Cambio car sharing system). Also on-going communication on the advances of the electric car is a must to overcome the threshold in the first use of the electric car by Cambio users.

Lesson 5 – Further optimization of the alternative vehicles and reducing the purchase costs are required

Further optimization of the energy storage and reducing weight of hybrid and electric vehicles is necessary to implement these vehicles on large scale. As the high purchase cost of a hybrid bus or an electric car keeps the main barrier to replace the public transport or Cambio fleet actions (e.g. providing funding,….) need to be done to reduce the purchase costs.

3.2.3.1.2. Measure 1.2: Energy efficient city fleet management

Measure description

This measure consisted of improving the private fleet management for the employees of the City of Gent. The main goal was to reduce the emissions of the vehicle fleet by increasing the efficiency of the fleet and reducing the use of fossil fuels in the City fleet. The number of vehicles was reduced, cleaner

\textsuperscript{17} Only available in Belgium
vehicles were introduced (e.g. 14 electric cars & 1 hybrid truck) and car sharing was promoted. Also 54 employees had the chance to reduce their fuel consumption through an ecodriving training.

The measure had the following deviations:

- **Biodiesel** – The implementation of B30 was planned but due to several barriers it was cancelled (see 1.8-GEN). This part is after the 4th amendment removed from the DOW.
- **City fleet management tool** – This part of the measure is removed from the DOW but will be developed anyway. The tool will be implemented in 2013.
- **Electric vehicles** – As a result of the feasibility study, 1 hybrid pick-up, 7 full electric vans (Renault Kangoo) and 7 electric cars (Peugeot ion and Volvo) for passenger transport were implemented in the city fleet. This decreased the city fleet’s emissions further.
- **Introduction of the Cambio car sharing system in city fleet** – The cambio car sharing system has been introduced into the city fleet. The cambio cars were being used by our employees and by citizens in the neighbourhood. Later on in the project: also an introduction of an electric shared cambio car.

**Evaluation approach**

To measure the environmental impact of the new fleet, drivers of the city of Gent had to fill in manually the total amount of km driven and tanked fuel. This dataset contained however a lot of inconsistencies, for example in the registration of number of km driven or fuel tanked.

The environmental characteristics of the vehicle fleet were evaluated by using the ecoscore, an environment score for vehicles developed by VITO. For a few old vehicles, the ecoscore and/or euronorm were missing, but this does not influence the results.

To evaluate the ecodriving trainings, the impact on driving behaviour and on fuel consumption was collected in cooperation with the subcontractor Drivolution.

**Impact evaluation**

**Key result 1 – Positive short term impact of ecodriving but less positive long term impact and CBA**

Despite of the first positive results of ecodriving on fuel consumption (it was reduced by 7%), the long term effect and the CBA of ecodriving is not positive. This means that on short time the target of reduction of 7% fuel consumption after ecodriving is reached. On long term, the target is not reached. Since the city of Gent currently does not have a city fleet management tool and no permanent GPS-tracking devices in the cars, it is impossible to do an accurate follow-up of the cars. Also some drivers suggested to extend the training period was too short as some of them haven’t driven a lot with their car due to other obligations, illness or holidays. The city of Gent can only keep on spreading the message about energy efficient driving (mailings, stickers in cars, car policy, etc.).

**Key result 2 – Fuel consumption of the city fleet is decreased by 3.7%**

The fuel consumption of the cars and light freight of the city fleet is decreased by 3.7%. The target of a decrease by 5% is thus partially achieved. The average fuel consumption of standard cars in 2010 and 2011 is at almost the same level (7 l/100 km). Comparing the results of average fuel consumption with the BAU 2011 (6.8 l/100 km), the fuel consumption has increased by 4%. There was no impact on fuel consumption by standard replacement of cars during the latest 4 years as all vehicles with highest consumption were already replaced by a cleaner one before the CIVITAS period, also impact of ecodriving trainings to 54 drivers was not detectable. The average fuel consumption of light freight has decreased from 10.5 l/100 km in 2010 to 9.3 l/100 km in 2011 (-11%). Comparing the results of average fuel consumption with the BAU 2011 10.3 l/100 km the fuel consumption decreased by 10%. This is a result of the replacement of light freight by a newer and cleaner one following the durable purchase strategy.

**Key result 3 – Total fuel use decreased by 24%**
The total fuel use of the city fleet decreased by 24%, which exceeded the target of reduction by 5-10% of fuel use. This is a result of removal of 45 standard cars from the fleet at August 2011 and the replacement of vehicles by a cleaner one following the sustainable purchase strategy as including the environmental score as a selection criterion in the tendering procedure.

**Key result 4 – Employees started thinking about their transport**

By removing 45 cars and 38 light freight vehicles from the fleet, employees start thinking about their transport and were “forced” to take a bike. Sometimes this leads to a positive conclusion that in the city centre you can move faster by bike than by car. This even leads to 30% reduction of driven km in the car fleet of the city. Also the total number of km driven of the light freight is reduced by 11%.

**Process evaluation**

**Barrier 1 – Late allocation of the city fleet manager**

Late allocation of the City fleet manager causes a delay of the set-up of the city fleet management cell and the city fleet management tool with more than a year.

**Barrier 2 – It is not so easy to change the attitude towards sustainable mobility**

Changing the overall attitude towards new ideas for mobility was a challenge. The city fleet manager needed more time than foreseen to convince the managers of the several departments of a refreshing approach of sustainable mobility meaning: less cars, other ways of transport, car sharing (cambio or own cars) …

**Barrier 3 – Difficulties concerning the implementation of B30**

There was a lack of critical mass volume of B30 for the city of Gent. For detailed description of several barriers, please consult the M1.8-GEN evaluation.

**Driver 1 – 80 passenger vehicles are B30-proof**

Thanks to the purchase criteria for new vehicles of the city of Gent, developed before CIVITAS, approximately 80 passenger vehicles are B30-proof (because of provisions in the tendering procedure). Unfortunately, this could not ensure that the implementation of B30 would go on.

**Driver 2 – Cooperation with Digipolis for an in-depth research**

Due to the complexity of the city fleet management tool, a close cooperation with Digipolis to write a detailed technical specification for the development of this tool was set up.

**Driver 3 – Cambio sharing system incorporated in city fleet**

Close cooperation with CIVITAS partner cambio leads to the introduction of the cambio car sharing system in the city fleet.

**Lessons learned**

**Lesson 1 – A permanent city fleet manager is advisable**

To monitor the cleanliness of the city fleet, the decisions of purchasing number and types of vehicles, need to be centralised at the city fleet management cell. For this reason it is advisable to allocate permanently a city fleet manager within the city of Gent. He can also organise ecodriving lessons.

**Lesson 2 – Recommended to organise feasibility study in advance**

No feasibility study on biodiesel (B30) in the city fleet was done before CIVITAS project. This leads to failure of the introduction of B30 in the city fleet. It is recommended to organise a feasibility study before including the measure in the CIVITAS project. It is required to provide a more active partner role for the fuel supplier(s) in such an important project as implementation of biodiesel (B30).

**Lesson 3 – Detailed monitoring system very useful**

A detailed monitoring system like the city fleet management tool including GPS tracking devices will be very useful to increase the efficiency of the fleet. This will also help to prevent inconsistencies in the registration of number of km driven or fuel tanked. Also the results of ecodriving can be monitored over
a longer period. The city fleet manager needs to follow up all results and give regular feedback to the drivers.

**Lesson 4 – Detailed follow up of tyre pressure is a must**

During the eco driving project lots of cars were detected with insufficient tyre pressure, directly leading to a higher fuel use and faster deterioration of tyres. A detailed follow up of the tyre pressure of the fleet is a must.

**Lesson 5 – City fleet manager needs to investigate which vehicle is needed**

It is required that the city fleet manager asked in detail why a vehicle needs to be purchased. If the vehicle will not be used frequently, car sharing needs to be stimulated. When the vehicle will only be used for short distances and within urban area, the purchase of an electric vehicle needs to be stimulated as no impact of hybrid vehicle on fuel use/emissions was measured. For long distances the city fleet manager can suggest to purchase a hybrid or CNG vehicle.

**Lesson 6 – Include use of bike or PT in car policy**

By removing 45 cars from the fleet, employees start thinking about their transport and were “forced” to take a bike. Sometimes this leads to a positive conclusion that in the city centre you can move faster by bike than by car. Due to this positive information, it is recommended to include in the car policy the use of a bike or PT when possible instead of taking automatically a car. Also setting up a bike sharing system for employees would be useful in this context.

### 3.2.3.1.3. Measure 1.8: Extended biodiesel production

**Measure description**

The city of Gent wanted to reduce CO\textsubscript{2} and other pollutant emissions of the (semi)public vehicle fleet by implementing the use of B30 (= a 30% mix of biodiesel with standard diesel) in the fleet. Before the implementation could start, some barriers had to be removed. Those were: reducing the costs of biodiesel, collecting technical guarantees from car manufacturers for the use of B30 and stimulating to set up a biodiesel pump circuit. This measure was allocated to the bio engineering faculty of the University of Gent to support the measure leaders of the M1.2-GEN (city of Gent) and the M1.13-GEN (public transport company De Lijn) removing the abovementioned barriers.

The measure had the following deviation:

- **Stopped in January 2012** – The reason for that was that the operator of public transport De Lijn decided that the implementation of biodiesel would not be done during the CIVITAS project because the conditions weren’t met. This leads to lack of critical mass volume of B30 for the city of Gent.

  The two conditions of De Lijn were:

  - There had to be a formal guarantee from the bus manufacturer for the engines when using B30 on buses of De Lijn to make sure that there will no problems with the PT services towards citizens: the manufacturer did not want to give any guarantee.
  
  - A watertight guarantee that the production of B30 is not to the detriment of the human food chain: according to De Lijn, the European sustainability certificate says nothing about the impact on the human food chain. Moreover it does not take into account the indirect land use change. Also the use of biofuels produced from waste is no economic or technical alternative yet to the current diesel fuel.

**Evaluation approach**

As the implementation of biodiesel will not be implemented during the CIVITAS period no impact evaluation can be done. Several process evaluation workshops were organised with the forum, including the representative of the Federal Authority of Economy and the representative of GBEV.
car manufacturers and fuel distributors were at the workshops as they were not actively involved in the project and thus difficult to reach.

**Impact evaluation**

No impact evaluation can be done.

**Process evaluation**

**Barrier 1 – Lack of trust by politicians and staff**

Despite of the many efforts taken by the University of Gent, the politicians and management staff were still not convinced of the sustainability of biodiesel.

**Barrier 2 – Legal barrier could not be overtaken**

As long as the B30 is not an approved fuel yet in Belgium, the discussions on sustainability of biodiesel will be on-going. Also car manufactures and fuel suppliers keep reserved to stimulate the use of biodiesel. Also the fact that B30 is not an approved fuel yet caused problems for the distribution of it: B30 can only be distributed in a closed circuit of registered partners.

**Barrier 3 – Uncertainty about the impact of biodiesel**

As little or nothing is known of the impact of biodiesel on engines the car manufacturers were reserved to give warranties.

**Barrier 4 – Unforeseen costs in the implementation**

As some partners (e.g. the City of Gent) do not have a closed pump circuit, extra unforeseen problems occurred: extra costs for installation of pumps and inefficient use of car fleet (extra km need to be driven to tank B30…)

**Barrier 5 – Lack of trust in sustainability of biodiesel**

There is still lack of trust in sustainability of B30 for traffic at this moment but there is still some trust for use of biofuels on long term when using second generation biofuels.

**Barrier 6 – Lack of cooperation**

Cooperation with several partners was required to get critical mass volume of 500,000 litres to convince the fuel distributors to deal with this project. As De Lijn stopped implementing B30, the city of Gent cannot continue with the project.

The University of Gent wants to keep sensitizing stakeholders by e.g. organising workshops in Flanders on biofuels. They will also try to set up a sequel project that will focus more on energy mix.

**Lessons learned**

**Lesson 1 – Check institutional status before implementation**

The B30 fuel needs to be legally approved in your country before starting the project to implement biodiesel on a large scale in your fleet.

**Lesson 2 – Involvement of stakeholders as car manufacturers and fuel distributors recommended**

It is recommended to involve the car manufacturers and fuel distributors in the project to get the required support from these stakeholders for a successful implementation of B30 in the fleet.

**Lesson 3 – Technical research required**

It is required to set up a scientific research on used oil in B30 engines, impact of use of B30 on parts of the engines and the maintenance of the B30 car fleet. This research will give insight on sources of possible damages and will convince the manufacturers to provide guarantees for use of B30. Also the impact of biodiesel on emissions needs to be further investigated.
3.2.3.1.4. Measure 1.9: Semi-public clean fleets

Measure description

Within this measure actions were done to improve the cleanliness of 3 different fleets: car fleet of Cambio (a car sharing service), the fleet of Max Mobiel and the shuttle bus fleet of V-tax, a taxi service which is also subcontractor of Max Mobiel. Cambio integrated 8 electric cars in its fleet without creating an extra barrier for the people using the cambio car sharing fleet, 4 of them were in Gent. Also ecodriving courses were provided to 35 cambio users. Cambio also set up a sustainable purchase strategy by extending its calls for tender with a passage on the cleanliness (environment values as CO$_2$, ecoscore). This has a great impact on the cleanliness of the whole cambio fleet. To reduce emissions, Max Mobiel integrated 3 CNG vehicles and one electric vehicle in its own fleet. Max Mobiel also convinced the subcontractor V-Tax to increase the cleanliness of their fleet by integrating LPG shuttle buses.

Evaluation approach

Cambio and Max Mobiel didn’t have any system to record the total amount of km driven, fuel used (petrol, diesel, CNG, electricity) on level of the cars. V-tax was withholding to provide any information. This caused some difficulties to evaluate the impact of clean fleet on fuel use, fuel consumption and on emissions. The figures used were mainly based on datasets available for the whole fleet, some technical specifications of the type of cars or on the datasets described in the offers (V-tax).

Due to the high costs of the measurement of the emissions, measurement was based on parameters of euronorm of the vehicles.

As cambio cars were used by several cambio users, also cambio users who didn’t follow any ecodriving lessons, it was not possible to measure the long term impact of the ecodriving trainings. Only the short term impact was monitored by a report developed by VITO.

As the CNG filling station was installed at early 2012, no datasets can be delivered to evaluate the impact of the use of CNG for the whole Max Mobiel fleet.

Impact evaluation

Key result 1 – Once cambio users tried out the electric cambio car, they were extremely positive

During the preliminary testing period, the vehicle was only available to the cambio staff, some prospective users among the employees of the city of Gent and a limited group of cambio users (total group: 45 persons). The experiences of these persons are positive (36.4%) to very positive (63.6%). Curiosity drove many of them to a first trip (17 answers), the results show that the positive experience led to use the electric car again. The respondents cited that it’s pleasant and comfortable driving with an electric car; the only minor aspect is the limited distance you can drive with an electric cambio car (50 km).

Key result 2 – 95 cambio users drove an electric cambio car

In August 2012, in total 495 cambio users requested the ‘authorization’ to get access to the electric car (significant increase of requests in August 2012). About 95 cambio users already tried out the electric car. The total km driven by the cambio electric car is 5800 km.

Key result 3 – At cambio the fuel consumption is reduced by 15%

An innovative sustainable purchase strategy and the implementation of an electric car lead to decrease of fuel consumption by 0.7 l/100km or a reduction of 15%. The total amount of fuel use was increased due to the extension of the cambio fleet. After BAU analysis, the total fossil fuel use was reduced by 10 171.5 litre or by 16.3%. Cambio succeeded to exceed the target of reduction of fuel consumption by 5% to 10%.

Key result 4 – Short term impact of ecodriving: -8.5% fuel consumption

After the ecodriving course there was a direct and obvious effect measurable when drivers tried out the offered tips. For 80% of the participants a positive result was noticeable (best result: reduced consumption by 28.1%), for 6% there was no noticeable result and 14% had the worst result: the result was even more negative after the trainings. Overall, however, the average consumption of 5 l/100km
dropped to 4.6 l/100km, which is a reduction of 8.5%. Conclusion is that for less frugal drivers it’s easier to have ‘better’ results than drivers who already have good results before the trainings. This ecodriving training measure achieved the target of reducing fuel consumption by 7%. Unfortunately the long term impact of ecodriving training on the fuel consumption cannot be measured as the cambio cars were also used by cambio users who didn’t follow ecodriving trainings.

Key result 5 – Installation of the CNG filling station for the CNG fleet of Max Mobiel

As there are almost no CNG filling stations in Belgium, Max Mobiel installed at end 2011 a private CNG-pump at its own promises. It is expected that the results on fuel consumption and emissions will be positive at end 2012, but data of 2012 are not available yet. It is expected that at the end of 2012 the targets on fuel consumption and emissions of Max Mobiel will be fully achieved.

Key result 6 – Replacement of V-tax shuttle buses by a LPG version had a positive impact on fuel consumption and on emissions

V-tax changed their fossil fuel fleet to a LPG version after the move to a building next to a LPG filling station in 2010. As in 2012 the shuttle buses were more used compared to 2008, a BAU was required to have insight in the impact of the replacement of the shuttle buses. Very positive results on fuel consumption (-30%) emissions as PM (-100%), NOx (-91%) and CO (-10%) were measured, except for CO₂. Driving with LPG buses led to an increase of 88% CO₂. For this reason the target of reduction of emissions by 5% is exceeded, except for CO₂, the target is not reached at all.

Key result 7 – Reduction of Cambio emissions partially succeeded after up-scaling analysis

The quantifiable target of decrease of emissions of the cambio fleet after up-scaling analysis with 5% is exceeded (-17.7% CO₂ and -24.4% CO), except for NOₓ (+11.7%) the target is not achieved and PM -3.9% of which the target is substantially achieved.

Process evaluation

Barrier 1 – Many options makes planning more difficult

The market of alternatives for fuel driven cars is evolving rapidly which makes it difficult at this stage to make a choice which clean vehicle will be integrated in the semi public fleet. The responsible persons of each fleet decided themselves which alternative vehicle will be integrated in their fleet (Cambio: electric car, Max Mobiel: CNG vans and V-tax: LPG shuttle buses).

Barrier 2 – Lack of involvement/communication of the main stakeholder

There was a lack of interest of V-tax to provide ecodriving courses towards shuttle bus drivers. For this reason, no ecodriving training was provided to the taxi drivers.

Barrier 3 – Technical shortcomings

No (or rare) availability of CNG filling stations and electricity charging stations in Belgium. Extra efforts need to be taken and budget need to be made available to install a CNG station and electricity charging station in Gent. This was not foreseen in the Description of Work.

Driver 1 – Fast evolving market of cleaner vehicles

The political and economic situation has been putting pressure on car manufacturers to work harder on cleaner vehicles which resulted in a very fast evolving market.

Driver 2 – Funding for implementation

Cambio succeeded to find extra (Flemish) funding to extend their cambio fleet to 8 electric cars (4 in Gent).

Lessons learned

Lesson 1 – Sustainable purchase strategy

A sustainable purchase strategy and the implementation of alternatives for fossil fuel car are good ways to reduce the fuel consumption of the fleet.
Lesson 2 – Investments are needed
To stimulate the use of alternative fuels, it is required to install on a large scale complementary infrastructure, such as a public filling station of CNG, electricity ...

Lesson 3 – Promotion on the electric car is required
On-going communication on the advances of the electric car is a must to overcome the threshold in the first use of the electric car by cambio users.

Lesson 4 – Easing the use, will increase the use
It is important to keep the user-friendliness of the electric car sharing vehicles in mind. Providing better guidelines, integration in a ‘normal’ car sharing station and integration into the reservation software will lead to increased use of the electric cambio car.

3.2.3.1.5. Measure 1.10: Introduction of hybrid vehicles in order to replace the existing trolley bus fleet

Measure description
The aim of this measure is to introduce articulated hybrid buses instead of replacing the old high-floor trolley buses by standard buses as a transitional measure between the present old trolley buses and the future tramcars foreseen on a part of the present trolley line 3. In the context of the objective to have 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 introduced 20 new energy-efficient and innovative articulated low floor hybrid buses (type AG300H) on bus line 3.

Deviations from the original plan were:
- Originally the purchase of 23 hybrid articulated buses was planned, but only 20 were purchased.

Evaluation approach
The evaluation of the measure focused on the evaluation of the fuel efficiency of the buses. Data collection of mileage and fuel use on weekly base gave a good insight in fuel consumption of hybrid buses. Also data on CO₂ emissions and noise emissions were collected. No detailed evaluation on other emissions could be conducted as the costs to measure the emissions are higher than the budget available for CIVITAS evaluation. Also the acceptance of the measure was evaluated. A CBA of the hybrid buses was conducted on request of De Lijn as the purchase cost of a hybrid bus is high.

Impact evaluation
Key result 1 – Reduction of 17.2% on fuel costs
During the year 2011, De Lijn saved with its 20 hybrid buses, all driving on line 3, 112.118 EUR. The reduction of fuel use leads to a reduction of 17.2% of fuel costs per year per hybrid bus compared to a standard articulated bus.

Key result 2 – Fuel use reduced with 16.3%
During the period of 1/01/2011 till 31/05/2012, the average fuel consumption of a hybrid bus is 47.51 l/100 km while the average fuel consumption of a standard articulated bus is 56.73 l/100km. The fuel consumption is reduced with 9.2 l/100km, or 16.3%. The quantifiable target of reduction with 25% is substantially achieved (at least 50%). This is partially caused by the fact that in the winter period the difference of fuel consumption between hybrid and standard articulated buses is less than in the summer period. The reason is probably the higher use of electricity for heating the bus in the winter period. Remark that the quantifiable target was set based on the summer results and thus not feasible.
Key result 3 – Emission reduced with 17%

Comparing emissions produced by hybrid and standard articulated buses leads to a reduction of 17.2% per year. This means a reduction of 271.55 tons of CO₂, 1.726 kg NOₓ and 18 kg PM per year.

Key result 4 – Acceptance of hybrid buses

57% of PT users were aware that they were travelling on a hybrid bus, 65% of the PT users even prefer travelling on a hybrid one. The quantifiable target of >75% is substantially achieved. Moreover, the drivers mentioned that several travellers already responded positively to the use of the new hybrid bus. Some passengers, mostly seniors, reported to the drivers that on hybrid buses they drive more comfortable, especially the seats and the low noise production contribute to this comfort. Some travellers even waited specially on a hybrid bus at bus stops. Also other PT companies showed their interest by asking for site visits and presentations.

It is also important to mention that the green range of thought exists already within the hybrid bus travellers, as 97% of them find it important that a public transport company as De Lijn invests in environmental friendly vehicles.

Key result 5 – Noise level reduced with 10 dB when leaving bus stop

As the impact is highest when leaving bus stops, only this noise level has been evaluated. The microphone was fixed outside the bus, exterior noise levels during leaving bus stops were measured during 5 seconds with full throttle leaving the bus stop. The noise level is reduced from 82.5 dB to 72.5 dB (-90%). This reduction was a significant positive result. However, the quantifiable target was defined as reaching the sound of a passenger car, and this has not been evaluated.

Key result 6 – Benefits do not outweigh the costs

Indicators used for CBA are the net investment costs, training costs to drivers, the net fossil fuel benefit and the net environmental benefit. Due to the high purchase cost, the CBA will be negative, during the expected lifetime of 14 years. The total discounted lifetime costs for 20 hybrid buses after a period of 14 years will be 1,999,605 EUR or 2 million EUR. As there is much uncertainty about the oil prices and tax treatments in the future, after the sensitivity analysis, the expected total discounted lifetime costs will deviate between 1.9 million EUR and 2.1 million EUR. It was not possible to quantify the reduction of fossil fuel benefit by reduction of capacity of the super capacitors, the extra costs for replacement of new super capacitors and the noise benefit.

Key result 7 – Up-scaling to the entire fleet
After up-scaling to the entire bus fleet of De Lijn the total fuel cost, fuel use and fuel consumption per year will be reduced by 13.7%. This means that De Lijn will save 455.002 EUR fuel cost per year, the fuel use will be reduced with 417.433 litres (or fuel consumption will be reduced by 6.3 l/100 km).

Process evaluation

Barrier 1 – Technical

Anticipated driving, crucial for maximum energy recuperation with a hybrid vehicle, requires some habituation. The training that these drivers followed provided sufficient knowledge and insight. But there is also a certain familiarisation period necessary to get used to drive with a hybrid bus. For this reason, more education and follow-up on driving behaviour is needed.

Lessons learned

Lesson 1 – Driving behaviour on hybrid buses influences the fuel consumption

Driving behaviour of the bus drivers has a big influence on the fuel consumption as anticipated driving is crucial for maximum energy recuperation. For this reason more extra attention need to be paid on this aspect. More education needs to be organized and more follow up of driving behaviour needs to be done.

Lesson 2 – Further technical optimization needed

Technical optimization as increasing the energy storage capacity and weight optimization is required to decrease the fuel consumption of the hybrid bus.

Lesson 3 – A hybrid bus is far more expensive than a normal bus

The high purchase cost of a hybrid bus (36% or 151.000 € more expensive than a standard diesel bus) keeps the main barrier to replace the PT fleet by a hybrid one.

3.2.3.1.6. Measure 1.13: Clean public transport strategies

Measure description

The PT company De Lijn wanted to increase the cleanliness of the present trams by reducing electricity consumption on trams after conducting an energy audit on a “measuring” tram. The results of the energy audit lead to a proposal of a consistent package of new actions as reducing cold air import, defining variable set point for inside temperature, defining variable intake of fresh air, and reducing ventilation in function of outside temperature and when doors are open, towards less energy consumption on trams. This proposal is introduced in new tendering procedures.

Deviations from the original plan were:

- Introducing B30 in public transport buses after a consensus on all levels (political, central services of De Lijn) and a positive evaluation of the pilot project with a selected number of B30-buses. The implementation of biodiesel failed as no warranties are given by the bus manufactures. To remove this barrier in the future, the existing calls for tender are extended with a passage on the B30-proofness of new buses. The second reason for failure of implementation of biodiesel is that according to De Lijn, no guarantee can be given that the production of B30 will not detriment of the human food chain.

- Retrofitting old buses: as all buses already received closed soot-filters, financed by Flemish Government, before the CIVITAS project was started, this part is removed from the description of work.

Although negotiations about the purchase of a Hydrogen bus were far progressed, the cabinet of the Minister in charge for De Lijn decided at end of December 2009 not to buy such a hydrogen bus as the core-business of the Public Transport Company is not to do research and development of new technologies. Nevertheless, B5 was implemented on large scale, as in all public fuelling stations in Belgium diesel were replaced with B5 (this means that the diesel fuel was mixed with 5% of biodiesel).
Evaluation approach

To analyse the impact of the optimized heating and ventilation strategy, the subcontractor, VITO, installed a network of sensors on one ‘Hermelijn’ articulated tram which was operational in the city of Gent. The network consisted of temperature sensors, voltage sensors, electric current sensors, and sensors for pressure of the pneumatic suspension (to measure number of passengers), all connected to one data logging device via a dedicated Controller Area Network (CAN). The log data was sent via GPRS to the VITO servers every 5 minutes, where the data was stored for further analysis. The data logging on the tram started on 20th February 2011 and is still on-going. This detailed data collection method gives good insight on the effects of the optimization strategies on the measuring tram.

As energy use on trams depends strongly on the OUTSIDE TEMPERATURE and the outside temperatures differ from year to year, it should be not correct to use the actual temperatures for impact evaluation on yearly base. For this reason, the SEM decided to use the average temperature per month collected between 1981 and 2010.

By using the average temperatures instead of real outside temperatures, the real impact on energy use can be different from the results described in this evaluation report.

Impact evaluation

Key result 1 – New heating and ventilation strategy leads to a significant reduction of energy used for heating of trams (-31%).

Due to the new heating and ventilation strategy as reducing cold air import, defining variable set point for inside temperature, defining variable intake of fresh air, and reducing ventilation in function of outside temperature and when doors are open, on 41 ‘Hermelijn’ trams in Gent, De Lijn Gent saves 850 MWh of electricity per year. This leads to savings of 101.992 Euro per year or 234 tonnes of CO₂ per year. Measuring the impact of the new heating and ventilation strategy on energy use in same conditions (same outside temperature, number of passengers, days in week…), leads to a reduction of 31% energy use.

Key result 2 – CBA was very positive. Costs already gained back in 2014.

It is worthwhile to implement the new heating and ventilation strategy in the tram fleet of De Lijn as already in 2014 the costs of the energy audit and the investment costs are gained back. Over a period of 24 years and after discount analysis, the benefit will be approximately 1.34 million €.

Figure 3.8: Use of energy
Process evaluation
For detailed process evaluation of the biodiesel implementation, see measure 1.8-GEN.

Driver 1 – Energy audit possible
The financial crisis stimulates De Lijn to start an energy audit to reduce energy costs. De Lijn even was in charge of the installation of all power supply, wiring and sensors, master controller hardware, GPS and GPRS antennas and verifying the working of the measurements for the energy audit tram.

Driver 2 – Instruction was implemented in Flanders
The measuring tram project (study how to reduce electricity in trams) was so successful that all 113 new low-floor trams in Flanders were adapted following the instruction of the study. The trams of the city of Gent are already adapted.

Driver 3 – Great interest from tram constructors
There was great interest of this project from the major tram constructors and of other PT companies within Europe.

Lessons learned
Lesson 1 – Small costs with huge benefit: reduction of total energy use up to 10%
The reduction on total energy use of trams can be achieved through savings of energy use for heating of trams as the reduction of cold air import, variable set point for inside temperature, variable intake of fresh air, reduced ventilation in function of outside temperature and when doors are open.

Lesson 2 – Feasibility study on biodiesel (B30)
It is recommended to organise feasibility study before handing in the measure in the CIVITAS project. It is required to provide a more active partner role for the manufacturers and the fuel supplier(s) in such an important project as implementation of biodiesel (B30).

3.2.3.2. Integrated package 2: Citizen engagement leading to changing mobility behaviour

3.2.3.2.1. Evaluation on Integrated package level

Measure description and implementation process
This Integrated Package aims to:

- improve the citizen’s awareness of their own contribution towards a sustainable and liveable city
- improve citizen’s engagement and changing their mobility behaviour

It contains all the mobility management measures or ‘soft’ measures to improve citizens’ awareness of the different sustainable transport modes and to increase their commitment to change their non-sustainable urban mobility behaviour. The (sub) measures consist of new communication strategies and new concepts focused on different target groups (e.g. employees companies, pupils, cultural event visitors, car-sharing users):

- 2.9 GEN Participatory re-development of main 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
There were no deviations from the original plan; minor deviations are reported on measure level.

Evaluation approach

The impact of each of the related measures on the mobility behaviour of their specific target groups has been registered or established by means of surveys on the specific target groups of the related measures.

- **Modal split**: data from the surveys of the specific target groups of the (sub)measures for which before and after data are available are put together and analysed as a whole. These results are compared the general modal split of citizens in the corridor, but this survey also interrogated citizens which were not included in one of the IP2 measures.

- **Awareness and acceptance**: a mobility survey at corridor level measured the acceptance of the governmental communication strategy and its participatory approach. However, the formulation of the questions and the answer possibilities were not exactly the same in 2008 and 2012, so the results of the before measurement were recalculated according to the answer possibilities of 2012 and it is not possible to make a completely correct comparison. Also data used at measure level are taken into account.

The overall effect of all the measures together in the ELAN-corridor was not evaluated as the various campaigns target mostly a limited amount of people from different target groups, and it would be difficult to distinguish the contribution of these small-scaled measures from the influence of other CIVITAS measures and external factors.

Impact evaluation

**Key result 1 – A positive modal shift**

When we combine the available modal split figures of the specific target groups of the measures, the average share of people using non-car modes increased after the campaigns by 5.29%, namely from 67.32% to 72.61%. A significant increase is achieved for all the target groups except for Fnac Gent, but here a lot of employees (77%) were using already a sustainable transport mode to go to work. Moreover, Fnac Gent is located in the pedestrian zone, so it is for many employees easier to use their bike, to go by foot or the public transport. However, the result would probably be different if the suitable data would have been available for all (sub)measures.

This figure of modal split of 72.61%, is 5.58% higher than the general figure (67.03%) based on the citizens survey on the corridor-level in spring 2012. This difference indicates the success of the implemented measures for the specific target groups. However, we have to take into account the fact that in the (sub) measure related surveys only the people who already participated in one of the submeasures were surveyed. Moreover, this group of interviewees uses sustainable transport modes more often than the average person in Gent.

**Key result 2 – The 70% target acceptance of the governmental communication strategy is not reached**

In 2008, 57.8% of the interviewees agreed to receive enough information, but a total of 25.8% of the interviewees had no opinion about it. 17.4% of the interviewed people did not agree with it. In 2012, 50.3% of the interviewees (completely) agreed that they received enough information about mobility changes and plans, 23.5% does (completely) disagree with that statement and more than 26.2% of the interviewees had no opinion about it. The target of 70% to agree with the statement has thus not been reached in 2012, moreover, the acceptance even decreased. No clear reason can be identified since the city continued and even intensified the communication action. A possible element in this is a growing expectation level of the citizens and users of Gent in relation to the availability of information. Another reason, which is described under evaluation approach, could be the fact that the questions used in 2012 were a bit different and also the answer possibilities were changed. On the other hand, more than 76% of the population agrees or has no opinion on the statement.

**Key result 3 – Acceptance of the governmental participatory approach for the redevelopment project and for sustainable mobility campaigns**

The quantifiable target of 60% was not reached in 2008: only 48.3% of the interviewees agreed and 23.3% did not. Circa 28% of the interviewees did not have an opinion on it. Neither in 2012 the target
of 60% is reached, the degree acceptance was even lower. Only one third of the interviewees accepted the governmental participatory approach and 30% did not accept it. Around 37% of the interviewees had no opinion. As a consequence, there can also be stated that an average share of 70% of the interviewees does not disagree which is actually quite positive. No clear reason can be identified since the city continued and even intensified the efforts for a participatory process especially in relation with the redevelopment of the area around the railway station. Possible elements in this are a growing expectation level of the citizens and users of Gent to participate in the city decision process and the difference in answer possibilities like mentioned in key result 2.

Key result 4 – Awareness of specific (sub) measures

The targets on awareness of the specific measures were (just) not reached for two-thirds of the (sub) measures. Only the target of 60% for the support of the redevelopment project of the railway main station area and some targets for specific sub-measures were reached. Although the measures were mostly not successful according to the targets which were set up, it is not appropriate to see these (sub) measures as a complete failure. It is not an easy task to measure the impact on awareness of the implemented measures. The results could e.g. been much more positive for some measures if another manner of interpretation was used.

But it cannot be neglected that some of the measures did not obtain a positive result. It is impossible to give one clear reason for these disappointed results, the reasons are more diversified. For measure 2.9 on citizen engagement in the area of the main railway station, a possible element in this could have been a growing expectation level of the citizens and users of Gent to participate in the decision process on de redevelopment of the area or the length of the construction works itself. Examples of factors that played a role in the results are for example the lack of public transport (e.g. for a specific location or at night), a lack of enthusiasm to participate and reluctance of stakeholders and/or partners.

Process evaluation

Barrier 1 – Difficult to reach and convince the target group

For some actions it was difficult to reach the target group, depending on the type of people in the target group and the type of action. The most difficult people to reach for these actions were the ‘die hard’ car drivers, certainly when they were approached in group. It is also more difficult to reach people individually than in groups. A range of strategies were tested to more successful e.g. approaching people at the important moments change in their life since then there is a higher openness for alternative mobility choices.

Barrier 2 – Cooperation of partners

The success of the measures often depended on the cooperation of the partners. Examples of these partners are construction companies, cultural venues, schools, etc. Most of the co-operations went very well, but due to both external as internal reasons, a minority of the co-operations did not go well.

Barrier 3 – Not all the desired data could be collected

Not all data finally could be collected and not all after surveys were fully in line with the before surveys. Different reasons were identified: time pressure, lack of motivation or involvement but also the positive reaction to improve the quality of the surveys in comparison with previous surveys. During the lifetime of CIVITAS ELAN a lot of effort was done to involve Measure Leaders and other related actors better in the evaluation work and to make them aware of the need for good data. Finally in most cases a creative processing and interpretation of the data allowed to draw well motivated conclusions.

Barrier 4 – MaxSUMO was introduced too late

A concrete evaluation method would have been useful, but MaxSUMO was introduced too late. It could have been used for the evaluation of several activities, but now it was only used for a couple of measures, also because MaxSUMO was not useful for every (sub)measure.

Driver 1 – Involvement of citizens and partners in the organization of participation activities

The task to involve citizens and other partners as good as possible in the different measures of IP2, has led to the creation of some new interactive communication methods. Over four years of CIVITAS, the measure leaders and other partners involved gained a lot of experience in the organisation of such measures. People are more involved when they get the chance to organise an activity / action / campaign themselves. Examples of this are the school competition and the organisation of the Mobi-
week. Advantage is also taken from the information that is collected in the survey. Employees, cambio
users, students, citizens, etc. themselves are often the most well placed to give advice on certain
topics.

**Driver 2 – Awareness of partners and citizens for sustainable mobility**

A lot of partners realized that there is a need for more sustainable city mobility which made the degree
of willingness to participate quite high. There were also a lot of positive comments and media attention
on the events which were often experienced as a stimulus by the participants and organisers to work
further on sustainable mobility.

**Driver 3 – Incentives to convince participants**

Incentives (e.g. candies, a concert, prize, etc.) stimulated participants often to participate very well.
Incentives were not only materialistic things, but also group pressure plays a role in this (e.g. ‘Our
department is moving’).

**Lessons learned**

**Lesson 1 – A well-diversified approach is more effective**

Changes in acceptance and modal split can be achieved in a stronger way by implementing specific
strategies for the different type of target groups both for citizens, commuters and visitors of the city.

**Lesson 2 – Define the target group(s) well**

It is important to define the target group(s) of the measure well beforehand because groups have often
to be treated differently. For example measures targeting students need another approach than
employees of a business park.

**Lesson 3 – A peer-to-peer approach with support from measure leader**

Peer-to-peer approach is often really important to keep the event or activity going. People are often
quicker convinced by peers then by foreigners. Examples of this are the Mobi-week organised by
employees of the companies itself or a mobility campaign organised by students. Important herein is
often the role in guidance of the measure leader. The best way of counselling depends on the type of
action, but in general, a one-to-one (personal) approach seems to work the best. However, this is often
quite time-and cost consuming and can thus not be guaranteed.

**Lesson 4 – Broad focus on sustainable modes**

The preferred evaluation methods should be presented in sufficient detail before the start of a
campaign / action. Both the Measure Leaders and the Local Evaluation Managers should be aware of
all data requirements and methods at the beginning of the project.

**Lesson 5 – Early preparation of evaluation methods**

A preferred evaluation method should be presented before the start of a campaign / action to avoid
problems during the evaluation process. For example, a good comparison is difficult when different
methods are used for the before and after measurement. Both the Measure Leaders and the Local
Evaluation Managers should be aware of all data requirements and methods at the beginning of the
project and could also discuss the delivery of data with the partners from the beginning.

### 3.2.3.2.2. Measure 2.9: Participatory redevelopment of main train station area

**Measure description**

In Gent, the entire area around the main train station Gent-Sint-Pieters is being redeveloped. This
area includes a part of the ELAN-corridor. Works already started in 2006 and the whole project will be
finished in 2020. It will have a massive impact on the area in terms of noise and dust nuisance, traffic
erouting and accessibility. In order to get public support for the projects the main stakeholders
invested in an extended project communication policy. Some of the innovative communication
methods are:
• Participative communication policy for example reduced hindrance meetings on a two weekly basis, organisation of visits to the construction works, information market aimed at local residents, shopkeepers, retailers etc…
• Permanent information point
• Digital 3D scale model

The original quantifiable targets were redefined during the process. The original targets were:
• An increase in the support of the redevelopment projects form the main public and stakeholders by 60%
• An increase in awareness concerning sustainable transport modes by +25%
• An increase in acceptance and awareness level of the participatory and communication strategy of the redevelopment of the main train station area which leads to modal shift towards sustainable transport modes by +60%.

These targets were redefined because they were on the one hand not realistic and on the other hand there hasn’t been made a difference during the process between the communication on the development project itself and on sustainable transport modes. Therefore, the targets were changed to:
• Acceptance of the governmental communication strategy on the redevelopment projects in the main train station area by a minimum of 70% of the main public and stakeholders.
• Acceptance of the governmental participatory approach for the redevelopment project and for sustainable mobility campaigns by min. 60% of the main public and stakeholders.
• Support for the redevelopment projects from the main public and stakeholders is minimally rated as 6 on a scale of 10

Evaluation approach

The extensive reports on the communication on Project Gent-Sint-Pieters which were made in 2010 and 2012 were a huge help for the completion of this evaluation report. By defining the three target groups before, there was also made a very clear distinction in the evaluation reports. In this way, the communication could eventually be adapted according to the needs or questions of the three target groups. The acceptance of the governmental communication strategy has not just been measured by one statement, but by six. Nevertheless, nuances must be made by adding extra figures related to the website and bike (sheds) in order to show the positive results of the measure as well. The acceptance of the governmental participatory approach has been evaluated by one statement. Also here, extra figures on questions, complaints and propositions of stakeholders were added to stress the positive story of the measure. A total of eleven statements were used to measure the support for the redevelopment projects from the main public and stakeholders.

Impact evaluation

Key result 1 – Acceptance of the governmental communication strategy on the redevelopment projects

A total of 46% of the commuters accepts the governmental communication strategy. With regard to the residents, 51% accepts the governmental communication strategy. The retailers do accept the communication strategy with a share of 46%. Respectively, 28%, 16%, 22% of the four target groups do not accept the strategy. The general level of acceptance decreased from 52% to 48%. This means that the target level of 70% for the acceptance of the governmental communication strategy was not reached. One clear reason cannot be given for this result, but among others a growing expectation level of the citizens and users of Gent to participate in the decision process on de redevelopment of the area and the length of the construction works itself have certainly played an important role.

But there are also some very positive results on the communication strategy. The website www.projectgentsintpieters.be/ is one of the tools which have been used. Figures on the number of visitors, visits, average length of visits and the percentage of newcomers show that the website reaches the public and stakeholders quite well. Both the number of visits and number of visitors has increased a lot; it has even more than doubled compared to the period 9/2008 – 8/2009. The last period is characterized by a small decrease, but the numbers are still a lot higher than before
September 2010. The website does not always attract the same people; there is even a majority in a range of 58% to 73% of new visits each year.

**Key result 2 – Acceptance of the governmental participatory approach of the redevelopment project and for sustainable mobility campaigns**

Respectively 47%, 32% and 30% of the commuters, residents and retailers does accept the approach or has no opinion about it. The question was not applicable to 28% of the interviewees in 2010. The results of 2012 are even a bit higher with an average acceptance level of 46% which is 10% higher than in 2010. 22% of the interviewees saw the question as not applicable. 36% and 46% are much lower than the target of 60% for the acceptance of the governmental participatory approach. This doesn’t mean that the participatory approach completely failed. Data collected on the number of questions, complaints and propositions received by the info point and the number of bikes present around the train station; give a more positive view on the acceptance of governmental approach.

The evolution in the number of questions, complaints and propositions are perfectly in line with the type of construction works that have been done. The redevelopment of one of the main access roads to the station and other works in the public area has caused an increase in the number of questions, complaints and propositions. These numbers decreased again after the construction works have been finished in November 2011.

In any case, there is a positive increase in the number of bikes. In four years there has been an increase from 6282 to 8511 bikes. This is an increase of ca.35%, clearly a strong shift towards more bikes. The number of bike sheds increased from 3774 to 5624 or a growth of 49%.

**Key result 3 – Support for the redevelopment projects from the main public and stakeholders**

The support for the redevelopment of the railway station area has increased within all the target groups. The support of the commuters and the local residents has increased with around 0.8 to respectively 6.95 and 6.47 on a total of 10. Very remarkable is the increase in the support of retailers from 3.2 to 6.65. But for this, there has to be kept in mind that the retailers had questions in 2010 which were more negative than the questions in 2012. Another important factor for this increase could be the fact that the construction works in the public area (e.g. access roads) did more or less end in November 2011. This means that target: “Support for the redevelopment projects from the main public and stakeholders is minimally rated as 6 on a scale of 10” has been fully achieved.

**Process evaluation**

**Barrier 1 – Lack of communication between the info point and the construction partners**

The communication between the construction partners and the info point did not always go well in the beginning. It happened that the construction partners did change the timing, for example due to bad weather or a late delivery. This affected the local residents certainly during the works on the public domain. These changes were not always known by the info point which led to a lot of complaints by the local residents and to certain loss of credibility.

**Barrier 2 – Delay 3D-model**

The architect was reserved to show anything that was not known in detail yet since he did not want to get the reproach that he announced elements that were not completely. Comments on any changes could also be avoided this way. This caused a delay in the creation of a 3D-model of the site in 2020. The 3D-model will be presented in September 2012 before CIVITAS has been ended. The 3D-model would make a lot easier to show the railway station area in the future and to discuss it during the several interactive activities. It could have been a perfect tool to raise the score given to the indicators of this measure.

**Driver 1 – Cooperation with the citizens led to the design of new communication methods**

There were not only ‘simple’ presentations, but also designed different very interactive actions. Some of these methods did have a more collective approach, others a more personal approach. In this way, also less articulate people are given the chance to participate to the project.

**Driver 2 – All the main partners make part of the info point team**

The info point team consists of the most important partners of the redevelopment of the railway station area, namely De Lijn, CIVITAS, the NMBS-holding and the city of Gent. This makes that they can keep
each other updated on their part of Project Gent-Sint-Pieters and that they work out actions which were e.g. not only in favour of one of the partners. Certainly the support of the city of Gent has been crucial. They used their experiences on citizen engagement in the past to engage the citizens in the re-development of the main train station area.

**Driver 3 – Recommendations based on research on how to communicate better**

The research conducted by students of the University of Gent, which was done in 2009-2010 and 2011-2012, resulted in a lot of useful information, e.g. to determine on which topics the info-point had to focus more. This research concluded with some suggestions to improve the communication strategy of the project Gent-Sint-Pieters and De Lijn as e.g. improving the websites.

**Lessons learned**

**Lesson 1 – Accurate and clear information is crucial**

The more accurate and clear information is available, the better the citizens can be informed about changes and progress of the construction works. Therefore, it is important to work closely together with the different partners of the projects already during the contract negotiations and to establish an open communication between the different partners and stakeholders. Moreover many local residents and retailers perceive Project Gent-Sint-Pieters as a prestige project. Therefore it is important to stress ‘what's in it for them’.

**Lesson 2 – Make use of a wide range of communication tools**

For such a big project, it is important not to focus on just one communication tool, but to use a wide range of communication tools for the different stakeholders. It is necessary to make sure that there are interactive tools as well in order to give the stakeholders the chance to give their opinion, complaints and ideas about the project. While designing these communication tools, it is important to keep in mind that it is easier to reach a group of people such as a neighbourhood committee than individual people. Based on a survey conducted in 2010, citizens, commuters and shopkeepers let us know that they wanted to be informed through an interactive website. An update of the website was thus a must and was finished in 2011.

**Lesson 3 – Interactive methods**

The soundboard group, dialogue café, info markets, visits to the construction works and the public events did always attract a lot of interested people. The soundboard group attracted every time around 30 to 40 people which is a good number of people to work with because a lot more people present would make it less effective. The fact that the number of participants did not decrease proves the success of the interactive methods which were used.

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**3.2.3.2.3. Measure 4.2: Mobility management for companies**

**Measure description**

This measure consists of providing support to Gent companies voluntarily intending to implement a company mobility plan. The Gent City Council contacted several companies with the aim to coordinate company mobility plans within the ELAN-corridor and to stimulate sustainable transport modes for home to work trips. In support of these plans, each time, an employee oriented campaign to promote sustainable travel behaviour is set up:

- The Technologiepark Zwijnaarde/ Tramstraat (TZT) was assisted by the Mobility Company and the private consultancy Traject in the set-up of a mobility plan, and Mobi weeks were organised three times. A kind of gentlemen’s agreement between the GCC, companies of the TZT and other partners is made whereby every partner on the site engages himself to several measures to increase the use of sustainable mobility (September 2011 – March 2012).
- A mobility plan was also worked out for Fnac Gent, a book and media store in the pedestrian zone. Also a mobility week was organised for the employees of Fnac Gent.
- Also 11 other companies or organisations in the ELAN-corridor ended up with a company travel plan or are currently working on it.
There were no deviations from the original plan.

**Evaluation approach**

For the two companies that set up a mobility plan within CIVITAS, the change in modal split and the participation level in the Mobi weeks were evaluated. For the TZT (where 3374 people were employed in 2009), data from the federal diagnostic service could be used, where all companies on the site with more than 100 employees had to hand in data on the modal split of their employees. As a small company with 75 employees, these data were not available for Fnac, so separate surveys were organised with the employees on their transport modes to go to work.

To measure the awareness of the targeted citizens, for each mobility campaign separately, the number of people present or the number of participants was compared to the total number of employees of the companies involved in this measure. This was measured for the mobility campaigns at TZT and Fnac Gent.

The response of contacted companies was registered by the City of Gent, as well as how many of those end up with a company travel plan.

**Impact evaluation**

**Key result 1 – The target of 50% easily reached for making a company travel plan**

13 out of 15 contacted entities ended up with a company travel plan or are working at it. This means that the target of 50% is easily reached. A lot of companies do realize that they have to work on the mobility of their employees because the traffic gets too busy in the area. Also the fact that the plans were made up by the Mobility Company and Traject, a private consultancy, made companies more enthusiastic about a mobility plan.

**Key result 2 – The mobility plans and campaigns created a modal shift of 5.9% towards more sustainable transport modes.**

The mobility campaigns at the TZT and the introduction of the mobility plans created a modal shift towards more sustainable transport modes. Between 2008 and 2011, a shift of 5.87% took place. An important factor in this change is probably the organisation of the mobility weeks, but also external factors could have played an important role, e.g. a general change in mentality related to sustainable movements or the general improvement in cycling lanes in the city of Gent. For Fnac Gent on the contrary not that much changed in the modal split, but the share of sustainable transport modes, namely 77%, was already very high.

**Figure 3.9: Modal shift of employees at Technologiepark between 2008 and 2011**
Key result 3 – A good participation of employees in Mobi weeks

An average of 9.1% of the employees at the TZT participated in the Mobi week which means that the target of 10% wasn’t reached. Nevertheless, the real share will be higher since not all participants did register for the event. All the employees of Fnac Gent did participate in the Mobi week in some way or the other. There has to be said that this is easier to organise since the Fnac only employs 75 people. An important factor for the participation in the Mobi weeks is the fact that these were organised by the employees themselves which creates a certain peer pressure for colleagues to join and the attractiveness of certain activities organised in the framework of the Mobi weeks.

Process evaluation

Barrier 1 – Risk of fatigue for message ‘sustainable home-work transport’

There is a risk of fatigue for the message of “sustainable home-work transport” amongst companies and employees. To avoid this fatigue campaigns need to be unique and original.

Barrier 2 – Public transport not adapted to the needs of the employees in TZT

Many employees are interested in using public transport for their home-work travels, but the current timetables of the public transport are not adapted to the wishes of the employees. Moreover, the infrastructure is not adapted to the needs of public transport in the TZT. There are e.g. no separated bus lanes or enough bus stops.

Barrier 3 – Max Mobiel shuttle services incompatible with working hours of employees at TZT

The trial period for Max Mobiel (a service providing shuttle services to employees) for the site TZT was not very successful. A lot of employees could not use this shuttle bus because of the variety in their working hours. Another important factor that explained the low number of users is the lack of promotion for the corporate public transport from the side of the companies because they did not want to pay much extra. Therefore, the trial period was not continued after a year.

Barrier 4 – Companies more reluctant to invest in sustainable mobility

The current financial crisis makes companies more reluctant to invest in sustainable mobility. The Pendelfonds was warmly welcomed by the companies, but this fund only pays 50% of the investments.

Driver 1 – Companies and employees realize that there is a need to change something

Many of the companies and their employees do realize that something has to change on mobility because the traffic gets too busy in the area. There were a few companies (e.g. the University of Gent) willing to take the lead in this. The fact that a few of these companies give “the good example” was a driver to start up this measure for other companies.

Driver 2 – Subsidy of 50% for companies that invest in sustainable transport actions

The measure leader informed the companies on the possibility of getting a refund of the Flemish government for investments related to solving mobility issues. A 50% subsidy is given by the Flemish Government if companies spend budget on sustainable transport actions.

Driver 3 – Employees willing to volunteer in organisation mobility-related events

The employees are more involved when they get the chance to organise mobility-related events themselves. But therefore, it is important to find enough (volunteering) employees willing to work on it. There was sent out a call among employees which was quite successful.

Driver 4 – Improved knowledge of travel options amongst employees and companies involved in participating organizations.

Due to info sessions at sites or companies and due to the set-up of the mobility plan and lots of mobility campaigns, employees get insight in the possibilities to travel with sustainable transport modes towards their companies. Also the companies themselves know better now which authorities they have to contact for mobility related issues.
Lessons learned

Lesson 1 – A peer to peer approach is more effective than top down

It is important to involve the employees and companies as much as possible. They know better than anybody else which mobility issues are experienced in the area. Within this measure, a peer to peer approach is more effective and produces better results than the top down approach. Crucial in this approach is the help of an external person, certainly in the start-up phase.

Lesson 2 – Cooperation with all companies at the same site to set up a mobility plan

At industrial sites, it required that companies located at these sites work together for setting up a mobility plan and campaigns. A common mobility plan strengthens the implementation of the measure and the communication towards employees.

Lesson 3 – Yearly mobility campaigns

It is important to organise not just one mobility campaign, it is better to organise it e.g. every year to keep the message ‘alive’. But it is important to be creative and not just to copy the campaign of the previous year.

Lesson 4 – Improved knowledge of travel options amongst people involved in participating organizations

The employees of the companies and organisations which participated in the campaigns learnt a lot about new travel options while setting up mobility plans. Certainly by organising the Mobi weeks themselves, the organisations / companies and their employees got in touch with these new travel options. They did not only discover more about alternative transport modes, but also about the way how to communicate about these options towards their employees.

3.2.3.2.4. Measure 4.3: Mobility management for schools

Measure description

Since 2002, the Gent City Council supports schools in making a school travel plan (STP) within the framework of a ‘Safe School Environments Plan’. Almost all of these schools are primary schools. With this measure, the objective was to also implement STPs in secondary schools. An STP encompasses all of the issues relevant to trips to and from the school and includes concerns about safety and health, and proposals for ways to make improvements. The main elements are common to all STPs but each plan was unique because it was produced and owned by a particular school, addressing the schools’ needs. Therefore, the measure leader approached the school to find out if they were keen to participate in the actions. For the last school year, a first introduction was given by the measure leader in the beginning of the year. The participating schools were stimulated to design an own mobility campaign instead of having to follow an enforced action. Each time, together with some students of the school in question, a brainstorm session was organised in order to work out a campaign that was relevant for the school. In these campaigns, they also decided themselves which communication tools there would be used. Spread over three years, a total number of 16 did organise an action or campaign.

Evaluation approach

Evaluation focused on the awareness of the students on sustainable mobility and how this affected their travel behaviour. Both are measured by a questionnaire in every participating school. The evaluation process was complicated by the fact that the after data for the first two editions were missing. Therefore, the situation before and after the mobility campaigns could not be compared. Most of these data were available for the last edition in 2011-2012, but it was not that easy to compare the results since some schools had organised the action on school level whereas other schools organised it only in one class. One has to keep in mind that two schools only questioned the students participating in the action and that only a total of 1804 students (out of more than 4000 students) filled in the questionnaire.
Impact evaluation

**Key result 1 – Results of modal shift were quite positive**
A modal shift could not be measured for the first two editions since the after data were missing. But the results of 2011-2012 were quite positive. Compared to the modal split before the campaigns, a decrease of more than 5% in the use of car has taken place, of around 0.5% in the share of motorcycles and of 1.5% in the share of walking. The share of bikes increased by 0.9% and the public transport share increased for about 7%. But as mentioned before, it has to be taken into account that there were less interviewees for the after data than for the before data. Moreover, the results also differ from school to school and class to class. This means that the target of 5% has been reached in 2011-2012. But the overall result is not known in detail due to a lack of after data in 2009-2010 and a lack of involvement in 2010-2011. The target for the whole period could therefore not be measured.

**Key result 2 – Awareness of the students on sustainable mobility**
There is a big difference between the seven schools that have filled in the questionnaire. There are three schools where, according to the collected data, the mobility campaign was known by all the participants. But the after data for two of these schools (KTA Mobischool and HTI Sint-Antonius) were only collected in the participating class. Therefore, no conclusions for these entire schools can be made. In general, 51% of the students were aware of the mobility campaign, 49% of the students were not. The average participation degree was, logically, lower than the share of students that noticed the mobility campaign. 36% of the questioned students participated in the action, 64% did not. A third and last question assessed the familiarity of the students with the concept “sustainable mobility”. It only rang a bell for 38% of the interviewed students. This percentage would probably even have been lower if there would have been more students interviewed since two schools (KTA Mobischool and HTI Sint-Antonius) only collected modal split data in the class that had set up the action. As a consequence, the target “All students in the participating schools are aware of sustainable mobility” was not achieved at all, but students that participated were very positive on the sustainable mobility and they started changing their attitude.

**Key result 3 – Poor participation of schools: only 16 schools with a target of 27**
Six schools participated in school year 2009 – 2010. Due to the illness of the measure leader, there were only two participating schools in 2010 – 2011 from which one school is also one of the nine schools that participated in school year 2011 – 2012. The target of nine schools each year was thus only reached in 2011-2012. The target was not reached the years before because of the illness of the measure leader. This means that in three years there should have been 27 participating schools, but in reality only 16 schools participated.

Process evaluation

**Barrier 1 – Schools receive already many requests for projects**
All the schools get many requests for projects and questionnaires every year. Therefore, an additional project like CIVITAS could not always be accepted.

**Barrier 2 – Serious health problems of measure leader**
Due to health problems, the measure leader was absent during the first CIVITAS year thus not much was done in the first year. He went back to work in July 2009, just in time to start within the school year 2009-2010 which worked out quite well. Unfortunately, the measure leader was confronted with health problems again in July 2010 and he passed away on the first of September 2010. Therefore, no competition took place in school year 2009-2010.

**Barrier 3 – The mobility consultancy bureau did not have a good contact with school life**
Mobiel 21, a mobility consultancy bureau, took care of the guidance of the participating schools in cooperation with the measure leader during the first two years that the competition took place. But Mobiel 21 did not have that much contact with the school life in Gent which is necessary to obtain good results.

**Driver 1 – Personal guidance is crucial**
Personal guidance is a crucial element in the whole process. Due to the health problems of the first measure leader, this was lacking during the first two editions. But the good personal guidance of the measure leader in school year 2011-2012 made the competition very successful.
Driver 2 – Every student could give his/her view on mobility issues

By organising a brainstorm session to make up a bottleneck analysis, all the pupils of the class or pupils’ council could give their view on the mobility issues they experience when they travel to school. This leads to a good insight of the main mobility problems around school on which the campaigns and the school travel plans can be focused on.

Driver 3 – Schools find inspiration for campaign or action in what they learn

Most of the schools found the inspiration for a campaign or action in what they learn at school. An informatics class designed for example an online competition and a class made use of their skills in woodcraft. Setting up campaigns linked to their school programme motivates the students to cooperate with this project. This makes the campaigns on sustainable mobility more attractive towards students. Students were more willing to participate in the project which led to an increased awareness on sustainable mobility.

Driver 4 – A competition with a reward and media attention was a strong stimulus

The fact that there could be won a prize has been a stimulus for the students and the teachers to work out their idea in real. Also media attention is often a big motivation for the students.

Lessons learned

Lesson 1 – Personal guidance is crucial for success

A personal guidance by a motivated measure leader is crucial for the success. It is important that this person has a certain feeling with the school life in Gent and that he is able to put a lot of effort into each school. Therefore, it is difficult to organise a competition with more than 10 schools per school year. If more schools would participate, a second counsellor would be a good idea.

Lesson 2 – Focus on mobility issues that affect most of the students/stakeholders

It is wise to focus on a mobility issue by which most of the students (or other stakeholders) are affected. In this way, it’s easier to get them involved, which leads to an increased awareness on sustainable mobility.

3.2.3.2.5. Measure 4.10: Comprehensive mobility dialogue and marketing campaign

Measure description

This measure is an individual marketing campaign. The inhabitants of the ELAN-corridor will receive individual one-to-one travel advice and practical support. The scheme works by contacting people in their households and aims to quickly identify those who are likely to change their travel behaviour. Subsequently, they are provided with tailor-made information about public transport and bicycle or walking routes in their neighbourhood and with free public transport tickets, bikes, etc.

Also sustainable travel modes are promoted by different actions:

- Distribution of a tailor-made brochure on sustainable transport modes in a particular district (Onze wijk beweegt – Our district is moving)
- Competition between streets to find the street with the highest modal shift toward more sustainable transport modes (Onze straat beweegt – Our street is moving)
- Competition between GCC departments to find the department with the highest modal shift towards more sustainable transport modes (Onze dienst beweegt – Our department is moving)
- Campaign to promote the positive image of cycling (Cycle chic)
- Personal counselling for car users willing to (temporarily) shift to a more sustainable transport mode (Ik beweeg ook zonder auto – I keep moving, even without my car)

There were deviations from the original plan:

- The measuring of the weight & blood pressure of the participants has never started.
- The campaign « Our district is moving » involved 3 actions in total. In the end, only the first one, namely the distribution of district based brochures, was implemented.

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• The competition in “Our street is moving” never took off because of a lack of interest. Instead, the same concept was used for the “Our department is moving” campaign.
• The Cycle Chic campaign was initially not planned, but BBL (the umbrella organisation of Flemish environmental organisations) asked if the GCC was interested to participate.

Evaluation approach

Evaluation focused on modal split and awareness of changing mobility behaviour. However, there were experienced several difficulties during the evaluation.

MaxSUMO, the method which was presented as the main tool for the evaluation, is only used for the “I keep moving, even without my car” campaign. Because MaxSUMO and MaxSEM was only presented in 2009, one year after the start up, the other campaigns were already set up or prepared and couldn’t be changed a lot anymore. This in combination with the fact that there has been several changes in the set-up of the campaigns, there is not always conducted a benchmark. As a consequence, it is for some campaigns impossible to measure a modal shift in a decent way.

Another point of difficulty experienced by measuring the impact of the campaigns is the number of external factors which can influence the impact. Examples of these external factors are the weather, construction works, changing bike culture and other campaigns.

Unfortunately no social economic background data were asked, for this reason no detailed analysis was possible. In the future when surveying the impact of campaigns, socio economic background data will be added in the enquiry.

Figure 3.10: Clusters MaxSEM method stage allocation “I keep moving, even without my car”

Impact evaluation

The fact that there were several actions for each indicator makes it quite difficult to make a definitive conclusion about the achievement of the quantifiable targets and objectives. Moreover, the submeasures do focus on different target levels (district, street, place of work, individual) and they do also differ in length. This makes it difficult or even impossible to give a general score for this measure.

Key result 1 – Two campaigns didn’t attract enough (target) people but alternative campaign was organised between employees of the city of Gent.

The results of the different submeasures do indicate that it is better to choose a well-defined target cohesive group or even to work with individuals than focusing on a certain target group like what has
been done in the campaigns “Our district is moving” and “Our street is moving”. These campaigns didn’t even get a response rate of 1%. Examples of more successful campaigns are the “Our department is moving” campaign. The success of this campaign can be explained by the presence of group pressure of colleagues since they are also the ones who are organizing the event.

Key result 2 – Quite good awareness of sustainable mobility

The results given under 'Key result 2’ were also used to measure the level of awareness. There were also conducted surveys for the campaigns “I keep moving, even without my car”, “Our department is moving” and “Cycle chic”. These surveys also assessed if it made them more aware of sustainable mobility. Respectively 71.19%, 72.93% and 27.2% answered positive on this question.

Key result 3 – Mixed results for the modal shift

The campaign “Our department is moving campaign” obtained a positive result showing that respectively 8.27% and 8.24% of the participants did change their mobility behaviour after the campaign. Remarkable is the decrease of the use of car by, the two editions combined, 6.95%. The participants of the “I keep moving, even without my car” campaign did travel 2163.5 km more sustainable during the campaign. The target of an “Increase in the use of sustainable transport by 5%” has been reached by the “Our department is moving campaign”, but data for other campaign are missing. No relative results are available for the “I keep moving, even without my car” campaign because no pre measurement was conducted. Data of “Our district is moving” and “Our street is moving” are also not available due the failure of these actions. If all these actions are taken into account, the target of 5% hasn’t been reached.

Process evaluation

Barrier 1 – Target group of car users could never be reached

The citizens belonging to the target group (car users) could never be reached. As a consequence, the actions, except of the “Our department is moving” campaign could not be started.

Barrier 2 – Not easy to reach group of people interested in personal travel advice

It was difficult to reach the suitable group of people for the “Our district is moving” campaign. Only a few people asked for personal travel advice and most of them already moved in a sustainable way others only asked for a cycle map. Reason for that is that those who read the brochure are already interested in sustainable mobility and are aware of that item.

Barrier 3 – Very poor interest in participation “Our street is moving”

Only two families were willing to participate in the “Our street is moving” action. A lack of a personal “push” to take part into the initiative might be the main reason for the failure of this action.

Barrier 4 – Difficult to find candidates who want to switch from car to sustainable transport

During the preparation of the action “I keep moving, even without my car”, it was very difficult to find candidates who were willing to participate in this action. They noticed that many people do come by bus, tram or bike and are thus not suitable for this action. On the other hand, only a few car drivers were willing to use alternative modes of transport instead of their own car during some days. Whether they were on the wrong place or met the wrong people is not clear.

Driver 1 – A lot of experience gained

There is gained a lot of experiences during the last four years. There are used different concepts of actions which were sometimes successful and sometimes not successful. Motivation, open communication and positive comments were therefore very important for the process.

Driver 2 – Additional campaign was launched that fitted into CIVITAS

BBL (Bond Beter Leefmilieu) asked to work together for the Cycle Chic campaign. This was invited as a nice opportunity which could also be fit into the CIVITAS-project and shows a positive story on bicycles in the city. Moreover, most of the work has been done by the BBL.

Driver 3 – Positive reactions on the Cycle Chic campaign

Positive reactions on the Cycle Chic campaign in the streets during the exhibition and online (Facebook, www.gentcyclechic.be, www.gentfietst.be). Also the “Our department is moving”-campaign
did get a lot of attention and could attract a lot of, but unfortunately not enough to reach the target, people. The campaign was repeated in 2011.

Lessons learned

Lesson 1 – Evaluation method should be presented before start of campaign

A preferred evaluation method should be presented before the start of the campaigns. Moreover, not every evaluation method, e.g. MaxSUMO, can be used for every campaign or action.

Lesson 2 – In order to change mobility behaviour, approach people in a personal way

It is not sufficient to give only general information online or on paper in order to change mobility behaviour. It is more efficient to approach citizens in a personal way or to approach them as a well-defined cohesive group. When they are approached as a group, there can be created a certain peer pressure and people can be motivated by their peers, for example by colleagues.

Lesson 3 – Approach citizens on key moments in their life to change (mobility) habits

Citizens should be approached more on key moments in their life which cause often big changes in their (mobility) habits. Examples of these moments are moving to another place, a marriage, a divorce, getting children, change of job...

Lesson 4 – Make your message clear

The message of the campaign also has to be clear. The message of for example the Cycle Chic campaign was not clear for everyone. The more focused the message, the more people start thinking about their mobility behaviour.

3.2.3.2.6. Measure 6.2: Innovative car sharing

Measure description

This measure aims at reinforcing the growth curve of car sharing in Gent and especially in the targeted corridor of this project. This was done first of all by installing new car sharing stations in the ELAN-corridor, partially based on the results of a survey. Secondly by elaborately introducing the system to local residents by offering a trial formula allowing people to try out the car sharing system for two months without further engagements. Thirdly, businesses were actively addressed to take part in a pool card system that is developed to make it possible for businesses to join cambio. Furthermore, new communication tools were used to promote car sharing based on the common knowledge of car sharing experts that mouth-to-mouth communication is the most effective promotion channel for this concept, e.g. client-ambassadors, cambio home parties, Facebook campaigns, new information panels at the car sharing stations etc.

There was a deviation from the original plan:

- Originally, it was planned to try out the “Installation of a locker system at one of the cambio stations within the corridor”. But due to technical difficulties with the locker system, this has never been worked out completely.

Evaluation approach

The measure has been evaluated on two inventories. For the inventory of contacted companies and their response, the number of circulating poolcards and the number of poolcard using companies have been counted. A total of circa 250 companies were addressed by mail wherefrom 150 were also contacted by telephone.

There has also been set up an inventory of the contacted target groups/citizens and the actual number of subscriptions. Therefore, the impact of the cambio trial offer on the number of users has been calculated. Also an annual growth of cambio users by 20% has been put forward as a target to measure the inventory. In general, the growth in number of cambio users, cars and car sharing stations are used to evaluate measure 6.2.
Impact evaluation

Key result 1 – A lot of companies joined the poolcard system

27 companies or around 11% of the contacted companies joined the poolcard system which is more than 5 times more than the target level of 5 poolcard using companies. There are 170 poolcards used in Gent which is almost 7 times more than the target of 25 cambio poolcards. The poolcard system can thus certainly be seen as a huge success.

Key result 2 – The cambio trial offer can be seen as a big success

There was a growth of cambio users of 68% in the autumn period of 2009 (when the first trial offer took place) compared to the autumn of 2008. The second and third trial offers even had a growth of cambio users of respectively 107% and 105% compared to 2008. But it has to be taken into account that there are also other effects playing which have an influence on the growth of the number of users. Therefore, it is probably fairer to compare the results of the three trial periods with the months following the trial period. Also this comparison makes clear that this trial offer is a successful method to attract new people. There has been an extra growth of respectively 35%, 32% and 30% during the autumn months in comparison with the spring months of that year. This is a significant difference with the same comparison for 2008 – 2009 when the difference in growth between the spring and fall was 11%. The target of an increased use of the cambio trial offer by 5% is thus easily reached.

Figure 3.11: impact of Cambio trial offer on number of subscriptions per month

Key result 3 – Cambio always had a strong growth of car users, also in the period 2009-2012

The growth of car users in the period 2009-2012 is with an average annual growth of 215.5 car users bigger than the average growth of 168.5 car users in the period 2005 – 2008. The average annual growth of cars used in Gent has grown absolutely seen from 6.25 to 6.75 and also the absolute number of car sharing stations has grown from an average of 2.25 to 3.25 a year. Relatively seen, the growth of cambio car users, cars and car sharing stations is lower for the period 2009-2012 than for 2005-2008. The growth of car users is relatively seen even three times lower, but it is with 23% still above the target of a growth of cambio users by 20% every year. The growth of cars decreased from 36% to 20% and the growth of car sharing stations from 45% to 26%. Absolutely seen are the results much more positive. The expected outcome has been easily surpassed for the number of car users (1536 instead of 1348), the number of cars (52 instead of 50) and the number of car sharing stations (22 instead of 18). Cambio can thus certainly be seen as a success story.

Process evaluation
Barrier 1 – Dependence on different actors for the integration of car sharing in new building projects

Cambio depends on different actors for the realization of the integration of car sharing in new building projects. There have been talks with AGSOB (City Development Company Gent) and the Mobility Company, but there is not yet a fixed car sharing station in a new building project. Nevertheless, this will be realized in the future.

Driver 1 – Support of the city of Gent

Since cambio is a private company, it does not directly need the approval of the City Council of Gent or another partner to start up an action on citizen engagement for example. But the city of Gent helps cambio with finding and starting up car sharing stations at interesting locations and in the supply of specific data for new actions of car sharing stations. The city of Gent has a keen interest in cambio because it lowers the number of cars in the city.

Driver 2 – Success questionnaire on potential car sharing stations

The questionnaire on potential new car sharing stations which was filled in by almost 600 (potential) users provided cambio with a lot of potential new car sharing stations. Since local residents know in general better than anyone else which places would be popular for a car sharing station, the suggested places for a car sharing station were taken into account and researched. In the end, four new car-sharing stations were opened.

Driver 3 – Cambio is also popular outside Gent

Cambio is not only popular in Gent, but they have also launched car sharing stations in other cities. This increased the number of possible destinations which increases the number of possible trips and users.

Driver 4 – General increase and successful first trial formula in 2009

The first trial formula offered in 2009 led to an extra growth of 36% in comparison with the spring months. This success incited cambio to organise the action again the upcoming years. The most important factor of this success is probably the well-functioning of word-of-mouth advertising. Moreover, this method of communication is free and very efficient.

Lessons learned

Lesson 1 – The trial offer formula worked very well

The trial offer has worked very well in order to attract new Cambio users. This is certainly a campaign which can be started up in other cities and future campaigns. An important factor for the success of the measure is the fact that the general climate in Gent supports the idea of car sharing more and more and cambio was already known quite well. According to the experiences of the ML with car sharing in other countries, the concept of the campaigns should probably be adapted in countries which are less ‘car-sharing friendly’.

Lesson 2 – The users of cambio are in general very open to citizen engagement

By engaging citizens into the search of potential new car sharing stations, for example by a survey, you can get more specific information on possible new places you did not know yet. The local residents know in general better than anyone else which places would be popular for a car sharing station. The suggested places for a car sharing station can be better taken into account and researched. A personal approach works mostly the most efficient to persuade companies to join a new project like the pool card system. Also social media can serve as a new platform for campaigns as they attract also another public than with the usual campaigns.

Lesson 3 – Importance of good cooperation with partners and time for the organisation to grow

The integration of cambio in new construction projects like living areas asks time to change the mentality towards car sharing and asks also for a good cooperation with the main partners and stakeholders.
3.2.3.2.7. Measure 6.3: Holistic event management

Measure description
This measure aims at a modal shift towards more sustainable transport modes for trips to cultural events in Gent. It included one-to-one talks with all event organizers and venue managers within the ELAN-corridor and the city of Gent. Together, they tried to resolve the stumbling-block issues hampering sustainable trips to their events and venues. These stumbling-block issues were detected by questioning 38 different cultural venues and event organizers. They all received an accessibility sheet from Slimweg, an initiative of the Flemish government in cooperation with a number of sustainable partners and provinces. Eight of these organizers were also already provided with a mobility plan, but the production of these plans has been suspended for a moment due to the high pressure of work at the Mobility Company.

Additionally, an internet-based tool, Decision Making Support System (DMSS), has been built to manage all of the mobility information, from questions to applications for the private use of public space, on upcoming events and to organise holistic event management. The tool did not only consist of questions related to mobility, but also questions and advice related to environmental issues were provided.

Finally, several campaigns focused on the visitors of cultural events were set up in the framework of CIVITAS. A first campaign with the name “Culture with low CO\textsubscript{2} emission” has been launched in September 2010 followed in 2011 by a similar campaign called “Go out without a car”. A video report of this campaign was also spread. Another campaign was set up with the NGO Bond Beter Leefmilieu in cooperation with four art houses and event organizers. People who came by bike could buy a special ticket and got a free VIP-treatment, travel advice and special cycle shed with a red carpet. A last campaign that was set up was the guidance of the visitors of Festival OdeGand. The measure leader took a few mobility measures such as extra cycle sheds and extra public transport during peak hours. During all these campaigns, the visitors could ask for personal travel advice.

The City of Gent did also provided support to several events like the Light Festival and different concerts.

There were deviations from the original plan:

- The original target “reduction of traffic nuisance in case of planned events by 30%” described in the DOW has been removed as it is difficult to measure the link between the campaigns and the number of parking violations and congestions.

Evaluation approach
The awareness of event organisers on mobility issues was evaluated by an inventory of how many event organisers completed the questionnaire on mobility issues and how many of the contacted organizers received an accessibility sheet and / or a mobility plan from Slimweg. Besides this, the number of actions / campaigns that has been set up by the organizers was analysed.

To evaluate the acceptance level of the event tool an online survey was set up for the event organizers who used the tool during the test period of one month. The response rate and the results of this survey have been analysed.

The awareness on changing mobility behaviour of the citizens has been measured by the share of citizens that participated in the campaigns. This was not that easy to measure since there are a lot of factors that could influence the travel behaviour of the interviewees. A total of 224 people has been questioned on the campaign ‘Culture with a low CO\textsubscript{2}-emission’ at the car-free Sunday of the Culture Market (opening event of the cultural season). For the edition of 2011, 1000 employees and their partners of the Gent City Council saw the promo movie which has been made about the campaign and were questioned afterwards.

Since it is too time-consuming and too costly to organise a questionnaire for the whole population, a modal split survey has only been organised with 402 visitors of the Festival OdeGand in 2011.
Impact evaluation

Key result 1 – A big majority of the contacted organisations organised an action or campaign

All the event organizers and managers were willing to work together with the city of Gent to cooperate on sustainable mobility. 45 event organizers, cultural venues and organizations were contacted, which all organised mobility actions in the framework of CIVITAS. 39 of them were provided with accessibility sheets and eight of them were even provided with a mobility plan. The target was that 40% of the contacted cultural organisations took measures to promote or facilitate more sustainable travel behaviour among their visitors, so this can be called successful.

Key result 2 – Low response rate on the survey event tool but the comments were all positive

The target was to get the event tool accepted by minimum 75% of all the participating cultural organisations. An online survey was conducted considering the DMSS-tool for the event organizers who used the tool. Only 22 users completed this online survey, but some stakeholders replied by e-mail and said that it was a very convenient tool. The target of 75% is thus not reached since not all the users filled in the survey. But the ones who did it were all quite positive. The website www.gentevenement.be has an average of 200 unique visitors each month and 250 visits per month in total. During the test period in October 2011, it even counted 396 individual visits.

Key result 3 – The majority of the visitors did understand the action, but a very small minority asked for personal travel advice in the end

Out of the 224 interviewees on the campaign “Culture with a low CO₂-emission”, 72% understood the message of the campaign and even 84% of the interviewees said that the campaign made them think about their own mobility behaviour. For the edition of 2011, there has been conducted a survey after showing the promo movie on the campaign “Go out without a car”. A total of 596 visitors filled in the survey. More than 95% also understood the theme of the short movie, namely ‘Go by foot, by bike, public transport, or briefly, without a car.’ Almost 48% of the interviewees said that this message spurs them to make more use of sustainable transport modes.

Respectively 44% and 70% of the interviewees would consider asking for free travel advice, but only 20 people per event did ask for travel advice in the end. The percentage of interviewed people that have asked for travel advice has been used for the target “10% of all contacted citizens participated in the mobility campaigns”. The two events combined, less than 5% of the contacted citizens did ask for travel advice.

Key result 4 – Modal shift towards more sustainable transport modes

When the modal splits of the visitors of OdeGand in 2010 and 2011 are compared, a modal shift of 3.68% can be seen towards more sustainable transport modes. The target of an increase of 2% in the use of sustainable transport modes to and from events is thus definitely achieved. But this shift would probably have been even bigger if it wasn’t raining the whole day in 2011 in contrast to 2010 when it was dry.

Process evaluation

Barrier 1 – Lack of money

Even though the cooperation with De Lijn works well, there is often a lack of supply of public transport in the evening and at night which makes it difficult to convince visitors to use the tram, bus or train as an alternative transport mode. Moreover, De Lijn is forced to limit the number of evening and night public transport due to the economic savings.

Barrier 2 – Event tool is not mandatory yet

Till now, it is not mandatory yet for event organizers to use the DMSS-tool. As a consequence, not all the event organizers use it already.

Barrier 3 – Unclear how to measure the impact of a campaign

Since travel behaviour is mostly influenced by a couple of factors, and not only by e.g. a campaign, it is difficult to estimate the impact of a campaign. Others factors that can play a role are the weather, infrastructural changes…
Barrier 4 – Slogan “Culture with a low CO₂ emission” was not clear for everyone
A certain number of respondents did not catch the slogan “Culture with a low CO₂ emission” immediately and did not understand the idea behind the campaign as a consequence.

Driver 1 – Support for the event tool
An online survey was set up for the event organizers who did use the DMSS-tool during the test period of one month. Nevertheless, this online survey was not filled in by anyone although a lot of them replied by mail to say that it was a very convenient tool.

Driver 2 – Popular video report campaign “Culture with a low CO₂ emission”
The photo shoot for the campaign ‘Culture with a low CO₂ emission’ got a lot of attention. A video report about it was shown on national television and was shown to a public of 1000 employees of the city of Gent. Because of this attention, the message of the campaign was well spread.

Driver 3 – Better cooperation between the Mobility Company and the event organizers and cultural venues
The Mobility Company got better known by the event organizers and cultural venues which improved the contact between them. They contact the Mobility Company quicker now for questions.

Lessons learned
Lesson 1 – A central information point is warmly welcomed by event organizers
Event organizers do not always know that well which tools they can use to reduce the impact. Therefore, it is important for a city to work together with the event organizers in order to estimate the impact of the event on the traffic in the city. In this way, the city can provide the organizers with means to limit the impact as much as possible. It is very useful for event organizers to have an information point, e.g. a website. By entering key information into the DMSS-tool such as timing, estimated number of visitors etc., tailor-made solutions will be suggested. These solutions will always propose a multi-modal approach that takes into account a mix of all possible transport modes. This administrative simplification of licensing the events by several city departments was very welcomed by the event organisers.

Lesson 2 – In order to persuade visitors to switch transport mode, it is important to give them the chance to try alternatives and not just to try to persuade them on paper
It is not only important to inform the event organizers itself about possibilities to limit the impact on the traffic. It are the visitors who have to be persuaded to move as sustainable as possible. It is not always easy to reach this target group and to give them good alternatives for the car. Therefore, it is important to give visitors the chance to use alternative modes. The best is to approach the visitors personally and not only by making some flyers and a banner.

Lesson 3 – It is very difficult to persuade people to ask for free travel advice
During the campaigns, citizens got the chance to ask for free travel advice. In the end, there were only 20 people per edition who really asked for travel advice. It is not sure why the response is so low, but some people maybe think that asking for free travel advice is as much work as searching it themselves.

3.2.3.3. Integrated package 3: Adjust car & freight traffic by traffic management

3.2.3.3.1. Evaluation on Integrated Package level

Integrated package description
This package contains the measures that have the aim to decrease car and freight pressure on the city centre by implementing sustainable traffic management:
- M2.4-GEN: Intelligent enforcement of the (free of charge) P+R parking: this system would reduce the improper use of the P+R parking by visitors of the surrounding activities. However, this plan was not implemented during CIVITAS due to a delay in the development of the surrounding site.

- M3.3-GEN: Parking and public space management in the railway station area: the use of the private car and the parking pressure in the main train station area was reduced by discouraging to come by car to the station area.

- M3.4-GEN: Pedestrian area enforcement: this measure aims to limit the traffic in the pedestrian area and thus to improve the pedestrian amenity by the implementation of a new permit policy and the installation of a camera system to control the traffic in the area. However the installation of the cameras is delayed for technical and organisational reasons. In September 2012 cameras are installed and being tested at two locations. Another seven locations will be done after the CIVITAS period.

- M7.3-GEN: City freight management: the city set up a discussion platform on sustainable goods delivery and developed a new type of loading spots around the Vlaanderenstraat.

- M8.6-GEN: Sustainable multi-modal traffic management system: display of free parking spaces in underground parking garages, flexible recommended route and road information. After CIVITAS, scenarios will be connected to real time automatic gained info from the road network.

**Evaluation approach**

Within this integrated package the measures do not have any common indicator, for this reason it was not possible to do any impact evaluation on IP level. All measures are evaluated on measure level. The main impact and process evaluation results are combined here to draw conclusions for this integrated package of measures.

**Impact evaluation**

**Key result 1 – Limiting the general car pressure on city**

The different measures contributed in the reduction of the pressure of the car traffic in the area: decrease of nuisance for the freight delivery and the nuisance caused by the freight delivery for other modes, lower congestion levels and lower parking pressure. This observation is also supported by the raise of the public transport users as shown in the public transport countings.

**Key result 2 – Lower congestion levels**

The counting points around the corridor are indicating that the congestion around the Kouter (main parking garages in the corridor) was decreased with 10%. Also the eastwards shift of the queues seems to prove that traffic guidance access routes are followed.

**Key result 3 – Parking pressure in main station area diminished**

The implementation of a new tariff zone and the opening of the underground commuter parking next to the station resulted in a decrease of parked cars in the zone around of 11%. This measure did not result in new problems in the adjoining neighbourhoods, except in one street for which a widening of the tariff is considered.

**Key result 4 – Raising awareness on parking management**

The workshops and internal discussion in the administration made parking management within new projects a hot policy issue. Sustainable development is becoming the key word within all these developments. Limiting the number of parking places is now a crucial objective: clustering parking spaces (= more efficient, sustainable and cheaper), combined use of parking, intelligent pricing methods, integration of car sharing schemes within these developments, etc.

**Key result 5 – More efficient freight distribution**

The project resulted in a strong reduction of improper use of loading spaces. The new type reserved loading spots around the Vlaanderenstraat are 5 times less abused, so they are always (at least partly) available for loading operations. The target for this measure is exceeded (-80% instead of targeted -20%).

**Key result 6 – Increased acceptance level of main stakeholders**

For all measures the involvement of stakeholders resulted in a strong increase of the awareness and acceptance levels for new measures: after tackling some smaller problems e.g. the loading spots the
members of the Freight Platform are all positive to develop further new initiatives. The project developers were pleased that they could give feedback on the new sustainable parking policy at new building projects and were open to accept new guidelines.

Process evaluation

Barrier 1 – Innovative systems in a real environment

Innovative systems that seem to work perfectly in a closed environment still face a lot of difficulties once implemented in a real urban environment. After the testing period, the functioning and technical quality of ICT systems (traffic guidance system, pedestrian area enforcement system) were unsatisfactory and led to a series of hardware and software modifications and thus extra delays.

Barrier 2 – Lack of political support for new technologies/policy

It takes much more time to get political support for implementing new (parking) policy and technologies. Some city's policy makers were strongly opposed to the integration of the new policy. This unyielding attitude stems from the fear of criticism from citizens as e.g. privacy item when using cameras.

Barrier 3 – New technological systems also effects the organisation and the human resources

The introduction of new technological systems also effects the organisation and the human resources management. The use of cameras and the control of the loading spaces increase the workload of the police and parking guards to follow up improper use.

Driver 1 – Operational benefits supports cooperation

During the Light Festival (200,000 visitors in city centre on Saturday between 18:00h and 24:00h), the traffic guidance system was under the shared control of both the police coordination centre. This cooperation was very appreciated by both parties.

Driver 2 – Integration of access control in the traffic guidance system

The ramp metering system that keeps traffic away from the Nederkouter when queuing starts, was successfully integrated in the traffic guidance system. When the ramp metering system is active, traffic to the Kouter is automatically rerouted. For this application a successful cooperation with De Lijn (public transport company) was needed.

Lessons learned

Lesson 1 – Complex systems take time to implement

For different more complex measures the time scale of the project was rather short. Design, approval procedures and testing takes a lot of time. Also the impact on travel behaviour is growing slowly. For this reason the full impact is not fully measurable yet in the lifetime of the project. However a raising impact is observed and expected the next year and a strong basis was created for a future development of the measures.

Lesson 2 – Support from the main stakeholders important for success of project

To keep on working on a sustainable parking policy in new project developments it is important to raise awareness within several departments of the city of Gent, the police, the project developers, the shopkeepers etc. Discussions with the involved departments and project developers are a must. For that reason it is required to involve those stakeholders in the beginning of the project.

Lesson 3 – Good monitoring of the functioning of the systems is crucial

A good follow up of the parking occupancy, the abuse of the loading spaces, the traffic going through the pedestrian area after implementing a new system is required. More personnel for following up the systems is thus needed.

Lesson 4 – P+R works if it gives a time benefit to users

The P+R is served by a high frequent tram route, but the tram journey from P+R to the city centre takes about 20 minutes. In most cases driving by car on B401 motorway into the city centre is a faster option. Only the long queues around the Kouter on shopping Saturdays and the extreme parking
shortage during big events (Gentse Feesten, Light Festival) will lead to a longer journey by car. Therefore, it is recommended for a successful implementation of a P+R, that attention must be paid to the accessibility of the P+R, both by public transport from the city centre as by car traffic coming from other directions.

3.2.3.3.2. Measure 2.4: Intelligent Park+Ride enforcement

Measure description
The objective of this measure was to 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, and to offer a complementary service to the public transport chain. The preliminary solution for the next few years comes down to:

- closing off the parking lot entrance with a barrier gate,
- issuing a parking ticket to every motorist entering the parking lot,
- each ticket serves as a valid public transport card, and
- has to be paid for and validated before leaving the parking lot.

The proposed solution will meet the expectations with regards to preventing the improper use of the parking lot: i.e. people who use the P+R parking lot as a free alternative to the surrounding parking lots where a paid parking regime is in effect. This scheme will discourage them because they will have to overcome two new barriers:

- the parking lot will be closed off physically, and
- everyone will have to pay to make use of the parking facilities.

There was a deviation from the original plan:
- The location of P+R became unsure due to development of surrounding site into a factory outlet centre and other activity poles. The location of P+R depends on whether or not a tunnel will be dug next to the current location. Different parties developing the site on which P+R terrain is located, appointed an expert to investigate the situation further. Contradicting views resulted in the decision being delayed. The installation of the parking equipment is useless until a location is known. For this reason the measure has been proposed to discontinue in the 4th amendment. However, work as installation, evaluation and better indication of the P+R (traffic signs) will continue after the CIVITAS period on GCC costs.

Evaluation approach
As this measure was not implemented during the CIVITAS period, it was not possible to do any impact evaluation.

Impact evaluation
Key result 1 – Development of integrated ticketing system
All public transport operators and a private parking company were involved in the development of an integrated ticketing system. All parties involved pursued the increase travel convenience.

Key result 2 – Technology and procedures ready
The technology (smart card system) and procedures (third payer system) are ready. The system will be rolled out in 2013/2014.

Key result 3 – Before data results
The survey of the current situation shows that the risk for improper use of free P+R facilities is very high. In areas with high parking pressure a P+R won’t be functioning without extra measures.
Process evaluation

Barrier 1 – Bad timing for integrated ticketing system
The fact that the Flanders public transport operator aims at 2013/2014 for the rollout of its own integrated ticketing system, ensures that we will not be able to fully participate in this project during the course of the CIVITAS project.

Barrier 2 – Liquidation of current P+R
At the end of 2011, the current P+R area was closed off due to work on the adjacent and connecting roads.

Driver 1 – Development of integrated ticketing system
All three public transport operators (one for each region), the National Railway Company of Belgium and a private parking company are all involved in the development of an integrated ticketing system. The mobility company of the City of Gent must try to align its point of view regarding the use of integrated ticketing systems with all stakeholders involved.

Driver 2 – Decision to continue the project after CIVITAS
It is decided to install the access control hardware as soon as the new P+R parking lot is being built, even it will be after the CIVITAS lifetime and without any funding. As this P+R location will remain in place for at least a few years, the investment will be worthwhile.

Lessons learned

Lesson 1 – Timing for integrated ticketing system
The fact that the Flanders public transport operator aims at 2013/2014 for the rollout of its own integrated ticketing system, makes it difficult for the minor players to adapt their planning. Better alignment of the planning should be considered at the beginning of the project.

Lesson 2 – Development integrating ticketing systems
All three public transport operators (one for each region), the National Railway Company of Belgium and a private parking company are all involved in the development of an integrated ticketing system. The mobility company of the City of Gent must try to align its point of view regarding the use of integrated ticketing systems with all stakeholders involved. The easy use of this integrated ticketing system will lead to an increased public transport use.

3.2.3.3. Measure 3.3: Parking and public space management around main train station

Measure description
The objective of this measure is to reduce the use of the private car in the ELAN corridor and thus also the parking pressure, especially within the area around the train station. Through the measure, commuters, employees and residents will be supported and encouraged to use sustainable transport modes as carpooling, public transport, walking or cycling. To achieve this, there are 2 submeasures:

- **On street parking policy** – A bigger and better situated parking was built for train users. To encourage the use of sustainable transport modes, the new parking is paying. To keep parked cars of commuters out of the neighbourhood, parking tickets around the railway station will be valid for a maximum of 5 hours (tariff zone 4).

- **Implementation of sustainable parking strategy at new building developments** – The parking policy for the development of new houses and offices around the main railway station consists of the realization of a clearly lower number of parking spaces in new buildings than usual. To keep parked cars of new residents out of the neighbourhood, the notarial contract will stipulate that no residential parking cards can be obtained for these new built houses. This part of the measure is not yet implemented since this part of the main station project is
scheduled after the CIVITAS period. 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.

**Figure 3.12: Parking regulations at main train station area of Gent**

There was a deviation from the original plan concerning the parking policy. As it is impossible to evaluate the impact of the new parking policy on building regulations in main train station area during the CIVITAS period (building activities will be finished after the CIVITAS period), the parking guidelines will be discussed with the stakeholders.

**Evaluation approach**

**On street parking policy** – The parking occupancy on street level was measured in a broad area around the main train station. In this way the impact of the implementation of the tariff zone 4 was measured, but also the impact on the adjacent neighbourhoods and the global evolution of the number of parked cars in a broad area around the main train station.

**Implementation of sustainable parking strategy at new building developments** – The spatial planning approach (new approach on the number and the location of new parking lots for the project development in the main train station area) was introduced to property developers. The acceptance level of this sustainable new approach was measured during a workshop.

**Modal split of the visitors of the train station Gent Sint-Pieters** – All passengers accessing the platforms were queried on 19/04/2007. After data will be collected at the 23th of October 2012, as the data collection was delayed due to the prolonged absence of the NMBS researcher.
Parking pressure in the main train station area – The decrease of parking pressure in main train station area 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 before the end of the CIVITAS project. Therefore the focus of evaluation was on discussing the parking guidelines with the stakeholders, to evaluate their awareness and acceptance.

Impact evaluation

Key result 1 – Parking pressure in main station area diminished
The implementation of the tariff zone 4 and the opening of the underground commuter parking next to the station resulted in a decrease of parked cars in the tariff zone 4 of 11%. This measure did not result in new problems in the adjoining neighbourhoods, except for the streets next to the Citadelpark. A widening of tariff zone 4 to this area is considered.

Figure 3.13: Evaluation of implementation tariff zone 4 Gent Sint-Pieters

Key result 2 – Raised awareness
As a consequence of this measure’s study work, a lot of thinking about parking management within new projects has become a hot policy issue. In the next few years, next to the main train station area, many new developments are being planned in the inner city, within the old industrial “19th Century Belt” and in suburban areas. Sustainable development is becoming the key word within all these developments. Parking restrictions are an essential element in this discussion: clustering parking spaces (= more efficient, sustainable and cheaper), combined use of parking, intelligent pricing methods, integration of car sharing schemes within these developments, etc. These are all topics in planning new projects. This is mainly due to the fact that the CIVITAS-ELAN measure on parking management around the main train station area exists.

Key result 3 – Design study on spatial planning
The spatial planning survey of the main train station area was finished and approved in 2011. This study determines planning restrictions on the number of parking spots in new buildings and the combined use of private parking spots. In this survey, a lot of attention was paid to the number and the location of new parking lots for the project development.

Process evaluation
The process evaluation was based on 2 different submeasures:

*On street parking policy*

**Barrier 1 – Lack of political approval**
Adding another on street tariff system could be confusing for the public. On the other hand on street parking should be more expensive than using the underground parking. In the end the concept of unchanged on street parking rates, but without the possibility to buy a day parking ticket, found political support.

**Driver 1 – Agreement on underground parking tariffs**
Owner of underground parking and the city made an official agreement to align the use and the tariffs of the underground parking in relation to on street parking in the neighbourhood.
Implementation of sustainable parking strategy at new building developments

Barrier 1 – Some requirements do not accord to Belgian law
Some of the new parking requirements that could be implemented might not be possible according to Belgian law.

Barrier 2 – Reluctance towards shared parking spaces
There is certain reluctance from social housing companies and private developers to share private underground parking places with other users.

Driver 1 – Parking management is crucial for sustainable mobility
Growing awareness of the fact that parking management is a crucial factor towards a sustainable mobility.

Lessons learned

Lesson 1 – Workshop future parking policy
To keep on working on a sustainable parking policy in new project developments it is important to raise awareness within several departments of the city of Gent and the project developers. Discussions with the involved departments and project developers are a must.

Lesson 2 – Follow up adaptation parking regulations
A good follow up of the parking occupancy after implementing a new tariff system is required. Adaptations (e.g. extension of new tariff zones) need to be done when the parking pressure is increased in neighbouring streets.

Lesson 3 – Parking tariffs of on street parking in line with the tariffs of the underground parkings
The underground parking (2000 out of 2700 places) has been opened mid December 2010. In the beginning of February 2011, the on street tariffs have been adapted to this new situation. The major change is that parking your car on the street the whole day is not possible within the applicable tariff system. 5 hours is the new maximum duration within the new tariff system, which means that commuters who come by car to the railway station to take the train (mainly to Brussels) have no alternative anymore but the new parking. This means a considerable reduction of on street parking pressure, and, as a consequence, a major reduction of cars searching for a scarce parking spot in the neighbourhood.

3.2.3.3.4. Measure 3.4: Pedestrian area enforcement with automatic number plate recognition

Measure description
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 amount and type of vehicles going through the pedestrian area, using a system of cameras to ensure an efficient enforcement.

Cameras record the movements of vehicles accessing the pedestrian area. Automatic number plate reading technology is used to identify the passing vehicles. If the license plate matches a white list of vehicles with valid permits, then the recorded image is 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) has its recorded images archived and a financial penalty is imposed.

The installation of the cameras is delayed for technical and organisational reasons. In September 2012 cameras are installed and being tested at two locations. Another seven locations will be done after the CIVITAS period.

A new permit system was developed during workshops that were attended by several city services and the police. The new permit system will be implemented in 2013. Permits will be issued by category.
The number of permanent permits will be drastically decreased. Some categories that have a permanent permit now will be asked to use the delivery hours (before 11:00 and after 18:00). Other categories are asked to follow a new procedure for urgent interventions in the pedestrian area: they receive a single access permit for each intervention by email or sms (for registered vehicles only).

**Evaluation approach**

The implementation of this measure was planned for the end of the CIVITAS ELAN project period. It is not possible to evaluate this project thoroughly in the manner we proposed in earlier evaluation plans. Technical performance and acceptance tests are still being performed, and impact assessment tests have not been started yet (i.e. measuring changes in traffic flow and traffic intensity). The focus is put instead on an in-depth process evaluation.

A complete evaluation is planned by the end of 2013, since a complete survey will give the best view on the impact of the measure. The results will be published on the CIVITAS website.

**Impact evaluation**

This will be written when the system is fully operational after the end of the CIVITAS project.

**Process evaluation**

**Barrier 1 – Political opposition**

Part of the city’s policy makers is strongly opposed to the use of cameras in the pedestrian area. This unyielding attitude stems from a fear of violation of privacy when access to the area is monitored by means of cameras.

**Barrier 2 – Workload of police to high**

The option based on the use of cameras fully complies with the laws in force, but is not a feasible option because of the fact that the main workload remains with the police who happen to be the party requesting to be relieved of all duties dealing with the handling of access to the pedestrian area.

**Barrier 3 – Organizational issues**

Evaluation of the framework contract Digipolis made with a supplier of cameras and software developer has taken up more time than originally scheduled. The negotiation of the quotation for the purchase and installation of cameras and for the development of back office software has also lasted a few months longer than anticipated.

**Barrier 4 – Technical issues**

In June and August 2012, the proper functioning and technical quality of our two access gates were thoroughly examined. The results were unsatisfactory and led to a series of hardware and software modifications. Our contractor was ordered to complete these modifications by Friday 21st September 2012.

**Driver 1 – Great political support**

In September 2010 Alderman Martine De Regge became responsible for all things related to Mobility. Thanks to the effort of the new alderman, the political parties agreed now to continue with the implementation of the cameras to prevent through traffic and to reduce the number of motorised vehicles within the pedestrian area.

**Driver 2 – Extension of optic fibre network**

The company responsible for the city's fibre optic communications network, with whom Digipolis has a framework agreement, is planning to extend the optic fibre network to all sites (i.e. into a terminal box embedded in the ground, from which Ethernet cables connect to the cameras).
Lessons learned

Lesson 1 – Strong political support is needed to overcome privacy issues

Cameras that are checking car movements (who is driving in and out) are a subject that can cause a lot of resistance of citizens and politicians.

Lesson 2 – Police should be involved from the beginning of the project

In Gent the police wasn’t supporting the camera project because of the fact that the main workload remains with the police who happen to be the party requesting to be relieved of all duties dealing with the handling of access to the pedestrian area. In the end the police is the only partner that is allowed to send out fines.

Lesson 3 – More time should be foreseen for implementation of cameras.

For this complex measure the time scale of the project was rather short. Design, approval procedures, testing takes a lot of time. Also the impact on travel behaviour is growing slowly. For this reason the full impact is not fully measurable yet in the lifetime of the project. However a raising impact is observed and expected the next year and a strong basis was created for a future development of the measures.

Lesson 4 – Good monitoring of the functioning of the systems is crucial

A good follow up of the traffic going through the pedestrian area after implementing a new system is required. More personnel for following up the systems is thus needed.

3.2.3.3.5. Measure 7.3: Institutional platform for city freight management

Measure description

The objective of this measure is to organise a discussion platform on sustainable goods delivery. At the platform solutions were searched to limit the nuisance of the city distribution of goods. To have more insight at the good distribution in Gent the City of Gent participated at the D-Via project, and members of the platform (good distributors and shopkeepers) were enquired. This resulted to a good insight of freight bottlenecks in Gent.

As the main bottleneck in Gent is lack and improper use of loading spaces, a pilot project was set up to develop a new type of loading spots around the Vlaanderenstraat.

Evaluation approach

The evaluation on measure level focused on the acceptance level of the workshops, which was measured by interviews, and the amount and the improper use of loading spaces.

The quality of the freight management has not been measured. There were insufficient datasets available to set up a quality index of the freight management in a meaningful way. The quality index should have been based on following sub-indicators: freight movements, nuisances, inventory and analysis of outputs.

Impact evaluation

Key result 1 – Extra loading spaces added

Within the measure a new type of loading spot was introduced in the neighbourhood around the Vlaanderenstraat. In the Brabantdam, two existing B-type sites were converted. Two new locations, Kuiperskaai and Lange Boomgaardstraat, got a new type loading spot. Since 4 new loading spots were introduced around the Vlaanderenstraat, the target was achieved in full.

Key result 2 – Reducing improper use of loading spaces

Before CIVITAS, a very high abuse rate was found at the existing parking spots dedicated for loading/unloading operations. The increased visibility of the loading spaces and the increased control of the proper use of these spots around the Vlaanderenstraat leads to a reduction of more than 5
times less abuse, so they are always (at least partly) available for loading operations. The target for this measure is exceeded (-80% instead of targeted -20%).

**Key result 3 – Platform of city distribution**

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, focusing on measures and initiatives, which are facilitating life for the distribution traffic: specific unloading spots, etc. After 4 workshops the members of the Platform of city distribution are all positive to very positive about the work that has been done. The target is achieved in full (at least three meetings were targeted).

**Key result 4 – Action plan for the nuisances mentioned at the platform**

The bottlenecks of freight distribution mentioned in the platform were tackled in the pilot project in the Vlaanderenstraat. The new type of loading spaces around the Vlaanderenstraat solve most of the problems ("Conflicts with trams along the Vlaanderenstraat causes stress"; "Lack and improper use of loading spaces, as there is a high need of loading spaces in this street", "Fines were distributed when freight vehicles are parked on tram tracks", "Lack of control of loading spots"). The measure is considered as achieved in full, since a solution for half of the problems was targeted.

**Process evaluation**

**New physical infrastructure solutions**

**Barrier 1 – Traffic sign permits**

The police department that delivers traffic sign permits is rather conservative and unwilling to support innovative measures.

**Barrier 2 – High abuse rate**

The abuse rate that is found at the existing parking spots dedicated for loading/unloading operations was much higher than expected. This means that probably more should be done than raising the visibility of the loading spots and more parking controllers need to be allocated to control the proper use of the loading spots.

**Barrier 3 – Control dotted parking spots**

Parking guards patrol on foot. A higher level of control for a little number of scattered parking spots around a neighbourhood was not easy to organise.

**Driver 1 – New traffic law**

A suggestion will be hand in at the federal government to extend traffic regulations with the new traffic law that explicit endures the use of colours for parking spots with a specific function.

**New organisational arrangements or relationships**

**Barrier 1 – Lack of data**

It was very difficult to find information and data concerning city distribution in Gent.

**Driver 1 – Inspiring workshops**

The organisation of workshops in preparation of the creation of the platform of city distribution had a great added value to the process of stakeholder involvement. The workshops were the ideal forum to gather know-how, points of view and good practices within the theme of city distribution.

**Driver 2 – Project of the Flemish Institute for Mobility**

The project of the Flemish Institute for Mobility has been a driver for this measure. Data has been gathered, comparison with other cities has happened, alternative manner to organise city distribution has been examined …
Lessons learned

Lesson 1 – Frequent control on the use of loading spots is crucial.
Dedicating parking spots to loading operation will only work if correct use is extorted. In Gent parking guards check the loading spots twice a day.

Lesson 2 – Free 15 minute parking ticket facilitates the control
To facilitate the control, parked delivery vehicle are obliged to get a free ticket with which they are allowed to park for 15 minutes. This makes it impossible for abusers to claim being just around the corner delivering goods at the moment a fine was written by the parking guard. Parking tickets are essential to avoid disputes afterwards.

Lesson 3 – Differences between ordinary parking spaces and loading spots should be made physically clear
Use of colour is very helpful in this matter. Traffic signs aren’t enough.

Lesson 4 – First solve problems and create confidence basis
The platform for sustainable urban freight distribution has been set up together with traders and transporters from the city centre and their carriers, to increase the efficiency of deliveries in Gent. By first removing the main bottlenecks experienced by them, their support to the sustainable city freight management will be increased.

3.2.3.3.6. Measure 8.6: Sustainable multi-modal traffic management

Measure description
The sustainable multi-modal traffic management system aimed at limiting the number of cars in the city centre, especially during peak hours. This was done by a mix of information and traffic guidance: information on upcoming events (roadwork), congestion warnings, Park + Ride recommendations, parking guidance and real-time traffic information.

The implementation of the measure was done in three phases:

- In the first phase the number of free parking spaces in underground parking garages in the city centre has been communicated.
- In the second phase flexible recommended routes have been implemented. A number of scenarios have been designed for specific returning events. Static road information, for instance road works and their impact, events... have also been displayed in this phase.
- The third phase will be implemented after the CIVITAS period. In this phase scenarios will be connected to real time automatic gained info from the road network. The removal of this part out of the DOW was approved with the 3rd amendment.

Evaluation approach
Both the functioning of the system was evaluated, as well as the perception by the citizens. Since it is difficult to measure of the impact of this specific measure on the traffic flow and congestion problems in the city centre, this impact has not been measured. Although to have a small insight in the impact, congestion at the entrance of the main parking garages and on the main axes in the corridor (Nederkouter) have been visually measured at the busiest moment on 3 Saturdays.

Besides this, the acceptance of traffic guidance system was measured by interviewing car users that were parked at the underground parking facilities about their route choice: did they use the information of the traffic guidance system, is the data clearly presented, etc. The postal questionnaire done by inhabitants of the CIVITAS corridor is a second source of information on the appreciation of the traffic guidance system.
Impact evaluation

Key result 1 – 10% shorter queues around the Kouter parking

In the before situation there was approximately 2,200 m of congested streets sections measured on a busy Saturday. In the after situation 2,000 m of congested streets were found. The target of a reduction of 10% was therefore achieved.

Key result 2 – Growing appreciation of new traffic guidance system

The appreciation was measured in a postal survey in the CIVITAS corridor. Citizens’ opinion on signposting of parking route stayed stable with 64% positive respondents. On the topic signposting of available parking spaces the number of positive respondents rose from 43% to 84%. The target of an increase of 25% was therefore achieved.

Figure 3.14: Observation of queues on busy Saturdays (evolution before-after)

Process evaluation

Barrier 1 – Discrepancies between the configuration of the test rig and the real-life sign

The test rig comprised of a laptop running sign test software, a radio that served as a transmitter, another radio that represented the receiver in the sign and a PLC (programmable logic controller) that simulated the internal controller of the sign. This test method was chosen by the contractor because a working sample of a sign controller was not yet provided by the Hong Kong based Vialis Products Limited. When the newly arrived signs were fitted with radios and tested, there appeared to be discrepancies between the configuration of the test rig and the real-life sign. Since software had to be adapted, this resulted in a few months delay.

Barrier 2 – Stability of connection with the signs

A majority of the signs had difficulties to connect with the server. In order to solve the radio connection problem the installation on the Belfry Tower was adapted. Also the position of the antennas on the poles was improved.

Barrier 3 – Controller false programmed

The integrated prisms of the 69 VMS signs on the city ring showed a memory problem. The Vialis controller sends the location of the prisms each time it demands a status report, which means every 4
minutes. The memory of the prisms was built to store 100,000 positions, which should have been enough, if the controller had been programmed differently. Again software had to be adapted, which resulted in a few months delay.

**Driver 1 – Satisfactory prototype VMS sign constructed**

Vialis proved by Initial Type Testing (EN12966-2:2005), that his VMS fulfils the demands of the required performance classes. The manufacturer could commence factory production of the 123 VMS signs.

**Driver 2 – Foundations built beforehand**

Because the poles for the VMS signs will be fitted with a footplate (which will be invisible after installation because buried under the sidewalk), the foundations for the poles can be cast beforehand.

**Driver 3 – Successful testing period at The Loop**

The testing period at fairground site “The Loop” was successfully ended. The first testing period has covered almost 6 months and gave a lot of information for the next step in the implementation process, i.e. the installation of the remaining batch of VMS signs in the city centre of Gent.

**Driver 4 – Successful cooperation with police**

During the Light Festival (200,000 visitors in city centre on Saturday between 18 and 24u), the city council employee that manipulates the VMS signs worked from the police coordination centre. This cooperation was very appreciated by both parties.

**Driver 5 – Integration of access control**

The ramp metering system that keeps traffic away from the Nederkouter when queuing starts, was successfully integrated in the traffic guidance system. When the ramp metering system is active, traffic to the Kouter is automatically rerouted. For this application a successful cooperation with De Lijn (public transport company) was needed.

**Lessons learned**

**Lesson 1 – Installation phase should be kept short**

To gain time in the installation, fixed signs and foundations were already placed in the streets, when production of variable signs was started. This seemed to be a bad choice, since problems in production phase led to a delay of a year in the delivery of the variable signs. The ‘temporary’ covered fixed signs, made the difficult implementation phase very visible for the public and led to some bad press.

**Lesson 2 – One contractor for the whole project**

The traffic guidance system was placed by two contractors, which led to some difficult communication in the implementation phase. RTS placed the radio connection, Vialis signs and software. The compatibility between the radio connection (that works serial) and the software (that normally uses TCP/IP internet protocol) could have been easier solved, if the project was given to one contractor.

**Lesson 3 – Fixed cabling preferred**

Fixed cabling results in a more stable communication than radio connections.

**Lesson 4 – Supervision at big events**

During big events a supervising VMS-sign-operator is very helpful for controlling traffic flows.
3.2.3.4. Integrated package 4: Improving the quality of public transport

3.2.3.4.1. Evaluation on Integrated Package level

Measure description

The goal of the integrated package is to improve the quality and the image of the public transport services and, on longer term, to stimulate the use of sustainable transport mode.

The integrated package consisted of 3 specific measures:

- Measure 5.7 – security enforcement in PT:
  - Implementing the educational ‘Trammelant’ bus in which youngsters experience by educational games and conversations being a bus driver or controller and the negative impact is of vandalism.
  - Implementing ‘Lijnspotters’ – personnel aiming to have a preventive effect in the vehicles, simply because of their presence.
  - Information campaign on how to behave in public transport
  - Train drivers in how to react in case of an incident.

- Measure 2.2 – improved public transport service levels:
  - Improving the accommodation and access of the public transport stops.
  - Increasing the commercial speed.
  - Improving the available information at the public transport stops.

- Measure 2.3 – Collective taxi service: this measure was stopped in 2009.

The measures included in this integrated package are contributing to the same objective but are each focused on a different aspect and have no direct interaction with each other.

Evaluation approach

The number of public transport users was calculated for 2007 and 2011, both on city level as for tramline 1 (main tramline in city corridor) based on the standard method used by the public transport company. The satisfaction of the public transport users on quality and service was measured through the ‘Quality Monitor’ survey, which is a standard method used by De Lijn to evaluate the quality of their services. The results of these surveys are used to evaluate the integrated package objective of improving the quality and image of the public transport services. A critical aspect of the evaluation is the fact that the last available data are available from October 2011 on the moment that the works were almost ready. However, due to the fact that the process of quality monitoring is an established process within the PT company, the evaluation over a longer period in time is guaranteed.

The process of implementing a collective taxi service was analysed to understand the reasons for the cancellation.

Impact evaluation

Key result 1 – Increased number of public transport users

The number of public transport users has increased between 2007 and 2011 with 31.5% on city level (bus + tram). On the total tram net an increase of 28.8% users is noticed. The decrease in users for tram line 1 (-10.2%), due to the severe impact of the implementation of the road measures to improve the line (due to reconstruction works of measure 2.2-GEN, tramline 1 was discontinued for a long period) is compensated by the strong increase of users on the other tramlines. This indicates that the other lines were an acceptable alternative for a part of the users during the works.

Key result 2 – Negative trend on satisfaction

A negative trend on the satisfaction of the public transport services on city level is observed. During the implementation phase of the measure on tramline 1 the public transport network in the city was severely disturbed (both tramline 1 and different bus lines). In addition to the construction works due to the CIVITAS project, also another major construction project (no CIVITAS project) started in September 2011, again influencing the public transport user flow and satisfaction on the PT services. Additionally there were significant changes in timetables for both bus and tram in spring 2010 as result
of an economical saving plan within the company. This plan gave rise to internal social in balance, resulting in strikes of the PT. Impact on the satisfaction of the PT users was a logical consequence.

**Key result 3 – Increased commercial speed**

Evaluation on a few segments with reorganised bus stops or traffic lights showed positive results on increased commercial speed for the related trajectory. For example the installation of traffic light at a crossing of an important inbound route resulted in more than an duplication (+116%) of the commercial speed between 3.30 pm and 5.30 pm. Based on this it is expected that when the implemented measure will be fully operational, it will result in a strong improvement of the speed and reliability of the line.

**Key result 4 – Significant decrease in number of incidents**

The number of documented incidents with youngsters (-18 years) in the area of Trammelant schools have decreased significantly. When we compare the average number of incidents for the first half of 2008 (before start of Trammelant) and the average for the same period in 2010 a reduction of -53% on incidents with youngsters -18 years is reached. The quantifiable target (number of incidents -30%) has been reached.

This reduction is even stronger when the comparison is made with the total number of incidents with youngster in the city of Gent which is increased between 2008 and 2010 with 52%.

**Process evaluation**

**Barrier 1 – Citizens' protest against the partial removal of the 'Alpentuin'**

The installation of the car access restriction system on the R40 required the reorganisation of the 'entrance' junction from the ring road R40. For this the removal of a small garden with historical value ('Alpentuin') was necessary. After the protest, the city decided to adapt the plans for the junction in order to keep the garden. This is a possible threat (build-up of traffic) for the traffic flow on the R40 as the original plan with an extra storage capacity on the E40 is not implemented.

**Barrier 2 – Technical problems**

Some new systems were implemented in this project, associated with some technical problems:

- The system that controls the rail points and the accompanying signalisation at the Korenmarkt and Cataloniëstraat did not work correctly at the start. As a result a number of the points had to be operated manually which caused additional delay for the trams. The contractor solved this problem by changing the software.

- There were some communication problems between the stop server and some of the RTPI-displays. This was studied in cooperation with the contractor in order to solve this problem.

- The implementation of the ramp metering system was delayed due to technical issues with the installation of a part of the hardware for this system.

**Barrier 3 – Strong competition between taxi operators**

A lack of motivation of the key stakeholders, namely taxi operators, to cooperate because of the big competition between them. As a result, they don’t trust each other and refuse to work together. The City of Gent has no legal means to force the taxi operators to work together, as they are private companies. As the union of the taxi sector works on voluntary base, this union is disorganised and does not have any impact on the taxi policy.

**Driver 1 – Support of schools in the corridor**

An information market was organized to inform the neighbourhood on the plans. This was more successful thanks to the support of an important school since this avoids the impression that only the city staff is supporting the plans.

**Driver 2 – Positive appreciation at schools and by the controllers**

The Trammelant project is well appreciated at schools, by the pupils and by the controllers of DE LIJN. This results in a strong support for these types of initiatives.
Lessons learned

Lesson 1 – Longer evaluation period

The ramp metering system was new for the public transport company. The time needed for optimizing the parameters, in order to have an optimal working system, is long and should be foreseen in the evaluation timing. Studying experiences with similar systems abroad could help to better estimate the impact of a new system and the needed evaluation time. This was not done in this case.

Not only the usage of a new system such as the ramp metering system, but also the project scale in size and time demand a longer evaluation period to make supportable conclusions.

Lesson 2 – Impact large infrastructure works on satisfaction public transport user

Complex road works can have a strong impact on the public transport service levels resulting on negative impact on usage and image. The impact on the public transport service should be kept as low as possible and also the traffic organisation as stable as possible. It is preferable to maintain deviations on certain bus/tram routes as long as possible to minimise the nuisance for the service, even if these deviations are not always the most optimal choices for a certain period of time during the project.

Lesson 3 – Improved collaboration between stakeholders

Thanks to the project, the relations between all stakeholders were reinforced. These links will be further extended in the future by the development of a traffic management centre in Gent.

Lesson 4 – High potential for replication the Trammelant project

The measure of the Trammelant bus is valued as interesting by other city-partners. The needed costs for equipment are low because busses that are not used anymore are used as Trammelant bus. To maximize the impact of the Trammelant activities, the focus has to be on schools where problems with youngsters on the PT were reported in the past.

Lesson 5 – Before starting a project, check if there is support from the main stakeholders

Before starting a project it is required to check if there is sufficient support from the main stakeholders, especially if the stakeholders are not well known and highly commercial as e.g. the taxi sector.

3.2.3.4.2. Measure 2.2: Improved public transport service levels

Measure description

The goal of this measure is focused on the improvement of the experience of the PT user when using the public transport by:

- Improving the accommodation and access of the public transport stops by reconstructing PT stops. In total 1144 bus/tram stops in the City of Gent were listed and evaluated if reorganization of the bus stop is needed and feasible. This analysis resulted in a list of 135 stops that had to be reconstructed. By mid-October 2012 81% (110 stops) have been done. The additional 25 stops will be done by the city of Gent.

- Increasing the commercial speed. This goal was approached on two levels:
  - The redevelopment of the main tram axis between the train station and the city centre (Korenmarkt). An important part of this redevelopment is the installation of a ramp metering system. This system was new for the PT company and never used before in the city.
  - Smaller and more focussed actions for example:
    - Reconstruction of the PT stops in such a way that busses stay on the road when stopping to let people on the bus. Other traffic has to stay behind the bus which makes it easier and faster for the bus to resume the ride.
    - Improvement of traffic lights crossings, consisted for example of traffic light control, changing the time intervals of the traffic lights or relocating PT stops away from the crossing in order to have no influence on the traffic light system.
• Improving the available information at the public transport stops by implementing real time information displays. In total 94 stops in Gent, of which 32 in the CIVITAS Corridor, were equipped with the RTPI-system.

There was a deviation from the original plan:
• Real time passenger information via sms was not implemented, but different other applications are implemented: application for iPhone, smartphone, Nokia, Android, mobile website. The real time information can also be consulted on the website (www.mijnlijn.be).

Evaluation approach
The evaluation of the commercial speed is based on the GPS data from the PT-vehicles. Detailed reports per line/trajectory/period are available; two examples are presented in the MERT.

The evaluation of the number of stops that are improved and how many real time displays are implemented is based on before / after lists that are drafted by the responsible for the implementation (city of Gent or PT company).

No final and conclusive evaluation on the redevelopment of the tram axis in the corridor between the main train station and the city centre (Korenmarkt) was possible as the optimisation and implementation of the ramp metering system is not yet finalized. The commercial speed is monitored at the PT company and follow-up of this evaluation will be done once all open actions are implemented.

The evaluation on the satisfaction of the PT users on quality and service of the PT is evaluated on IP level.

Impact evaluation
Key result 1 – Increased commercial speed
Evaluation on a few examples of reorganised bus stops or traffic lights showed positive results on increased commercial speed for the related route. For example the installation of traffic light at a crossing of an important inbound route resulted in more than a duplication (+116%) of the commercial speed between 3.30 pm and 5.30 pm.

Key result 2 – Installation of RTPI system
In July 2012 94 stops in Gent, of which 32 are in the CIVITAS corridor, were equipped with the RTPI-system. By the end of the year, 166 displays should be placed in the City of Gent, of which 38 in the CIVITAS-corridor.

Key result 3 – Reorganisation of 110 bus stops
81% of the 135 stops that were selected to be reorganised, were done by mid October 2012. The other 25 are planned to be redeveloped after CIVITAS. All 41 cross point with traffic lights are optimized according to the evaluation study on traffic lights in the city of Gent.

Process evaluation
Barrier 1 – Resistance of local shop owners
There was a resistance by the local shop owners of the Kortrijksepoortstraat towards the implementation of the ramp metering system because they were worried that people would not be able to reach the shops anymore with their car as when the ramp metering system would be active. This could lead to a delay of the implementation of the ramp metering system, to avoid this delay, different information markets were organised to explain the goal and implementation trajectory of the project and to explain them that there would be any problem to enter the Kortrijksepoortstraat by car as this street will be accessible any time (but with small delays when ramp metering is active).

Barrier 2 – Citizens’ protest against the partial removal of the ‘Alpentuin’
The installation of the car access restriction system on the R40 included the removal of a small garden with historical value (‘Alpentuin’). After the protest, the city decided to adapt the plans for the R40 in
order to keep the Alpentuin. This is a possible threat (build-up of traffic) for the traffic flow on the R40 as the original set-up will not be implemented.

**Barrier 3 – Bad winter weather**

The redevelopment of the Korenmarkt and the tram axis between the main train station Gent Sint-Pieters and the ring road had some delay in the works due to the cold winter.

**Barrier 4 – Technical problems**

Some new systems were implemented in this project, associated with some technical problems:

The system that controls the rail points and the accompanying signalisation at the Korenmarkt and Cataloniëstraat did not work correctly at the start. As a result a number of the points had to be operated manually which caused additional delay for the trams. The contractor solved this problem by changing the software.

There were some communication problems between the stop server and some of the RTPI-displays. This was studied in cooperation with the contractor in order to solve this problem.

The implementation of the ramp metering system was delayed due to technical issues with the installation of a part of the hardware for this system.

**Barrier 5 – Use of camera registrations**

To support the good working of the ramp metering system, cameras are installed in order to be able to fine car drivers who do not follow the directions of the ramp metering system. Due to ambiguities (organisation, financing and validation) between the different involved parties (De Lijn, the police department of the city of Gent and AWV) the installation of these cameras was delayed. The cameras were installed in August 2012 but are not yet in active use as the protocol to use the camera registration in law enforcement is still to be approved and signed by the different partners.

**Driver 1 – School support**

A big school in the neighbourhood of the Kortrijkse steenweg offered their great support to the new concept and actual plans. The 'information market' could be organised in this school. This positive attitude of the headmaster sure had an influence on the visiting public.

**Lessons learned**

**Lesson 1 – Longer evaluation period**

The ramp metering system was new for the PT company. The time needed for optimizing the parameters, in order to have an optimal working system, is long and should be foreseen in the evaluation timing. Studying experiences with similar systems abroad could help to better estimate the impact of a new system and the needed evaluation time. This was not done in this case.

Not only the usage of a new system such as the ramp metering system, but also the project scale in size and time demand a longer evaluation period to make supportable conclusions.

**Lesson 2 – Improvement commercial speed**

The implementation of small scale changes, for example installing/optimizing a traffic light of reconstruct PT stops can have a significant positive influence on the commercial speed of the PT vehicles.

**Lesson 3 – Reduce impact infrastructure works on PT service**

When major infrastructure works are done, the impact on the PT service should be kept as low as possible and also as stable as possible. It is preferable to maintain deviations on certain bus/tram routes as longs as possible, even if these deviations are not always the most optimal choices for a certain period of time during the project.

**Lesson 4 – Improved collaboration between stakeholders**

Thanks to the project, the relations between all stakeholders were reinforced. These links will be further extended in the future by the development of a traffic management centre in Gent.
3.2.3.4.3. Measure 2.3: Collective taxi services

Measure description
As outside the usual working hours public transport is less accessible (lower frequency, no late night service during week days), people going out in the city centre often have difficulties to get back home when using public transport. This results in a higher private car use. To keep stimulating alternative transport modes at evenings, the city of Gent wanted to stimulate the use of taxis.

Enough available taxis in Gent, but there is a certain reluctance to use a taxi because of the high fee of taking a taxi. For this reason, the city of Gent wanted to reduce the costs by introducing shared taxi’s when possible. By setting up a collective taxi sharing system, unrelated people with more or less the same destination would be stimulated to travel in group and share a taxi. In this way, the fee of a taxi would be divided by more people, so cost per person will decrease and this should lead to an increased use of taxi services.

In the meantime, the Gent City Council would create, in cooperation with the taxi operators, a positive image and promote the use of taxis with other means.

There were deviations from the original plan:
- **Image of taxi services** – As there is a big competition between the taxi operators, they don’t trust each other and refuse to work together on a collective taxi sharing scheme. To decrease the competition between the taxi operators, efforts were taken to increase the image of taxi services which leads to increase of taxi users.
- **Cancellation of the measure** – Measure stopped at autumn 2009 as there is no support from the taxi sector.

Evaluation approach
As the measure already stopped before finishing the evaluation plan, no measurement methodology was defined; the focus was on process evaluation. This showed that big competition between the taxi operators leads to a lack of trust between taxi operators and refusal to work together. No partnership arrangements with other taxi operators were possible for this reason, which made the implementation of the measure impossible.

Impact evaluation
**Key result 1 – Implementation failed**
As there is no support from taxi sector, the implementation of the system failed.

Process evaluation
**Barrier 1 – Lack of motivation of taxi sector**
There was a lack of motivation of the key stakeholder, namely the taxi sector. No partnership arrangements with other taxi operators could be made as there is big competition between the taxi operators. As a result, they don’t trust each other and refuse to work together.

**Barrier 2 – GCC has no legal means to force taxi operators**
The City of Gent has no legal means to force the taxi operators to work together, as they are private companies.

**Barrier 3 – Union of taxi sector does not have impact on taxi policy**
As the union of the taxi sector works on voluntary base, this union is disorganised and does not have any impact on the taxi policy.

**Barrier 4 – Taxi operators have no money to fund the collective taxi service system**
The taxi operators need to fund the collective taxi service system as well. For small taxi operators this cost is too high.
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Driver 1 – Governor was prepared to provide extra budget
The governor of the province of East Flanders was prepared to provide some extra budget for the implementation of the collective taxi service system.

Driver 2 – Collective taxi service system exists already in other city
A collective taxi service system already exists and is used in Barcelona.

Lessons learned
Lesson 1 – Before starting a project, check if there is support from the main stakeholders
The most important lesson learned is therefore that before starting the project it is required to check if there is any support from the main stakeholders, namely the taxi sector, to deal with the collective taxi service.

3.2.3.4.4. Measure 5.7: Security enforcement in public transport

Measure description
The goal of the measure is to increase the security perception of the PT users and to enhance the positive contacts between drivers / controllers and youngsters. This measure consists of following submeasures:

- The implementation of ‘lijnspotters’: personnel that has a preventive effect on vehicles by being on it. Apart from their presence, they also give information to passengers and signalize defects to the driver.
- The implementation of an educational ‘Trammelant’ bus: this project lets youngsters experience the difficulties that come with being a bus driver or controller and what the negative impact is of vandalism for the public transport company and other travellers. This is done by educational games and conversations.
- To train personnel with a focus on safety and security (e.g. how to handle difficult situations, attitude, working with youth organisations and schools…).
- Organise a specific information campaign on how to behave on public transport. Extra information on buses, trams and on stops keeps the passenger informed.
- Train drivers and controllers to work out and cooperate with preventive and proactive project activities which scholars can participate in. The aim is to conceive mutual understanding and respect.
- Train drivers on customer contact and how to react in case of an incident.

Deviation from the original plan:
- In the latest version of the DOW for 5.7 it is mentioned that cameras will be installed in the vehicles. This submeasure is implemented but not as a part of the CIVITAS ELAN project. De Lijn did not want to wait for the start of the project as this was an important issue in the safety plan; the implemented action was based on an internal project schedule. The evaluation on this item is therefore not part of this evaluation document.

Evaluation approach
The evaluation was done by collecting the number of incidents on PT, the number of contacted schools / students and the number of interventions of the Lijnspotters.

The documented incidents (aggression forms) are in the security monitor registered at the level of statistical sectors, which are the smallest administrative units in Belgium. To evaluate the impact of Trammelant on a given school, the aggression forms of the sectors where the scholars of that school
take PT most frequently before/after school are filtered. For the BAU scenario, the whole region of Eastern Flanders is used.

The evaluation on the security perception of the PT users is evaluated on IP level.

**Impact evaluation**

**Key result 1 – Significant decrease in number of incidents**

The number of documented incidents with youngsters (-18 years) in the area of Trammelant schools have decreased significantly. When we compare the average number of incidents for the first half of 2008 (before start of Trammelant) and the average for the same period in 2010 a reduction of -53% on incidents with youngsters -18 years is reached. The quantifiable target (number of incidents -30%) has been reached.

This reduction is even stronger when the comparison is made with the total number of incidents with youngsters in the city of Gent which is increased between 2008 and 2010 with 52%

**Key result 2 – Positive internal perception at De Lijn**

During the evaluation meetings with the involved controllers it was stated that often they see the positive impact of the project when they are doing control activities asked for an intervention for an incident in the neighbourhood of a Trammelant school. Due to the fact that some of the youngsters (from Trammelant schools) know what the mission of the controllers is or that they recognize the involved controllers it is easier for the controllers to intervene and do their job. There is a mutual understanding and respect.

**Process evaluation**

**Barrier 1 – Budget cuts**

The measure was almost cancelled due to budget cuts.

**Barrier 2 – Financial agreements**

The financial agreement concerning the transition of the Lijnspotters from De Lijn to the city of Gent was part of a discussion between both parties. A clear agreement on which part had to be paid by each partner was defined, included in a covenant and signed by the Gent City Council and De Lijn.

**Driver 1 – Project appreciated by schools**

The Trammelant project is well appreciated at schools. There is no problem in finding schools to participate in the Trammelant project.

**Driver 2 – Interest from media**

Positive attention from the press (local newspaper, Vanguard newsletter, local TV station) and seminars (CIVITAS meeting Gent, TAIEX – Amman, CIVITAS meeting Malmö)

**Driver 3 – Positive feedback employees De Lijn**

The controllers, involved in this project, confirm that in most of the cases the contact between the youngsters that have been involved in the project and the controllers / bus driver is more positive after finishing the project.

**Lessons learned**

**Lesson 1 – Potential for replication**

The Trammelant concept is implemented in the other entities of the public transport company because of the positive evaluation/effect. Not only within the public transport company, but also the other CIVITAS city-partners value the measure of the Trammelant bus as interesting. The needed costs for equipment are low because busses that are not used anymore are used as Trammelant bus. To maximize the impact of the Trammelant activities, the focus has to be on schools where problems with youngsters on the PT were reported in the past.
Lesson 2 – Motivation of controllers and bus drivers

It is important that the controllers and bus drivers are motivated and have education skills. It is recommended to organize periodical evaluation meetings with the involved controllers/drs so that the program can be changed if needed.

3.2.3.5. Integrated package 5: Stimulating cycling and walking conditions

Integrated Package Description

Integrated package 5: Stimulating cycling and walking conditions is formed by combining impacts of five measures:

- M4.5-GEN: The House of the Bike and bicycle activities
- M4.7-GEN: Walking promotion
- M5.6-GEN: Safe cycling corridor
- M8.9-GEN: IT-based bicycle theft prevention
- M8.10-GEN: Route planner for bicycles.

In this package are all the ‘hard’ measures that are physically implemented like new walking and bicycle services and the renewal of the transport infrastructure in order to stimulate cycling and walking. These measures are often supplemented with ‘soft’ campaigns such as campaigns to promote the use of the bicycle route planner and the bicycle website or campaigns to stimulate walking.

Evaluation Approach

The combination of all these measures contributes was expected to have a positive impact on the walking and cycling conditions in the city, and therefore also contribute to an increase in cycling/walking and a more positive attitude towards cycling/walking. The joined impact of these measures is thus evaluated on the IP-level:

- The objective quality of walking and cycling conditions are evaluated by a walkability and bikeability index, taking different quality aspects into account, taking into account different aspects of cycle paths (width, marking, highlighting, elevation,...)
- The attitudes towards cycling and walking were questioned in various surveys. Students in higher education were asked to participate in an internet survey. A link to the questionnaire was distributed by e-mail (Gent University) or was published in an internal newsletter of the university college. Response rates are highest if respondents are personally contacted by e-mail, response rates tend to be lower in those university colleges which announced the survey in a general newsletter. Citizens received a postal survey which they could send back, but they were also invited to fill out an online version of the questionnaire. Cyclists and pedestrians were questioned on-street, in the area around the main railway station Gent Sint-Pieters.
- The number of cyclists and pedestrians are counted on the street before and after measure implementation.

Impact evaluation

Key result 1 – Decreasing number of cyclists and pedestrians

The effect of the infrastructure works and the promotion campaigns on the number of cyclists and pedestrians remains questionable. The number of cyclists and pedestrians along the Kortrijksesteenweg and at the crossing Kortrijksesteenweg-Charles de Kerckhovelaan has decreased.
significantly. This means that the target of increase of walking and cycling by 5\% is not reached. This is due to contextual factors: bad weather influenced the number of cyclists whereas the closure of a nearby tram stop influenced the results of the pedestrian counting. Also the incubation time was too short to measure the long-term impact.

**Key result 2 – Improved cycling and walking infrastructure**

The infrastructure works in M4.7-GEN (redesign of sidewalks along the Kortrijksesteenweg and its side streets) and M5.6-GEN (redesign of cycling lanes in the CIVITAS ELAN corridor) contributed to the achievement of a better walking and cycling infrastructure. 2km 180m cycling lanes have been redesigned and 2km 139m additional new cycling lanes were constructed. Furthermore, 1km 146m sidewalks have been redesigned. The target of increased bikeability index in at least 2 km cycling lanes is exceeded. The target of increased walkability index in at least 2 km sidewalks is partly achieved.

**Key result 3 – More positive attitude towards cycling, but not towards walking**

The various promotion campaigns of cycling in M4.5-GEN (bicycle website, bicycle boxes and bicycle bins), M5.6-GEN (communication with respect to the introduction of the first cycle street) and M8.10-GEN (bicycle route planner) and redeveloped/new cycle lanes contributed to a more positive attitude towards cycling among the three target groups. Moreover, the new bike services of these measures are also promoted by measures in other integrated packages (e.g., IP2). But despite all efforts the minimum target of 75\% positive students, citizens and cyclists has not been achieved. The same positive effect can however not be detected from the promotion campaigns of walking in M4.7-GEN (walking promotion campaign, functional walking map). The attitude towards walking has become worse among all three target groups so that the minimum target of 75\% positive students, citizens and pedestrians seems to be further away than before. Reason for the less positive result towards walking could be the reconstruction works on-going in the area where the survey was done.

**Process evaluation**

**Barrier 1 – External factors caused delay in the infrastructural works.**

Infrastructural works (redevelopment of sidewalks and cycling lanes in M4.7-GEN and M5.6-GEN, secured bicycle sheds in M8.9-GEN) were delayed due to the cold winter of 2010 and 2011.

**Barrier 2 – Dependency on other city departments and/or external companies often slow down the planning of measures**

Within some measure a high dependency existed on other departments of the city of Gent and/or external companies. These other departments and/or external companies often have their own priorities which do not necessarily correspond with the priorities of the CIVITAS ELAN project. It often remained difficult to influence the planning of these departments and/or external companies (M4.5-GEN, M4.7-GEN, M8.9-GEN, M8.10-GEN)

**Barrier 3 – Complex administrative procedures for building permits in public domain**

Administrative procedures to install objects such as a bicycle bin (M4.5-GEN), a bicycle barometer (5.6-GEN) or a secured bicycle shed in public domain (M8.9-GEN) took more time than initially planned.

**Driver 1 – Involvement of specialized partners**

New partners with specific knowledge facilitated the preparation phase of some measures. For example:

- The Department of Geography, Gent University, became a new partner within CIVITAS (since September 2009). The knowledge of this partner facilitated data collection and research (calculation of the bikeability and walkability index in M4.7-GEN and M5.6-GEN; design of before and after surveys on cycling and walking as well as the user acceptance of bicycle bins in M4.5-GEN).
- Digipolis became a new partner too. They were responsible for the purchase of the handheld computers in M8.9-GEN.
Driver 2 – Using various media

The public was involved by using various media. Calls to all citizens were published in the city magazine and the city website. For example, citizens made suggestions for the locations of 20 additional bicycle bins in a follow-up project (M4.5-GEN), citizens reported necessary improvements of cycling lanes (M5.6-GEN)

Driver 3 – Integration with other measures

Integration with other CIVITAS-measures or with other measures/plans of the city (1 +1 = 3) facilitates the implementation and encourages the operation of a specific CIVITAS measure. For example:

- the bicycle website (www.gentfietst.be, M4.5-GEN) was combined with the website of the route planner for bicycles (8.10-GEN)
- the bicycle website (www.gentfietst.be, M4.5-GEN), bicycle bins and bicycle boxes (M4.5-GEN), the route planner for bicycles (M8.10-GEN) were promoted by various measures in IP2.
- redevelopment of sidewalks in M4.7-GEN is integrated in the existing “Pavement Plan” of the Road Department of GCC.

Lessons learned

Lesson 1 – Strong involvement from the start of the project

Strong agreements must be made in advance so that all participating partners keep to the time plan/schedule and share the same vision on the project. This lesson is particularly important for the building project “House of the Bike”. It remained very difficult to find a consensus among the participating partners in defining the way and degree of integration of the different bicycle focused organizations for the available budget. Also for infrastructure works strong agreements must be made in advance with all partners involved in the project. This also applies to the “lokfiets” (enticing bicycle) project. This can only be successful if agreements were made with the police and justice department. The justice department must prosecute in case a bicycle thief is apprehended. If not, the police will not put effort into locating bicycle thieves.

Lesson 2 – Strong inter-relationships with other measures stimulating cycling

The development of the bicycle website in 4.5-GEN was combined with the development of the bicycle route planner in 8.10-GEN. The successful inventory of route planner contacts can be explained by the continuous promotion of the bicycle route planner. This promotion was also done by measure leaders of the mobility management measures. Inter-relation ship with other measures is thus very important for the success of cycling.

Lesson 3 – Communication is important when introducing a new concept

The redesign of the Visserij as a cycle street illustrated that communication (towards citizens and cyclists) is important. The usefulness of new concepts such as the cycle street is better understood by various target groups resulting in an increased public support. Moreover, various when talking to cyclists who effectively use the cycle street some less known problems rose to the surface.

Lesson 4 – Continuous update of the website www.gentfietst.be and the route planner

The content of the bicycle website must be updated regularly with new information on cycling in Gent. It is important that the website offers up-to-date information on cycling and cycling events in Gent so that frequent visitors remain visiting the website and new visitors are attracted.

Lesson 5 – Citizens can be easily engaged in a project if it fits within their daily life

Demand for parking places for bicycles is extremely high in densely built neighbourhoods. Because the implementation of the bicycle bins provide an answer to a very precise and urgent need of many citizens, engagement of those citizens into the pilot project was fairly easy.

Lesson 6 – Continuous promotion needed to different target groups

Promotion of walking as a sustainable transport mode cannot be based on a single event, but it requires a continuous effort. Also promotion needs to be focused to other target groups as e.g. students (in Gent there are 67,000 students).
Lesson 7 – Staying on track with the latest technological developments

It is important to adjust the walking and cycling promotion to the newest technological developments (e.g. apps, online version, facebook, integration in google maps, etc.).

Lesson 8 – Continuous road construction works to improve quality and safety for cyclists and pedestrians

Improving quality and safety for cyclists and pedestrians is a must. As the implementation of a cycle street was a success, it is recommended to extend cycle streets in Gent, preferably on the main cycle routes in the city centre where there is no space for cycle lanes. At cycle routes where there is enough space, cycle lanes need to be constructed along these cycle routes. For pedestrians, high attention needs to be paid to the quality and safety of the footpaths along the recommended walking routes and in shopping streets.

Lesson 9 – Longer incubation time to see impact

In order to measure the effect of large-scaled infrastructure works such as the effect of the redevelopment of the Kortrijksesteenweg on cycling and walking (in terms of the number of cyclists and pedestrians and attitudes towards cycling and walking) a longer incubation time is needed between the end of the infrastructure works and the organisation of the surveys.

Lesson 10 – Include zone 30 in evaluation

The bikeability index does not calculate a score for the cycling conditions in zone 30. That's because the paths were tested based on the guidelines on Flemish level. In the future attention need to be paid to other aspects not related to how a cycle path is constructed, but rather on the overall cycling experience / bicycle environment.

3.2.3.5.2. Measure 4.5: The “House of Bike” and public bicycle activities

Measure Description

This measure aimed at increasing cycling through the combination of two submeasures:

- Planning and design of ‘The House of the Bike’
  Quite a number of people use the bike in the city centre. However no main contact point or information point existed where cyclists could get specialized information or access to small-scale services such as bicycle repair, bicycle rent and secured bicycle parking. Before the CIVITAS ELAN project, all these services were offered alongside each other. The design of ‘The House of the Bike’ aimed at the integration of all the services of Max Mobiel, StudentENmobiliteit and the city bicycle depot.

- Testing various types of secured bicycle sheds
  Bicycle theft and lack of space to install bicycles at home are an important problem in this area of Gent. Good secured bicycle sheds could limit the number of thefts, but there is too little parking space for bicycles in general and secured bicycle sheds especially. Therefore, various types of secured bicycle sheds were tested during the project: Park & Bike boxes (used by commuters) and local neighbourhood bicycle bins (used by residents).

There were deviations from the original plan.

- Virtual ‘House of the Bike’ instead of a physical ‘House of the Bike’: The building project of the front office of the House of the Bike is linked to a large scale city redevelopment. The timing of this larger project runs beyond September 2012. Moreover, it was very hard to find a consensus among the participating partners. For these reasons the actual building of the ‘House of the Bike’ is delayed. The realization of the physical ‘House of the Bike’ will not be achieved within the CIVITAS ELAN project period. A virtual ‘House of the Bike’ (www.gentfietst.be) was realized as an alternative.

- Alternatives for the public rental bicycle system of the city: The public rental bike system (white bikes) was not realized within the CIVITAS ELAN period. The reason for this was the high costs of such a system and the little added value of the system. The city has already a high level of bicycle ownership among residents, and has other well developed and very accessible bicycle rental systems for students and commuters. This part of measure 4.5-GEN was
cancelled by amendments. Instead, alternatives for the public bike sharing system were examined (e.g., bicycle renting facilities for tourists in the city centre, extension of the Blue Bike system which is a bicycle sharing system of the railway company NMBS) and will be implemented in spring 2013.

Evaluation approach
As this measure is mainly evaluated on IP level, the appraisal of evaluation approach is described in the evaluation report IP5 – stimulating cycling and walking. In this evaluation report, only the impact of the virtual House of the Bike (www.gentfietst.be) and the secured bicycle sheds are evaluated.

Initially, quantifiable targets were only formulated with respect to the occupancy rates of new types of secured bicycle sheds (bicycle bins / boxes). Occupancy rates of the bicycle bins and the bicycle boxes were collected by the city of Gent based on the renting contracts.

Other indicators and quantifiable targets specifically related to measure 4.5-GEN were not formulated. However, during the evaluation period it became clear that various possibilities existed to gain more detailed insights in other aspects of the implementation of measure 4.5-GEN. Additional indicators and associated quantifiable targets were thus formulated:

- Evaluation of the use of the bicycle website www.gentfietst.be by analysing the number of visits using Google Analytics.
- Data collection on the interest in and familiarity with new bike services such as the bicycle website (www.gentfietst.be) and new types of secured bicycle sheds (bicycle bins and bicycle boxes) by different target groups (students in higher education, citizens, cyclists) through the survey organized on IP-level. Before the implementation of these new bike services, respondents were asked to indicate whether they are interested in future activities such as the bicycle website and new types of secured bicycle sheds. After the implementation of the new bike services, the survey on IP-level was repeated among the same target groups, but this time asking about the familiarity with the implemented activities.
- Some specific aspects with respect the willingness-to-use the bicycle bins were questioned in a separate survey to residents of the neighbourhoods and participants of the pilot project before and after these bicycle bins were installed on the street. This separate survey was initially not planned so that indicators and associated quantifiable targets with respect to willingness-to-use the bicycle bins had to be added to the data collection monitor. The survey included questions on among others the willingness to park one or more bicycles in a bicycle bin, the willingness-to-pay and the willingness to have a bicycle bin in close vicinity to the house.

Impact evaluation
Key result 1 – More than 4000 website visits per month (www.gentfietst.be)

The average website visits per month is more than double the quantifiable target of 2000 visits. The inventory of bicycle website contacts is thus successful.

Key result 2 – Envisaged interest in the bicycle website (70%) among all target groups, but this interest does not automatically result in being familiar with the bicycle website

Before the implementation of the bicycle website: all target groups (students in higher education, citizens, and cyclists) were interested in the bicycle website www.gentfietst.be. In today's digital world, nobody seems to object the implementation of a digital tool such as this general website on cycling. However being interested does not automatically result in using the bicycle website. Only a minority has already used it. Especially citizens and cyclists are more familiar with the bicycle website than students.

Key result 3 – High occupancy of new types of secured bicycle sheds (bicycle bins / boxes)

Most bicycle bins are actually completely rented out. During the pilot project, demand for a parking place in a bicycle bin was higher than the limited supply of 6 bicycle bins (x 5 parking places per bicycle bin = 30 parking places). Moreover, at the beginning of 2012 the city decided to order 20 additional bicycle bins. Citizens could make suggestions for possible locations. Again, demand is higher than supply. Citizens are willing to pay a maximum renting price of 5€ per month per bicycle.
The bicycle bins are thus a real success story. The success of the bicycle boxes took some time, but eventually 20 of 25 bicycle boxes are rented resulting in an occupancy rate of 80%, so the target was reached.

**Key result 4 – Envisaged interest (70%) in new types of secured bicycle sheds not achieved**

Before the implementation of secured bicycle sheds: some target groups (especially citizens) nearly reach 70%, but the interest of other target groups (students in higher education and cyclists) is considerably lower. Minimum familiarity with secured bicycle sheds of 25% is achieved for among citizens but not among students and cyclists. This is no surprise since citizens are the main target group for the use of bicycle bins. Bicycle bins have a strong visual presence in the streetscape of the residential neighbourhood of citizens.

**Key result 5 – Familiarity for bicycle bins higher than for bicycle boxes**

Familiarity with bicycle boxes is lower than familiarity with bicycle bins. Bicycle boxes actually aim at commuters who park their bicycle and switch to their car or public transport in their commute trips. Consequently, the use of bicycle boxes is more specific than bicycle bins. This might explain the lower familiarity rates.

**Key result 6 – Participation in the pilot project decreases significantly the NIMBY-effect (“Not In My Backyard”)**

The (un)willingness to have a bicycle bin in close vicinity remains constant, unless citizens have participated in the pilot project. This unwillingness disappears once they have used the bicycle bin.

**Process evaluation**

**Barrier 1 – Difficulties in obtaining consensus among partners in a large scaled building project such as ‘The House of the Bike’**

It remained very hard to find a consensus among the participating partners in defining the need of surface for several functions, the precise location of these functions (separation between back- and front office) and the way and degree of integration of the different bicycle focused organizations for the available budget. Moreover, because of a lack of personnel and several other priorities, the Department responsible for the acquisition of real estate put this project on hold in 2011.

**Barrier 2 – Lack of interest among other city departments to install bicycle bins**

Several departments of the city of Gent who have to give permits to install bicycle bins were not convinced of the benefit of the project. The measure leader had to take lots of efforts to convince them to continue the project.

**Barrier 3 – Lack of interest among residents in bicycle boxes**

A unit of 5 Park & Bike boxes was relocated to a terminus bus stop in the centre of Oostakker (suburb of Gent near the harbour) as a Bus & Bike facility for employees working in the Harbour of Gent. However, complaints rose from citizens living in the vicinity of the boxes. Especially shop keepers and a cultural organisation nearby argued that the bicycle boxes occupied too many parking places for cars. Questions were raised on the usefulness of this infrastructure.

**Driver 1 – Constant promotion of the bicycle website www.gentfietst.be, also by other measure leaders**

The bicycle website www.gentfietst.be is constantly promoted at events and by other MLs who also use the website to share their news and activities (e.g., the route planner for bicycles – measure 8.10 GEN). The bicycle website will be completely integrated in the future website of the Gent Mobility Company which is currently under development. This website will function as a digital information platform which centralizes all mobility-related information in Gent. In order to function as a true virtual information point, a set of digital form were already developed. People will be able to apply online for specific mobility services just by filling out these digital forms.
Lessons learned

Lesson 1 – Strong involvement from the start of the project

Strong agreements must be made in advance so that all participating partners keep to the time plan/schedule and share the same vision on the project. This lesson is particularly important for the building project “House of the Bike”. It remained very difficult to find a consensus among the participating partners in defining the need of surface for several functions, the precise location of these functions (separation between back- and front office) and the way and degree of integration of the different bicycle focused organizations for the available budget.

Lesson 2 – Continuous update of the bicycle website www.gentfietst.be

The content of the bicycle website must be updated regularly with new information on cycling in Gent. It is important that the website offers up-to-date information on cycling and cycling events in Gent so that frequent visitors remain visiting the website and new visitors are attracted.

Lesson 3 – Strong inter-relationships with other measures stimulating cycling

The development of the bicycle website in 4.5-GEN was combined with the development of the bicycle route planner in 8.10-GEN. The successful inventory of route planner contacts can be explained by the continuous promotion of the bicycle route planner. This promotion was not only organized by the measure leader of this measure but also by other measures stimulating cycling (4.2-GEN, 4.3-GEN, 4.5-GEN, 4.10-GEN, 5.6-GEN, 6.3-GEN). Inter-relationships with other measures were thus very important for the success of the bicycle website.

Lesson 4 – Detailed survey results provide valuable information which can be used for a successful implementation of a measure

The before survey on preferences and willingness-to-pay for bicycle bins provided valuable information which was used to convince other city departments of the benefits of this measure. The results of the after survey (among citizens but also among participants of the pilot project) were used to organize the follow-up project successfully. Based on these surveys well-founded decisions could be made related to renting fees, type of bicycle bin, … Similar surveys should be organized before and after the implementation of other pilot projects to gain better insights into the factors that contribute (or not) to a successful implementation of a measure.

Lesson 5 – Citizens can be easily engaged in a project if it fits within their daily life

Demand for parking places for bicycles is extremely high in densely built neighbourhoods. Because the implementation of the bicycle bins provide an answer to a very precise and urgent need of many citizens, engagement of those citizens into the pilot project was fairly easy.

3.2.3.5.3. Measure 4.7: Walking promotion

Measure description

This measure aimed at supporting walking as a sustainable transport mode through the combination of existing and new promotion campaigns and small infrastructure works. This measure thus includes two aspects: (i) one aspect is to stimulate walking through promotion campaigns and the distribution of a walking map, and (ii) another aspect is an analysis of the current state of the roadwork with a focus on pedestrians. Based on this analysis actions were undertaken in the CIVITAS ELAN-corridor. Small infrastructure works have thus been implemented that increase the safety and comfort of the corridor for pedestrians.

There was a deviation from the original plan. Supplementary, a functional walking map was also developed to stimulate walking in Gent.

Evaluation approach

Evaluation of the familiarity with the walking promotion campaign and the functional walking map among different target groups (students and citizens) was easily accomplished. Data was collected through a survey on IP-level on how people perceive walking in Gent. In the survey organized after the implementation of the walking promotion campaign and the functional walking map, respondents were asked to indicate whether (i) they use or participated in these initiatives, (ii) they know these initiatives
but did not use or participated in them, or (iii) they do not know these initiatives at all. This provides information on how familiar people are with the existence of the walking promotion campaign and the functional walking map. This information can be considered as one aspect of the acceptance level of this measure.

Impact evaluation
For more key results on the improvement of walking conditions, please consult the evaluation report on IP level “Stimulating walking and cycling conditions”.

Key result 1 – Citizens are more familiar with the walking promotion campaign as well as with the functional walking map than students
Citizens (12.5%) are more familiar with the walking promotion campaign and the functional walking map than students in higher education (10.7%). Objectives of at least 25% familiarity are thus only partially achieved. The lower familiarity rates among students in higher education might be explained by the lower promotion effort towards this target group. Although Gent is an important student city, promotion towards students is sometimes low mainly because this must be organized via the student office which already has to distribute too much information towards students.

Key result 2 – Familiarity is higher with a specific tool compared to a general promotion campaign
The functional walking map is a specific tool which students and citizens can actually use whereas the walking promotion campaign is more general. This might explain the higher familiarity rates related to the functional walking map. 17.3% of the students and 27.2% of the citizens are familiar with the functional walking map.

Process evaluation
Barrier 1 – Too optimistic planning
The measure was implemented with a delay due to an initial time planning that was too optimistic.

Barrier 2 – High dependency on the other departments of the city of Gent and external companies
The main problem was that the company in charge of the actual pavement works did not stick to the agreed time plan. It remained difficult to influence the planning of these departments and external companies so that the actual implementation of small infrastructure works was delayed severely.

Driver 1 – Good cooperation with another department
Cooperation with the Road Department of GCC to improve the pedestrian infrastructure.

Driver 2 – Measure integrated in existing plan
This measure is integrated in the existing “Pavement Plan” of the Road Department of GCC. Also other departments as “Gebiedsgerichte Werking”, a department working on citizen engagement, and the social services department (representing e.g. handicapped people) are involved in this project.

Lessons learned
For more lessons learned, please consult the evaluation report on IP level “Stimulating walking and cycling conditions”.

Lesson 1 – Continuous promotion needed
Promotion of walking as a sustainable transport mode cannot be based on a single event, but it requires a continuous effort

Lesson 2 – Specific promotion towards students in higher education
Gent is an important student city but this target group is often neglected (see lower familiarity rates among students in higher education). More effort is needed to reach this target group.
Lesson 3 – Staying on track with the latest technological developments

It is important to adjust the functional walking map to the newest technological developments (e.g. apps, online version …).

Lesson 4 – Consultation of the public in prioritizing small infrastructure works

By consulting the public, new and less known ‘walking problems’ rose to the surface.

3.2.3.5.4. Measure 5.6: Safe cycling corridor

Measure description

This measure focuses on the implementation of safer and better cycling routes in the corridor by improvements of the main crossroads on the cycling routes from the main train station Gent Sint-Pieters towards the city centre and the university area. Also other cycling routes to and from the station were audited and improved within this measure. A second submeasure, which is a pilot project in Belgium, is the redevelopment of the Visserij as a cycle street. The Visserij changed from a road with mixed traffic (30 km/h) into a cycle street. The concept of the cycle street is that cyclists have priority and cars are only “guests”. The Visserij is the first cycle street in Belgium. For promotion and stimulation of safe cycling, but also for data collection, the cycling barometers were installed at the Visserij and the main cycling axis in Gent, the Coupure Links.

Evaluation approach

As this measure is mainly evaluated on IP level, the appraisal of evaluation approach is described in the evaluation report IP5 – stimulating cycling and walking. In this evaluation report, only the impact of the redesign of the Visserij as a cycle street is evaluated. This was not initially planned so that additional indicators and quantifiable targets had to be added to the data collection monitor afterwards.

Initially, the number of cyclists in the Visserij was counted manually. The traffic research cell of the mobility department of the Gent City Council organizes each year a manual on-street cyclists’ count in the Visserij. Cyclists towards and out of the city centre are counted on a workday. However, the number of cyclists is related to only one hour in morning rush hour. No evolution during a day (on-peak versus off-peak), a week (weekday versus weekends) or a year (summer versus winter) are possible. Since the installation of the bicycle barometers, the number of cyclists is registered automatically on a daily basis so that daily, weekly and yearly evolutions will be possible in the future. The bicycle barometers were installed in August 2011. Some technical problems occurred in the beginning. For example, when two or more cyclists passed the bicycle barometer together, often only one cyclist was counted resulting in an underestimation of the number of cyclists during rush hour.

The interest in the ‘cycle street’ concept was measured during a meeting on which 4 redesign scenarios of the Visserij were discussed. 250 invitation letters were posted in every mailbox in the Visserij (between Keizerspoort and Tweebruggen). Approximately 100 persons participated at the meeting of which 75 returned the questionnaire. This might seem a good response rate at first sight. However, it remains unclear whether those 75 questionnaires are representative for the whole neighbourhood. Perhaps the most interested residents show up at the meeting, whereas the car-oriented people stay home.

A focus group provided information on the general acceptance of the ‘cycle street’ concept by cyclists who cycle along the Visserij. This information is more qualitative so that quantitative targets are difficult to formulate.

Impact evaluation

For more key results on improvement of cycling conditions, please consult the evaluation report on IP level “Stimulating walking and cycling conditions”.

Key result 1 – Strong public support for the ‘cycle street’ concept

Strong support exists among residents of the Visserij, the street that was redesigned as a cycle street. During a meeting on which 4 redesign scenarios were discussed, 88% of the participants showed interest in the ‘cycle street’ concept.
Key result 2 – Significant increase in cycling due to the implementation of the cycle street
The implementation of the cycle street clearly encourages cycling. The number of cyclists has increased by 36% between 2010 and 2012 so that the quantifiable target of a minimum increase by 5% is significantly exceeded. The majority of this increase has been realized after the implementation of the Visserij as a cycle street in August 2011. The success of this first cycle street has resulted in an official integration of the cycle street concept in the Belgian traffic regulations in the near future.

Key result 3 – Cyclists are convinced of the usefulness of the cycle street, but do also have some remarks
Cyclists are not unanimously positive about the cycle street. They are convinced of the usefulness of the concept, but raise several aspects that can be improved. For example, cyclists are not always aware that they are allowed to cycle in the middle of the street even when a car approaches (this was communicated to residents of the Visserij but not to cyclists) and bad application of the red coating (contractor did not meet the specifications).

Process evaluation
Barrier 1 – External factors caused delay in the redevelopment of the cycle lanes.
The factors are the leave of a crucial person in the Road Department and the colds winter periods in 2010 and 2011.

Barrier 2 – Problems with the contractor caused a delay in installation bicycle barometers
The installation of two bicycle barometers was delayed due to problems with the contractor and the different administrative procedures required. The contractor promised to deliver the bicycle barometers ready for installation in January 2011. But then all contact was lost between our contractor and the company who would provide them with the counters. In December 2010 it became clear that the company producing these bicycle barometers was no longer producing the type our contractor ordered, so a new provider needed to be searched.

Driver 1 – Participation due to publication of a call in city magazine and city website
Citizens were asked to give their input on the quality of the cycle lanes in Gent. This was done through a publication of a call to all citizens in the city magazine and on the city website.

Driver 2 – Campaign to promote cycling in winter together with survey
In the winter of 2011, Gent City Council (GCC) organized a campaign to promote cycling even in winter by distributing nice and warm gloves. In return, cyclists had to answer several questions on cycling in winter.

Driver 3 – First cycle street in Belgium, including official integration in Belgian traffic regulations
The Visserij changed from a road with mixed traffic (30 km/h) into a cycle street. The concept of the cycle street is that cyclists have priority and cars are only “guests”. The Visserij is the first cycle street in Belgium. Since the installation of the cycle street in 2011, the number of cyclists has increased. In February 2012, the Belgian press announced that the concept of the cycle street will be officially integrated in the Belgian traffic regulations.

Lessons learned
Lesson 1 – Communication is important when introducing a new concept
The redesign of the Visserij as a cycle street illustrated that communication (towards citizens and cyclists) is important. The usefulness of new concepts such as the cycle street is better understood by various target groups resulting in an increased public support. Moreover, various when talking to cyclists who effectively use the cycle street some less known problems rose to the surface.

Lesson 2 – Continuous road construction works to improve safety for cyclists
Improving safety for cyclists is a must. As the implementation of a cycle street was a success, it is recommended to extend cycle streets in Gent, preferably on the main cycle routes in the city centre.
where there is no space for cycle lanes. At cycle routes where there is enough space, cycle lanes need to be constructed.

**Lesson 3 – Consulting the public brings bottlenecks to the surface**

By consulting the public, new and less known “cycling problems” rose to the surface.

### 3.2.3.5.5. Measure 8.9: IT-based bicycle theft prevention and recovery

**Measure description**

Students in higher education (at Gent University or at one of the university colleges in Gent) can rent a bicycle at very low costs (€ 40 per year) by the organization StudentENmobiliteit. Many of these rental bicycles get stolen or are missing (e.g., students that do not return their bicycle after a one-year rental period at the end of the academic year). This measure aimed at decreasing the number of stolen and missing rental bicycles of StudentENmobiliteit through the combination of four submeasures:

- **Design of a unique frame for the rental bicycles**
  
  A unique frame for the rental bicycles of StudentENmobiliteit was designed so that these rental bicycles are easy to recognize in the streetscape.

- **IT-based anti-theft system**
  
  All rental bicycles of StudentENmobiliteit were equipped with a chip so that handheld computers can be used to locate stolen or missing bicycles more efficiently. Before CIVITAS ELAN, the check on the road was done manually, using a list with numbers of all bicycles reported as stolen. If a stolen bicycle is recovered, the team on the road has to contact the secretary of StudentENmobiliteit (administration) who then contacts the student from which the bicycle was stolen. Thanks to the handheld computer, the check on the road can occur now automatically. The chip embedded in the bicycle lock is scanned with the handheld computer. If the bicycle is reported as stolen, an automatic message is send to the student indicating that the stolen bicycle is recovered.

- **Installation of secured bicycle sheds**
  
  Secured bicycle sheds were installed so that students in higher education can park their bicycles in a secured place during night, weekends and holidays instead of parking their bicycles on-street in bicycle racks. These bicycle sheds are secured by a unique access system (not to be confused with secured bicycle sheds).

- **Implementation of “lokfiets” (enticing bicycle)**
  
  A “lokfiets” (enticing bicycle) with a positioning device would be placed at the main railway station Gent Sint-Pieters. When it gets stolen, the bicycle can be traced back and leads to the thief. This provides information on who steals the bicycles of StudentENmobiliteit: occasional thieves (e.g., students who “borrow” a bicycle because their own bicycle got stolen) or organized groups who steal and then sell these bicycles?

There were deviations from the original plan.

- **Secure bicycle sheds in university colleges instead of public secured bicycle sheds:** obtaining the building permission for the secured bicycle sheds in public domain was too difficult. As an alternative, secured bicycle sheds were installed on the domain of Gent University and two university colleges instead.

- **Delayed implementation of the “lokfiets” (enticing bicycle):** tracking systems have been tested during CIVITAS ELAN, but were not fully implemented. This is mainly due to difficult discussions with the local police and the department of justice on practical arrangements related to the use of the tracking device and the legal consequences when a bicycle thief would be caught in the act.
Evaluation approach

This evaluation report specifically focuses on the decrease in the number of stolen and missing rental bicycles of StudentENmobiliteit by (i) the design a unique frame for the rental bicycles, (ii) the implementation of an IT-based anti-theft system, (iii) the installation of secured bicycle sheds, and (iv) the implementation of “lokfiets” (enticing bicycle).

Data on the number of stolen bicycles was collected by inventorying the police reports that are submitted to StudentENmobiliteit. When stolen bicycles are recovered by the bicycle city guards during their regular road checks, this is also recorded.

The increase in efficiency because of the automatic road checks with the handheld computer was evaluated as input for the Cost Benefit Analysis. Four field tests were performed in which the time needed to (i) check a rental bicycle of StudentENmobiliteit, (ii) administration on the road, (iii) administration by the secretary, and (iv) contact with the student in case a stolen bicycle was recovered, was recorded.

The four submeasure of measure 8.9-GEN might also contribute to an increase in cycling and a more positive attitude towards cycling, but this is described in the evaluation report IP 5 – stimulating cycling and walking since other measures in this IP contribute to this as well.

Impact evaluation

Key result 1 – Increase in efficiency

The use of the handheld computers when checking the rental bicycles of StudentENmobiliteit resulted in an increase in efficiency, but only when a stolen bicycle is recovered. Checking a bicycle takes more time, but administration when a stolen bicycle is recovered (on the road, by the secretary, contacting the student) is handled more efficiently and faster. In case a stolen bicycle is recovered, students are informed much faster. Controlling 200 rental bicycles (of which 13 can be assumed as being stolen) with the handheld computer results in a time saving of 1h 28 min 08 sec which equals to 29.38 €. However, the results of the CBA results indicate that this saving does not outweigh the capital and operation costs.

Key result 2 – Decrease in stolen bicycles

A decrease in the number of stolen rental bicycles by 2% seems to be achieved. However, the evaluation period is too short to credit this result with certainty to the initiatives undertaken in measure 8.9-GEN. The IT-based anti-theft system with the handheld computer is operational since the beginning of 2012, the first secured bicycle sheds were installed in April 2012 and the “lokfiets” (enticing bicycle) is still not operational.

Key result 3 – Increase in recovered stolen bicycles

An increase in the number of recovered stolen bicycles by 10% seems to be partially achieved. However, the evaluation period is too short to credit this result with certainty to the initiatives undertaken in measure 8.9-GEN. The IT-based anti-theft system with the handheld computer is operational since the beginning of 2012, the first secured bicycle sheds was installed in April 2012 and the “lokfiets” (enticing bicycle) is still not operational.

Process evaluation

Barrier 1 – Problems with building permission for the secured bicycle sheds on public domain

Secured bicycle sheds were initially planned at two locations on public domain nearby classified and protected monuments. This made it very difficult to obtain a building permission for the secured bicycle sheds. As an alternative, secured bicycle sheds were eventually installed at the private domain of Gent University and two university colleges.

Barrier 2 – Technological problems with the tracking device of the “lokfiets” (enticing bicycle) and the handheld computer for field work

Test results of a “lokfiets” system of a Dutch company were not positive due to too much interference on the transmitter. Furthermore, many suppliers of car tracking systems exist, but for bicycles these systems must be smaller and be protected against different weather conditions and vandalism.
Several companies showed interest in developing such a product, but soon dropped out because of the rather low investment potential. Therefore, finding a specific partner/supplier was difficult.

After market research and offer research, it appeared that existing handheld computers did not meet our criteria. Therefore, an external software supplier (Trias) needed to be contacted to develop the software for the handheld computers. This caused a delay of a few months.

**Barrier 3 – External factors caused delay in the installation of the secured bicycle sheds**

Installation of the secured bicycle sheds was delayed due to (i) the traditionally busy rental period in autumn at StudentENmobiliteit (start of the academic year), and (ii) the cold winter 2010-2011.

**Driver 1 – Arrangements with the local police to provoke theft by using the “lokfiets” (enticing bicycle)**

Discussions with the local police clarified that the “lokfiets” can only be used to provoke theft, but not to trace down bicycles that are already stolen. For the latter, a difficult procedure is necessary which did not seem possible here. Therefore arrangements with the local police were made to provoke theft by using the “lokfiets”.

**Lessons learned**

**Lesson 1 – Compatibility between the software of the handheld computer and the general system used at the secretary of StudentENmobiliteit**

Software of the handheld computer must be compatible with the software generally used at the secretary. Therefore, the same supplier was contacted who is already familiar with the general system used by StudentENmobiliteit.

**Lesson 2 – Feasible locations for the installation of secured bicycle sheds**

The initial plan was to install the secured bicycle sheds on public domain, near two protected and classified monuments. However, it is rather difficult to obtain a building permit for such locations. Alternative and more feasible locations were found at the parking places of Gent University and two university colleges.

**Lesson 3 – Strong agreements with external partners**

When small infrastructure works are included in a measure (such as the installation of secured bicycle sheds at university and university colleges), a high dependency exists on external partners (in this case: board of university and university colleges). Strong agreements must be made in advance so that all measure partners keep to the time plan/schedule.

**Lesson 4 – Arrangements with police and justice department**

The “lokfiets” (enticing bicycle) can only be successful if the police and justice department cooperate. Agreements must be made first with the police: how can they work together with StudentENmobiliteit? Agreements must also be made with the justice department. The justice department must prosecute in case a bicycle thief is apprehended. If not, the police will not put effort into locating bicycle thieves.

**Lesson 5 – More secured bicycle sheds needed**

The IT-based anti-theft system with the handheld computer enables StudentENmobiliteit to relocate stolen bicycles much more efficiently. The “lokfiets” (enticing bicycle) was intended to gain insights in the profile of the bicycle thief. However, these two initiatives do not prevent bicycle theft. Preventing bicycle theft can be achieved by the installation of (more) secured bicycle sheds. This allows students to park their rental bicycle safely during night, weekend and holidays instead of parking their rental bicycles on-street in bicycle racks.

**Lesson 6 – Integration of the rental bicycles of StudentENmobiliteit into a bike sharing program**

Another way to prevent bicycle theft is to integrate the rental bicycles of StudentENmobiliteit into a bike share programme. In the current system, every student owns his/her own rental bicycle and must seek for parking place during night, weekend and holidays with the risk of bicycle theft. In a bike share programme, the rental bicycle can be safely parked in each bicycle station of the programme so that no one has to be worried about bicycle theft.
Lesson 7 – Increase in efficiency

Although the CBA results of the handheld computers seem negative at first sight, it has to be taken into account that there are other non-quantifiable benefits to this system. Due to the increased efficiency, the bicycle city guards have more time available for other work activities. On the other hand, more bicycles can be controlled and more stolen rental bicycles can be retrieved. This could lead to an increase in the number of recovered rental bicycles. Furthermore, students are now informed much faster if their stolen bicycle is recovered and the recovered stolen bicycle is returned to the student much faster.

3.2.3.5.6. Measure 8.10: Route planner for bicycles

Measure description

Measure 8.10 GEN aimed at stimulating safe cycling in the City of Gent through the development of an Internet-based route planner for bicycles that not only gives the fastest route, but also the safest one. It also has the possibility to export the calculated routes to a (bicycle) navigation system.

There were no important deviations from the original plan.

Evaluation approach

Evaluation of the use of the bicycle route planner was easy. The website that promotes the bicycle route planner also registers among others the number of visits, the number of unique visits, the number of ‘events’ (i.e., requested routes) and the visiting time. This occurs on a daily basis and information can be analysed with Google Analytics. Google Analytics is a web analytic solution and offers insight in website traffic. Data are continuously collected and information is digitally available which facilitates the evaluation.

The acceptance level of the bicycle route planner by different target groups (students in higher education, citizens in general and cyclists) was evaluated through the survey organized on IP-level on the perception of quality of cycling and bike services. In the survey organized before the implementation of the bicycle route planner, respondents were asked to indicate whether they are interested in future activities that the city might take. After the implementation of the bicycle route planner, the survey on IP-level was repeated among the same target groups, but the question was targeted this time to the familiarity with the route planner. This information can be considered as another aspect of the acceptance level besides the interest in the bicycle route planner before it was implemented. Consequently, when evaluating the acceptance level of a measure, one should be aware of the difference between the interest before the measure is implemented and the actual use and familiarity afterwards. This difference was at the start of CIVITAS ELAN neglected so that the initial target level was wrongly formulated. The data collection monitor mentioned “Acceptance level will be at least 70%” as target level for the indicator “Acceptance level of the bicycle route planner”. During the evaluation activities, it became clear that this target level had to be reformulated. Therefore, a distinction was made between (i) the interest in the bicycle route planner before it was implemented as one aspect of the acceptance level and (ii) the familiarity with the bicycle route planner afterwards as another aspect of the acceptance level. Target levels needed to be reformulated accordingly as well.

Impact evaluation

Key result 1 – Citizens and students in higher education are more interested in the bicycle route planner than cyclists

Before the implementation of the bicycle route planner: students in higher education (68.7%) and citizens (71.9%) were more interested in the bicycle route planner than the cyclists themselves (56.3%). Quantifiable targets and objectives related to the acceptance level are thus only partially achieved (min. 70%).
Key result 2 – Citizens and cyclists are more familiar with the bicycle route planner than students in higher education

After the implementation of the bicycle route planner: citizens (25.2%) and cyclists (21.6%) are more familiar with the bicycle route planner than students in higher education (9.8%). Quantifiable targets and objectives related to the acceptance level are thus only partially achieved (min. 25%). The lower familiarity rates among students in higher education might be explained by the lower promotion towards this target group. Although Gent is an important student city, promotion towards students is sometimes low mainly because this must be organized via the student office which already has to distribute too much information towards students.

Key result 3 – Being interested does not automatically result in using the bicycle route planner

When comparing before and after data: despite a positive attitude towards the bicycle route planner, only a minority has already used it. An important difference thus exists between an overall interest in the bicycle route planner before the start of CIVITAS ELAN and effectively using it afterwards. Quantifiable targets and objectives related to the acceptance level are thus only partially achieved. The difference between interest and familiarity is large especially among students in higher education. However, communication of the bicycle route planner to these students was limited.

Key result 4 – More than 2,000 requested routes each month

The average number of requested routes per month is more than double the quantifiable target of 1,000 requested routes per month. The inventory of route planner contacts is thus successful.

Key result 5 – Direct effect of promotion campaigns

The evolution of the inventory of route planner contacts illustrates that promotion campaigns have a direct influence and result in an increase in the number of requested routes. For example, the first day after the press release, more than 1200 citizens consulted the route planner. This increase is however only temporary and directly associated with the timing of the promotion campaigns. Afterwards, the effect of the promotion campaign diminishes. Therefore, promotion of the bicycle route planner should be a continuous effort.

Process evaluation

Barrier 1 – Complex procedure for IT projects

Procedure for IT projects in the city of Gent is complex which delayed somewhat the implementation of the bicycle route planner.
Barrier 2 – Different priorities of other partners
Digipolis was the principle participant who researched and developed the web-based bicycle route planner. However, Digipolis did not allocate budgets for CIVITAS ELAN measures at the start of the project in 2009. The next year (2010), clear arrangements were formulated and budget problems within Digipolis were solved.

Driver 1 – Availability of technological knowledge
Technological knowledge available in Gent (Tele Atlas, Digipolis, GIS department of city of Gent, etc.).

Driver 2 – Integration of measure 8.10-GEN with other measures in IP 5 and measures outside CIVITAS ELAN
Measure 8.10 GEN is part of a lot of bicycle services developed in the Mobility Department of the City of Gent. Consequently, the bicycle route planner was integrated in the general bicycle website \(\text{www.gentfietst.be} \) – see measure 4.5 GEN). Furthermore, measure leaders of related measures promote the bicycle route planner through their own measures and the bicycle website is used in measures outside CIVITAS ELAN as well. The Tourist Office of the city of Gent wants to promote Gent as a Bicycle Town. For this reason, they will promote the bicycle route planner through their communication channels as well. The bicycle route planner was adjusted for a large art event in Gent (TRACK, May-September 2012) so that visitors are stimulated to cycle towards different art locations throughout the city.

Driver 3 – Active participation of stakeholders and users
Stakeholders as the cycle union, the cycle officer of the city of Gent and province of East Flanders, colleagues, friends and family were actively involved in testing the bicycle route planner.

Updates of the bicycle route planner are partly based on the feedback that is received from users. Users of the bicycle route planner can always give feedback and comments through e-mail (fietsrouteplanner@gent.be or mobiliteit@gent.be), at GentInfo or by filling out comments in the Feedback Database integrated in the bicycle route planner.

Lessons learned

Lesson 1 – Clear task division between technological and content development
Within this measure, one partner (Digipolis) was responsible for the technological development of the bicycle route planner whereas another partner (measure leader from the Mobility Department of the city of Gent) was responsible for the content since she has a better practical knowledge of the study area. This clear task division facilitated the development of the bicycle route planner. Moreover, this guaranteed an on-time implementation of the bicycle route planner.

Lesson 2 – Continuous updates of the bicycle route planner (technological and content)
It is important to adjust the bicycle route planner to the newest technological developments (e.g., apps, google maps ...). The technological development of the bicycle route planner is one aspect, but the route planner must be updated regularly. For example, shortcuts for cyclists and bicycle bridges are normally not included in digital data of (mainly car-oriented) road infrastructure. This type of information was added to the bicycle route planner in a next stage.

Lesson 3 – Involvement of stakeholders in the upgrade of the bicycle route planner
The measure leader already has a good knowledge of the bicycle infrastructure in the study area, but this can be supplemented with field knowledge of stakeholders such as the bicycle union, the cycle officer of the city and/or province, colleagues, friends and family.

Lesson 4 – Continuous promotion, especially to students in higher education
Promotion of the bicycle route planner was not based on a single event, but it required a continuous effort. More effort needs to be taken to reach the students in higher education. They are an important target group as more than 80% of the 65,000 students in higher education are cycling in Gent.

Lesson 5 – More detailed evaluation indicators
The interest in and the familiarity with the bicycle route planner already gives an indication of the acceptance level of the bicycle route planner. However, it would also be interesting to evaluate the
convenience of the bicycle route planner and whether people really recognize the benefits of this route planner. This should be kept in mind for future initiatives.

3.2.3.6. Evaluation results on corridor level

Description of the measures

The quality of life in the city is a crucial objective for the City of Gent. Mobility and health go hand in hand here, whether about the environment or about our individual health. Since car traffic is one of the mayor negative impacts of mobility in the city, alternatives to the car need to be stimulated. In this context the CIVITAS ELAN were implemented in the corridor.

The southern part of this axis (from The Loop to the Sint-Pieters station) is the main entrance road towards the city centre, with a lot of traffic and congestions. The southern part is even one of the most dynamic areas in Gent with the fairground area and the railway station area being developed. From the Sint-Pieters train station towards the city centre, the corridor is characterized 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.

As there is a dense of huge projects around the train station which will attract lots of traffic, lots of mobility management activities were focused in this area to stimulate alternatives to cars.

At the Sint-Pieters train station an information point was installed to communicate and involve citizens on the development of the area. The car sharing partners Cambio and Max Mobiel also organised their activities on this location. Over the whole corridor additionally new safe and secured bicycle sheds, rental bikes became available here. Ramp metering, redesign of the road to improve the quality of the public transport, with specific attention towards pedestrians and cyclists is realised.

At the northern part of the corridor, the Korenmarkt is the heart of the pedestrian area. To enforce the quality of this area, traffic should be decreased by means of an automatic number plate recognition system. Goods distribution is also managed in a better way in this area by providing dedicated loading and unloading spots and specific hours to distribute goods. Finally the Korenmarkt which is also a public transport node was refurbished.

Some actions to improve the quality of life were done on city level:

- Enhancing the use of clean vehicles improving the air quality by cleaning up the fleet through stimulating a sustainable market as electric cars, CNG vehicles, hybrid buses and B30 and through optimising the energy use by providing ecodriving trainings, reduction of car fleet and stimulating car sharing, following up the tyre pressure and reducing energy loss of trams.
- Mobility management increasing citizen's awareness leads to changing their mobility behaviour. New communication strategies focused on different target groups (e.g. employees companies, pupils, cultural event visitors, car-sharing users) was introduced.
- Adjust car & freight traffic by traffic management decreasing car and freight nuisance by managing (parking) space to increase its quality and its use, rationalising freight distribution, providing reliable traveller information, simplifying ticketing and integrating fares which stimulated the use of public transport and ‘decongesting’ corridors from polluting vehicles.
- Improving the quality of the public transport stimulating the use of sustainable transport mode by security enforcement, improving the accommodation and access of the public transport stops, increasing the commercial speed and improving the available information at the public transport stops.
- Stimulating cycling and walking by implementing cycle route planner, new types of secured bicycle bins, anti-bike theft chip, walking map and the improvement of the infrastructure. These measures are often supplemented with campaigns such as a walking campaign or promoting the cycle website (with all cycle related information).
There were deviations from the original plan:

- Bio diesel (B30) not implemented – The measure was stopped at January 2012. The main barriers were the fact that B30 is not an approved fuel in Belgium, which caused the problem of distributing B30 and that car manufactures keep reserved to provide warranties on the use of B30.
- Collective taxi service not implemented – This measure was stopped in 2009 due to the insufficient support from the taxi sector themselves.
- Intelligent P&R enforcement delayed – Due to the development of surrounding site, P&R will be relocated. The installation of the parking equipment is therefore useless, however, when the new P&R is developed, the measure will be implemented anyway.
- Implementation of pedestrian area enforcement still on-going – The installation of the cameras is delayed for technical and organisational reasons. In September 2012 cameras are installed and being tested on two locations. Another seven locations will be done after the CIVITAS period.
Evaluation approach

According to the evaluation plan a wide range of evaluation activities were done to understand the impact of the measures. In general the evaluation approach proved to be solid and effective. However some important observations were done which are important to take into account for the future:

Not all the desired data could be collected: Not all data finally could be collected and not all after surveys were fully in line with the before surveys. Different reasons were identified: time pressure, lack of motivation or involvement but also the positive reaction to improve the quality of the surveys in comparison with previous surveys. During the lifetime of CIVITAS ELAN a lot of effort was done to involve measure leaders and other related actors better in the evaluation work and to make them aware of the need for good data. Finally in most cases a creative processing and interpretation of the data allowed to draw well motivated conclusions.

Different monitoring systems available: The PT company has several monitoring systems which facilitated the evaluation of set of public transport measures. The monitoring systems are the Quality Monitoring System, the Security Monitoring System and the Commercial Speed Monitoring System. The city of Gent used the liveability monitoring system to evaluate the modal split on city level.

CIVITAS evaluation timings sometime too short: Time frame of CIVITAS is too short to evaluate profoundly large projects as redevelopment of main corridor axis, the main train station area, the traffic guidance system, and the innovative parking guidelines. Also CIVITAS timing does not always fit into the data collection timings of the standard data collection period of the public transport company De Lijn or the city of Gent used for their monitoring systems. However, due to the fact that the process of monitoring is an established process within the PT company of the city of Gent, the evaluation over a longer period in time is guaranteed.

CBA was not always easy; this should better be done by experts. The results were useful, but as not all benefits can be quantified, costs were mostly higher than the benefits.

Useful input from the University of Gent, they had another view on the evaluation methods as e.g. the bikeability index. However this index need to be analysed how to implement on larger scale.

On corridor level, the impact of the project on the modal split and air quality was evaluated. A traffic model was constructed to assess the air quality in 2015 with or without the CIVITAS measures and modal split survey was carried out in the corridor.

Impact evaluation

Key result 1 – Modal shift in the CIVITAS corridor towards durable transport modes by 2%

Within the corridor, the use of cars as driver or passenger is reduced by 1.8%, the target of 2% is thus almost achieved. The car drivers and cyclists left their transport mode at home and went walking to school or work. Reason is that at the moment the survey took place, the redevelopment of the main corridor axis including new cycle lanes and improved footpaths was just finished, on long term it is expected to have better results.

Key result 2 – Increase of air quality in the CIVITAS corridor by 2%

Despite the positive results on measure and/or IP level, no impact on air quality can be observed. But a decrease of 350 tonnes of CO₂ (or 1.3%) is noticed. It is clear that the CIVITAS measures are bit too small scaled to have impact on air quality, but as the measures will be up-scaled to the whole city, to all target groups, impact on air quality will be measureable.

Process evaluation

Barrier 1 – Difficult to reach the target group

For some actions it was difficult to reach the target group, depending on the type of people in the target group and the type of action. The most difficult people to reach for these actions were the ‘die hard’ car drivers, certainly when they were approached in group. It is also more difficult to reach people individually than in groups. Campaigns were adapted to reach these target groups.
Barrier 2 – Technical problems
New systems as ramp metering system, traffic guidance system, pedestrian area enforcement by camera’s were associated with some technical problems. Testing period was set up, hard- and software systems were adapted after some testing periods on testing locations. This took more time than planned.

Driver 1 – Team building activities in Gent led to better cooperation and knowledge exchange between the CIVITAS partners
Few examples: installation of electric charging station for electric Cambio cars on premises of the city of Gent and in parking lots; cooperation of city of Gent with Max Mobiel to install secured bicycle bins on public places; centralised bicycle website with bicycle information and route planner from several partners as the city of Gent, Max Mobiel and Student&Mobility; introduction of sustainable purchase strategy (clean cars) at city of Gent, Cambio and De Lijn, strong cooperation between site coordinator, site dissemination manager and site evaluation manager, …

Driver 2 – Motivated measure leaders
The CIVITAS measures were most of the time all guided by motivated measure leaders. Also deadlines, with a good monitoring system linked to a realistic time plan stimulated the measure leaders to succeed their projects. The work was sometimes only a bit complicated because of the high work pressure of the measure leaders.

Driver 3 – Involvement of citizens and partners in the organisation of participation activities
Over four years of CIVITAS, the measure leaders and other partners involved gained a lot of experience in the organisation of such measures. People are more involved when they get the chance to organise an activity / action / campaign themselves. Examples of this are the school competition, the organisation of the Mobi-week and the pilot project of secured bicycle bins in dense areas, the implementation of the cycle street, etc. Advantage is also the information that is collected in surveys. Employees, Cambio users, students, citizens, etc. often are the best people to give advice on certain topics.

Driver 4 – Incentives to convince participants
Incentives (e.g. candies, a concert, prize, etc.) stimulated participants often to participate very well. Incentives were not only materialistic things, but also group pressure plays a role in this (e.g. ‘Our department is moving’).

Lessons learned
Lesson 1 – Support from the main stakeholders important for success of project
Before starting a project it is required to check if there is sufficient support from the main stakeholders, especially if the stakeholders are not well known and highly commercial as e.g. the taxi sector, the car manufacturers, the project developers or the shop keepers.

Lesson 2 – A combination of specific measures has a significant impact on cleanliness of the fleet
Increasing cleanliness of the fleet requires a combination of measures as setting up a sustainable purchase strategy, providing eco-driving trainings, follow up of the tyre pressure of the vehicles, removal of vehicles with low mileage from the fleet and at same time stimulating use of bike, public transport and car sharing system as Cambio, optimising energy use on trams and introducing hybrids, CNG and electric vehicles in the fleet.

Lesson 3 – For mobility management a diverse, preferably peer-to-peer approach to well defined target groups is more effective
Changes in acceptance and modal-split can be achieved in a stronger way by implementing specific strategies for the different type of target groups both for employees, pupils and visitors of the city.
Lesson 4 – Extended implementation period needed for traffic management

New systems as ramp metering system, traffic guidance system, pedestrian area enforcement by camera’s were associated with some technical problems. For those innovative systems, more time is needed for testing and optimising the hard and software of the systems.

Lesson 5 – Impact large infrastructure works on satisfaction citizens and public transport users

The impact on the public transport service during complex road works should be kept as low as possible and also the traffic organisation as stable as possible.

Lesson 6 – Successful walking and cycling measures should be continued

As impact on walking and cycling on measure level is very positive, these measures as implementation new cycle lanes, cycle streets, cycle bins need to be up-scaled to the whole city. It is also required to focus the campaigns towards new target groups as e.g. students (there are 67,000 university/ high school students in Gent).

3.2.4. Conclusions & recommendations for this city

Within CIVITAS ELAN, Gent further developed specific themes and some innovative ideas were implemented. More and more, Gent is becoming a real cycling city: new initiatives like the cycle website, a route planned for bicycles, the cycle street, bike boxes and many others have enhanced the cycling culture. Also significant improvements in public transport took place, by the introduction of hybrid buses and reorganising important public transport routes. Although Gent had a long tradition in participatory involvement of citizens and other stakeholders before CIVITAS, during the project new innovative methods were demonstrated.

However, also in Gent, there were barriers obstructing the implementation process of some measures. Due to differences of opinion between important stakeholders, the implementation of biodiesel was not implemented. Similarly, the establishment of a camera surveillance system could only be implemented after a change in political representation. And because many new technological innovations were implemented, technical problems regarding standards and legal frameworks needed to be overcome as well.

Many of the CIVITAS measures will have a life after CIVITAS, for example the city fleet management is embedded in daily practice and energy savings in public transport will continue. The evaluation tools developed within CIVITAS will also be integrated into the daily routine of the Mobility Department.
3.3. Zagreb

3.3.1. City description

The 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, with more than 65 000 students. The city 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 3.17: Zagreb city map

However, the development of the transport system was not able to meet the growing needs of the city mobility; a steep rise in the number of private cars has caused congestion and air quality problems in the city centre, calling for urgent action. Public transport consists of buses, trams, a funicular, and suburban trains. The city centre boasts many pedestrian areas, parks and green areas. Special attention is given to mobility requirements of persons with special needs.

Table 3-8: Key characteristics for the city of Zagreb

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>2009-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td></td>
</tr>
<tr>
<td>Surface (km²)</td>
<td>641.29</td>
</tr>
</tbody>
</table>

*The data was provided by Croatian Central Bureau of Statistics.*
### Car ownership (per 1000 inhabitants)

<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car (driver)</td>
<td>24.36</td>
<td>20.5</td>
</tr>
<tr>
<td>Car (passenger)</td>
<td>5.84</td>
<td>4.52</td>
</tr>
<tr>
<td>Walk</td>
<td>31.44</td>
<td>30.34</td>
</tr>
<tr>
<td>Cycle</td>
<td>2.96</td>
<td>4</td>
</tr>
<tr>
<td>Bus</td>
<td>10.78</td>
<td>15.98</td>
</tr>
<tr>
<td>Tram</td>
<td>21.56</td>
<td>21.4</td>
</tr>
<tr>
<td>Train</td>
<td>2.06</td>
<td>2.94</td>
</tr>
</tbody>
</table>

### Society and economy

<table>
<thead>
<tr>
<th>Category</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>792.875</td>
<td>292.875</td>
</tr>
<tr>
<td>% pop over age 65</td>
<td>17.1</td>
<td>17.5</td>
</tr>
<tr>
<td>% pop under age 15</td>
<td>14.9</td>
<td>15.0</td>
</tr>
</tbody>
</table>

### Energy and environment

<table>
<thead>
<tr>
<th>Category</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>% estimated energy use by transport sector in total energy consumption of Zagreb</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>% emissions of Carbon Dioxide by road sector in total emissions in Zagreb</td>
<td>31</td>
<td>30</td>
</tr>
</tbody>
</table>

### 3.3.2. The CIVITAS-ELAN strategy

#### 3.3.2.1. The CIVITAS corridor in the city

The demonstration corridor 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. The Savska Street is a major part of ELAN corridor in the City of Zagreb. It is a 3 km long, two-directional street which connects the narrow city centre with the northern bank of the Sava River. The street was selected as it is one of the most congested traffic arteries, with a large number of tram lines and personal vehicles sharing insufficient space. The street also hosts several faculties, three student dormitories and restaurants as well as more than 100 institutions from private and public sector.

#### 3.3.2.2. The CIVITAS integrated packages of measures

For the city of Zagreb the Evaluation team of CIVITAS-ELAN identified 5 integrated packages of measures grouping a wide range of measures with the objective to change the mobility situation in the city focusing on the corridor.

### Table 3-9: Measure overview Zagreb

<table>
<thead>
<tr>
<th>City/ IP/ Measure Number</th>
<th>Measure Title</th>
<th>Impact evaluation</th>
<th>CBA</th>
<th>Focussed process evaluation</th>
<th>Evaluation of Citizen engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 1- ZAG</td>
<td>Implementing the use of clean vehicles in public fleets</td>
<td>X</td>
<td></td>
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<tr>
<td>1.3-ZAG</td>
<td>Energy recovery system for trams</td>
<td>X</td>
<td>X X X</td>
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<tr>
<td>1.14-ZAG</td>
<td>Clean public transport strategies (CNG, biofuel and emission control)</td>
<td>X</td>
<td>X X</td>
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<tr>
<td>1.15-ZAG</td>
<td>Clean public fleet vehicles</td>
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</tr>
<tr>
<td>IP 2- ZAG</td>
<td>Stimulating intermodal</td>
<td>X</td>
<td></td>
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<tr>
<td>City/IP/Measure Number</td>
<td>Measure Title</td>
<td>Impact evaluation</td>
<td>CBA</td>
<td>Focussed process evaluation</td>
<td>Evaluation of Citizen engagement</td>
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<tr>
<td>2.5-ZAG</td>
<td>Intermodal high-quality mobility corridor</td>
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<tr>
<td>4.8-ZAG</td>
<td>Improving cycling conditions</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>IP 3-ZAG</td>
<td>Improving QoS of PT through innovative technologies</td>
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<td></td>
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</tr>
<tr>
<td>2.6-ZAG</td>
<td>Promotion of electronic PT tariff system</td>
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<td>X</td>
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<tr>
<td>8.2-ZAG</td>
<td>Public transport priority and traveller information</td>
<td>X</td>
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<tr>
<td>IP 4-ZAG</td>
<td>Traffic management in dialogue with stakeholders</td>
<td>X</td>
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<td>3.2-ZAG</td>
<td>Study of congestion charging and dialogue on pricing</td>
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<td>X</td>
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<tr>
<td>7.4-ZAG</td>
<td>Freight delivery restrictions</td>
<td>X</td>
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<tr>
<td>IP 5-ZAG</td>
<td>Safe and secure public transport</td>
<td>X</td>
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<tr>
<td>5.3-ZAG</td>
<td>Safety and security for seniors</td>
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<tr>
<td>5.8-ZAG</td>
<td>Security improvement in PT</td>
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<tr>
<td>IP 6-ZAG</td>
<td>Changing travel behaviour</td>
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<tr>
<td>4.4-ZAG</td>
<td>Mobility management for large institutions</td>
<td>X</td>
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<tr>
<td>4.8-ZAG</td>
<td>Improving cycling conditions</td>
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<td></td>
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<td>X</td>
</tr>
<tr>
<td>4.11-ZAG</td>
<td>Comprehensive mobility dialogue and marketing</td>
<td>X</td>
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<td></td>
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</tr>
</tbody>
</table>

### 3.3.3. Summary of evaluation results

Here we summarize the results of the detailed evaluation of the measures in the city.

First the findings on the level of the Integrated Packages of measures are discussed. These are the impacts for which the different measures are working strongly together to achieve this impact. In many cases it is also difficult to disentangle the impact of the different measures since they are implemented in the same timescale for the same target group. For this reason the impacts are considered together and a more qualitative assessment is given of the importance of each of the measures in the package. This is done through an expert ranking of the measures in which the Site Evaluation Managers together with mobility experts familiar with this type of measures rank the measures in order of importance on the observed impact.

Further the impacts which are specifically related to one of the measures are discussed and conclusions are drawn per measure.

The detailed information is presented in the Measure Evaluation Result Templates (MERT) in annex of this report. Also these MERTs are structured in this way: first the aspects to be discussed on the level of the Integrated Packages of Measures and further the related Measures.
3.3.3.1. Integrated package 1: Enhancing the use of clean vehicles

3.3.3.1.1. Evaluation on Integrated package level

Integrated Package Description
All measures in this integrated package are aimed toward introducing new and “greener” vehicles into the public fleets:

- Measure 1.3 Energy recovery system for trams: 70 new trams with the ability to return some of the consumed energy back into the network while braking, were introduced by the PT company (ZET).
- Measure 1.14 Clean public transport strategies (CNG, biofuel & emission control): ZET introduced 160 new buses of which 100 buses run on the mixture of regular diesel and biodiesel and 60 buses run on CNG.
- Measure 1.15 Clean public fleet vehicles: Waste disposal company (CISTOCA) introduced 52 new vehicles running on a mixture of regular diesel and biodiesel.

All of these measures have the common objectives to decrease energy consumption, emissions and vehicle noise.

There was one deviation from plan: the construction of a CNG filling station (within the measure 1.14) was postponed to 2013.

Evaluation Approach
The implemented measures would lead to a reduction of emissions and vehicle noise, a reduction of energy consumption and an increase in the usage of alternative fuels. The impacts that are evaluated on measure level are combined on IP-level to evaluate the overall effect of these measures.

During the data collection process all activities were conducted without any problems (only minor delays occurred). The contacts which were made with Laboratory of Applied Thermodynamics from Aristotle University of Thessaloniki were especially valuable in terms of evaluating emission levels of the bus and waste disposal fleet.

Impact evaluation

Key result 1 – Less noise from public fleet
The average noise level of the public fleet vehicles decreased from 80.26 dB to 77.18 dB (the target was to decrease it by 3 dB). All measures from this IP contributed to this result: the tram noise level on the straight line was reduced by 0.09 dB and by 8.3 dB in bends (measure 1.3); the bus noise level was reduced by 2.08 dB (measure 1.14); the noise level of waste disposal vehicles was reduced by 1.85 dB (measure 1.15).

Key result 2 – Less emission of particulates
The average level of PM$_{2.5}$ emissions decreased by 33.41% (the target was to decrease it by 5%). This decrease is due to the measures 1.14 and 1.15. Most of this reduction is due to the better characteristics of new vehicles as well as due to the introduction of CNG buses (measure 1.14) which considerably reduced PM$_{2.5}$ emissions.

Key result 3 – Increase in energy consumption
The targeted decrease in energy consumption by 10% was not reached mainly because of the characteristics of the new PT vehicles. New buses have significantly more powerful engines compared with the older fleet vehicles. Moreover, the buses are now equipped with additional systems which were non-existent in the previous models of buses (e.g. air conditioning). This means that they require more energy to operate. The same applies for the tram fleet. Energy consumption in the tram fleet increased by 10%, mostly because different technical characteristic of new trams (they have over 60% more power compared with the old trams) and they are equipped with auxiliary systems which were non-existent in older fleet. The increase in energy consumption can be attributed to the changed vehicle characteristics of the new fleet, since the operating conditions of PT vehicles are more or less the same.
Key result 4 – Increase in CO\(_2\) emissions

For the same reason that explains the increase in energy consumption, the target of decreasing CO\(_2\) emissions by 5% was not achieved either. The CO\(_2\) emissions were increased by 1.77%, mainly because of emission increase on the measure 1.14 (by 9.3%).

Process evaluation

Barrier 1 – Croatian fuel regulations

The current Croatian norm for the use of biodiesel states that fuel mixture can contain maximum 7% of biodiesel (and 93% of regular diesel) which made some of the measure level objectives unreachable.

Driver 1 – Good business plan

For all measures a good business plan enabled efficient measure implementation. One of the visible results of this planning was the arrival of all new vehicles on time or even well before schedule. This encouraged the measure teams to continuously push forward with the implementation.

Driver 2 – Political will

During the whole duration of the public transport fleet modernization the process itself was a good topic for earning political points at local elections which ensured political support to the project.

Lessons Learned

Lesson 1 – Establish necessary preconditions for introduction of alternative fuels

The CIVITAS ELAN project significantly influenced the structure of the public fleet. 52 waste disposal vehicles and 160 buses were introduced over the course of 4 years. This process also required some adjustments within PT and waste disposal company: driver and maintenance staff had to be educated; facilities for creating a mixture of regular diesel and biodiesel had to be implemented taking into account all technical and safety regulations etc. Only when this, almost, logistic support is provided, the process of fleet modernization can be efficient.

Lesson 2 – Need for investments in infrastructure

For all measures the lack of investments into infrastructure caused reduced measure impact or different barriers in measure implementation occurred. In order to reach full potential of new technology (energy recovery system, CNG and biodiesel), investments in rolling stock must be followed by investments into infrastructure (e.g. CNG filling station was never build which made operation of CNG buses more difficult).

Lesson 3 – Big difference between the old and new fleets has to be taken into account

The differences between old and new vehicles are considerable. Because of their different technical characteristics (regarding engine power as well as presence of auxiliary devices), the defined targets regarding energy consumption and emissions were not reached. This especially refers to the vehicles of ZET. It was very hard to expect reduction of energy consumption when such significant differences in engine power and vehicle equipment exist (especially when the investments in infrastructure did not occur).

Lesson 4 – Choosing the right measure for citizen engagement

In the measures of this IP citizen engagement activities were not implemented. Even the dissemination activities were relatively limited. However, this fact does not have to be considered as a downside, because not all measures are suitable for citizen engagement. In this case, it was more important to define a financial construction for the implementation of new vehicles and to ensure that the process of their introduction into the operation runs smoothly. For instance by ensuring continuous biodiesel supply, implement driver and maintenance staff training programme...
3.3.3.1.2. Measure 1.3: Energetic recovery systems for trams

Measure description
Public transport company ZET (Zagreb Electric Tram) is the main PT operator in the City of Zagreb. As a part of this measure, ZET has passed through the most radical tram fleet modernization in company history. This process started actually already in 2005, so by the start of the project 70 new trams were already in operation. Since the beginning of the ELAN project additional 70 trams were introduced. New trams were constructed by ZET’s technical specifications.

The existing fleet was gradually substituted by state of the art air-conditioned and low floor trams, which are able to generate and return power into electrical supply network.

From the electrical point of view – while braking, new trams are actually power generators and not power users. The electrical power which is generated during braking is returned into the power grid and can be used for other purposes. However, the concept of energy efficiency is not fully exploited during the ELAN project because the generated electrical power can only be used by another tram if that other tram is on the same network segment as the braking tram.

Evaluation approach
Since the measure is mainly oriented toward reaching a higher level of energy efficiency, the following indicators were used for the evaluation:

- Noise level on straight line and in bends
- Energy consumption
- Costs.

All data were received from ZET. Energy consumption was calculated as a ratio between the total electricity consumption of the fleet and the total number of passengers in the trams, as well as the ratio between total electricity consumption of fleet and total number of vehicle kilometres (vkm). Regarding the noise level, real-life measurements were conducted by ZET at different places of ELAN corridor.

During the project several problems with the data collection occurred:

- The data about the energy consumption (expressed separately for the old and new trams) was not available. Note that during the whole ELAN lifetime both old and new types of trams were in operation on a daily basis.
- The data about the distance which was travelled by the old and new trams was also not available. Only total number of vkm of the whole fleet was available.
- It also remained unknown how much energy each new tram generates during its operation.

Generally, due to the lack of data, the actual effect of the energy recovery system remained unknown. For the evaluation team, it was possible only to record total amount of energy used by tram fleet.

Impact evaluation

Key result 1 – Modernisation of tram fleet
The number of new vehicles in operation increased from 70 vehicles in 2008 to 140 in the final year of CIVITAS project.

Key result 2 – Increase of electricity consumption
Electricity consumption per passenger of the whole tram fleet increased by 25% (the target was to decrease it by 7% per passenger). Increase in the energy consumption is also indicated by the increase of the MJ consumption per vkm by 10.6%. Three key factors influenced these results:

- New trams are more powerful – new trams have 6 engines and the continuous power output of 390 kW, while the old trams had one engine and power output of 240 kW, i.e. power output is increased by 62.5%.
• New equipment – new trams are equipped with new systems and therefore they consume more energy (e.g. air-conditioning and heating system, information system etc.).
• Fewer passengers – the number of passengers decreased by 3.8% comparing the “before-after” state (caused by the cancellation of free tickets for students, seniors and other user groups, and by the increase of general public transport ticket prices).

Key result 3 – Decrease of vehicle noise level
Tramway noise level in curves decreased from 85 dB to 76.7 dB (the target was to decrease it by 5 dB); tramway noise level on the straight line decreased from 83.09 dB in to 83 dB (the target was to decrease it by 3 dB).

Process evaluation

Barrier 1 – Additional technological requirements
The section length of the catenary (overhead line) was not adequate for the new trams (the length of catenary section was too short for recovery systems), so the energy recovery system could not be fully exploited.

Barrier 2 – State of the infrastructure
Investments in the new fleet were not accompanied with the investment in the infrastructure (rectifying stations, power supply and catenary) which caused poor infrastructure quality at some network sections. Furthermore, since the power network and new trams were not equipped with some sort of power accumulators, the concept of energy efficiency is not fully exploited. However, it must be noted that these activities require substantial financial investments (for instance, it means complete redesigning of the power network).

Driver 1 – Good planning
Before acquiring the vehicles, ZET conducted an extensive technical and financial planning process which proved to be valuable later on during the project (measure was fully implemented).

Driver 2 – Political will
During the whole duration of the fleet modernization process, the process itself was a good topic for earning political points at local elections which ensured political support to the measure.

Lessons learned

Lesson 1 – Investments in infrastructure
New trams have the ability to generate energy while braking which can then be re-used in the same tram or it can be accumulated in the power network. However, this requires additional investments into power network and power accumulators. In order to reach full potential of this new technology, investments in rolling stock must be followed by the investments into infrastructure.

Lesson 2 – Necessity of full data sets
Evaluation process in this measure really highlighted the importance of detailed data sets. Due to the lack of data sets, the actual effect of the energy recovery system remained unknown. It is hard to justify the investments into this new technology without the right data. The majority of data issues could be resolved if each new tram would be equipped with a device that would measure the input-output power (i.e. consumed-generated power) in any given moment. Including sensors for monitoring individual tram use in the specifications for new trams would overcome this problem and could benefit maintenance as well.
3.3.3.1.3. Measure 1.14: Clean public transport strategies

Measure description

During the process of implementation of this measure, ZET (the main PT operator in the city) has implemented a comprehensive fleet modernization. In total 160 new buses were purchased: 100 powered on a mixture of biodiesel and regular diesel and 60 powered on CNG. The new buses were put in operation between 2008 and 2010 and they now make up for around 38% of the bus fleet. The construction of new buses follows the modern standards regarding passengers’ comfort, safety and accessibility.

It must be noted that measure 1.14 had another important objective which was not reached: the construction of a CNG filling station. Even though careful planning was undertaken, some barriers remained unresolved during the ELAN lifetime (mainly financial) and the construction of the filling station is postponed to 2013. In order to be able to operate, CNG buses have to be filled in on public filling stations, and that takes more time.

Apart from the introduction of the new buses, a special driver training programme was implemented as well. The objective of the programme was to increase the safety of passengers, but also to teach the drivers on how to save fuel.

Evaluation approach

Activities in this measure were oriented towards modernizing the fleet of buses which would lead to reduction of negative impacts, reduction of fuel consumption and increased usage of alternative fuels. Hence, impact evaluation focussed on monitoring the fuel use of the different fuel types and modelling the environmental characteristics of the bus fleet.

During the data collection process all activities were conducted without any problems (only minor delays occurred). The contacts which were made with Laboratory of Applied Thermodynamics from Aristotle University of Thessaloniki were especially valuable in terms of evaluating emission levels of the bus fleet.

Impact evaluation

Key result 1 – Increased share of alternative fuels
The share of biodiesel and natural gas in the total fuel consumption increased to 6.15% (the target was to introduce 10% of alternative fuels into the fleet). Furthermore, total fuel consumption in 2011 was 11 038 410 kg:
- 10 640 966 kg of fuel mixture (regular diesel and biodiesel) with 281 276 kg of biodiesel and
- 397 444 kg of CNG.

Key result 2 – Increased fuel consumption
Total fuel consumption increased by 7.33%. This can be explained by the technical characteristics and the equipment of the new buses. New diesel powered buses have more powerful engines compared with the old buses; they are equipped with air conditioning system, heating system, information system etc. – all of which require more energy in order to operate.

Key result 3 – Reduction of noise
Average noise level of buses decreased from 74.88 dB in 2007 to 72.8 dB in 2011 (the target was 3 dB).

Key result 4 – Impact on emissions
The CO\textsubscript{2} emissions increased by 9.26%, also due to the technical characteristics of vehicles. More powerful engines caused the increase of energy consumption which caused CO\textsubscript{2} emissions increase. However, PM\textsubscript{2.5} emissions decreased by 90.9% for tons and almost 59% for kg/vkm.
Process evaluation

Barrier 1 – Unsuccessful public tender and overall economic situation

Public tender for construction of the CNG filling station was conducted three times. Each time the tender was challenged and failed in the end. Eventually, due to the lack of financial resources, the construction of CNG filling station was postponed until 2013. It is clear now that the financial crisis which occurred and recession which followed in Croatia affected the measure implementation.

Barrier 2 – Legal framework

During the ELAN project, significant changes occurred in the Croatian law practice concerning which made biodiesel supply difficult. Moreover, the current Croatian norm for the use of biodiesel states that fuel mixture can contain maximum 7% of biodiesel (and 93% of regular diesel). This introduced a barrier in terms of achieving the measure objectives.

Driver 1 – Political will

During the whole duration of the fleet modernization process, the process itself was a good topic for earning political points at local elections which ensured political support to the project.

Lessons learned

Lesson 1 – Investing into infrastructure is equally important

The ELAN project significantly influenced the structure of the bus fleet of ZET. 160 vehicles over the course of 3 years were introduced. This process also required some adjustments within the company itself because new technologies were introduced (biodiesel and especially CNG). However, the problem with CNG filling station was not solved, so the gas filling process is still taking much more time than originally planned. In future, this supply chain has to work efficiently in order to achieve optimal results. This problem with the construction of CNG filling station confirms the following: investments into rolling stock have to be followed by the investments into infrastructure.

Lesson 2 – Indirect impacts of fleet modernization

Not all impacts of the new fleet are positive, but in general it is useful to modernise a new fleet, because it also contributes to a positive image of PT company. The modern vehicles offer better comfort to the passengers and this could be a factor that can attract new users of public transportation.

3.3.3.1.4. Measure 1.15: Clean public fleet strategies

Measure description

In this measure the local waste disposal company CISTOCA purchased 50 new waste disposal vehicles and 2 pick-up cars. These 50 new waste disposal vehicles make roughly one quarter of entire waste disposal fleet (since only 2 pick-up cars were introduced, personnel and pick-up cars were not considered in the evaluation; moreover it is difficult to compare the data for such different types of vehicles).

The new vehicles were implemented during the course of four years. The largest group of vehicles came in 2009 (35 of them). In 2010 9 additional vehicles were introduced while the last 8 vehicles arrived in 2011 and 2012 (3 and 5 vehicles, respectively). All new vehicles are leased, apart from 5 vehicles in 2012 which are purchased by CISTOCA.

All new vehicles are running on the mixture of regular diesel and biodiesel. During the measure implementation the supply of biodiesel was interrupted from October 2009 till July 2011, due to administrative problems concerning procurement. After two years and four public biddings biofuel supply was back on track again in July 2011. Since then, all diesel vehicles of CISTOCA fleet run on B7.

In parallel with the introduction of new vehicles, CISTOCA staff was trained and dissemination activities were implemented. Apart from the driver training programme that was implemented
(education of drivers about vehicle characteristics and its usage) a special training of CISTOCA maintenance personnel took place in Farid industrial facility in Italy. Regarding the dissemination, three measure leaflets were produced (all of them supported by ODRAZ – responsible for site dissemination).

No deviations were made in this measure.

**Evaluation approach**

Activities in this measure were oriented towards modernizing the fleet of waste disposal vehicles which would lead to reduction of negative impacts, reduction of fuel consumption and increase usage of alternative fuels. Hence, impact evaluation focuses on the energetic and environmental impact of the measure by keeping track of the following indicators:

- Energy consumption – the consumption is measured on fleet level in MJ/vkm. The data for this indicator was provided by CISTOCA (amount of consumed fuel and vehicle kilometres).
- Fuel use – this indicates the share of different diesel fuels in the total fuel use (i.e. the share of regular diesel and biodiesel). It is expressed in kg (for mass) and in litres (for volume) for the whole fleet.
- Number of clean kilometres – indicates the total number of clean kilometres driven by the vehicles running on biodiesel.
- Emissions – CO\textsubscript{2} and PM\textsubscript{2.5} emissions are expressed annually (in kg and kg/vkm) on a fleet level. All emissions are calculated by using the software for emission modelling – COPERT 4.
- Noise level – noise level was measured by a sound meter placed outside of the vehicle. Vehicle engines were tested at different RPM's and average noise level of a vehicle is presented.

During the data collection process all activities were conducted without any problems (only minor delays occurred). The contacts which were made with Laboratory of Applied Thermodynamics from Aristotle University of Thessaloniki were especially valuable in terms of evaluating emission levels of CISTOCA fleet.

**Impact evaluation**

**Key result 1 – Reduction of emissions**

CO\textsubscript{2} emissions of waste disposal vehicles decreased by 5.13% (the target was to reduce it by 10%). PM\textsubscript{2.5} emissions remained unchanged if the absolute values are compared (kg), but they are reduced by 15.68% if the relative values are observed (kg/vkm). For the PM\textsubscript{2.5} emissions the target was to reduce it by 10%.

**Key result 2 – Less fuel used**

Fuel consumption in CISTOCA fleet decreased by 5.6% (the target was to reduce it by 10%).

**Key result 3 – Increased share of alternative fuels**

The share of biodiesel in the total fuel use increased by 3.31% (for litres) or by 3.44% (for kilograms). The defined target was to replace approximately 10% of fuel in the public fleet with alternative fuels. However, that share would be 7% if the problems with the biodiesel procurement had not occurred (i.e. since this supply issue was resolved in July 2011 all vehicles are now running on the 93% diesel and 7% biodiesel mixture).

**Key result 4 – Lower noise level**

The noise level of fleet vehicles decreased from 78.07 dB in 2008 to 76.22 dB in 2011. The target to decrease it by 3 dB was almost achieved. The new engines and materials used in vehicle production clearly produced this positive effect.

**Key result 5 – Reduced operational costs**

CBA analysis showed that the operational costs were reduced by 38.72%.

During the implementation of the measure one quantifiable target was altered because it was defined too optimistically in the beginning of the project (the expected reduction of CO\textsubscript{2} emissions by 15% was changed into: decrease of CO\textsubscript{2} by 10%); and new ones were added (further decrease of emissions by
10% in the up-scaling analysis, reducing the fuel consumption by 10%, reducing maintenance costs by 3% and reducing operational costs by 3%).

Process evaluation

Barrier 1 – Insufficient technical planning and analysis to determine requirements of measure implementation

One of the measure objectives was to replace approximately 10% of fuel consumption of the CISTOCA fleet by alternative fuels. But during the ELAN project, CISTOCA could only add up to 7% of biodiesel into the fuel mix, due to the manufacturer restrictions (vehicle warranty), and Croatian norm on diesel fuels that allows a maximum of 7% of biodiesel in the fuel mixture.

Barrier 2 – Problems with biodiesel supply

The existing contract for biodiesel procurement had to be cancelled in 2009 according to the Croatian Public Procurement Law, due to changes within the supply company (change of the owner and the company name). Since then, four public tenders for biodiesel procurement were published, and three of them had to be cancelled.

Driver 1 – Good business plan

This was truly an important driver which enabled efficient measure implementation. One of the visible results of this planning was the arrival of new vehicles well before the schedule. This encouraged the measure team to continuously push forward with the measure implementation.

Driver 2 – Early definition of project task force and concept of work

This was very important for defining the measure activities and individual partner responsibilities early in the project. The result was that all the activities were carried out according to the measure description and without any delays. Moreover, 12 additional vehicles were introduced.

Driver 3 – Individual motivation

Key participants in this measure stated that they are feeling highly motivated because they are given the opportunity to work with experts in this field and exchange experience. One of the examples is the contacts which were established by the measure leader with the representatives of Laboratory of Applied Thermodynamics from Aristotle University of Thessaloniki. They provided the measure leader with the software for calculation of traffic emission (COPERT 4). The result was that data collection activities were carried out on time.

Lessons learned

Lesson 1 – Establish necessary preconditions for introduction of alternative fuels

ELAN project significantly influenced the structure of the CISTOCA fleet. 52 vehicles over the course of 4 years were introduced. This process also required some adjustments within the company itself: driver and maintenance staff had to be educated; facilities for creating a mixture of regular diesel and biodiesel had to be implemented taking into account all technical and safety regulations etc.

Lesson 2 – Ensuring uninterrupted supply of biodiesel

From October 2009 till July 2011 the supply of biodiesel was interrupted due to administrative reasons. Even though new vehicles can run on regular diesel, without this interruption measure results would be even more significant. Furthermore, Croatia still has only few biodiesel producers (mainly smaller to medium sized companies) which makes biodiesel procurement a bit difficult, because often the demand is higher than the supply. Before any large scale implementation of biodiesel this issue has to be resolved first.

Lesson 3 – Maintenance should be provided internally

All new waste disposal vehicles are leased apart from the 5 vehicles in 2012 which are purchased by CISTOCA. Due to the leased contract maintenance is outsourced and its costs are fixed. We believe that these costs could be significantly decreased if the CISTOCA would be conducting maintenance of new vehicles.
3.3.3.2. Integrated package 2: Stimulating intermodal journeys

3.3.3.2.1. Evaluation on Integrated package level

Integrated Package Description

The main objective of this integrated package is to reorganize the traffic infrastructure supporting more intermodal journeys, increased usage of bicycles for every-day trips and the reduction of accidents due to the more suitable traffic environment. In CIVITAS-ELAN two measures, both of them dealing with improvement of infrastructural conditions and intermodal integration between different sustainable modes of transport, focus on this objective:

- **2.5 Intermodal high-quality mobility corridor** – to define a high-quality mobility corridor from the southern part of the city into the historic city centre, where public transport, cycling lanes and pedestrians have priority over individual motorized traffic. This should lead to an improvement of the quality, accessibility and attractiveness of public transport, an improved integration with of the Croatian Railways resulting more public transport passengers and a decrease of the number of cars entering the city centre. The plan was to achieve this through some financially demanding infrastructural improvements, such as the construction of the new intermodal interchange and railway station in the ELAN corridor. Due to financial and time constraints, the implementation was limited to new cycling lanes and bicycle parking lots (for 20 bicycles). Also a communication scheme towards the general public was put in place. Additionally research was done on reorganization of the road traffic network of the corridor, which would lead towards the reduction of travel times (both for car and public transport). Also a study of intermodal terminal SAVA-NORTH was produced.
- **4.8 Improving cycling conditions** – this included establishing a network of high quality cycling lanes in whole ELAN corridor, parking lots, signposting for cyclists, preparation for the introduction of public bicycles etc. However, apart from several strategic documents like a Cycling Master Plan, the bicycle parking lots were the only physical implementation which occurred.

Evaluation Approach

The evaluation on Integrated Package level focuses on the synergies which different measures may produce to achieve a common objective. The choice of evaluation indicators was based on the objectives and expected outcomes of the measures.

The impact on the number of cyclists was measured by counting cyclists on 4 points within the corridor and 3 points outside the corridor. The number of accidents involving cyclists and pedestrians were also monitored in 3 streets, but the sample size was too low to be able to draw statistically significant conclusions. Also the number of pedestrians was planned to be an indicator but due to the resource restrictions these measurements were not conducted.

Since several other ELAN measures also work on increasing the usage of more sustainable transport modes the impact on the intermodality and modal split will be evaluated on the city level.

Impact evaluation

**Key result 1 – The number of cyclists in ELAN corridor increased significantly**

In all cycling counting points a strong increase was observed e.g. in the main street of the corridor where new cycling lanes were implemented (Savska Street, see M2.5-ZAG) an increase of 20.75%. In other streets the increase is even greater. Taking into account that no real infrastructural change was realized in the corridor, this increase can be explained by the low number of cyclists in the baseline year, the realization of cycling lanes in Savska Street and a general increase of cycling in the city, due to the financial crisis and the rising fuel prices.
Process evaluation

Barrier 1 – Lack of (financial) planning over the partners

Plans need to be harmonized between the different stakeholders, otherwise something similar to a “domino effect” can occur: one partner has necessary budget, but it cannot implement planned activities before another partner implements theirs. But this other partner is experiencing the lack of funding so they cannot follow the implementation dynamic. As a result, both partners failed to implement what was planned.

Barrier 2 – Lack of consensus on the overall mobility strategy

The city authorities nor the City Traffic and Transport Department (which were not part of the CIVITAS team) were really convinced on the need for priority for cycling and public transport. Despite all efforts of the measure leader and project partners, it seems that cycling is still not considered as a valuable transport mode for the decision makers within the city municipality.

Driver 1 – Good dissemination activities

In both measures dissemination is detected as an important driver for the measure, encouraging public participation, disseminating RTD results more efficiently etc. However it was not strong enough to convince key measure participants to push implementation of the measures forward.

Lessons Learned

Lesson 1 – The danger of overoptimistic objectives

Both measures suffered from extensive and rather frequent changes of planned activities. It can be argued that this indicates that:

- the original plan was defined in highly optimistic manner and the specific objectives were simply out of the reach of the project so they had to be adjusted to fit into the local context and/or,
- measure partners were not able to ensure necessary support from other stakeholders, so certain objectives of the measures could not be achieved, thus they were altered and/or,
- measure partners did not invest enough effort to implement planned activities so the only option was to change the plan.

However, for the measure level evaluation reports, it is evident that the third argument is the hardest to defend. From these reports it can be seen that unrealistic and discordant objectives of different partners and stakeholders aggravated the implementation process and caused disincentive with some work team members. Hard and dedicated work of one or more measure partners does not ensure measure success. This is even more evident in the measures in which financially demanding objectives are defined.
Lesson 2 – More intensive citizen engagement could help

Knowing the outcome of the measure 4.8, it could be argued that citizen engagement activities could have improved the chance for successful implementation of at least one other measure objective. With extensive citizen engagement activities, maybe it could have been possible to create a critical group of users which would be able to put additional pressure on decision-makers, and implementation activities would be triggered (at least during the election period).

3.3.3.2.2. Measure 2.5: Intermodal high-quality mobility corridor

Measure description

The main objective of this measure was to define a high-quality mobility corridor stretching from the historic city centre on the northern part of the city towards and across the Sava River, where public transport, cycling lanes and pedestrians have priority over individual motorized traffic. The original objectives in the description of work were to improve quality, accessibility and attractiveness of PT, to increase participation of Croatian Railways into PT system, to increase the number of passengers in PT, to decrease the number of cars going towards the city centre (change of modal split) and to enable shorter duration of journeys.

The plan was to achieve this through some financially demanding infrastructural improvements, such as the construction of the new intermodal interchange and railway station in the ELAN corridor. Due to financial and time constraints, these activities were altered during several amendment processes; the only implementation that took place during the project was the implementation of new cycling lanes and bicycle parking lots (for 20 bicycles).

Also a communication scheme towards the general public was developed to collect their opinions and suggestions, as well as to disseminate the information about the measure. However, the focus of the measure was rather on different traffic studies. Two studies were planned since the beginning of the project:

- the study of intermodal terminal SAVA-NORTH (intermodal PT terminal)
- the study about the reconstruction of the Šarengradska Street and introduction of it into the traffic system of the city and redistribution of traffic flows in Savska Street (Šarengradska Street is parallel with Savska Street but it is not suitable for any transport mode including even pedestrians)

Later, during the amendment processes, two more, smaller, studies were included into the measure description, both dealing with the introduction of railway stations into the traffic system (i.e. Remetinec and Buzin train stations). It must be noted that both of these stations are located outside the ELAN corridor.

Evaluation approach

This measure faced substantial changes during the project. Naturally, this was reflected on the evaluation approach. In the beginning of the project the expected outcomes of this measure were high and they included major infrastructural improvements. However, the real situation suggested that in many of these activities the risk of failure is present and relatively high. Hence, during the project more attention was given to the process evaluation. Moreover, the experience from citizen engagement activities encouraged us to upgrade the evaluation approach and to evaluate this measure from that perspective as well.

The measure was evaluated on different levels of impact evaluation: the measure outputs such as the number of parking spaces and the length of cycling lanes were evaluated on measure level. The impact on the number of cyclists and accidents involving cyclists and pedestrians was evaluated on the integrated package level because overlaps with the measure 4.8 exist. Impacts on the modal share of cycling and intermodality are evaluated on the city level, because almost all other ELAN measures will produce an impact on the modal split.
Impact evaluation

Key result 1 – The study of intermodal terminal SAVA-NORTH

The study explored the possibility of interconnecting various transport modes: walking, cycling, bus, tram and railway. The high level design of the terminal was defined, incorporating bus, tram and train station, car and bicycle parking spaces and taxi terminal. The new terminal would be the key intermodal spot in the southern part of ELAN corridor, enabling commuters to abandon cars and use trains to reach the city. The study pointed out that this could lead toward substantial reduction of car traffic in the corridor. Moreover, the terminal would provide a better connection between buses and trams, which would improve intermodal conditions in the corridor. Apart from less car traffic, the study highlights few more direct benefits: less traffic accidents and more space for alternative transport modes such as cycling.

Key result 2 – The study of introduction of Šarengadska Street into the traffic network of the city

The second study pointed out several key benefits of integrating Šarengadska Street into the traffic network. Mainly, the Savska Street would be mostly cleared from car traffic which would lead toward numerous benefits regarding the concept of sustainable mobility. The data collected from the simulation results can serve as a crucial argument in the decision-making process (for instance, average operational time of the trams in Savska Street would decrease by 34%, Level of Service on all intersections in Savska Street would improve – from 33 s/vehicle in average at present state, to 21.6 s/vehicle on average in modelled state).

Key result 3 – Improvements in cycling infrastructure

1.8 km of new cycling lanes was marked in the ELAN corridor. New cycling lanes were interconnected with the existing ones. Some of the new lanes connect the biggest railway terminal of the city with the city centre and the main square, while the other part connects two faculties with one of the largest student restaurants in the city. Also 20 bicycle parking places were installed in front of the CIVITAS Info Point, but this cannot be seen separately from the bicycle parking places that were installed within measure 4.8.

Process evaluation

Barrier 1 – Higher level planning

City administration and Croatian Railways have their own priorities and finances. Without common objectives these differences are causing an important barrier. These two institutions have to reach an understanding before any real implementation of the intermodal interchanges, P&R systems or similar transport infrastructure objects.

Barrier 2 – Too much dependency on public funds

Considering the scope of the measure in the beginning of the project and its objectives, it is clear that success highly depended on the local (city) budget. Later on during the project it turned out to be a too big investment for the local authorities and measure objectives had to be changed significantly. Very good demonstration of this barrier is the fact that, due to the economic situation and the crisis which occurred during the ELAN, all railway infrastructure investment projects were delayed and partner HŽ Infra (the railway company) was not able to follow the Description of Work in regards to the measure implementation.

Driver 1 – Complexity of the problems to be solved

Very high problem complexity and involvement of large number of stakeholders was detected as the most important driver because it motivates the measure partners.

Driver 2 – RTD results

Results of the traffic modelling, which was conducted as a part of a study to include Šarengadska Street into the traffic system of the city, serve as a good basis for future projects and highlight the benefits of measure activities.
Lessons learned

Lesson 1 – Necessity to define measure objectives and expected outcomes realistically

In the first few months of the ELAN project, it became clear that the initial description of this measure contained overoptimistic objectives: infrastructural improvement activities which were a part of almost all local traffic planning documents in the past 20 years. However, they were never implemented due to the lack of finances. Measure team had to invest a lot of effort during the project in order to bring the measure description in line with the availability of resources. Finally, the measure description was changed and more attention was given to the RTD activities like detailed traffic studies which precede the abovementioned infrastructural improvements.

Lesson 2 – Definition of a complete list of measure participants and their role

Especially during the process of production of two major studies in this measure it was important to include all relevant actors. For this reason, the list of measure stakeholders needed to be expanded considerably. Unique knowledge of each stakeholder and measure partner was crucial for these studies.

Lesson 3 – Harmonizing the objectives between different stakeholders

While attempting to establish intermodal integration it is important to agree on common objectives between different stakeholders, especially if they rely on different financial sources. In the case of measure 2.5 this meant adapting the development plans of Croatian Railway Company (funded by the Croatian government) and bringing them in line with local level planning activities, i.e. the requirements of the future construction of intermodal terminal. This experience taught us that in all future intermodal planning and implementation activities where railway is included, Croatian Railway Company and local authority have to agree on common objectives. Otherwise, financial issues may emerge in the later stages of the project because of dependency on public funds.

Lesson 4 – Good timing and the commitment to citizen engagement

While producing the study of the intermodal terminal SAVA-NORTH, citizens were engaged from the earliest stages of the study. During the public discussions, the dialogue between all measure stakeholders was encouraged. This enabled citizens to state their opinions and to propose solutions for the improvement of the final study. Moreover, the public interest on the topic was increased when they realized that some of their suggestions will actually be accepted. They could witness that they have real influence on the decision-making process. Their support can be crucial in the next steps of the SAVA-NORTH terminal implementation.

3.3.3.2.3. Measure 4.8: Improving cycling conditions

Measure description

In the City of Zagreb cycling conditions are far from ideal. During the ELAN project and the implementation of measure 4.8, several activities were planned in order to reverse the situation. For the city this was the first project which tried to systematically introduce necessary improvements. The majority of efforts were targeted in the ELAN corridor. These activities included the establishment of new parking lots, the introduction of dedicated signage, the development of a network of high level cycling routes, the introduction of 30 km/h zones, the development of a Cycling Master Plan and the publishing of a tender for public bicycles.

There were a lot of deviations in the measure; only one part of the measure was implemented, i.e. only the parking lots were introduced with a total capacity of 340 parking spaces (34 locations inside and outside of ELAN corridor). Almost all other activities were stopped due to the lack of political will or legal/administrative reasons. The measure leader (BICIKL) completed all tasks which were in their domain but in the next step of measure implementation (i.e. when a decision at the higher level was needed) activities were cancelled.

Apart from some infrastructural improvements and production of strategic documents, the measure implemented various dissemination activities which were targeted at different users. The objective was to raise mutual understanding between different groups of users and to promote cycling in general. It should be noted that almost all ELAN dissemination activities were conducted in cooperation with the measure 4.11 Comprehensive mobility dialogue and marketing that coordinated all dissemination and
citizen engagement activities; hence measure team of 4.11 supported implementation of these activities measure-per-measure.

Evaluation approach

In the description of the measure 4.8 numerous objectives were defined. Mainly, they are oriented in three directions:

- To increase the share of cycling in modal split by pushing the role of cycling as a serious transport mode.
- To increase the number of intermodal journeys (this impact is also evaluated on the city level with the modal split survey) and to reduce the number of accidents involving cyclists and pedestrians.
- Contribute to more efficient energy use and reduction of CO$_2$ as well of air pollutants and transport related noise.

However, it is difficult to separate the impact of this measure on these indicators, as they are affected by other ELAN measures as well. Therefore, most expected impacts are evaluated on the city level (besides the number of accidents involving cyclists and pedestrians, this is evaluated on IP-level).

Furthermore, on measure level, the outputs of the measure are evaluated, more specifically the number of parking spaces for bicycles. Regarding data collection activities the importance of students of Zagreb Faculty of Transport and Traffic Sciences (ZFOT) has to be highlighted. Without in-the-field counts it would be hard, if not impossible, to collect accurate data about public and private parking places in the ELAN corridor.

Impact evaluation

The measure produced two key results related to the improvements of cycling infrastructure which are listed below.

**Key result 1 – Introduction of 150 parking spaces at 15 locations inside ELAN corridor**

This improved cycling infrastructure considerably. This measure objective was exceeded because the target was 60 parking spaces.

**Key result 2 – Introduction of 190 parking spaces outside ELAN corridor, at different points-of-interest in the city (in front of shops, theatres, largest concert hall, PT stations, underground garages, on squares etc.)**

The objective of the measure was to introduce 60 parking spaces on major PT stations in the city. However, only 10 of those 190 parking spaces are placed on the main bus terminal in the city, but at least the target number of 60 new parking spaces was considerably exceeded.

It must be stressed that prior to ELAN, cycling issues in the city were never tackled in a consistent manner and with a strategic plan. Therefore, following key measure results have to be highlighted as well:

**Key result 3 – Development of a Cycling Master Plan**

The plan was not officially accepted by the City Assembly; however it serves as an excellent basis for future development of cycling traffic in the city because it defines the vision, objectives and some general measures for improvement.

**Key result 4 – Blueprints for the introduction of cycling lanes in Southern part of Savska Street**

The implementation did not go forward, but if there would be a political decision in the future on this matter, the plans can be implemented immediately.
Process evaluation

Barrier 1 – Lack of motivation

Lack of motivation of municipal authorities for investing in development of cycling traffic was the most important barrier. Despite all efforts of the measure leader and project partners, it seems that cycling is still not considered as a valuable transport mode for the decision makers within the city municipality. Often financial, administrative or spatial reasons are mentioned by municipality politicians, as being too big barrier to overcome.

Barrier 2 – Lack of understanding of measure objectives within City Traffic and Transport Department

This department is responsible for traffic policy and infrastructural improvements in the city but was not part of the ELAN consortium. Because of the lack of their support, almost all infrastructural improvements were cancelled (except installation of parking spaces).

Barrier 3 – Lack of finances

The recession-tailored budget significantly reduced finances for cycling development activities in the city.

Driver 1 – Economic crisis and fuel price

Economic crisis and raising fuel prices, which occurred during the project implementation, raised the cycling acceptance among citizens. A large part of the city’s population started cycling in order to cut their travel expenses.

Driver 2 – Good cooperation of measure consortium

The measure consortium consisted of all relevant partners: NGOs, city municipality (City Office for Strategic Planning and City Development), PT operators and knowledge institutions. Due to their good cooperation at least one part of the measure was implemented and the targets were exceeded. However, the consortium was not strong enough to have a bigger influence on decision-makers.

Lessons learned

Lesson 1 – Need for common objective

In the case of this measure, the crucial reason for unsuccessful implementation was the lack of understanding of measure objectives within City Traffic and Transport Department. This department is responsible for traffic policy and infrastructural improvements in the city, but was not part of the ELAN consortium. Because of the lack of their support, almost all infrastructural improvements were cancelled (all except installation of parking spaces). This experience teaches us that without common objectives within city municipality it is difficult to implement these types of measures.

Lesson 2 – Citizen engagement

Knowing the outcome of this measure, it could be argued that citizen engagement activities could have improved the chance for successful implementation of at least one other measure objective. With extensive citizen engagement activities, maybe it could have been possible to create a critical group of users which would be able to put additional pressure on decision-makers, and implementation activities would be triggered (at least during the election period).

3.3.3.3. Integrated package 3: Improving Quality of service of public transport through innovative technologies

3.3.3.3.1. Evaluation on Integrated package level

Integrated Package Description

The measures in IP3 have the common objective to increase the quality of public transport service through implementation of Intelligent Transport Systems (ITS):
• 2.6 Promotion of an electronic PT tariff system – the new electronic ticketing system which enabled easier usage of PT is implemented and it usage is promoted with a marketing campaign. Furthermore, PT company established new contact and info centres which contributed the efficient dissemination of pre-trip information.

• 8.2 Public transport priority and traveller information – the efficiency of PT and quality of on-trip information is improved by the introduction of a public transport priority system at signalized intersections and a traveller information system at PT stops which includes a network of LED displays and a control centre.

Evaluation Approach
The user satisfaction was evaluated in a combined user survey. Measure-specific survey results are discussed on measure level. Other aspects of quality of PT service are evaluated in other measures that contributed to the increase of quality of PT service.

Impact evaluation
Key result 1 – Increased user satisfaction with new ITS services
In 2011 the average share of satisfied users increased by 5.91% while the average share of very satisfied users (highest grade) increased by 5.64%. The strongest increase in very satisfied and satisfied users was perceived for the information about the ticket prices (30.23% in 2009 to 46.39% in 2011) and the information about incidents in PT (23.11% in 2009 to 37.32% in 2011). This indicates that both measures contributed to the general increase of satisfaction.

Process evaluation
Barrier 1 – Technical issues
In the beginning of the project some technical issues regarding the implementation of innovative ITS services arose in both measures. Intensive interactions between the partners solved these technical problems.

Barrier 2 – Stakeholders’ support
During the process of implementation it was difficult to get the sufficient stakeholder support. This resulted in extension of the time needed to implement the measures. A higher consensus among all involved partners on the objectives and the practical design of the measure should overcome this.

Driver 1 – Cooperation among partners
Good and successful cooperation between project partners was established at the very beginning of the project.

Driver 2 – Personal motivation
In both measures, personal motivation is identified as an important driver. This can be crucial for overcoming measure barriers.

Lessons Learned
Lesson 1 – Importance of the background data
Due to the financial crisis, several important changes occurred in the PT tariff system that influenced the results. This emphasises the importance of recording various background data because projects like this are implemented in the global environment, hence they are not immune to the global changes.

Lesson 2 – Ensuring interoperability between different systems and technologies
When implementing innovative systems and services, which have to be integrated with existing systems and efficient upgrading has to be ensured, the important thing is to achieve the interoperability between different interfaces on the organizational, technical or physical level.
Lesson 3 – Traffic modelling as crucial factor

The traffic modelling was crucial for the design of the measures. It was very helpful to convince the representatives of City Transport and Traffic Department that the reorganisation would not cause the disturbance of traffic flows of the corridor.

3.3.3.3.2. Measure 2.6: Promotion of electronic public transport tariff system

Measure description

High usage of public transport requires a high level of comfort in PT vehicles (including raising safety and security standards) and the introduction of various systems to simplify its use, bring added value and raise the service quality in general. One of these systems is electronic payment system which needed to be implemented and promoted as a part of this measure.

The preparations for the introduction of a new electronic PT tariff system were finished before the ELAN project and the implementation period started roughly at the same time as the project. All trams and buses were equipped with the ticket validation terminals that allow travellers to define their travelling zone and to pay tickets for more than one person at the same time. The ability to communicate with terminal in English language is supported as well. The new system required also an updated ticket palette, in order to meet user requirements and needs. Generally, all old tickets were replaced by the electronic versions and some new types of tickets were added. In total, users can now choose from 23 different types of tickets which makes it easier for them to buy the “right ticket for right destination”, i.e. the ticket which meets their needs the most.

Regarding the marketing campaign, the official start of it was in September 2009, during the European Mobility Week and celebration of the CIVITAS Day, when the new tariff system was presented to interested stakeholders. Afterwards, the campaign included the production of measure leaflets about the new tariff system, detailed public presentations about the system (concept, validation terminals, vending places, ticket control, work of the back office, types of tickets, e-purse, benefits for PT operator and PT users etc.). Furthermore, PT operator (Zagreb Electric Tram – ZET) invested into the introduction of a contact centre and information centre. This services allows citizens to quickly find out all relevant information about: who are the eligible users of free-of-charge tickets in the city, where are free-of-charge routes in the centre, what are the working hours of vending spaces, as well as information about the time tables, present traffic conditions, prices, etc.

Apart from these implementation activities, the measure produced one important study: a research study for possible implementation of integrated PT tariff system on national level. The study can be considered as a first step toward integrated transport and a unified tariff system on the city and the national level. Another study was included in the measure during the project lifetime: Free PT for hotel visitors. The study explored the possibilities for a PT ticket scheme for hotel visitors in Zagreb.

No deviations were made in this measure.

Evaluation approach

Evaluation of the measure 2.6 Promotion of electronic PT tariff system required evaluation of quantitative and qualitative impact of the measure. Quantitative evaluation was based on the recording of the number of sold electronic tickets, while the evaluation of general user satisfaction with the unified tariff system referred to the qualitative impact of this measure.

Furthermore, the evaluation approach included the evaluation of the economic impacts of the measure. During the production of CBA results, POINTER recommendations were helpful as well as several workshops which were organized during the project lifetime.

Impact evaluation

Key result 1 – Increase in number of electronic tickets sold

The number of sold prepaid tickets increased by 19.6% from 2009 to 2011; the number of sold e-purse tickets increased by 10.82%. The quantifiable target was to increase the number of electronic tickets
sold by 6% (all types). E-purse tickets were charged 88% more often (if the figures from 2011 are compared with the ones from 2010).

Key result 2 – General user satisfaction with the unified tariff system increased

The share of satisfied users (very satisfied & satisfied) by the sub-criterion *Are you satisfied with the possibility to purchase “right ticket for right destination”* increased from 51.34% in 2009 to 58.85% in 2011; the proportion of satisfied users by the sub-criterion *Are you satisfied with the availability of information about the ticket prices* increased from 30.234% in 2009 to 46.39% in 2011; in total 85.33% of respondents expressed some form of satisfaction with the sales network.

Process evaluation

Barrier 1 – Stakeholder collaboration toward common objectives

The process of establishing an integrated public transport system has proved to be a difficult and slow process (e.g. agreeing on common tariffs between different local authorities). It required a lot of effort, a lot of political negotiations and a lot of financial resources.

Barrier 2 – User acceptance

This measure introduced a significant innovation into the PT system. Users did not accept new technologies instantly. Specifically, prior to ELAN, 90% of users were using prepaid tickets which had to be shown to the ZET personnel only during ticket controls. New system requires ticket validation upon each boarding which requires more effort from passengers. This meant that additional efforts had to be invested into measure promotion and information dissemination.

Driver 1 – Political will

During the whole implementation of the measure, the measure itself was a good topic for earning political points at local elections which ensured political support to the project.

Driver 2 – Improvement of PT service

New electronic ticketing system improves the PT service which created a sense of accomplishment among measure team members.

Lessons learned

Lesson 1 – Harmonized objectives

In the case of establishing an integrated electronic ticketing service it is important to agree on common objectives between different stakeholders, especially if they rely on different financial sources. An integrated public transport system requires the understanding and cooperation of different stakeholders and they all have to find a motive to participate. For instance, different arrangements can be made: one PT operator of suburban areas can operate the PT network of another, urban, operator etc. This arrangement could reduce their operation costs which can be a good motive for participation.

Lesson 2 – Importance of information dissemination

During the measure implementation a lot of effort has been invested into informing citizens about the changes in the tariff system. It is understandable that current and potential users have to be informed about the changes in the system; however it is important to note that, while doing this, different communication mechanisms have to be used. In the case of this measure this meant producing and disseminating leaflets, organizing public events, opening the contact centre and information centre, using media to reach wider target group etc. Marketing campaigns have to be tailored specifically for each user groups. For instance, it cannot be expected that senior population will use the Internet as their primary source of information; for this target group leaflets or brochures may be more appropriate. Due to their specific handicap, visually impaired users might appreciate the contact centre the most etc.

Lesson 3 – Gradual substitution of old technology

New electronic system introduced considerable changes in the existent tariff system. From the user perspective, few key changes occurred: new types of tickets were introduced that offered more choices, almost all types of old tickets were replaced by their electronic versions, new system now
requires ticket validation upon every boarding (unlike before, when the ticket had to be shown only during ticket control). In order to avoid user rejection and to give them enough time to choose the “right” ticket which will satisfy most of their needs, ZET ensured a short transition period. Now when the new system is implemented it can be said that this was a good decision.

3.3.3.3. Measure 8.2: Public transport priority and traveller information

Measure description

Measure 8.2 is one of the measures which improved public transport service in the City of Zagreb by introducing intelligent transport system (ITS) services. The measure introduces two types of ITS services: a traveller information system and a priority system. The traveller information system includes the establishment of a control centre and the installation of 40 LED display panels on PT stops in the corridor. Only the display panels were part of ELAN activities.

The second part of this measure was to demonstrate the public transport priority system on signalized intersections in the corridor, Savska Street is used by more than 6 tram lines. The priority scheme was developed for three intersections on this street. The implementation occurred only for a limited time period (several weeks), only for one direction of travel of trams (Northbound) and only one tram of the line no. 17 has been given the priority. The priority system was demonstrated at one intersection (inductive loop based technology was used) and signalling cycles on two adjacent intersections were synchronized.

In order to see how different priority schemes would influence other traffic flows, a traffic model was built. This was done by creating a microscopic simulation model of Savska Street in PTV VISSIM software.

There were deviations from the original plan:

- In the original description of the measure the objective was to demonstrate the priority system, but the measure leader initially wanted to conduct full implementation in Savska Street, on all 12 intersections if possible. During the project it became clear that full scale implementation would not happen, because the City Transport and Traffic Department (not a part of ELAN consortium) did not want to make any changes in the traffic system which might have an influence on car traffic flows. Specifically, the full scale implementation of PT priority system in ELAN corridor would require the complete re-programming of signalling plans in Savska Street and wider transport network area. Furthermore, it was discovered that different types of signalling equipment are installed on different intersections and it would be a very challenging task to synchronize them all and implement priority schemes. This resulted in down-scaling of the measure impact to only three intersections where the equipment is compatible and where there is not so much car traffic.

Evaluation Approach

For the purpose of evaluating the impact of this measure it was necessary to evaluate the quantitative and qualitative impact. Nine evaluation indicators were measured and used for quantitative impact evaluation. We introduced the decomposition of tram operation time that enabled rather detailed evaluation on intersection-per-intersection basis. This was important, because it would be hard to detect the down-scaled impact of the measure if we recorded tram performances on a macro level, i.e. at the PT line endpoints. However, this type of analysis requires very detailed sets of data. In our case we used GPS vehicle tracking and we set the devices to record tram position and speed each second, which provided us with good resolution of the measurement.

The qualitative impact evaluation of this measure included the survey of public satisfaction with the new information system that was implemented. This was done with the survey about the quality of PT service (originally designed by De Lijn – PT operator of the Flanders region and a CIVITAS ELAN partner) which contained the questions about the PT information system.

Another expected impact of the measure is an increase in patronage in public transport, but this is measured on city level, as this is affected by multiple measures.
Impact evaluation

Key result 1 – Improvement in tram performance

Even as the measure is down-scaled the impact is remarkable:

- Average tram operation time decreased by 6.46% (the target was 2%)
- Cumulative running time of a tram decreased by 7.3% (the target was 4%)
- Tram operating speed increased by 6.9% (the target was 2%)
- Cumulative intersection delay for tram in the whole Savska Street decreased by 17.84% (the target was 3%) and the intersection delay for tram on Deželičeva intersection was reduced by 84%
- Average number of vehicles on all intersections in Savska Street decreased by 1.86% (the target was 3%).

Key result 2 – Increased satisfaction with accuracy of PT vehicles

The share of satisfied users (very satisfied & satisfied) with the accuracy of PT vehicles increased from 51.56% in 2009 to 58.85% in 2011. However, this cannot be related to the impact of the PT priority system, because it was implemented only at one small part of the corridor. Moreover, the priority was given only to one tram in one direction of travel. The reasons why the satisfaction is increased is because of the installation of LED displays at PT stops. People are willing to wait longer if they know how long they have to wait. This increases their overall perception about the public priority accuracy.

Key result 3 – Increased satisfaction with availability of information on PT stops

The number of satisfied users (very satisfied & satisfied) with the availability of information about incidents in PT, clearly indicates the positive change (their share increased from 23.11% in 2009 to 37.32% in 2011). Also the number of satisfied users (very satisfied & satisfied), with the availability of information about incidents in PT, clearly indicates the positive change (their share increased from 23.11% in 2009 to 37.32% in 2011).

Process evaluation

Barrier 1 – Lack of understanding the measure leader needs

During the project negotiation phase the measure leader from Zagreb Faculty of Transport and Traffic Sciences (ZFOT) was not included, so the necessity of having traffic modelling software was overlooked. Thus, this type of cost was not included in the budget. It was only then that traffic modelling was first included in the measure. It has direct consequence on measure activities. They have been postponed for several months. The very same barrier had another impact as well. Measure leader did not have the opportunity to specify equipment requirements in order to collect the data in a more efficient manner. Components like vehicle counters and detectors, cameras, software for image processing was also left out of the budget. This resulted in data collection methodology which was not as efficient as it could be.

Barrier 2 – Outdated traffic signalling equipment

Different types of traffic signalling equipment is installed on different intersections in the ELAN corridor. This is why problems during the implementation phase of this measure were experienced; interfaces had to be developed in order to achieve necessary coordination and synchronization between different intersections. Also, the majority of installed equipment is 15 or 20 years old which made implementation process impossible on some intersections; signal controllers on those intersections cannot support implementation of tram priorities. It would make more sense to completely remove old signalling devices and install new ones, instead of trying to implement the measure on the old signalling equipment. However, that was not possible during ELAN project due to financial and administrative restrictions.

Barrier 3 – Lack of support

In the critical stages of the measure implementation, City Transport and Traffic Department introduced new requirements to the measure partners, mainly because the department was concerned about the measure impact on the car traffic flows. Additional efforts had to be invested in order to comply with
the new demands (extra simulation scenarios had to be produced as well as down-scaling of the measure).

Driver 1 – Innovative aspects and the complexity of the measure

This was experienced as truly an important driver which pushed the measure forward throughout the entire project life cycle. Students, assistants and professors of ZFOT were highly motivated for the work because the measure had a very intense ITS nature and gave all of them the opportunity to academically evolve. This open cooperation made data collection process more efficient and effective, and best practices and previous experiences were exchanged.

Driver 2 – Local champion

Under the leadership of measure leader and his enthusiasm the measure went forward and new and innovative ideas were developed almost every day. The evidence of that are all innovative approaches to the data collection and cooperation with different stakeholders. Also, measure leader is the one who indicated the necessity of the traffic modelling in order to make implementation possible and because of that the modelling was included in the measure activities and the modelling software was bought.

Driver 3 – Opportunity to make scientific research

Some members of the measure work team saw the opportunity to produce scientific papers (see references) based on the research on this measure. This motivated them to work harder on the measure itself.

Driver 4 – Economic opportunity for stakeholders

When different private companies realized that ELAN seriously works on the implementation of the PT priority and that this will happen for the first time in the city, they became more interested about the project because they wanted to seize the economic opportunity (e.g. if the measure is going to be upscaled, excellent business opportunity will be presented to the measure stakeholders; experience from ELAN expands their list of references which might be crucial for getting the contract with the city municipality).

Lessons Learned

Lesson 1 – Complex technical design requires realistic planning

The measure faced some important technical issues (re-programming of signalling plans in Savska Street and wider transport network area and synchronising different types of signalling equipment). As these issues were initially not foreseen, the measure was down-scaled to only three intersections. In order to implement the measure on the whole corridor, a longer implementation period and higher political support should have been available.

Lesson 2 – Traffic modelling as crucial factor

Apart from being quite innovative, measure 8.2 was also quite demanding from the traffic engineering point of view. Traffic modelling required a lot of data which was not available (this problem was experienced in many ELAN measures in the City of Zagreb). This required the development of complete data collection methodology for different evaluation indicators. However, this time was well spent because the traffic modelling was crucial for measure success. It was a very helpful data source when the representatives of City Transport and Traffic Department needed to be convinced that the ELAN and the measure 8.2 will not cause the disturbance in traffic flows of the corridor. The model shows that up-scaling of the measure could lead to significant improvements in PT performance. It can be stated that without the simulation results, the measure would have failed to demonstrate PT priority system.

Lesson 3 – Precondition for up-scaling is harmonized signalling equipment

Regarding the future activities of the measure in the City of Zagreb, the following must be noted. To reach full effectiveness of PT priority system, different traffic signalling equipment in the corridor has to be harmonized. There is no point in giving the priority to PT vehicles on one intersection and then delaying them on the next one. Hence, the system as a whole has to be implemented in a way that ensures fluid motion of PT vehicles. This cannot be achieved if interoperability problems exist between the equipment of different intersections.
3.3.3.4. Integrated package 4: City mobility management in dialogue with stakeholders

3.3.3.4.1. Evaluation on Integrated package level

Integrated Package Description

One of the primary objectives of the ELAN project is the implementation of public participation in different measures dealing with a wide variety of topics. This implies the inclusion of all interest stakeholders into the process of measure planning and implementation. Many ELAN measures in the City of Zagreb introduced this concept, but only two measures were aimed at creating new policies and restrictions in cooperation with measure stakeholders that would be affected by it. These measures are:

- M3.2-ZAG Study on congestion charging and dialogue on pricing – main objective of the measure was to conduct a feasibility study about the congestion charging in the City of Zagreb. Measure defined an eco-zone in which indirect congestion charging model would be applied. The zone included the area of 2 km$^2$ around the main city square. This area contains a pedestrian zone.

- M7.4-ZAG Freight delivery restrictions – the target of this measure was to develop more flexible freight delivery policy which would be applied in and around the same pedestrian zone as in the measure 3.2, i.e. in immediate city centre.

During the project lifetime, measure 7.4 encountered unsolvable barriers which resulted in discontinuation of the measure in the fourth ELAN year. This meant that in IP4 there was no real life implementation, i.e. the impact of the IP is reduced since neither measure 3.2 nor 7.4 entered the operational phase.

Regarding the dissemination and citizen engagement activities, both measures could be used as examples. These activities were implemented on different layers, ranging from mere information dissemination to creating a dialogue with stakeholders. It must be noted that the role of the site dissemination manager was crucial in this aspect of the measures.

Evaluation Approach

In order to collect the necessary data to conduct the evaluation on the IP level, results of two surveys on the measure level were used. It was decided that the surveys in both measures should be jointly conducted. The main reason for this lays in the fact that ZFOT had to conduct both surveys, using a limited amount of resources.

Impact evaluation

Key result 1 – Increased public awareness about transport related issues

The share of affirmative answers of citizens to the question Should the issues like delivery traffic, public transport and congestion charging, be part of an integrated traffic policy package is increased from 58% in 2010 to 72% in 2012.

Key result 2 – Increased awareness about transport related issues among business subjects

The share of positive answers to the same question is also increased among business subjects by 4%, i.e. from 64% in 2010 to 68% in 2012.

Key result 3 – Increased approval of the proposed measures

General indication that the approval of newly developed strategies is increased, lies in the share of the Do not know answers to the question Which would be the positive side effect(s) of introduction of new strategies? Their share is considerably decreased in both target groups (by 9 and 12% among citizens and business subjects, respectively). General public is more aware about the problems and more open to the possible solutions. Nevertheless, results on measure level indicate that acceptance for congestion charging remains higher than acceptance of freight delivery restrictions.
No quantifiable targets or objectives were defined for this integrated package.

**Process evaluation**

**Barrier 1 – Lack of data**

In both measures the initial barrier was the lack of data. The city municipality was unable to provide the data about the traffic flow volumes in the corridor, travel times, vehicle occupancy, input-output matrices etc. This caused a delay because ZFOT first had to organize data collection activities.

**Barrier 2 – Stakeholders’ support**

During the process of implementation of the measures within this IP, it was uneasy process of ensuring stakeholder support. This can be experienced as a measure barrier because this process is also very often time-consuming.

**Barrier 3 – Public acceptance**

Communication with general public was sometimes difficult. Any type of new financial constrain or restrictions sets the public against the measures.

**Driver 1 – Personal motivation**

In both measures personal motivation is identified as an important driver. This can be crucial for overcoming measure barriers. This driver was mostly visible in the measure 7.4 because, nevertheless discontinued measure implementation, measure team invested a lot of effort into data collection and designing of new delivery scheme.

**Lessons Learned**

**Lesson 1 – Use of unique knowledge by expanding the list of stakeholders**

Measures within this IP used the knowledge of a wide range of stakeholders. This ensured that the research work that is conducted during the measure implementation is more complete. Moreover, when the main measure objective is to introduce some form of restrictions or when it is necessary to reduce/terminate current privileges, the importance of measure stakeholders is also significant. New traffic policies should be developed for mutual benefit, i.e. compromised solution should be the target.

**Lesson 2 – Importance of the informed and motivated citizens**

The public needs to be motivated to participate in creating solutions together with traffic engineers and city municipality representatives. In order to achieve this, the awareness level of general public about the traffic issues within the city needs to be raised as well as the awareness about possible solutions. To achieve both of these objectives, the importance of dissemination and citizen engagement activities needs to be recognized. It can be argued that only the informed and motivated citizen can take a role of a partner when new traffic policies are being developed.

**Lesson 3 – Importance of the complete data sets**

For the production of the study and new delivery restrictions one of the main elements was ensuring a complete set of data about the traffic conditions. Since the majority of necessary data was not available, additional efforts had to be invested. In the future, city municipality should ensure complete data sources, because without the data it is not possible to realistically derive appropriate solution for specific traffic environment.

3.3.3.4.2. Measure 3.2: Study of congestion charging and dialogue on pricing

**Measure Description**

Measure 3.2 explored possibilities for the introduction of a congestion charging scheme in the City of Zagreb, by conducting a study on congestion charging. The background of the study relies on the will to change the car oriented culture that was (and still is) incorporated in the very fabric of the city. In order to reduce the share of private cars the city municipality (i.e. City Office for Strategic Planning and
City Development – the site coordinator) decided to develop an outline for a congestion charging scheme within the ELAN project. Afterwards, the study was included into the ZAGREB PLAN – a strategic document that serves as a framework for future development of local traffic related policies and points out key objectives. However, the congestion charging is still considered only as one of the possible options for tackling traffic issues, hence the decision about the implementation of it is still not made.

The congestion charging study was aimed at:

- Exploring traffic congestion in the city centre area.
- Exploring limiting exhaust emissions, vibrations and noise caused by traffic.
- Exploring the possibility of introducing polluter-pays-principle to the public in urban transport.
- Exploring the possibility of reducing the number of vehicles entering the city centre.
- Fostering the use of PT, cycling and walking.

During the process of production of the study it was necessary to raise the awareness about the traffic problems in the city as well as the acceptance of the congestion charging as a concept. To accomplish this task it was necessary to implement comprehensive dissemination and citizen engagement activities. For this purpose layered dissemination actions were undertaken.

Evaluation Approach

This measure imposed relatively unique requirements regarding the development of the evaluation approach. From the beginning of the project the aim was to conduct some form of impact evaluation and not just concentrate the efforts on the evaluation of the process of implementation. It also became evident that the work around the study requires the implementation of various dissemination and citizen engagement activities; hence it was decided that one of the possible real life impacts of the study could be raising the level of acceptance of congestion charging concept.

It should be noted that the evaluation team invested additional efforts in terms of evaluating the citizen engagement process, implemented within this measure. This was quite an innovative task. For its completion, the role of site dissemination manager was crucial. This proves that the project consortium as a whole has to closely cooperate in order to bring out the most out of the specific measure and to create an added value.

Impact evaluation

Key result 1 – Increase of acceptance of eco-zone

Since there was no real life implementation of the congestion charging, the evaluation results are not easily quantifiable. However, the following impact was achieved:

- The acceptance level of the congestion charging concept among the citizens increased from 62% to 68%.
- The acceptance level of the congestion charging concept among business subjects increased from 70% to 78%.

Key result 2 – Study with recommendations on congestion charging

The most important result of the measure is, of course, the study itself. Based on the local conditions and challenges (described in detail in the study), as well as the available literature on this matter, the study proposed the solution for implementation of congestion charging scheme in the city. The proposed solution consists of introducing indirect model of billing (vignettes) for the use of traffic infrastructure in the centre of the city. The, so called, "eco-zone" is actually 2 km$^2$ area located around the main square. Drivers would have to pay a vignette before entering this zone (each vignette would be valid for one year). The cost of the vignette depends on the type of engine (five different vignettes are defined: green, yellow, red, grey and white).

The study serves as an excellent starting point for future project of introducing the congestion charging in the City of Zagreb because it gives a clear recommendation how to implement congestion charging.
It also contributed to the increased level of acceptance among stakeholders and citizens (mentioned above).

### Process evaluation

**Barrier 1 – Lack of data**

City municipality was unable to provide essential data for the feasibility study, such as: traffic flow volumes in the corridor, travel times, vehicle occupancy, input-output matrices etc. This caused a delay because ZFOT had to organize data collection activities.

**Barrier 2 – Public acceptance**

Communication with general public was sometimes difficult. Any type of new financial constrain sets the public against this measure.

**Driver 1 – Availability of literature and best practise**

Congestion charging is ever present topic in transportation planning. Hence, availability of literature and examples from other European cities, which can be found on-line, was an important driver for the congestion charging study in the city.

**Driver 2 – Personal motivation**

During the whole implementation of the measure, measure leader was highly motivated because he was able to incorporate CIVITAS ELAN work into his doctoral study.

### Lessons Learned

**Lesson 1 – Importance of stakeholders**

First and maybe the most important lesson is that in this type of measures, dealing with complex traffic engineering problems, a wide range of stakeholders needs to be included. This ensures that the research covers different aspects and impacts which makes it more complete (in the case of this measure this meant investigating the impact in the field of traffic and transport, economy and ecology). Furthermore, measure participants showed the ability to recognize the possibilities for the improvement which was crucial for the public acceptance of the study. This teaches us that the citizens and stakeholders have to be considered as a part of the solution and not as a problem. However, their involvement depends on the information and dissemination activities which have to be continually improved and upgraded in order to reach wider public and to motivate their interest and potential engagement. The importance of the media has to be recognized as well.

**Lesson 2 – Dissemination of relevant information**

The information sharing needs to include all relevant data, e.g. explaining the full set of benefits to the users of the measure might be highly beneficial. In the particular case, the results of the surveys show that the business subjects realized that they could benefit from congestion charging regime in a wider area. If the wider congestion charging zone is included than this means fewer cars on the roads, which leads to less congestion and faster delivery of their goods. Furthermore, since the part of the congestion charging income would be invested into alternative transport modes, this means that it is possible that the number of pedestrians would be increased and more pedestrians leads to more potential customers. This way of thinking increases the level of acceptance of the congestion charging, which is crucial in this types of measures because they introduce additional restrictions.

**Lesson 3 – Importance of data**

For the production of the study one of the main elements was ensuring the complete set of data about the traffic conditions. Without the data it is not possible to realistically derive appropriate solution for a specific traffic environment.
3.3.3.4.3. Measure 7.4: Freight delivery restrictions

Measure Description
Measure 7.4 tried to systematically work on freight delivery issues in the Zagreb city centre. This included revising existent freight delivery regulation and implementation of “soft” and “hard” activities, i.e. creating public partnership scheme and implementing some form of coordinated delivery, respectively.

Based on the collected data, Zagreb Faculty of Transport and Traffic Sciences (ZFOT), as a measure leader, defined a revised proposal. The new proposal is adjusted to the actual traffic conditions in the city centre and stakeholder needs. The objectives of the new proposal (regulations) are to reduce delivery traffic during morning rush hour (after 7 a.m.) and allow certain shippers to make deliveries during an additional time window from 10.30 a.m. to 11.30 a.m. Apart from the new time window, new regulations also determine delivery spots within the two delivery corridors, north and south, with additional time windows. The delivery corridors are placed on the rim of the pedestrian zone and can be accessed through secondary streets with lower traffic loads. This would reduce traffic congestion in the city centre.

After the new proposal was drafted by ZFOT and then accepted by the stakeholders who participated in the public discussions, it was sent to the City of Zagreb Transport and Traffic Department, because implementation of revised traffic regulations falls under their jurisdiction. However, no official response was received by the end of the project and, therefore, no proposed solutions were implemented. After realising that the solution would not be implemented, ZFOT proposed the implementation of the Pilot project. The Pilot project is actually the demonstration of the new proposal. Proposed measures would have been implemented only during a time period of two weeks. The intention was to see how new regulations would work and what could be their impact. This proposal was also sent to the City Transport and Traffic Department, however, it was not acknowledged.

In the fourth year of the ELAN project, after series of bilateral consultations with stakeholders, (un-official) attempts of political lobbying and official requests for implementation which were all rejected, the measure was stopped.

Evaluation Approach
Because the implementation of the measure was cancelled, the focus for this measure was on process evaluation and the evaluation of citizen engagement activities.

Even though the measure is not implemented, the before data on freight delivery flows have been collected by ZFOT students.

Besides this, the acceptance level of delivery restriction policy was surveyed among two target groups. In a survey, citizens were asked to evaluate which measure would be the most effective for reducing specific negative impact. Business subjects were asked the same question, and they were asked as well to evaluate the acceptance of each presented measure for delivery management.

Impact evaluation
Key result 1 – No impact on freight delivery
Due to failed implementation, the measure did not produce any key result (the target was to reduce the number of delivery vehicles moving into the demo area outside the allowed time window by 6-8%). However, the experience itself can be considered as one of the measure results.

Moreover, before discontinuation of the measure several data collection activities occurred. For instance, freight delivery traffic flows were analysed for the first time in the city centre. Results of that analysis can be considered as one of the important outputs of the measure. In the case of the ELAN corridor it is clear that the number of city police officers should increase on Thursdays and Fridays, because that is the time when the largest number of offences was recorded (i.e. the number of goods vehicles moving into the demo area outside the allowed time window was the highest on these two week days).
Key result 2 – No impact on acceptance of freight restrictions

It was hard to expect a large increase in acceptance for both target groups, since the measure was not implemented.

Among the population of citizens the average grades remained practically unchanged. Effectiveness of the various measures is estimated rather low (around 4 out of a total of 9). The survey results of the inhabitants of the city centre show a higher acceptance for a limited delivery zone and limited number of delivery spots.

Survey results among business subjects suggest that business subjects in the city centre area generally believe that the implementation of possible restriction measures could have significant negative influence on their business activities and they basically do not want any changes of present freight delivery regime in the regarded area. 27% - 40% of vendors had responded that mitigation of undesirable impacts with some of the proposed measures is not possible. The only measure that gained acceptance is the concept of delivery corridors, which was a part of the suggested solution of this measure.

Process evaluation

Barrier 1 – Commitment of key stakeholders

Lack of cooperation between different stakeholders caused insufficient consensus on consolidated delivery. Specifically, private store and restaurant owners were reluctant toward the measure and the concept of joined delivery which was later reflected on the level of their participation. Moreover, new restrictive regulations for delivery traffic were never fully implemented by the city municipality which proves that there was no consensus about common objectives (different city departments have different objectives so they were not all committed to the ELAN project objectives).

Barrier 2 – Stakeholder (user) acceptance

Apart from joined delivery, in the pilot project phase it was planned to introduce higher fees for those business subjects who do not comply with new access restrictions. Naturally, that caused even greater revolt toward the measure.

Barrier 3 – Complexity of the problem to be solved

A lot of stakeholders were involved in the implementation of this measure (shopkeepers, delivery companies, restaurants, city authority etc.). Finding the agreeable solutions for everyone turned out to be an unreachable objective.

Driver 1 – Personal motivation

Key participants in this measure stated that they are feeling highly motivated because they are given the opportunity to work with experts in this field and exchange experience. The data which was collected in this measure was also helpful to them in their scientific work.

Driver 2 – Similar measures were implemented in other cities

The positive experiences from other European cities helped the measure leader to disseminate and educate the stakeholders about all the benefits of this type of policies and to overcome some barriers.

Driver 3 – Large number of stakeholders

Work on the measure brought together professionals with different backgrounds and interests (police, city municipality, distributors and recipients of services, university etc.) to work together on the same issues which resulted in open dialogue workshops and exchange of views and experiences.

Lessons Learned

Lesson 1 – Importance of stakeholder cooperation at all levels

Measure 7.4 failed in its implementation mainly because of the lack of cooperation between different stakeholders (abovementioned barrier 1 and 2). When the main measure objective is to introduce some form of restrictions or when it is necessary to reduce/terminate current privileges, the importance of measure stakeholders is significant. Even if this measure would have been implemented, its usage
in the operational phase depends on the stakeholders. Of course, it is always possible to be indifferent to the users of the measure and, in this case, frequently collect money from penalties. However, that approach can hardly be considered as a form of public partnership which is one of the key points of entire ELAN project.

**Lesson 2 – Timing for citizen engagement**

To ensure and cherish this cooperation one of the key tools can be citizen engagement. However, the timing has to be right. Specifically, citizen engagement activities have to start at the beginning of the project and this was not the case in this measure. Note that the implementation of this measure depended only on support of the several departments within the city municipality. Everything was prepared and agreed upon, but the coordinated scheme was never implemented. However, had the critical mass been reached, it would have probably sped up the necessary decisions.

**Lesson 3 – Start small and build up**

Even though the measure was stopped, it might be possible to implement the same measure on another location (not immediately in the narrow centre of city). For instance, if the measure would have been implemented in some other part of the city, where there is less demand for delivery, maybe it would be easier to convince decision-makers and other stakeholders that it is a good idea to try to implement similar activities in the centre of the city.

### 3.3.3.5. Integrated package 5: Safe and secure public transport

#### 3.3.3.5.1. Evaluation on Integrated package level

**Integrated Package Description**

The measures of this Integrated Package focus on safe and secure public transport contributing further in a specific way to the quality of public transport:

- M5.3-ZAG: Safety & security for seniors consisting mainly of citizen engagement activities
- M5.8-ZAG: Security improvements in PT including several technical improvements to increase safety and security

Both measures envisage the reduction of unwanted events (incidents) in bus and tram traffic: accidents, injuries, attacks and damaged vehicles.

**Evaluation Approach**

To evaluate the impact on the number incidents the data are derived from the specific monitoring for both measures.

The public perception on security and safety was evaluated with data from the general survey about the quality of PT service. The survey consisted of several detailed questions about specific aspects of the PT safety and security. The general questions about PT safety and security are used here to draw some common conclusions. Specifically the level of safety in PT was evaluated within the measure 5.3-ZAG and the level of perception of PT security within the measure 5.8-ZAG.

**Impact evaluation**

The impacts of this Integrated Package of measures need to be seen in a context of a general improvement of the quality of public transport service by a fleet modernization process which started before and then intensified during ELAN: 70 new low-floor trams (M1.3-ZAG) and 160 new low-floor buses were introduced (M1.14-ZAG).

**Key result 1 – Reduction of the number of incidents in PT**

Total number of incidents in PT was reduced by 37.9% if the figures from 2011 are compared with the ones from 2007. This is the result of a decrease in the number of accidents (affected by M5.3-ZAG)
and a decrease in the number of attacks and damaged vehicles (which is affected by M5.8-ZAG).
Results are presented on the Figure 3.19.

**Figure 3.19: Number of unwanted events in PT**

![Graph showing the number of unwanted events in PT from 2007 to 2011.](image)

**Key result 2 – Increased user satisfaction**

The percentage of users that are very satisfied with general level of safety and security in PT increased from 4% in 2009 to 20.9% in 2011. Moreover, almost 65% of all respondents to the quality of PT service survey graded general level of safety and security in PT with two highest grades available (4 – satisfied and 5 – very satisfied). Results are presented on the Fehler! Ungültiger Eigenverweis auf Textmarke.

**Figure 3.20: General level of satisfaction with the level of safety and security in PT**

![Graph showing the percentage of users satisfied with the level of safety and security in PT from 2009 to 2011.](image)
Process evaluation

Barrier 1 – Complex administrative procedures
When trying to implement new systems or make infrastructural improvements, complex administrative procedures are often experienced as measure barriers and they have to be considered when making time plans.

Driver 1 – Complete and motivated measure team
The members of both measure teams were open for communication, which was very helpful for a successful measure implementation. To further strengthen this driver, partner meetings at local level were held regularly.

Driver 2 – Exchange of know-how
The questionnaire example which was received from the Flemish Transportation Company De Lijn (also a part of CIVITAS ELAN consortium; City of Gent) has been a major help in the data collection process which proves that these types of projects can be excellent base for know-how exchange.

Lessons Learned

Lesson 1 – Citizen engagement can be crucial
The implementation of better safety and security environment has been really intensified after the start of the public workshops and training sessions with specific target groups. The City Department for Social Welfare and Disabled Persons had an important role in the communication with citizens.

Lesson 2 – Synergy between measures
Parallel improvements of safety and security conditions that occurred during ELAN undoubtedly created synergy and maximized individual measure effects (especially regarding the public perception). To produce similar result it is important to implement different measures in the same time. This of course requires coordination between different institutions which might be responsible for the measure implementation on the local level.

Lesson 3 – Complete and motivated measure team
This is very important for the measure implementation, especially when the members are open for communication. It is also crucial to have regular partner meetings at local level.

3.3.3.5.2. Measure 5.3: Safety & security for seniors

Measure description
In this measure, comprehensive citizen engagement activities are implemented, aiming at seniors to be able to participate safely in urban transport. One of these activities was the design and implementation of an educational programme for seniors in senior nursing homes. The main focus of the programme was public transport, being the most important transport mode for seniors apart from walking. The task was to present new systems and services in PT to the senior users, as well as explaining to them how to use these new systems (by the term “new systems” new PT vehicles, new ticketing system and new information system are considered). In total, 15 sessions were held.

The seniors were also given the 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. Based on this information (user demands, problems and suggestions), measure activities were “re-shaped”. For instance, one of the most successful measure outcomes was the introduction of two PT drivers into the training sessions (one bus and tramway driver). The drivers were actively involved in the discussion with the users of nursing homes.
Evaluation approach
The measure was expected to increase positive perception of senior PT users about PT safety and a reduced number of injured PT users in general. It is reasonable to expect that the former impact can be reached (due to the citizen engagement activities which were oriented toward senior population); however, the latter impact is hardly under the influence of the educational campaigns which are implemented in senior nursing homes. The latter impact should mostly be reached as a result of two other ELAN measures which worked the most on fleet modernization. Specifically, since 2008, 70 new trams and 160 new buses were introduced into the fleet (M1.3-ZAG Energy recovery system for trams and M1.14-ZAG Clean public transport strategies). Apart from a substantial increase in comfort, new vehicles also raised the level of safety and security of PT service because vehicles now comply with the latest standards in this field.

In order to evaluate the impact on senior perception, two surveys have been carried out on a group of 28 seniors which were involved in citizen engagement activities. The questionnaire for the survey was adapted for the questionnaire example provided by De Lijn – PT operator of the Flanders region and a CIVITAS ELAN partner.

Besides this, the number of injured PT users is also evaluated here, derived from the statistical data of ZET about the number of injured persons over the course of four years.

Impact evaluation
Key result 1 – Reduction of the number of injuries in PT
The total number of accidents was reduced by 37.6%. This resulted in fewer injuries as well: the total number of injuries in PT was reduced by 12.9%, the total number of minor injuries in PT was reduced by 13.1% and the total number of minor injuries in tram traffic was reduced by 52.9%. 65% of all accidents involve senior citizens; this indicates the importance of educational programmes in nursing homes to affect the number of injuries.

Key result 2 – Increased satisfaction of senior users
Indicated on Figure 3.21; red and blue columns indicate the share of answers in 2009 and 2011, respectively. For all categories, there was a strong increase of very satisfied senior PT users.
Key result 3 – Implementation of innovative citizen engagement activities towards specific target groups

Training and awareness raising concepts are planned and executed in order to improve safety and independent mobility of seniors. These types of activities have never been applied in Zagreb prior to ELAN. Different stakeholders (city municipality, PT company, and safety and mobility experts) realized the importance of citizen engagement. This confirms the necessity of ensuring full commitment of all measure stakeholders.

Process evaluation

Barrier 1 – Incomplete measure team

ZET as the main public transport operator in the City of Zagreb was not included in this measure from the beginning of the project. The primary field of work of the measure leader (City Office for Strategic Planning and City Development) was not safety and security in PT. That meant that additional effort had to be taken in order to fulfil measure tasks. Only during the fourth amendment process, ZET was officially included into the measure team as a key partner. Also other measure partners (ODRAZ and ZFOT) took a bigger role in the measure implementation in order to cover all aspects of the measure.

Barrier 2 – Impeding administrative structures, procedures and routines

It was experienced that it was difficult to make improvements in spatial planning for the public transport stops due to the complex administrative procedures.

Driver 1 – Communication with stakeholders

An Action plan was created for public involvement. The main elements of the Action plan created the motivation of the senior population to take a more active role in the measure. Based on this action plan, numerous public events were organized in order to raise the public acceptance of new systems that were introduced in public transport. Also direct communication with the interested target group and seniors established a good relationship between stakeholders and end users. All this has prompted the target group to accept new solutions that are implemented in the public transport.
Driver 2 – Motivation of the measure team

Public transport has a more than 120 year long tradition in the City of Zagreb. It is incorporated in the fabric of the city; hence it provides good motivation to work on PT improvement. Another source of motivation was the opportunity to really help the seniors in their daily life activities and mobility needs. All measure partners took an active role in measure implementation from the very beginning of the project. Moreover, key stakeholders were very committed to achieve the measure objectives.

Lessons learned

Lesson 1 – Full commitment of all measure stakeholders

This was a crucial factor for the measure implementation. Measure implementation has been really intensified after the start of the public workshops and training sessions with specific target groups. An important subject who participated in the implementation of citizen engagement activities was the City Department for Social Welfare and Disabled Persons (not a part of ELAN consortium). This confirms the necessity of ensuring full commitment of all measure stakeholders.

Lesson 2 – Investments in infrastructure are equally important

This measure showed positive results, but its connection with the fleet modernisation (M1.3-ZAG and M1.14-ZAG) is very important. Without improvements in infrastructure, i.e. new PT vehicles, the senior satisfaction and safety would not increase so much.

3.3.3.5.3. Measure 5.8: Security improvement in public transport

Measure description

In 2005 ZET (Zagreb's largest PT company) underwent the process of modernization of their fleet. By the end of 2007 there were 70 new low floored trams in operation. In 2008 this process was incorporated into the CIVITAS ELAN project and up-scaled. Specifically, additional 70 new trams were implemented as a part of the measure 1.3 Energy recovery system for trams, and 160 new low floored buses were put in operation as a part of the measure 1.14 Clean public transport strategies. Apart from significant improvement in energy efficiency, service accessibility and general level of comfort, certain number of new vehicles are also equipped with security systems which did not exist in the past.

Specifically, CCTV cameras were installed in 214 new public transport vehicles within this measure. Apart from this, the vehicle cockpits were equipped with an SOS button for efficient dissemination of information about the security incidents between different stakeholders. Furthermore, educational workshops for citizens were organized on safe and secure usage of public transport. Finally, the PT drivers also went through an educational programme. They learned about the new security systems which were now a part of the new vehicles, as well as how to use them.

There was one deviation. Original description of the measure contained one more objective which was not achieved: to install CCTV system on PT stops. Due to the lack of finances this activity was altered (4th and 5th amendment) into the installation of additional CCTV cameras in additional 40 older tram models.

Evaluation approach

It was expected that the abovementioned activities would lead to the decrease of the number of damaged PT vehicles, decrease in the number of attacks on PT employees and increased user satisfaction with new level of PT security. Therefore, we used evaluation indicators from the Transport and Society group of indicators. In order to evaluate joint impact of both measures in IP5, some results were combined on the IP level.

In the data collection process, important contribution came from the measure and project partners on local and project level. ZET provided their statistical data about the number of damaged vehicles and attacks on PT employees over the course of 4 years which was essential for one part of evaluation activities. Other type of impact (related to public perception) was evaluated using data from quality of service in PT survey. The questionnaire for the survey was adapted for the questionnaire example provided by De Lijn – PT operator of the Flanders region and a CIVITAS ELAN partner.
Impact evaluation

Key result 1 – Reduction of the number of damaged vehicles
Total number of damaged vehicles was reduced by 40.5%; total number of damaged trams was reduced by 81.3%; total number of damaged buses was reduced by 15.4%.

Key result 2 – Reduction of the number of attacks toward PT employees
Total number of attacks on ZET employees was reduced by 35.7% and total number of attacks on ZET bus drivers was reduced by 54.5%.

Key result 3 – Increased public perception
The positive perception of general public was significantly increased:
- The percentage of very satisfied users (highest grade) with the statement I feel secure inside the vehicles (with or without other users) was increased from 10.67% to 28.36%.
- The percentage of very satisfied users (highest grade) with the statement I feel secure while waiting on PT stops (with or without other users in vicinity) was increased from 5.78% to 22.14%.
- The percentage of very satisfied users (highest grade) with the illumination at PT stops was increased from 4% to 8.71%.

Note that the second and third criterion was included in the survey before the discontinuation of the installation of CCTV system on PT stops. In order to see possible change in user perception we kept those questions in the second survey, i.e. after the discontinuation.

Generally, significant improvements were recorded by all evaluation indicators. Moreover, it was noticed that a positive impact, produced by improved security conditions in PT vehicles, can have a positive influence on public perception on the level of security in the whole PT system, even though the whole system is not covered with security improvements. In addition to the previous statement, the complementarity with the fleet modernisation (M1.3-ZAG and M1.14-ZAG) needs to be stressed. Apart from new security systems installed in vehicles, the fact that ZET considerably modernized its fleet surely had an impact on public satisfaction with security standards. We believe that a greater impact on public perception would have been possible if the plan had not been changed and the stops were equipped with CCTV system.

Process evaluation

Barrier 1 – Financial restrictions
Some financial issues emerged due to which one part of the measure plan had to be altered. Specifically, instead of installing CCTV system on stops, the system was installed in additional 40 trams. Even though 40 more trams are equipped with CCTV, it can be said that due to this financial issues the measure was downscaled (in terms of security standards, only one part of PT system was upgraded).

Driver 1 – Exchange of know-how
The questionnaire example which was received from De Lijn has been a major help in the data collection process which proves that these types of projects can be an excellent base for know-how exchange.

Lessons learned

Lesson 1 – Need for a holistic approach in solving security issues
A greater impact on public perception could have been possible if the CCTV system was installed on PT stops. Future improvements should also include citizen engagement activities to further increase the impact on public perception of PT security; especially among specific groups of users (e.g. visually impaired users).
Lesson 2 – Importance of modernization of PT fleet

The aforementioned results show remarkable improvement of security and perception. However, it must be noted that before ELAN, last significant modernization of PT fleet occurred 20-25 years ago. Old vehicles were not equipped with any kind of security systems. If the fleet was continuously modernised in shorter time periods and equipped with security systems, the difference between before and after implementation would not have been so pronounced.

3.3.3.6. Integrated package 6: Changing travel behaviour

3.3.3.6.1. Evaluation on Integrated package level

Integrated Package Description

This integrated package envisages changing travel behaviour of two specific target groups in the ELAN corridor: employees who work in the corridor and students who currently live in the corridor. These measures are:

- **M4.4-ZAG Mobility management for large institutions** – in 8 selected institutions a mobility plan was implemented motivating the employees to change their travel habits, i.e. shifting towards cycling, PT and carpooling. To further stimulate carpooling a ride matching site was build (available to everyone and not just employees).
- **M4.11-ZAG Comprehensive mobility dialogue and marketing** – a range of dissemination and citizen engagement activities were set up to intensify the mobility dialogue with the citizens: dissemination of information (e.g. a CIVITAS-ELAN Zagreb brochure, promotional movies), discussion groups, workshops, round tables, surveys, a facebook page and a CIVITAS ELAN info point in the city centre. Additionally also a public bicycle scheme for students was implemented with 20 bicycles.

These activities were crucial for the implementation of the Mobility management for large institutions because various promotional materials were produced and public promotional events were organized. In general, the mobility dialogue was very important for increasing the usage of other ELAN measures.

Hence, the common objectives of these measures were to increase the awareness level on the benefits of sustainable mobility solutions and offer new alternative concepts of urban transport. Also to be an activator for the change of people’s opinions and travel habits.

Evaluation Approach

The common objective of both measures in this integrated package was to influence travel behaviour of employees and students. In order to detect this change, a modal split survey was conducted, separately for each of these two target groups. Both surveys were properly announced and additional effort has been invested into informing respondents on how to complete the questionnaire (e.g. educational video has been prepared, showing how to use the online survey tool). Hence, the number of responses to the surveys was relatively high which ensured a small statistical error.

Since no data on modal split in the city for nearly 15 past years were available, a new measurement methodology was developed.

Impact evaluation

**Key result 1 – Significant modal shift toward more sustainable modes**

An increase of the share of sustainable transport modes of 11.48% for employees (target 10%) up to 78.56% and 3.13% for students (target 10%) up to 91.09% was recorded. Since the share for student was already 88.32% the target was not realistic. The increase in public transport by the employees is surely affected by the introduction of new PT vehicles (M1.3-ZAG and M1.14-ZAG). This increase is not visible among students, as during the project, the right for a free PT tickets for students was cancelled.
Key result 2 – Very strong increase of share of shared rides for student population
The share of shared rides among student population tripled almost to 13.41% of the total.

Key result 3 – Increase of share of cycling
The share of cycling among employees increased by 2.22% and among the student population by 1.55% (the targets were to increase the share of cycling from 3 to 7%). This is in line with the increase in cycling on city level, as the evaluation of IP2 already indicated.

Figure 3.22: Modal split within institutions
![Modal split within institutions](image)

Figure 3.23: Modal split of students
![Modal split of students](image)

These key results show that there was a positive impact on modal split, but the targets sets were not fully achieved. This can be explained by one important fact. Prior to the ELAN project, no similar research was undertaken within these two target groups. Furthermore, the last official modal split survey on the city level occurred back in 1999. Without knowing the historical trends it was difficult to define realistic targets e.g. a 10% increase of sustainable transport modes within the student population when their share was already high in the baseline year (88.32% in 2009).

Process evaluation
Barrier 1 – Communication between measure partners and stakeholders
In the beginning of the project both measures experienced some problems with establishing communication channels with relevant stakeholders.
Driver 1 – Motivation of measure leaders
Both measures introduced several innovative concepts and it was uncertain whether these concepts would be accepted or rejected by the users. It can be stated that without personal motivation of these individuals, it would be hard to produce the same results.

Driver 2 – Citizen engagement
Citizens have confirmed themselves as experts for their local (mobility) conditions and are most interested in improvements. Their input was crucial for the development of transport plans and for shaping the structure and defining the topics of public events.

Lessons Learned
Lesson 1 – Importance of data
Without knowing historical trends it is difficult to define realistic targets for the implementation of measures. In this particular case, due to the lack of data, the objectives were simply set too high.

Lesson 2 – Dependence on personal motivation
Measure success depends on few enthusiastic individuals whose commitment level can motivate other team members and, perhaps more importantly, measure stakeholders. This can be useful when trying to overcome measure barriers.

Lesson 3 – Include citizens into the early phase of the project implementation
In this way they can have the most influence on decisions which will be made.

3.3.3.6.2. Measure 4.4: Mobility management for large institutions

Measure Description
In this measure mobility management was implemented in large institutions. Eight organizations in the corridor were selected for measure implementation which included the implementation of transport plans and promotion of sustainable mobility in general. Transport plans were tailored for the specific institutions. The modal split data was collected in each institution. After the presentation of the baseline state for specific institution, different recommendations were made to the employees on how to travel to/from work. This while keeping in mind employees’ home addresses and the availability of specific modes in their neighbourhoods. Employees of different institutions were encouraged to travel together. To host this collective transportation concept an online car matching service AUTOZASVE (in English: “CARFORALL”) was set up.

Additionally, the target group was expanded to encompass the student population by including three student dormitories into the marketing campaigns of the measure. However, since the students are not permanently located at the dormitories (i.e. they often move each academic year), for them the transport plans were not developed (they could only make use of the car matching service).

As a part of marketing campaigns 13 technical lectures (in total 348 participants), 4 workshops (in total 72 participants), 2 training sessions (in total 129 participants) and 1 round table (in total 46 participants) were organized.

There were no deviations from the original plan.

Evaluation Approach
At the measure level evaluation report, only the carpool service was evaluated, by three indicators:
- Average vehicle occupancy: data on city level collected by conducting Roadside Windshield counting
- Number of carpools in institutions: derived using the modal split results
- Acceptance of carpooling: a public opinion survey.
Collected data sets for all indicators were sufficiently detailed and they even enabled the impact evaluation on a micro level, i.e. per individual institution (in case of the Number of carpools in institutions evaluation indicator). Other impacts of the measure like the number of employees and students commuting by alternative modes were evaluated on the IP-level.

Impact evaluation

Key result 1 – Increase in number of carpools
ELAN successfully implemented a carpool scheme in eight institutions. The number of carpools arrangements within the target group “employees” increased from 8 in 2009 to 36 in 2012; within the target group “students”, this number increased from 26 in 2009 to 74 in 2012 (i.e. the target increase the average use of carpooling in institutions in the corridor by 15% was exceeded). However, this did not result in an increase of the vehicle occupancy rate on city level, the target increase the average number of passengers in cars by 20% was not achieved.

Key result 3 – Increased acceptance of the concept of carpooling
8% more employees stated that they are willing to use carpooling as one of the transport alternatives when travelling to work (from 46% in 2009 to 54% in 2012).

Process evaluation

Barrier 1 – Lack of data
Instead of working on transport plans and developing new mobility solutions for the target groups, the measure leader and evaluation team had to acquire first the necessary data. Most important barrier for this measure was the lack of the modal split data.

Driver 1 – Media support
TV and radio interviews which were held with the measure leader triggered the increased usage of the web portal for carpool arrangements and also a wider target group was reached more easily.

Lessons Learned

Lesson 1 – Include evaluation team into the planning phase of the measures
In this way, data collection could be included into the measure time plan more realistically. Usually, time plan of all measures includes data collection, but this process is unique for every measure and carries its own time constraints.

Lesson 2 – Importance of media
This became clear once the measure entered the operational phase. Their support is an important factor for the “soft” measures which are oriented toward changing people’s behaviour through dialogue and public participation instead of conducting physical implementation (e.g. construction of new roads and cycling lanes, PT stations etc.).

Lesson 3 – Inclusion of students in the measure
Based on the results of other projects it was decided to expand measure activities to the student population. Students are more willing to change their travel behaviour and they are more likely to accept carpooling scheme because carpooling can also be considered as a form of social integration of individuals.

3.3.3.6.3. Measure 4.11: Comprehensive mobility dialogue and marketing campaign

Measure description
The primary aim of this measure was to ensure participation in different public events. Dissemination and citizen engagement activities for other ELAN measures were often supported by this measure as well.

During the measure implementation various tools were used to engage the citizens, ranging from project and measure information dissemination as a precondition for participation, to conducting surveys on various topics and gathering citizen opinions, giving presentations with discussions within specific measures, round tables, workshops or organising gatherings at the city district level to identify problems and find solutions. In total, 22 workshops were held. The project brochure was produced and 10,000 copies were disseminated, official project website was built, Facebook fan page was opened, three promotional movies were produced, an InfoPoint was established, a photo contest was established, a series of discussions with local community boards was initiated etc.

Apart from these activities, in the last ELAN year measure 4.11 initiated a pilot project called STUDOCIKL. This was the project of introduction of public bicycle scheme for student population of ZFOT and University of Zagreb. At first 20 bicycles were purchased, 10 for each of the two locations (one in the University Campus Borongaj and another close to the ZFOT main building).

There were deviations from the original plan:

- **Additional activities:** during the project, some actions were added to this measure; CIVITAS ELAN Info point, community board round tables and debates, Photo award and exhibition on sustainable urban mobility solutions in the city, leaflets, brochures, newsletters and other promotional material, STUDOCIKL, ...

**Evaluation approach**

This measure aimed at promoting sustainable mobility solutions and especially public transport, as an important alternative, through implementation of marketing campaigns and conducting citizen engagement activities. A three-layer impact can be associated with this measure:

- First, dissemination activities stimulate citizens to involve themselves in public discussions about mobility issues (e.g. sending newsletters about upcoming workshops to measure stakeholders can increase the level of participation). This is evaluated by keeping track on the number of participants on public events. ODRAZ representatives were keeping track of the attendance lists at different events.

- Secondly, numerous public events and dissemination products (organized/produced within this measure or with the support of this measure) were used to raise the public awareness about the latest improvements in PT (e.g. new vehicles, new information and ticketing system etc.). Impact of these activities is evaluated by surveying general public about their satisfaction level with the dissemination of PT related information as well as investigating public awareness about the sustainability of PT. This was evaluated with quality of PT survey conducted among PT users.

- The third layer is the most important one: by encouraging public participation and creating a dialogue, change of travel behaviour should occur and more sustainable transport modes could gain on their importance. This is actually the final objective of this measure; to induce a behavioural change. Since other ELAN measures also contribute to this impact this is evaluated on the city level with the modal split survey.

Regarding the STUDOCIKL project, its implementation came too late (September 2012) to be able to conduct impact evaluation.

**Impact evaluation**

**Key result 1 – Successful introduction of information provision and citizen engagement**

During the project lifetime this measure was the organizer or co-organizer of 34 workshops, 2 press conferences, 32 public presentations, 11 roundtables and 2 exhibitions. 1715 citizens in total attended these events. Moreover, ELAN appeared in 40 newspaper and 98 web articles, 29 TV and 21 radio shows. In total 21,630 people visited CIVITAS ELAN Info point.

**Key result 2 – Increased satisfaction level with the dissemination of PT related information**
The percentage of satisfied users increased from 29.02% in 2009 to 38.06% in 2011; the percentage of very satisfied users was increased as well (from 5.36% in 2009 to almost 12% in 2011). This positive result is due to various communication mechanisms which were established during the ELAN. The mechanisms were used to communicate with the general public about the improvements which were introduced in PT during the project. However, even though this measure worked the most on information provision and dialogue with citizens, other measures could have an influence on these results as well (e.g. the establishment of a call centre for PT users).

**Key result 3 – Increased awareness**

Public awareness about the sustainability of PT increased. Only a small share of the respondents use PT because it is beneficial for the environment, but an increase was observed after the implementation of the measure (the share of this answers increased from 4.69% in 2009 to 6.4% in 2011).

No quantifiable targets were defined.

More value to the second and third key result would be added if it would be known how many survey responders were affected by the measure dissemination. However, this is not possible because the data was not collected in this way. Nevertheless, from the first key result it is clear that large scale dissemination was implemented, which increases probability that responders to the survey were somehow affected by at least one communication channel.

**Process evaluation**

**Barrier 1 – Lack of communication and cooperation between city administration and general public**

It can be said that CIVITAS ELAN was one of the first major projects in the city in which citizens could take an active role. However, it is a known fact that due to this kind of innovativeness, projects usually experience barriers on different levels of decision-making during the implementation.

**Barrier 2 – Lack of systematic political support**

During the first months of the project, a low level of interest of higher city officials for project activities and results was reflected in absence or postponement of necessary decision-taking.

**Barrier 3 – Distrust**

From various public events, where discussions were encouraged, it was evident that citizens feel distrust and lack of confidence regarding their possible proactive role in mobility dialogue and planning. This barrier is followed by another: low level of citizens’ interest for mobility dialogue because they feel that they cannot have any influence on decision-making process.

**Driver 1 – Cooperation among partners**

Good and successful cooperation between project partners was established at the very beginning of the project.

**Driver 2 – CIVITAS ELAN Info Point**

Availability of the Info point was a major driver of the measure. Without the Info point it would be hard to complete different dissemination tasks within specific measures.

**Driver 3 – Personal motivation**

The opportunity to create a constructive dialogue between general public and city administration motivated the measure leader and the measure team.

**Lessons learned**

**Lesson 1 – Appropriate venue for future dissemination and citizen engagement activities**

According to the planned measure timetable this should have happen before the project start, but it happened only in the fourth ELAN year because the space for the venue (ZgForum) was not ensured (the city municipality was responsible for this activity). However, the measure partners successfully mitigated this barrier and CIVITAS ELAN Info point was implemented which produced unexpected
success. This proves that “Plan B” has to be prepared, especially when successful implementation depends not only on commitment of project partners, but also on other project/measure stakeholders.

**Lesson 2 – Continuous improvement and upgrade of dissemination activities**

Once when the communication mechanisms were established, it was important to keep achieved momentum, to reach a wider public and to motivate their interest and potential engagement.

**Lesson 3 – Include citizens into the early phase of the project implementation**

Citizens have confirmed themselves as a valuable source of information about the mobility conditions in their neighbourhoods. It is wise to include them into the early phase of the project implementation, as their input can be very helpful in shaping the measure activities. Furthermore, once implemented, measures are accepted easily if the general public was involved in their design, because citizens are aware that they are also partially responsible for the changes.

**Lesson 4 – Importance of recognizing the complementarities of different measures**

Dissemination and citizen engagement activities implemented in the ELAN were almost always led or supported by the measure 4.11. This increased the “visibility” of the project because all dissemination activities were very well coordinated and supplemented by the unique knowledge of project partners (e.g. different measure leaders). However, this makes it difficult to distinguish the impact of a specific activity. Therefore, the effect of all measures which strive to similar objectives should be seen as complementary. This is one of the reasons why some impacts have to be evaluated on a higher level.

### 3.3.3.7. Evaluation results on corridor level

**Description of the measures**

ELAN was the first project that systematically tried to change the mobility conditions in this corridor. The activities were aimed at improving conditions for alternative transport modes and intermodality as well as improve the quality of PT service. Cycling and PT were rather neglected in the past two decades which only stimulated the high car use.

1.8 km of new cycling lanes were introduced in order to interconnect existing lanes which were often fragmented. Furthermore, the corridor now has 150 new bicycle parking spaces. Significant improvements were achieved in the PT system. Besides car traffic, PT can be considered as one of the main transport modes in ELAN corridor. New, low-floored trams improved service accessibility and comfort; 40 LED information displays installed at PT stops in the corridor provides accurate info about the arrival time of tramway; thanks to the demonstration of the PT priority system tram now passes Savska Street 6.46% faster.

Regarding the improvements in the intermodal conditions, first steps towards establishing large intermodal terminal and inclusion of railway into the traffic system were undertaken. High level design of the future SAVA-NORTH intermodal terminal is produced, taking into account various transport modes (walking, cycling, PT, car and taxi). The objective was to divert car traffic flows to the terminal, so that trips into the city centre would be made by other, more sustainable means of transportation.

During the ELAN several traffic studies were conducted in order to investigate the impact of the new solutions on the mobility in the Savska Street. Two most important ones were the study of congestion charging and traffic modelling of the introduction of Šarengradska Street into the traffic network of the City of Zagreb (Šarengradska Street goes parallel with Savska Street but it is not currently suitable for any transport mode). After the introduction of Šarengradska Street the ELAN corridor could become car-free zone, where walking and cycling would become two mainstream transport modes.
Figure 3.24: Target corridor Zagreb, A - Main Railway Station; B - West Railway Station; C - New interchange ‘Sava-north’; D - New PT stop

Evaluation approach

The objective of almost all ELAN measures in the City of Zagreb is to focus on the development of sustainable transport modes and promoting their usage. In this way a turning point in the modal split of urban mobility is envisaged. Hence, expected impacts which are evaluated on the city/corridor level are:

- **More PT users** and change in the **modal split**. Two quantifiable targets were defined:
  - increase of patronage in public transport by 6%.
- increase the number of persons commuting by alternative modes by 10%.

The data about the number of PT users was provided by the PT operator while the data about the modal split was collected by carrying out a survey on the city level (sample 500 citizens; 2 sample stratifications).

- Improved air quality with a reduction of CO\textsubscript{2} emissions by 5%. However, this target was not assessed due to the constraints of the measuring equipment at the air quality measuring location (all air quality data is extracted from the air quality measuring station located in the ELAN corridor; data is publicly available on-line). Instead, NO\textsubscript{2}, CO, SO\textsubscript{2} and PM\textsubscript{10} emissions were analysed.

- Reduction of noise level: decrease of sound level within the corridor by 5%. In order to derive noise levels in the corridor a macroscopic simulation model was used (specially build for this purpose based on the real life measurements of traffic flows).

- Improved image of PT company (ZET). The data for this indicator was extracted from the quality of PT service survey which is conducted among PT users.

Impact evaluation

Key result 1 – Less \text{SO}_2 and \text{PM}_{10} emissions

\text{SO}_2 and \text{PM}_{10} emissions are reduced by 27.47% and 22.28% respectively (if the figures from 2012 are compared with those from 2009). However, emissions of NO\textsubscript{2} and CO increased.

Almost all ELAN measures worked to improve the air quality in the corridor by introducing clean vehicles into the public fleets (M1.3-ZAG, M1.14-ZAG and M1.15-ZAG), stimulating “green” modes (cycling and walking in measures 2.5, 4.8 as well as 4.11), promoting the use of the public transport services and using new mobility solutions like carpooling (M4.4-ZAG).

Key result 2 – Reduction of sound level

On 8 out of 10 locations in the corridor a decrease was achieved between 11.1 to 27.6%. Hence, the target decrease of sound level within the corridor by 5% is achieved.

Similarly to the air quality, several measures had an impact on the noise level. A positive impact occurred due to the various ELAN objectives like reducing the noise levels of the public fleet vehicles (public transport and waste disposal vehicles in M1.3-ZAG, M1.14-ZAG and M1.15-ZAG), stimulating walking and cycling (M2.5-ZAG, M4.8-ZAG and M4.11-ZAG), discouraging the use of individual vehicles by prioritising PT vehicles (M8.2-ZAG) and promoting multimodal journeys (M2.5-ZAG).

Key result 3 – Increased share of cycling, walking and PT in all journeys

Figure 3.25 shows an increase from 68.8% in 2009 to 74.66% in 2012 (i.e. the target increase the number of persons commuting by alternative modes by 10% is substantially achieved).
Key result 4 – Increase in public transport
The share of tram and bus journeys increased from 32.34% to 37.38%. However, the number of PT tickets sold decreased by 11.8%, which can be explained by the fact that in 2009 many groups of users were entitled to a free PT ticket, but not all of them were actually using the service. After this privilege was terminated (in 2011), less PT tickets are actually sold, but they are used more frequently (e.g. one sold monthly ticket is recorded as one PT user, but this ticket can be used for many journeys in one month).

Regarding the third and fourth key result it is clear that actions like the acquisition of the new PT vehicles (trams and buses in M1.3-ZAG and M1.14-ZAG, respectively), implementation of the new systems (tariff system and information system in M2.6-ZAG and M8.2-ZAG, respectively), establishing better safety and security standards (M5.3-ZAG and M5.8-ZAG) contributed to higher number of users. Furthermore, communication campaigns (implemented, for instance, in the M4.4-ZAG and M4.11-ZAG), better infrastructural conditions for cyclists (M2.5-ZAG and M4.8-ZAG) and other measure level activities produced an impact on these modal split figures.

Key result 5 – Improved image of ZET
The overall image of the company is improved. Shares of very satisfied users about the travel time (Product), vehicle comfort (Place) and level of dissemination of PT related information (Promotion) is more than doubled. Modernisation of the PT fleet (M1.3-ZAG and M1.14-ZAG), as well as comprehensive implementation of information dissemination (M1.3-ZAG, M1.14-ZAG, M2.6-ZAG, M4.11-ZAG and M8.2-ZAG), evidently affected the public satisfaction levels.

Process evaluation
Barrier 1 – Lack of data
The general lack of data, which is experienced in many ELAN measures, was the most visible barrier. The city municipality was unable to provide the necessary data for a surprisingly high number of evaluation indicators. To cope with this barrier ZFOT (Zagreb Faculty of Transport and Traffic Sciences) and other project partners had to invest additional efforts.

Barrier 2 – Lack of mutual understanding and common objectives
In the implementation of several ELAN measures the lack of cooperation and mutual understanding of specific departments of the city municipality caused major barriers which were sometimes too big to overcome and the measures were stopped or partially implemented. Specifically, the problem was that City Transport and Traffic Department was not officially the part of ELAN consortium and most of the specific ELAN objectives relied on their support which was not always provided

Driver 1 – ZFOT students
Students who were included in data collection activities and data processing proved to be the important driver to the project. Over the project lifetime around 200-300 students were included into the data collection process. It can be easily said that without them and their participation it would be difficult, if not impossible, to implement measures and conduct impact evaluation.

Driver 2 – Personal motivation
In several ELAN measures the importance of the individuals was key driver in all stages on measure implementation. Moreover, it was discovered that the measure can be further pushed forward if the measure leaders are young researchers (e.g. PhD. candidates) who are able to include ELAN work in their scientific research.

Lessons Learned
Lesson 1 – Need for harmonized objectives
In several ELAN measures, the successful implementation demanded the cooperation between the City Traffic and Transport Department and ELAN partners. The department is responsible for traffic policy and infrastructural improvements in the city and it was not a part of the ELAN consortium. This experience teaches us that without common objectives within city municipality it is sometimes very hard, if not impossible, to implement projects like ELAN.
Lesson 2 – Planning of data collection process

In future projects data collection activities have to be better planned. To achieve this, evaluation team could be included into the planning phase of the measures. In order to define data collection time plan more realistically. Usually, time plan of all measures includes data collection, but this process is unique for every measure and carries its own time constraints.

Lesson 3 – Citizen engagement activities are less suitable for technical measures

During the project implementation it became clear that not all measures are suitable for the implementation of citizen engagement activities, because some measures have rather technical objectives (e.g. development of microscopic traffic model for the simulation of public transport priority scheme) and citizen engagement is not crucial for their implementation.

Lesson 4 – Discontinued implementation of measures still allows sustainable progress

In the last year of the project two measures were discontinued (measures 4.8-ZAG Improving cycling conditions and 7.4-ZAG Freight delivery restrictions). Nevertheless, process of understanding the problem and convincing citizens and stakeholders on possible future steps went on resulting in a strong basis for the future policy.

3.3.4. Conclusions & recommendations

Within CIVITAS ELAN, the city of Zagreb made public transport more attractive, secure and energy efficient: the modernisation of the PT fleet, improved information for travellers, surveillance cameras in public transport and a new e-ticketing service were introduced. Information sharing and dialogue with citizens revealed the citizens’ interest in mobility issues and their willingness to be involved in finding solutions. Nevertheless, some more controversial topics, such as freight restrictions and access charging faced some opposition on different levels.

During the project partners gained knowledge and experience to overcome the initial lack of effective communication and understanding of partnership principles. But further capacity building is still needed, regarding ensuring more efficient coordination mechanisms supporting mobility decision making, improving the practice of mobility dialogue with citizens, securing regular data collection on mobility, researching the needs of different user groups and working on integrated and multi-sector transport and mobility planning.
3.4. Brno

3.4.1. City description

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 km² and its length is 21.5 km.

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.

Figure 3.26: 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.
The number of inhabitants is almost 380,000 inhabitants and is rising steadily in the last years. 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 80,000 students at many famous universities (e.g., Masaryk University Brno, Brno University of Technology).

Brno is internationally known as a centre of fairs, with the Brno Exhibition Centre as one of the modern landmarks. In 2006 the exhibitions were visited by over 1 million visitors. Lately Brno supports strongly the development of science – especially medical science and technical education – by building Technological Parks and university campuses.

The general information on the city and its economic characteristics is summarized in Table 3-10.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td></td>
</tr>
<tr>
<td>Surface (km²)</td>
<td>230</td>
</tr>
<tr>
<td><strong>Society and economy</strong></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>378,965</td>
</tr>
<tr>
<td>% unemployed</td>
<td>8.56%</td>
</tr>
<tr>
<td>GDP per capita (€)</td>
<td>13,166 (South Moravian Region)</td>
</tr>
</tbody>
</table>

Sources: Czech Statistical Office

**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
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, owned by the city of Brno.

Figure 3.28: The extensive network of the public transport system in the city of Brno

Even though 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.

3.4.2. The CIVITAS-ELAN strategy

Most CIVITAS measures are implemented on a city-wide scale. However, dissemination activities are concentrated in a demonstration corridor in the northwest part of the city. The Integrated Mobility Centre of CIVITAS ELAN in Brno is located in the centre of this corridor. 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.

3.4.2.1. The CIVITAS integrated packages of measures

For the city of Brno the Evaluation team of CIVITAS-ELAN identified 2 integrated packages of measures grouping a wide range of measures with the objective to change the mobility situation in the city focusing on the corridor.

Table 3-11: Measure overview Brno

<table>
<thead>
<tr>
<th>City/ IP/ Measure Number</th>
<th>Measure Title</th>
<th>Impact evaluation</th>
<th>CBA</th>
<th>Focused process evaluation</th>
<th>Evaluation of citizen engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP1- BRN</td>
<td>Promoting public transport by communication and dialogue</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.12-BRN</td>
<td>Comprehensive mobility dialogue and marketing research – new transport services</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4.13-BRN</td>
<td>Integrated Mobility Centre</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Other measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4-BRN</td>
<td>Optimised energy consumption in tram and trolley bus network</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.7-BRN</td>
<td>Ticket vending machine diagnostics</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2.7-BRN</td>
<td>Improving bus services for disabled persons</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

3.4.3. Summary of evaluation results

Here we summarize the results of the detailed evaluation of the measures in the city.

First the findings on the level of the Integrated Packages of measures are discussed. These are the impacts for which the different measures are working strongly together to achieve this impact. In many cases it is also difficult to disentangle the impact of the different measures since they are implemented in the same timescale for the same target group. For this reason the impacts are considered together and a more qualitative assessment is given of the importance of each of the measures in the package. This is done through an expert ranking of the measures in which the Site Evaluation Managers together with mobility experts familiar with this type of measures rank the measures in order of importance on the observed impact.

Further the impacts which are specifically related to one of the measures are discussed and conclusions are drawn per measure.

The detailed information is presented in the Measure Evaluation Result Templates (MERT) in annex of this report. Also these MERTs are structured in this way: first the aspects to be discussed on the level of the Integrated Packages of Measures and further the related Measures.
3.4.3.1. Integrated package 1: Promoting and enhancing the use of public transport

3.4.3.1.1. Evaluation on Integrated package level

Integrated Package Description

Over the last couple of years a general improvement of quality of public transport (PT) service is taking place in Brno. Systematic revitalization of the PT fleet is underway with dozens of trams, trolley buses, buses and even boats introduced lately. But the City of Brno together with Brno’s Public Transport Company (DPMB) are well aware that just technical improvements without the comprehensive communication and discussion of these changes with the stakeholders would be far from effective. Therefore they joined forces with KORDIS JMK company (the coordinator of public transport services of the South Moravian Region).

In this context CIVITAS ELAN two complementary measures were implemented:

- M4.12-BRN: Comprehensive Mobility Dialogue and Marketing Research – New Transport Services: a yearly comprehensive mobility dialogue was established with the citizens to facilitate communication between transport authorities and passengers. By communication and marketing activities it intends to influence travel behaviour and shift it towards greener and sustainable patterns. Based on this dialogue Transport Plans for years 2009-2012 were developed.
- M4.13-BRN: Integrated Mobility Centre: this centre increases the level of communication with the passengers and also provides them with all kinds of information at one spot. Important part of the measure was also to equip the stops at Joštova/Česká Streets with the Real Time Information Panels to increase the quality of the interchange. An important part of the measure was also to equip the stops at Joštova/Česká Streets with the Real Time Information Panels to increase the quality of the interchange.

Evaluation Approach

Both measures are expected to increase awareness and satisfaction of the PT users with the service as well as to the increase of PT users. It is important to note that the comprehensive mobility dialogue took place yearly, whereas the Integrated Mobility Centre was only opened in September 2011. This affects therefore only the results of the last year;

Following indicators were therefore defined:

- PT use: number of PT users recorded by DPMB and survey results on PT and car use derived from the results from the Transport Barometer of M4.12.
- Awareness on PT and on both CIVITAS ELAN measures: survey collected in M4.13
- Satisfaction with PT: derived from the results from the Transport Barometer of M4.12.

Impact evaluation

Key result 1 – Good awareness on public transport

Most of Brno citizens find the transport information accessible and satisfactory and only a minor group of people (3.1%) has problems in seeking transport information. The update of Transport Plans (M4.12) is much better known than the newly built Integrated Mobility Centre (M4.13). At the moment of the survey, the IMC has been open only for 1 year, whereas the transport plans were updated regularly for several years.

Key result 2 – Increased satisfaction on public transport services

The satisfaction level among the PT users increased significantly. The general satisfaction changed from 2.85 in 2008 to 2.42 in 2012 (on scale from 1-5 where 1 means total satisfaction). Concerning the satisfaction with specific quality components of transport service, out of 27 components assessment of 24 improved by more than 0.1 (on the same scale). These positive results are in line with the increase of respondents that would recommend PT to a tourist to travel around Brno from 68% in 2008 to 80% in 2010 and 2011 and 78% in 2012.
Key result 3 – Increase of season tickets but decrease of single tickets

While the sales of single tickets decreased between 2008 and 2011, sales of season tickets improved by 6%. As several other variables intervened to the sales, it is hard to determine which specific extent was affected by the CIVITAS ELAN measures. Survey results also show that PT users travel less by both PT and individual cars; the main reason will probably be the more pressing economic crisis which forces them to limit the number of their trips to limit the travelling budget. Further results suggest it is unlikely that this trend would be result of dissatisfaction with PT services.

Process evaluation

Barrier 1 – Dependency on other projects
The implementation of the Mobility Centre was delayed due to the fact that it was a part of wider project of reconstruction of the city centre

Driver 1 – Good cooperation among departments
Fruitful cooperation was established among various departments of Brno City Municipality. This became a great basis for the implementation of the measures.

Driver 2 – Good survey methodology
The replication of the method over time and longitudinal data allow for deeper comparisons concerning satisfaction and acceptance of PT. The survey provides a large amount of data and information on satisfaction and acceptance of the PT.

Driver 3 – Political support
The political representation of the City supports the project of IMC in the city centre. Extra financial means were dedicated to the IMC in September 2012 to ensure functioning after the end of the project.

Lessons Learned

Lesson 1 – Importance of good information campaigns
Campaigning is an important activity to disseminate the information and get feedback from the public on the measure design and functioning. All the means of communication to the citizens were used including workshops or new social media. Continuous campaign, not only around the start of a measure, seems to be important to access more and more citizens.

3.4.3.1.2. Measure 4.12: Comprehensive mobility dialogue and marketing research: new transport services

Measure description
The measure developed a flexible procedure of evaluating the information from the “Transport Barometer” and implementing changes according to the results. Basic data regarding customer needs and opinions were gathered by means of so called “Transport Barometer” survey, which had been conducted on yearly basis by KORDIS JMK (the coordinator of the Integrated Public Transport System of the South Moravian Region) already for some time before the start of the CIVITAS ELAN project.

The survey is conducted and analysed at the same time every year, and the results are provided to transport planners to be implemented to the specifications of the yearly transport plan for the next year. Opinions are reflected and trends are evaluated every year so the service can be adjusted closer to the needs of the passengers.

This measure builds upon the transport planning work done by the KORDIS JMK in the years before the implementation of CIVITAS ELAN. This transport planning incorporated demographic changes and land use information into transport planning.
There were no deviations from the original plan.

**Evaluation approach**

The data on acceptance of PT, satisfaction of PT and number of PT use were collected and reported on IP level, since this measure is closely inter-related to measure 4.13 Integrated Mobility Centre that also aims at raising satisfaction and number of PT users. The key results focus on the impact of the results of the Transport Barometer on the Transport plan.

**Impact evaluation**

**Key result 1 – Changes in transport plan**

All requests and recommendations collected in the Transport Barometer are answered and if it is possible they are accepted. Such an example are the new school buses that are now operating in Brno City District Medláňky and thus helping to get the children from new housing area to the schools safely.

The most important recommendations which resulted from sociological research is to improve the quality of the services of the interchanges and improve the quality of the PT services itself, and to improve the possibility of change. Therefore for example the interchange at Česká/Joštova, which was reconstructed last year, was equipped with new shelters and ticket vending machines. The surface is barrier free and supplemented with the guiding lines for the blind. Within CIVITAS ELAN the stop was equipped with electronic information panels with real time information.

**Key result 2 – Awareness of the transport changes due to marketing survey**

Almost half of the respondents (48%) know about the regular update, adjustments and optimisation of the transport system in Brno, so called Transport Plan in Brno. Older people (age group 45-59 and 60+) are better informed than younger people (e.g. students). It is probably connected with the length of residence in Brno as these changes are done only once a year. Therefore, it may take time for students from outside the city to learn and be aware of these changes.

**Key result 3 – Increase in satisfaction with PT**

An increasing trend in satisfaction with PT started in 2008 and sped up in 2010. The general satisfaction changed from 2.85 in 2008 to 2.42 in 2012 (on scale from 1-5 where 1 means total satisfaction) which means an improvement of this indicator. The share of unsatisfied passengers dropped from 16% in 2008 to 5% in 2012, whereas the two most positive answers of "fully satisfied" and "quite satisfied" rose from the share of 29% in 2008 to 53% in 2012. The satisfaction increase was slightly lower in 2009, probably due to changes in the tariff which took place only a few months prior to the survey.

**Process evaluation**

**Barrier 1 – Internal procedures**

A delay in publication of the research results occurred due to the internal procedures. The results needed to be approved by Brno City Council that did not meet due to elections in October 2010. The publication of results was then postponed from September 2010 to January 2011.

**Driver 1 – Good methodology**

The replication of the method over time and longitudinal data allow for deeper comparisons concerning satisfaction and acceptance of PT. The survey, a tool used in this measure, provides a large amount of data and information on satisfaction and acceptance of the PT. It is a unique technique and focuses only on PT users (unlike other surveys).
Lessons learned

Lesson 1 – Need for cooperation

Cooperation between stakeholders is necessary to implement citizen engagement actions, especially in the environment where this is not a daily practice. Setting up a good cooperation to maintain and proceed with involving citizens is a key issue.

3.4.3.1.3. Measure 4.13: Integrated Mobility Centre

Measure description

Main goal of this measure is the installation of the Integrated Mobility Centre on the intersection of the Joštova and Česká Streets. This intersection is situated next to the historical centre of the city of Brno. This place is not only very valuable public space but also one of the most important junction points of public transportation in the city. There is a transition point for eight tram lines and six trolley bus lines. This place is the main meeting point in the city centre as well.

On this spot the IMC provides its clients with all kinds of targeted traffic information as well as tourist information on Brno and South Moravian Region. The building was equipped with the necessary facilities for two officers and a sophisticated ticket vending machine offering not only single but also open and season tickets. The computer terminal installed in IMC displays topical information and news interesting for the citizens and visitors alike. It also provides Internet access for the visitors.

Apart from the building of IMC itself there are several other improvements of the public space made for construction in the framework of this measure. Real Time Passenger Information Panels suitable for this historic city centre were developed and then installed into the newly reconstructed Česká and Joštova interchange point (reconstruction was done outside the CIVITAS framework), new shelters were erected on the stops and the stops themselves were made better accessible for handicapped persons.

Training of the Integrated Mobility Centre staff as well as dissemination of both the new offer and of the measure results is part of this measure.

The installation of IMC and RTIPs as well as related inventory had been delayed for more than a year due to the delay in reconstruction of the Joštova street, which was the prerequisite for the installation. It was finally finished in September 2011 so the IMC could launch its operation on 19th September of the same year as well as the RTIPs. PR campaigns and staff training were delayed for the same reason.

There were no deviations from the original plan.

Evaluation approach

The impact of the IMC on the general perception of PT is evaluated on IP-level. In the evaluation on measure level, several indicators were measured and monitored:

- The number of visitors and their types of questions were recorded
- PT ticket sales of the vending machine in the IMC were recorded.

Impact evaluation

Key results to indicate satisfaction and the number of PT use will be reported at IP level and only results on the number of visitors compose a part of this MRT.

Key result 1 – High number of visitors

According to the IMC monitoring it was visited by 9,320 clients from its opening in September 2011 till the end of August 2012. The IMC is visited equally by men and women and most of them are in adult age. Almost one fifth of the visitors are from foreign countries. 60% of all the questions these visitors raise are on transport. This proves the need for such services in the city of Brno.
Key result 2 – Fluctuating ticket sales in IMC

After 13 months of the IMC operation, the total number of tickets sold in the IMC was over 9000 tickets, on average 719 per month. High sales in October 2011 indicate primarily interest of the passengers in the new type of the vending machines. On the other hand the relatively small sales in January and February are especially due to the changes of the tariff implemented at the beginning of the year 2012. Therefore, the effect of the IMC vending machine on the ticket sales is too small to be clearly determined, as there were other determining factors which had been out of control of the consortium. Ticket sales in the IMC are fluctuating around 0.04% of the total number of sold tickets. These numbers clearly that the assumptions regarding the ticket sales development had been overestimated. There are actually more people coming to IMC in search of information than just to buy their tickets, suggesting that there had been a demand for this kind of service in Brno.

Process evaluation

Only one barrier occurred during the course of the project that was related to the institutional changes over the election period where the City Council was not meeting regularly.

Barrier 1 – Delayed implementation

The measure implementation was delayed due to the fact that it was a part of wider project of reconstruction of the city centre (area accessible to pedestrians and public transport). Since this project was a little delayed as such (over the winter, archaeological research), consequently the tender was postponed and the supplier was contracted later.

Driver 1 – Political support

The political representation of the City supports the project of IMC in the city centre. Extra financial means were dedicated to the IMC in September 2012 to ensure functioning after the end of the project.

Driver 2 – Funding of CIVITAS

CIVITAS ELAN was an important river in terms of ensuring funding for the measure. This appeared to be of a special importance in the deepening economic crisis.

Lessons learned

Lesson 1 – Choice of location is crucial

The location of such IMC is a crucial issue for its operation and acceptance by the public. Good location in a key junction point makes a difference for such information centre. The city of Brno encountered quite high number of visitors of this centre compared to other similar centres in Europe. Although it still composes a small share of the total population, the location gives the IMC a great potential.

Lesson 2 – Campaigning

Campaigning is an important activity to disseminate the information on the measure and get feedback from the public on the measure design and functioning. All the means of communication to the citizens were used including workshops or new social media. Continuous campaign, not only around the opening, seems to be important to access more and more citizens.
3.4.3.2. Other measures

3.4.3.2.1. Measure 1.4: Optimised energy consumption in tram and trolley bus

Measure description
This measure aims to reduce the peak usage of energy for trams and trolley buses in order to limit the contracted reserve capacity and the related costs.

Brno Public Transport Company (DPMB) has to contract its annual expected amount of electricity to ensure the electric vehicles operation. To obtain a balanced energy distribution, there is also a requirement for DPMB to book monthly a reserve capacity for each 15-minute interval. The costs related to reserve capacity have a negative influence on the cost of electricity because unused capacity still needs to be paid and exceeding the contracted reserve capacity is heavily penalised.

To achieve these objectives a remote heating control is installed in 380 electric vehicles (240 trams and 140 trolleybuses). This includes also an automatic warning system which in case of reaching the level of reserve capacity will generate the message to be transferred to the on-board computer in the electric vehicle and switch off the heating automatically for 5 minutes.

This new system was presented to the public during the European Mobility Week and the CIVITAS Day and through articles in the regional newspapers and in the periodical magazine about public transport in Brno for passengers. The new system was presented also at the targeted expert meeting of public transport operators which took place in the city of Most (April 2012) and to the representatives from Bratislava PT Company (Slovakia).

No deviations were made in this measure.

Evaluation approach
The data of reserve capacity, operating cost, acceptance level and temperature inside the vehicles were collected and analysed before and after the implementation of the new system:

- Measurements of electricity consumption
- Collecting of operation cost
- Measurements of the temperature in the vehicles
- Passengers surveys on their perception on the temperature comfort in the vehicles
- Temperature measurements of Czech Hydro meteorological Institute

Impact evaluation

Key result 1 – Reserve capacity
The annual reduction of reserve capacity reaches 15 000 kW (6.2%). Exceeding the planned reserve capacity was avoided. In 2012, DPMB contracts 6.24% less of additional reserve capacity due to new system of remote control of heating in the trams and trolley buses.

Key result 2 – Cost reduction
In spite of the fact that the total costs of reserve capacity still depend on expected energy consumption, the annual cost reduction for the total fleet equipped with the system exceeds the envisaged €50 000 and will reach over €67 000 for 2012. Total savings due to the operation of the system reach almost €132 000 for the whole project duration whereas the costs of the system were €58 839.

Key result 3 – Temperature in vehicle
A slight decrease in temperatures measured in winter 2010 to the ones in 2011 in 9 out of 10 types of trams and no temperature decrease in trolleybuses was observed. However, the stronger winter in 2011 is a factor influencing the fall of temperature in the vehicles (by not even 2°C). These outside winter conditions have also influenced the passenger satisfaction with the temperature inside the vehicles during the winter 2011 in a negative way.
Process evaluation
Barrier 1 – Diverse fleets take more time for installation
Implementation into the vehicles differs from one type to another. Installation of the remote control may in some cases be really complicated and requires consultation with the supplier of the system. Therefore, the implementation may take longer in the PT companies with very diverse fleet than in those with unified fleet.

Barrier 2 – In some vehicles the system is less effective
The efficiency of system varies in each type of vehicle and in some types of vehicles it was difficult to adopt.
These barriers were immediately solved by the DPMB staff together with service supplier.

Driver 1 – Good relations between supplier and the transport company
Good relations developed between the PT Company and the supplier of the system helped the cooperation on the minor technical problems that occurred during the implementation of the system and in operation. Fine tuning in these phases was ensured and the system functions as planned.

Lessons learned
Lesson 1 – Potential for transferability of energy saving system
This energy saving system by limiting the heating on specific moments proved to be very efficient and results in strong cost savings for the public transport company. The cost of the system is already compensated after one year. For this reason this measure seems to have a great potential for transferability.

Lesson 2 – Amount of savings not always predictable
The amount of the savings reached by the implementation of the measure is not dependent only on the scale of the activities of the public transport company. The amount of savings is affected by the predictable values (such as number of km driven, the age of operating vehicles etc.) but also the external, unpredictable variables (like the weather, change of the legislation etc.).

Lesson 3 – Communication about the measure may help prevent scepticism
Although the system has roughly no significant impact on the temperature in the vehicle, some group of passengers may feel some temperature discomfort. The targeted and comprehensive communication campaign may help averting scepticism towards the implementation of remote control system of heating in electric vehicles.

3.4.3.2.2. Measure 2.7: Improving bus services for disabled people

Measure description
Within the measure 5 new low-floor minibuses were introduced and thus the attractiveness of the public transport for the disabled and wheelchair users was increased. The new minibuses also helped to ensure the operation of the public transport in areas where the demand is low especially during off-peak hours.

Most frequently the minibuses are operating on special lines n.81 and n.82 which are connecting the housing areas and the city centre. These lines have an interchange point in the city centre. During the off-peak hours (in the evenings, weekends) the minibuses are also operating on the lines with low demand where the usage of the standard buses wouldn’t be effective. At the weekends, the minibuses also can be used for trips of the disabled out of Brno (e.g. for shopping).

The minibuses have a special variable interior: space for at least 6 wheelchairs and folding seats that can be easily changed to standard seats. Minibuses are also equipped with a modern information system and a loading ramp. The new smaller buses have also better manoeuvrability and they are
more suitable for narrow city centre passages. It can help the disabled and wheelchair users to reach the city centre (pedestrian area) more easily.

The Fiat Mave minibuses have the EURO 4 emission standard and are thus more environmentally friendly in comparison to the standard buses thanks to the lower fuel consumption.

To present this measure to the public Brno Public Transport Company (DPMB) published articles in the regional newspapers and in the periodical magazine about public transport in Brno for passengers. During the European Mobility Week and CIVITAS Day the measure was presented to the public. The measure and the CIVITAS ELAN project were also presented at the targeted expert meeting of public transport operators which took place in the city of Most (April 2012) and at several exhibitions within the Czech republic.

No deviations were made in this measure.

**Evaluation approach**

The expected impacts of the measure were defined as follows:

- Reduction of operating cost per km by 0.5 euro/km: fuel use and operational costs could be extracted out of the financial data of DPMB.
- Reduction of the pollution caused by the bus fleet: this is evaluated based on the emission standards of the different types of buses
- Improved customer satisfaction, in particular of the impaired persons: this was evaluated in a qualitative way in a focus group with disabled people, and user numbers were recorded.
- Enhancing number of connection by better public transport provision in the city centre: this is calculated based on the number of stops of the minibuses

Also a Cost Benefit Analysis (CBA) was calculated.

**Impact evaluation**

The impact evaluation shows that the measure was overall a successful example and may be recommended to replicate in other cities. Here we propose the overview of key results:

**Key result 1 – Lower emissions (CO, NOx, particles, HC)**

The emissions decreased because the emission standard of the buses is higher (old buses – EURO 0 vs. minibuses – EURO 4). Low-floor buses (BAU) have the same emission standard as the minibuses. The targeted decrease by 30% was exceeded.

**Figure 3.29: Emissions in g/km**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Old buses</th>
<th>Minibuses/low-floor buses</th>
<th>Difference: Old buses - minibuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>6.045</td>
<td>0.033</td>
<td>-6.012</td>
</tr>
<tr>
<td>NOx</td>
<td>10.747</td>
<td>0.356</td>
<td>-10.391</td>
</tr>
<tr>
<td>Particles</td>
<td>0.484</td>
<td>0.039</td>
<td>-0.445</td>
</tr>
<tr>
<td>HC</td>
<td>1.478</td>
<td>0.000</td>
<td>-1.478</td>
</tr>
</tbody>
</table>

**Key result 2 – Improved vehicle fuel efficiency**

Minibuses with lower fuel consumption (19l/100 km) are more than 2.5 times more fuel efficient than the standard low-floor buses (fuel consumption 45 l/100 km) and 1.9 times more efficient than the old buses (fuel consumption 36 l/100). The initial goal to save 10l/100km was therefore exceeded.
Key result 3 – Decreased operating costs

Represented by cost on fuel. The operation of the minibuses (0.20 €/km) is 1.7 times cheaper than the operation of the old buses (0.33 €/km). The alternative solution – the operation of the standard low-floor bus (0.53 €/km) would be 2.6 times more expensive regarding the fuel costs in comparison to the minibuses. The target of saving 0.5 €/km was not defined realistically, as the original costs were only 0.33 €/km.

Key result 4 – High acceptance of the measure

According to the organised meeting with the target group (disabled citizens) appreciates the direct connections with the city centre and the hospitals provided by minibuses, especially during the winter when it is difficult to use other connections such as the low-floor trams, trolleybuses or buses.

Key result 5 – Number of users

The planned target to raise the number of transported disabled people by 10% was not met. On the contrary, the number of the users of the minibuses is decreasing from 2009. But it can be explained as a result of the increasing number of low-floor vehicles in the public transport fleet. Therefore the disabled passengers have now more possibilities to travel and they are using other PT vehicles than minibuses.

Key result 6 – Increased number of connections

The targeted increase in the number of connections by 50% was not met, although there was an important increase in the number of connections between 2009 and 2011 on both lines, due to the better manoeuvrability of the minibuses new stops can be created.

Key result 7 – Positive CBA

The one-to-one comparison of the Business As Usual analysis (BAU) (standard low-floor buses) with the measure (the minibuses) found a positive Net Present Value (NPV) of 318 585 € over 10 years.

Although the initial investments for the new minibuses were high, their operational savings have been very significant so the initial investment should be repaid within the minibuses lifetime. Only the fuel efficiency is 2.5 times better when DPMB use the minibus instead of standard low-floor bus.

Process evaluation

Barrier 1 – Technical problems

The innovative vehicles need special attention in their implementation and operation. Some technical problems occurred during the operation of the minibuses. Partly they were caused by overweighting the vehicles and some problems were related to the outside (winter) conditions. Rerouting the service was a solution to these problems.

Driver 1 – Communication with the target group

Active and positive involvement of the target group of disabled people was a fruitful mean to design the service and adjust it to their needs and to disseminate information on the measure and raise interest. When dealing with specific groups, choose the appropriate method – for communicating to the disabled in Brno a focus groups technique seemed perfectly suitable and gave space to express the needs and suggestions concerning the operation of the buses.

Lessons learned

Lesson 1 – Cost-efficient solution for specific purposes

This measure proved to be very cost-efficient in comparison to standard low-floor buses. The capacity of the minibuses for wheelchairs is higher, but reducing the capacity for regular passengers. It is therefore recommended to limit the use of these minibuses to low-demand lines or for connections with a large number of disabled passengers.

Lesson 2 – Communicate to your target group

Active and positive involvement of the target group of disabled people was a fruitful mean to design the service and adjust it to their needs and to disseminate information on the measure and raise
Lesson 3 – Pay special attention to the terrain of the city

Different types of minibuses should be used for different types of the terrain. Try to find the city with the similar geomorphologic conditions where you can observe the public transport operation and to set the technical conditions for the vehicles.

Lesson 4 – Effects of other measures

If the PT Company is constantly increasing the number of the low-floor vehicles, the number of the disabled using the special services should not increase significantly. Because the disabled are having more possibilities how to travel by public transport, the total number of use of this target group will split up among the all low-floor connections.

3.4.3.2.3. Measure 8.7: Ticket vending machine diagnostics

Measure description

DPMB owns 159 tickets vending machines. The system of administration and maintenance of vending machines is based on periodical checks by maintenance workers. Checks are done depending on the location of the vending machines more frequently in the centre, but weekly in the suburbs. The information about the conditions of the vending machines (e.g. break down, lack of paper, even stolen machine) is missing.

In order to increase customer satisfaction DPMB introduced ticket vending machine diagnostic by applying GPRS technology in all 159 ticket vending machines. In comparison to conditions before, the new GPRS technology helps to restore all functions of ticket machines faster for a better service to passengers and to optimise operation costs and revenues.

No deviations were made in this measure.

Evaluation approach

The measure was evaluated by the operational characteristics of the ticket vending machines (dead time and number of defects) and the impact on customer satisfaction (number of tickets sold and number of complaints). Also a Cost-Benefit Analysis (CBA) was calculated by comparing the introduction of the ticket vending machine diagnostics with the case when this system would not be introduced (BAU).

Impact evaluation

Key result 1 – Recovery of ticket sales in vending machines

The initial expectation was that the number of tickets sold in vending machine would rise by 5%. This indicator is strongly however influenced by the economic situation and the rise in tariff approved by the City of Brno. Since 2009 the change in the number of tickets sold in vending machines was negatively influenced by the economic crisis and decreasing demand for public transport (-3%). However, we could see some slow economic recovery watching the macroeconomic indicators in 2011 (+7% compared with 2009, +11% compared with 2010). The target has therefore been achieved, but this cannot be completely attributed to this measure. More interesting is that despite these fluctuations in ticket sales, the share of tickets sold in vending machines has substantially risen from 21% to over 26%. This shows that ticket vending machine diagnostic by wireless technology can raise the number of single tickets sold in vending machines.

Key result 2 – Increase in number of complaints

This indicator has doubled since the beginning of the project, although a decrease of 10% was expected. As the tariffs have risen, DPMB receives a complaint when its ticket vending machine does
not sell the ticket correctly. Another reason for this tendency is an important increase of ticket vending machines voluntary waste by vandals.

**Key result 3 – Decreased number of defects**

This indicator has dropped by half since the measure implementation, so the target of decreasing by 10% was exceeded. DPMB and the ticket vending machine manufacturer try to adapt the software so the vending machine can solve the most frequent and easy defects by itself.

**Key result 4 – Decreased dead time of vending machine**

After the implementation of the measure, the indicator has fallen by one third or by 15h. The initial goal was to shorten the out-of-order time with 10h and in 2012 this was almost 15 hours. The target of a decrease by 10h was thus exceeded.

**Key result 5 – Positive CBA results**

The net present value of the introduction of the ticket vending machine is estimated positively at 1,878,955 Euro over 6 years. Although the initial investment for the GPRS modules and new control centre was high, their operational and maintenance savings due to the decreased dead time have been very significant so the initial investment should be repaid within the ticket vending machines lifetime.

**Process evaluation**

**Barrier 1 – Technological problems**

The software of the system was not user-friendly and its functions are not suitable. The software generates messages that are sent to the system (intranet) and sometimes it repeats sending the same information. Every message costs a certain amount of money, the payment is fee-based so once the amount of fees is exceeded, every message causes an extra payment. A mistake in printing, coin system and the operation system leads to the restart of the machine and causes problems. The needs to make some important changes into the software were presented to the supplier and this was provided (regardless of the fact that this was not contracted). Besides this, some technical problems occurred when replacing the SIM cards of the supplier by those purchased by DPMB for the measure operation. During this time the telecommunication services were paid by the supplier.

**Driver 1 – Cooperation of the measure partners**

The communication with the supplier MIKROELEKTRONIKA is really fruitful and they cooperate on necessary changes in the system to make it more useful for all the users within DPMB. The outcomes of the system are being adjusted to the needs of DPMB in cooperation with MIKROELEKTRONIKA; they incorporate the necessary changes and update the software in order to function well. In newer versions mistakes are removed.

**Lessons learned**

**Lesson 1 – Impact of other policies**

The more the ticket vending machines are supervised, the more the PT Company receives complaints. The number of complaints depends on the price of the ticket sold. The more expensive the ticket is, the higher the probability that the PT Company receives a complaint when the ticket vending machine does not sell the ticket correctly.

**Lesson 2 – Good contractual documents**

Well prepared contract with provider can help avert an unexpected increase in telephone (GPRS) and other fees. The contract with the supplier should contain a clause on update of the software and necessary changes related to user-friendliness and functioning of the system.
3.4.3.3. Evaluation results on city level

Description of the measures

CIVITAS ELAN project was a significant project in terms of various impacts and gained knowledge in brand new fields of action. Impacts of 5 implemented measures may overall contribute to better transport share that is advantageous to public transport and consequently better air quality in the city.

The mentioned 5 projects were aiming to reach different outputs, such as lowering energy or fuel consumption (M1.4, M2.7) or enhancing the PT services for the citizens (M2.7, M4.12, M4.13 and M8.7) always with the objective to support and promote PT usage and retain the high share of public transport in modal split. The measures focused on improving the quality of the services provided by public transport (e.g. low-floor minibuses) and of the services facilitating and enhancing the using of PT (e.g. providing the transport information, the functioning of the ticket vending machines). One of the important aspects of the implementation, especially in the time of economic crises, is our effort to decrease the cost of the PT operation to secure its existing scale (e.g. optimising the energy consumption in PT vehicles).

Figure 3.30: The city of Brno and location of CIVITAS ELAN measures
None of these measures separately, or all of them bundled, aspire to have major impact but represent smaller steps in transport policy. Regarding the potential of these five measures to improve modal split and air quality in the city, it must however be noted that the scale is rather small in the context of the whole city. It has to be noted however that there are many externalities that intervene in the results of these indicators as CIVITAS ELAN measures are implemented next to many other measures in PT and transport planning. All the gathered data must therefore be interpreted bearing the size and the impact of the measures in mind.

**Evaluation approach**

In order to have an overall view on the evolution of the transport situation in Brno and the related impact on the air quality the following city level indicators were measured:

- **Modal Split**: survey asking permanent and temporary residents of Brno as well as daily commuters about their transport behaviour on their ways to work/school, in their free time, on the weekends etc.
- **Air quality**: monitored at 13 measuring stations using analysers in compliance with technical standards.

**Key result 1 – Modal shift for work/school commuters towards car and bike use**

From 2010 to 2012 the share of people using individual car transport from 27% to 36% but also the share of cycling increased from 1% to 4%. Walking and public transport decreased. Despite this evolution, the share of public transport is still high (62%). The CIVITAS ELAN measures had rather limited overall impact on the modal split.

**Key result 2 – Insight into travel behaviour of citizens and commuters as a basis for future initiatives**

The surveys provide detailed information on the current travel behaviour in and towards Brno and on the recent evolution and changes. Important figures are e.g. the following:

- A total of 79% of people living or working in Brno commute to work or school.
- Most of them (62%) use public transport, 36% use individual cars.
- Trams, buses and trolleybuses are used mostly for a shorter period of time (20 minutes on average). They spend more time travelling by car (26 minutes) and most time travelling by train (38 minutes). Of course, this is related to the length of the route to get to work/school.
- Unlike the trips to work/school when public transport is used most, for the rest of the time (during work/school, leisure time, weekends) people much more often walk (short distances) or use cars (longer distances).
- The same differentiation applies to the type of transport – while Brno residents most often use public transport to get some services, they use cars to go shopping and walk to visit friends.

The CIVITAS ELAN surveys created a good basis for future initiatives and a consistent overall monitoring of the mobility situation.

**Key result 3 – No increase of air pollution**

Decrease of air pollution burden was not proved by measuring of monitored indicators concentrations. Monitored pollutants concentrations show significant correlation with climatic characteristics (temperature, wind intensity), in particular in winter period.

In general, the geographic location of the city surrounded by hills is an important negative aspect in relation to the air quality. Exceeding PM10 and NO2 concentrations is mainly detected in locations exposed to traffic. Rolling stock renewal and increase in numbers of ecological vehicles in public transport contributes to the air quality improvement, unfortunately it is not realistic to expect significant improvement in air pollution characteristics considering constantly increasing car volumes in Brno agglomeration with no bypass route existence. In this sense the minibuses (M2.7) compose a part of PT fleet that produces lower emissions on its lines and such measures are considered contributing to the city air quality.
Process evaluation

Barrier 1 – Lack of experience with citizen engagement

The City of Brno and its partners were not very experienced in active engaging citizens into transport planning or measures. However, during the implementation of CIVITAS ELAN the situation was improving.

Driver 1 – Good relations between stakeholders

Good relations developed among the key stakeholders – political representation, officers and specialists at the municipality, PT operator, PT organiser, target groups etc. – were extremely important for the implementation of the measures and smooth run of the project.

The CIVITAS team at Brno City Municipality did additional efforts to learn about citizen engagement methods from other cities and through active cooperation with the citizen engagement Coordinator. Various trainings to the staff were provided on how to communicate with public, how to lead a public discussion and so on. This knowledge and skills were transferred to Brno and put in practice by organising a workshop for public and launching active campaigns.

Lessons learned

Lesson 1 – Successes on small scale

Although the individual measures show positive evaluation results on measure level, they were implemented on a too small scale to reverse the general trend of a decreasing modal share of public transport, which is caused by other factors like increasing PT ticket prices.

Lesson 2 – Develop relations

It is important to develop good relations developed among the key stakeholders for the implementation of the measures and smooth run of the project.

Lesson 3 – Learn to communicate

The City of Brno and its partners were not very experienced in active engaging citizens into transport planning or measures. The CIVITAS ELAN Project gave the great opportunity for the CIVITAS team at Brno City Municipality to learn about citizen engagement methods from other cities and through active cooperation with the citizen engagement Coordinator. Various training to the staff were provided on how to communicate with public, how to lead a public discussion and so on. This knowledge and skills were transferred to Brno and put in practice by organising a workshop for public and launching active campaigns.

Brno also prepared and organized the Student Congress ELAN Youth on the Move for students from all ELAN cities. This event was a unique opportunity to engage the youngsters into the problematic of the urban mobility. And through the organized workshops gain their opinion.

3.4.4. Conclusions & recommendations for this city

The primary goal of CIVITAS ELAN in Brno was to increase the number of public transport users through communication and service quality improvements. Innovations such as more and detailed transport information and vehicles designed for the transport of disabled passengers made travelling easier and more comfortable. As a result, the passenger satisfaction increased on various levels.

One of the success factors was efficient coordination and communication between the city of Brno and its public transport operator. Mostly technical challenges were encountered during the implementation of these measures, like the outdated PT fleet. Although citizens were not used to express their needs, CIVITAS ELAN established a mobility dialogue which helped understanding passenger needs and led to improved services.

All measures that were implemented within the project will be continued in the future. The experience in involving citizens will help the city to give passenger needs further attention. The Mobility Shop in the city centre will be a key element for gathering feedback from citizens on improving public transport.
3.5. Porto

3.5.1. City description

The city of Porto is located in the North of Portugal and is the heart of the country’s second biggest metropolitan area – Porto Metropolitan Area. Porto is also the centre 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 neighbouring cities of Matosinhos (North), Maia (North) and Gondomar (East). In terms of population, in 2001 the city represented 263,131 (17%) of a total of the 1.5 M inhabitants within the Porto Metropolitan Area. In 2011 the city population was only 237,584 (14%) of a total of the 1.7 million. Porto’s population has been declining over the last decades, in contradiction to the increasing population in other municipalities of the agglomeration. In a regional context, Porto is the main urban centre in Northern Portugal and its agglomeration is the hub of the North-western Portuguese 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 3.31 – The city of Porto

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 economic 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.). In the past, transport policy focused primarily on the expansion of the road capacity, but is now increasingly concerned with the improvement of the public transport system.

Table 3.12: Key characteristics for the city of Porto (National Institute of Statistics)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td></td>
</tr>
<tr>
<td>Surface (km$^2$)</td>
<td>41</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>504</td>
</tr>
<tr>
<td>2011</td>
<td>545</td>
</tr>
<tr>
<td>Characteristics</td>
<td>City</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>% daily trips by mode of transport (home-work, home-school)</td>
<td></td>
</tr>
<tr>
<td>- Car</td>
<td>42.1</td>
</tr>
<tr>
<td>- Walk/cycle</td>
<td>26.7</td>
</tr>
<tr>
<td>- Bus</td>
<td>27.8</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Society and economy</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>2011</td>
</tr>
<tr>
<td>Population</td>
<td>263 131</td>
</tr>
<tr>
<td>% unemployment</td>
<td>10.2</td>
</tr>
<tr>
<td>% pop over age 65</td>
<td>19.3</td>
</tr>
<tr>
<td>% pop under age 14</td>
<td>13.1</td>
</tr>
<tr>
<td>237 584</td>
<td>10.5</td>
</tr>
<tr>
<td>23.4</td>
<td>12.0</td>
</tr>
</tbody>
</table>

### 3.5.2. The CIVITAS-ELAN strategy

#### 3.5.2.1. The CIVITAS corridor in the city

**Figure 3-13 – Asprela corridor in the city**

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 centre.

This fact raised 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.
Table 3-145: Key characteristics for the ELAN corridor (National Institute of Statistics)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>ELAN Corridor (Civil Parish of Paranhos)*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td></td>
</tr>
<tr>
<td>Surface (km²)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2001  2011</td>
</tr>
<tr>
<td>% daily trips by mode of transport (home-work, home-school)</td>
<td></td>
</tr>
<tr>
<td>- Car</td>
<td>43.9  N/A</td>
</tr>
<tr>
<td>- Walk/cycle</td>
<td>25.3  N/A</td>
</tr>
<tr>
<td>- Bus</td>
<td>28.3  N/A</td>
</tr>
<tr>
<td><strong>Society and economy</strong></td>
<td>2001  2011</td>
</tr>
<tr>
<td>Population</td>
<td>12 000  21 170 (44 298*)</td>
</tr>
<tr>
<td>% unemployment</td>
<td>8.8   18.9*</td>
</tr>
<tr>
<td>% pop over age 65</td>
<td>18.9*  23.9*</td>
</tr>
<tr>
<td>% pop under age 14</td>
<td>12.3*  10.8*</td>
</tr>
</tbody>
</table>

Before the start of the project, the local transportation conditions in the corridor have been changing in terms of demand patterns and supply infrastructures, which made 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.

3.5.2.2. The CIVITAS integrated packages of measures

For the city of Porto the Evaluation team of CIVITAS-ELAN identified 2 integrated packages of measures grouping a wide range of measures with the objective to change the mobility situation in the city focusing on the corridor.

Table 3-156: Measure overview Porto

<table>
<thead>
<tr>
<th>City/ IP/ Measure Number</th>
<th>Measure Title</th>
<th>Impact evaluation</th>
<th>CBA</th>
<th>Focused process evaluation</th>
<th>Evaluation of citizen engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 1- OPO</td>
<td>Developing an Efficient Transport System</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5-OPO</td>
<td>Light Weight Bus Shuttle</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
3.5.3. Summary of evaluation results

Here we summarize the results of the detailed evaluation of the measures in the city.

First the findings on the level of the Integrated Packages of measures are discussed. These are the impacts for which the different measures are working strongly together to achieve this impact. In many cases it is also difficult to disentangle the impact of the different measures since they are implemented in the same timescale for the same target group. For this reason it is clearer to consider the impacts together and to give a more qualitative assessment of the importance of each of the measures in the package. This is done through an expert ranking of the measures in which the Site Evaluation Managers together with mobility experts familiar with this type of measures rank the measures in order of importance on the observed impact.

Further the impacts which are specifically related to one of the measures are discussed and conclusions are drawn per measure.

The detailed information is presented in the Measure Evaluation Result Templates (MERT) in annex of this report. Also these MERTs are structured in this way: first the aspects to be discussed on the level of the Integrated Packages of Measures and further the related Measures.

3.5.3.1. Integrated Package 1: Developing an efficient transport system

3.5.3.1.1. Evaluation on Integrated Package level

Integrated Package description

This Integrated Package of measures contains all the “hard” measures that were physically implemented in the Asprela area like new transport services, renewal of the transport network infrastructure (roads, bus lanes, sidewalks, cycle lanes) and new strategies of transport and traffic management in order to improve the supply side of the multi-modal transport system. The main objectives are to reduce the level of congestion and energy consumption.

The new transport services are:

- A clean bus shuttle within the Asprela corridor (M1.5-OPO)
- A demand responsive transport – DRT service (M6.4-OPO)
- A carpooling platform for trips announcements (M6.4-OPO)
- Bike renting system that supply the Asprela corridor (M6.4-OPO)
Measure 3.5 “Integrated Accessibility Planning in Aspela Quarter” resulted in the renewal of the multi-modal transport network infrastructures. Also a mobility plan was developed with new strategies of transport and traffic management.

Specific elements were implemented as part of the related measures: new public transport stops for shuttle users (M1.5-OPO) and cycle facilities (e.g. parking) for the bike renting system (M6.4-OPO)

The following deviations were observed from the full implementation of the IP:
- No full implementation of the circulation plan (M3.5-OPO)
- No implementation of parking policy (M3.5-OPO)
- No implementation of the bike renting system (M6.4-OPO).

Evaluation approach
The selection of the evaluation indicators was based on the objectives and expected outcomes of the measures within this IP:
- Traffic congestion is measured through indicators like travel time, delay, stopped time, speed and public transport vehicle fuel consumption. The data collection on these indicators was done through a GPS equipped car. Four routes were defined within the corridor and each route was run five times, before (2009) and after (2012) measures implementation. Although the method was carefully planned and performed, it would be interesting to collect the data in same period of the year (October). However it was not possible because the measure was implemented in the beginning of the year 2012, so data needed to be collected in spring, instead of October 2012 to have evaluation before the end of the project lifetime.
- Fuel consumption was measured by collecting fuel data of public bus and 2 private operators. It was not possible to limit the data collection only to CIVITAS-ELAN corridor as the operators did not have means to filter the data, so data on all routes crossing the corridor. For private cars this was not available. It was assumed that the public transport offer has not changed in these 4 years.

Impact evaluation
Key result 1 – Congestion level decreased
For the peak morning period the average journey time reduced by 17%, the speed increased by 27%, the average delay decreased by 31% and stopped time decreased by 41%. For the peak afternoon period the average journey time decreased by 29%, the speed increased by 39%, the average delay increased by 48% and the stopped time decreased by 42%. All indicators exceeded their target values significantly (at least three times higher). The results would be perhaps slightly less positive if the data were collected in autumn (worse weather conditions), but the difference is large enough to still assume a positive impact. In our point of view, measure 3.5 was the most responsible for these results.

Key result 2 – No impact visible on fuel consumption PT bus operator
The private operator Valpi has a more significant decrease of consumption than the public operator and the other private operator (Albano). It is important to say that this indicator includes not only information within the corridor but for the entire routes of all lines crossing the corridor. The real impact is therefore difficult to measure, as in some companies the fuel consumption increased and in others it decreased.

Process evaluation
Barrier 1 – Institutional bureaucracy
Implement new transports services like DRT and shuttle service as well as making infrastructural changes (M3.5-OPO) often brings impeding administrative structures and procedures. During the planning phase is important to considerer alternatives paths. During the measure process there was experienced some bureaucracy during bike renting negotiation, implementation of bus stops, citizen engagement activities.
Barrier 2 – Political opposition
The new circulation plan was presented by CMP to the Paranhos' People Representative (local Mayor). He rejected all of the proposal directions on two streets. The problem was the funeral course from Paranhos Church to the cemetery. So the plan was not fully implemented.

Driver 1 – Good cooperation between measure partners
Although each measure of this IP1 has a different team workers and partners, in all a constructive and motivated partnership arrangements were achieved. This good partnership permitted to an open communication and problem discuss, very important to overcome the barriers and develop a good work.

Lessons learned
Lesson 1 – Integrated evaluation requires good coordination
To allow the analysis of measures at IP level it is important to have a good coordination between them in order to have all the measures implemented at same. In our case the DRT service (6.4) and shuttle service (1.5OPO) were implemented only during a testing period. So it was important to collect the data in the period that all measures were implemented.

Lesson 2 – Stakeholders involvement crucial
In the case of establishing an integrated mobility plan it is important to agree on common objectives between different stakeholders, especially if they have different interests in the area. It is important to involve transport operator, inhabitants, major institution and local representative (political).

3.5.3.1.2. Measure 1.5: Light weight bus

Measure description
The main objective of the measure is to implement an innovative technology to manufacture lightweight bus bodies using lightweight fibre reinforced composite materials that meet tough requirements of high static and dynamic performance and to provide power using biodiesel waste.

The main goals are to reduce the levels of gaseous emissions produced by city buses and the manufacturing time of body-in-white of the bus (vehicle body's sheet metal without components like doors), and to increase mobility with a new transport service in the corridor.

The project adopts a “fusion technology” innovation approach since it integrates knowledge already available from different disciplines and industrial sectors, combining it into a new product not yet available in the market.

The prototype is based on a transformed old minibus. Its original chassis (mechanical components included) was reused, the bodywork was removed, and the new composite body was assembled.

Figure 3.32: Light-weight bus
The prototype was used in as a shuttle service connecting institutions of the CIVITAS corridor with PT service on weekdays during twelve weeks. STCP partner was the responsible for shuttle operation. Some disseminate activities were done by FEUP like: flyer delivery in major institutions and near the PT stops, information about the service displayed in Mobility shop and media.

There were deviations from the original plan:

- **Change the type of power** – In first version of Dow, it was stated that the bus would be powered by quiet and clean hybrid electric power trains, using wheel-mounted electric motors and diesel LPG or gas-driven combustion engines. However, due to severe financial and time constraints (some of them not foreseen beforehand), it is not possible to develop a hybrid bus shuttle (with all the innovative aspects of the bus body) with the current budget. Instead, a vehicle powered by biodiesel waste will be developed.

- **Hurdles on Biodiesel supply** – The original plan was to use biodiesel in the vehicle. However, due to a lot of obstacles, basically bureaucratic, this was changed to using normal diesel.

**Evaluation approach**

The impact evaluation was used to measure the impact of the following objectives:

- Improved air quality and fuel efficiency: the CO emission, NO\(_x\) emission, and fuel efficiency was measured. However, for the fuel consumption it was not possible to achieve the differences between before and after measure implementation due to difficulties in applying the same conditions in the two measurement periods.

- Shuttle acceptance by users – the number of service users as well as their opinion about the service were measured through a face to face interview in the bus.

**Impact evaluation**

**Key result 1 – Weight reduction of bus prototype**

A 16% reduction on the bodywork weight was achieved in comparison with the transformed bus (380 kg less). Moreover, the transformed bus had a passenger capacity of 7 additional people in comparison to the normal minibus.

**Key result 2 – Considerable reduction of the medium percentages on instantaneous gaseous emissions**

A considerable reduction on all pollutants (%vol) took place because of the tare weight reduction. The target to reduce emissions by 5% was therefore exceeded:

- CO\(_2\): reduction of 7-36%
- CO: reduction of 36-48%
- NO\(_x\): reduction of 28-45%
- HC: reduction of 38-39%.

**Key result 3 – Increasing number of users**

On average, 261 passengers per day were transported. However it is noted that the average, in the last month of the operation (May 2012), was 343 passengers per day, and during the last week the average increased to 384 passengers per day which prove that a growing tendency was observed, in terms of users. According to the survey, 27% of shuttle users are new users of public transports. It means 71 new PT users per day that leave their car home.
Key result 4 – Positive opinion on shuttle

Shuttle users are very satisfied with the service (60% completely satisfied, 37% rather satisfied). 27% of suggestions done were to keep the service running and other 28% asked for extending the service (route, shuttle stops, number of services).

Process evaluation

Barrier 1 – Homologation difficulties and insufficient initial budget

A couple of changes in the project were done to find a cheaper product, because the type of equipment to integrate into the vehicle, the method by which the bodywork would be produced and the materials needed for their manufacture to the dimensions required, were too expensive. Therefore, it was necessary to change the choice of propulsion hybrid system to a vehicle powered by just biodiesel, and the intended size for the vehicle had to be reduced as well (the concept car originally was 12m long). The 12 m chassis released by STCP, was no longer considered as a worthy alternative and another car had to be transformed (mini bus). It was necessary to acquire a used bus without the ideal characteristics for the project (low-floor).

Barrier 2 – Lack of production capacity by FEUP

Brings the necessity for outsourcing some services and goods. The involvement of outside firms (MOBipeople and ENP) on project, is low, particularly to answer the technical questions quickly. This situation puts limits on creativity and increases costs.

Barrier 3 – Change of interest in the project by the bodywork builder company

After realising that only one prototype would be built, the bodywork builder company decreased its interest and his availability to participate more intensely on project decisions. The delivery time agreed was not respected, which increased the delay of the measure.

Driver 1 – Integration of the DesignStudio FEUP in the project

Industrial design is a structural element of the project because they focus on a set of objectives realistically achievable, whether the budget level or the legal level. They help to stabilize of the concepts. The integration of the DesignStudio was a very good adopted concept because it increased the focus on task and the final team was able to recover time.

Driver 2 – Large experience from the team of the ENP

Although there were problems with the resin, the entire work on shipyard (infusions of the two parts and the bonding process) occurred as planned and without additional problems, and the bodywork was successfully done. Knowing the project delays, their commitment was done in order to finish the manufacturing as soon as possible.
Lessons learned

Lesson 1 – Good and active communication
An organization based on good communication and active participation of all working groups could be the key in achieving the objectives within the time envisaged. Efficient communication between all participants has prevented a large number of errors and led the team to be more pragmatic.

Lesson 2 – Realistic and sustainable budget
For the implementation of similar measures, a realistic financial plan is very important to improve its final results. It is a measure which involved a high investment, mostly on the implementation and operational phase of the process. Several modifications to the measure were introduced due to budget restrictions, which did not allow achieving some of the consortium’s initial ambitions.

Lesson 3 – Positive operational results of measure
The bus prototype meets its technological goals like better environmental performance. Also it was a success in the corridor community due to the efforts of the design team and the marketing activities that convinced the community to use the new transport mean in a very short time. This measure was very useful and the vehicle is in use now in another campus of University of Porto.

Lesson 4 – Manufacturing advantages of the measure
The productive process showed that the tools investments (moulds) are fully depreciated after the manufacturing of five parts and as those kinds of moulds allow manufacturing up to 20 parts, at least, the respective industrial costs would be competitive. Moreover, the manufacturing process applied, is cleaner than the welding of metals, less environment pollutant, and results in lower health risks for the workers. The structural properties of the bodywork manufactured are ensured for a long term life, predicted up to 50 years without loss of properties into the normal service conditions. Additionally the bodywork can be adapted to existing chassis which enables the recycling of old buses.

So the higher costs of development and manufacturing a prototype compared to acquiring a standardized vehicle are outweighed by the possibility of obtaining a product that fulfills the actual needs of the PT company, rather than adapting what the market has to offer: vehicle characteristics could be defined in the process, such as capacity, versatility, materials, technological manufacturing process, etc. This allowed eco-friendly and innovative choices for the related sector. Moreover, during the development process data was collected and knowledge acquired that may foster the development of a better product in the near, optimising the materials choices and improving the manufacturing process.

3.5.3.1.3. Measure 3.5: Integrated accessibility planning in the Asprela Quarter

Measure description
The main objective of the Asprela Circulation Plan was to change the mobility and improve accessibility of the Asprela quarter.

A general plan of intervention was developed by FEUP with cooperation of other measure partners considering all modes of transport (cars, buses, bicycles and pedestrians) in a comprehensive transport planning perspective (including land-use, environmental and operational issues). The evaluation and selection of the circulation plan used modelling tools in order to choose the most effective technical solutions to implement.

Actions proposed in this plan were implemented, focusing mainly on:

- Implementing a cycle lane network;
- Increasing the width of footpaths;
- Improving the accessibility to pedestrian crossing;
- Improving traffic signalisation;
- Giving priority to PT.
There was a deviation from the original plan:

- Not all proposed measures were implemented during the project: because the Civil Parish Representative and the local catholic priest did not accept the proposal directions on two streets of the Plan and none of the proposal alternatives presented, CMP has decided not to implement the traffic directions defined on the new circulation plan. Nevertheless the infrastructure works provided the changes needed for a future implementation. On the other hand, the policies concerning the parking system in the corridor were not fully implemented like the parking.

This measure included the following citizen engagement activities:

- Brochures: When the Mobility Plan scenario was chosen by partners, a brochure about the plan was personally delivered in corridor households. This brochure included a section where people were asked to give their opinion about the plan by e-mail or in person in the Mobility Shop;
- Survey: After measure implementation, a face–to-face survey campaign was organized in corridor households where inhabitants were asked about their opinion about the measure;
- Flyer: CMP placed flyers on the cars parked on cycle paths. This action served to enhance drivers’ awareness for the new cycle paths.

**Evaluation approach**

The following indicators were evaluated:

- Congestion levels: data on typical average vehicle speed, average journey times, average delays and number of stops were derived from a traffic simulation model before and after measure implementation (after situation includes the implemented traffic management strategies).
- Quality of service for PT: this indicator includes the comfort of PT stops, the capacity of PT vehicles, the PT service reliability in terms of timekeeping and complaints. This data was provided by the PT operator and corridor visits, before and after measure implementation;
- Infrastructure for all transport modes: measured by indicators like length of cycling lane and bus corridor, sidewalk accessibility and extension, parking spaces supply and demand (legal and illegal), before and after the measure implementation;
- Traffic safety: the number of recorded serious injuries and deaths caused by any means of transport were collected for the full period of the project and for the previous 3 years within the CIVITAS corridor (January 2006 – December 2011). This data was obtained in the website of National Authority of Road Safety (www.ansr.pt). However, as the measure implementation occurred only in the beginning of 2012, there are no results for the “after” situation and it is not possible to draw conclusions on this indicator.

**Impact evaluation**

**Key result 1 – Accessibility improvements in the corridor for cyclists and pedestrians**

A bicycle lane network was implemented with 3.6 km of length in corridor where there were no facilities for biking. The area for pedestrians grew by 2408m² (+3.6%); and the effective area, i.e., without obstacles by 1465m² (+6%). The accessibility of the pedestrian crossings was also improved in number and in quality, but there are still 8 pedestrian crossings that are not equipped with parallel curb ramps, although the target was to equip them all.

**Key result 2 – Decrease in parking spaces**

Parking spaces decreased by 2% in private parking and by 17% for street parking, so the target of a reduction by 50% is only partly achieved. The initial circulation considered a higher reduction of parking spaces but it was not accepted by the representative. Illegal parking on the street is still a reality (22% of legal parking). However comparing with 2009 there was a decrease of 10%. So there is a positive trend in ending with illegal parking on the streets.

**Key result 3 – Decrease in car use**

The results of the traffic simulation indicate that the measures that were actually implemented lead to an exceeding of almost all congestion targets. The average journey time decreases by 26% in morning and by 30% in the afternoon (target of -9%), the average vehicle speed increases by 54% in the
morning and by 30% in the afternoon (target of -5%), the average delay decreases by 48% in morning and by 15% in afternoon (target of -15%) and the average number of stops decreases by 33% in morning and by 31% in afternoon (target of -17%). The target of traffic queue is not achieved. The average traffic queue increases after measure implementation due to the implementation of traffic lights in one intersection and some changes in others, namely longer cycle length due to pedestrians crossings which implies longer queues.

Key result 4 – Public transports enhanced

The 13 bus stops increased their quality due to improvements in the infrastructure or in information available. However, the targeted bus lane extension was not achieved, as the studies extensions were not implemented because of the rejection of the circulation plan. The target to improve timekeeping by 25% was only achieved for two private bus operator companies (Albano and Minho, improvement of 90%), but not for the public bus operator STCP (constant between 2011 and 2012) and the third private company (Valpi, improvement of 7%). For these bus operators the target to increase capacity by 5% was not achieved either (private operator average increase of 1.7%, public operator decrease by 1%). This decrease of the capacity was induced by a national restructuring plan in public transport sector. The capacity of the metro line was maintained though (no increase was targeted as the metro is already working at full capacity). Nevertheless, the number of complaints regarding the public bus operator decreased by 64% compared to the average of the last four years, so the target of 50% was achieved in full.

Process evaluation

Barrier 1 – Institutional bureaucracy

Usually CMP needs several months for official approval of reports like guidelines of plan, preliminary circulation plan report and outline design. All those plans needed to be approved to start the next task.

Barrier 2 – Political opposition

CMP presented the new Circulation Plan to the Paranhos People Representative (local Mayor). He did not accept any of the proposal directions on two streets. CMP has proposed several alternatives but none of them were accepted. The problem was that the proposed circulation plan interfered with the funeral course from Paranhos Church to the cemetery.

Driver 1 – Measure team

One of the persons responsible for the project development working in FEUP was already part of a trainee program held in CMP so there was already aware of the type of data and local transport problems (the trainee program was on the Asprela area). This fact eased the data collection and processing phase. Having the same partners as in measure 2.10-OPO has facilitated coordination of the measure.

Driver 2 – Early problem detection

Some difficulties to the circulation were detected due to the traffic conflict on the FEUP vehicle parking that was impeding the traffic flow on the Rua D. Frei Vicente de Soledad e Castro. In order to minimize this problem CMP immediately started the infrastructure works to extend the vehicle lane at the entrance.

Lessons learned

Lesson 1 – Stakeholders involvement

In the case of establishing an integrated mobility plan it is important to agree on common objectives between different stakeholders, especially if they have different interests in the area. It is important to involve transport operators, inhabitants, major institutions and local representatives (political).

Lesson 2 – Select mean of communication

The mean of communication must be carefully chosen according the age of the people. In case of elderly people, they probably have mobility problems, for this reason, it is inconvenient to ask them to give their opinion about mobility plan in a different place where the brochure was delivered. On other perspective, the communications by e-mail presented the same problem; this age group is not already
oriented to this type of recent communications. So the target group must be well studied before design the CE&D campaign.

Lesson 3 – Flexibility with timetable
A measure like this needs some flexibility with the timetable because the work of drawing a mobility plan with citizen/stakeholder involvement is very hard to predict because it depends on their feedback and additional work for the technician team.

Lesson 4 – A combination of actions towards different modes
The implementation of this measure proved the effectiveness of the specific measures when integrated in a global approach of transport planning. The mobility in corridor was enhanced. The municipality is pleased with the changes and it already started to prepare a plan to extend the cycle lane network from the Asprela quarter to the city centre. Also, some of the innovative aspects from the circulation plan will be up-scaled to other areas of the city, such as the time of passage of pedestrians at crosswalks and the so-called “clean phase” which eliminates conflicts between the passage of pedestrians at crosswalks and turning vehicles.

3.5.3.1.4. Measure 6.4: Flexible mobility agency

Measure description
As part of the Mobility Shop a Flexible Mobility Agency was created to take initiatives in order to affect people’s travel behaviour through an attractive offer of innovative sustainable mobility services: bike rental, carpooling and Demand Responsive Transport (DRT):

- The carpooling agency is supported by a web-based platform and a web forum that allow users to find other users for a joint ride and to share their experiences with the system. OPT took the first year and half of the project to develop and implement the system. CMP is the responsible for platform operation and service dissemination.

- The first two years a study and analyse was done of the use of new transport solutions in the Asprela area for periods with scattered demand or by specific small user groups with special requirements which cannot be supported by the regular services of transport. For this analysis questionnaires and interviews with potential users and actual users of bus transport were organised. This resulted in the implementation of a DRT service for the night bus service in the area, connecting the two main academic centres. Target users are the students that generally travel at night to study or to participate on the night activities of the city. STCP was the PT company responsible for this operation.

- In order to maximize user acceptance carpooling and the DRT service were promoted through specific marketing campaigns with official municipality support and Mobility Shop logistical support. DRT service has the support of an external sponsor (Super Bock) that was involved in marketing campaign.

- The Bike Rental system would allow bicycle usage to be enhanced as an effective and healthy mean of transport for daily use. A special focus was put on the integration of bikes with public transport as the parking spaces should have been developed next to transport stops (light metro, bus). Additionally, other features were planned to be added, allowing for a “pick and ride” bike service to the PT users.

Figure 3.34: DRT service
There was a deviation from the original plan:

- **No implementation of the Bike Rental System** – To set up the Bike Rental system several potential companies were contacted and negotiations were done with the Municipal Director to find a sponsor for the system. However no final solution has been found, so the service was not operational within the project lifetime.

**Evaluation approach**

The following indicators were evaluated:

- Acceptance of the new transport services (carpooling and DRT) through the collection of number of users since the services implementation. The PT operator STCP was the partner responsible for data collection of DRT operation indicators.
- DRT users’ opinion was collected in an online survey organized by OPT. The survey was disseminated by e-mail in institutions of Asprela.

As this measure is responsible to implement new transport services, no targets were defined about the number of users or their opinion about services.

**Impact evaluation**

**Key result 1 – Reasonable number of users of the DRT service**

1106 passengers were transported in the DRT service, with an average of 26 passengers per night; this was more than expected by the PT company. However the number of DRT users was not in line with the marketing efforts: the capacity of the vehicle was higher than needed.

**Key result 2 – High awareness of the DRT service**

73% of Asprela commuters knew the DRT service; 28% used the service. The results achieved with the online survey are due to a strong marketing campaign.

**Key result 3 – DRT service pollution emissions**

A standard vehicle has a CO$_2$ emission of 6015 g per passenger. The best option for DRT operation would be the minibus vehicle since the CO$_2$ emissions per passenger are 62% lower. This indicator shows that the DRT type of bus is the best option to be used in future services, regarding the CO$_2$ emissions per passenger.

**Key result 4 – Few carpooling service users**

A large number of carpooling members were achieved due to a good marketing campaign. However it is important to refer that although the carpool scheme has a lot of members, the main objective of the project wasn’t achieved. For all these users, only four trips were shared. People use the web site as a network and not as a platform for planning trips.

**Process evaluation**

**Barrier 1 – Financial crisis**

The negotiation process for the bike rental scheme failed because the measure has no funding and there are impeding regulations on concerning grant publicity to the bike rental companies to economical support the system

**Barrier 2 – Security of carpooling**

Carpooling service is facing some resistance by CIVITAS users. Although several dissemination campaigns have been done in the area, people are still afraid for their security.

**Driver 1 – Good cooperation**

All partners were motivated to get the main objective. There was a good cooperation with the local institutions.
Driver 2 – Sponsoring of DRT
We got a sponsor to do a huge DRT Marketing Campaign. The sponsor was a beer brand (Super Bock). In collaboration with STCP they develop several communications actions during the DRT operation.

Lessons learned
Lesson 1 – DRT
The design of the service with the operation definition concerning target group, schedule, routes and business model is crucial as well as the dissemination campaign.

Lesson 2 – Carpooling
Organise big marketing campaigns involving the main target groups is not enough. Some additional benefits to carpooling users must also be taken into account as special parking spaces or HOV lanes.

3.5.3.2. Integrated package 2: Promoting the effective use of sustainable transport
3.5.3.2.1. Evaluation on Integrated Package level

Integrated Package description
Integrated package 2 contains all the “soft” measures that are involved in the dissemination of transport services in order to influence demand behaviour and improving the service of public transport.

The new transport services are:
- Mobility shop (M4.14OPO)
- Website of mobility shop (M4.14OPO)
- Infoboard: LCD with PT information (M8.8OPO)
- MOVE-ME: application for internet devices (M8.8OPO).

The Mobility Shop implemented in the Asprela corridor provides personal public transport information and advice, while being the support to innovative mobility services and the symbol of the CIVITAS-ELAN project in the corridor. Information is also available on the website.

The measure 8.8-OPO provides information in real time about the routes and timetables that help people to plan and decide on their trips.

The LCDs show a map of the area covered by the services and stops of the different means of transportation. It also includes relevant information on the operation of such means of transportation: timetables, lines, destinations, stops and waiting time for the next service. The LCDs do not allow any interaction with the user, etc.

Another tool for consulting information in real time is 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. This is a more interactive tool.

Evaluation approach
The evaluation approach on the IP level combines the analyses done for the separate measures. In detail, the number of users of mobility information services is an addition of the number collected for the mobility shop and website and of the MOVE-ME service. The service efficiency, is a combination of the three indicators of satisfaction level (mobility shop, MOVE-ME and LCD system)
Impact Evaluation

Key result 1 – Increasing mobility information services
Between February 2012 (when the last service was implemented) and June 2012, there were 109,726 mobility information requests (91.8% MOVE-ME, 4.8% Mobility Shop visitors and 3.4% website of Mobility Shop). Each month the number of mobility information requests is increasing in all services.

Key result 2 – High services satisfaction
People are satisfied with the new mobility services. On the LCD service the final feedback was: “very good and with good readability”. On the mobility shop the users gave the classification of 4.73, where 5 is completely satisfied and 1 is completely dissatisfied. On MOVE-ME service the classification was 3.7, and OPT have been received a lot of mails with encouragement comments.

Process Evaluation

Barrier 1 – Bureaucratic functioning
The bureaucratic functioning of the city administration is often responsible for delays in implementing measures like the implementation of mobility shop and the dissemination work of the Infoboard.

Barrier 2 – Maintenance of the information from the operators
In case the operators do not update the planned data in the system. And consequently the system becomes unattractive for the users. Final users do not joint to this new service due to lack of information or interest

Driver 1 – Local institutions support the activities
The local institutions are very pleased and interested in the project measures. Some local institutions supported and were involved in the measure, mainly during the dissemination of the useful features of the measures, user support and the data collection for the evaluation.

Lesson learned

Lesson 1 – Complementarity measures
The measures of this integrated package combined synergies in order to obtain better results. The services of 8.8-OPO were disseminated and explained in the mobility shop (4.14-OPO)

Lesson 2 – Users are the main force
The final users are the main force that will assure that the maintenance of the system after CIVITAS finishes, so their evaluation is of crucial importance for the final success of the project.

Lesson 3 – Good coordination
To be able to analyse the measures at IP level it is important to have a good coordination between them in order to have all the measures implemented at the same time.

3.5.3.2.2. Measure 4.14: The Mobility Shop

Measure description
This measure consists of implementing a local Mobility Shop within the Asprela area. The Mobility Shop is responsible for:

- Giving public transport information to the local population
- Supporting innovative mobility services like bike renting, DRT bus service and carpooling service
- Being the symbol of the CIVITAS-ELAN project
- Developing marketing campaigns that provide people with mobility information and at the same time work as a constant observatory of the mobility issues within the area.
Also several activities for citizen engagement were organised, like events, distributing brochures/leaflets and questionnaires.

There was a deviation from the original plan:

- Originally ticketing facilities were planned for Mobility Shop, but that was cancelled because no agreement was found with the partners STCP and MP.

**Evaluation approach**

3 main indicators were selected for the impact evaluation:

- The number of visitors was collected continuously in order to know the acceptance of MS by citizens and commuters.
- The satisfaction about the service of the Mobility Shop was measured conducting a face-to-face survey among the users.
- As people are better informed on their travel options the patronage of PT was expected to increase. Therefore it was planned to collect the number of tickets sold in the Mobility Shop. But because the ticket selling facilities in the Mobility Shop were cancelled, this indicator has been cancelled as well.

**Impact evaluation**

**Key result 1 – High number of visitors of the Mobility Shop**

There was a strong increase in the number of visitors after changing the design of the Mobility Shop in May 2011. Monthly 1100 persons visit the Mobility Shop. They request mostly information about transport operator. The peak of visitors was in September, when 2214 people visited the Mobility Shop, probably due to the new students that came to study to the faculties within the corridor.

![Figure 3.35: Monthly visitors of the Mobility Shop](image)

**Key result 2 – Increasing number of visitors of the Mobility Shop website**

Each month the number of the Mobility Shop website visitors has a new record. In May 2012, the website had 870 visitors In May 2011 a new design of the website was launched and it helped to increase the number of visitor but this new design did not have the same impact as the change of design of the Mobility Shop visitors

**Key result 3 – High satisfaction with Mobility Shop**

Visitors are very satisfied with the offered services in the Mobility Shop, their global opinion about the shop received a score of 4.73, where 5 is completely satisfied and 1 is completely dissatisfied
Process evaluation

Barrier 1 – Spatial
The number of available and feasible places was not as big as planned in the preparation of the measure phase. The solution foreseen, to install the MS in Campus São João Shopping Centre was abandoned due to lack of necessary certification of the building that is mandatory for the signing of any contractual document.

Barrier 2 – New mobility information service
In the beginning, the citizens didn't know what kind of services was provided in the MS so it was hard to reach them. After changing the exterior design of the Mobility Shop, this became clearer.

Driver 1 – Collaboration and support
There was a very high interest and collaboration of all Asprela institutions in the CIVITAS project and faculties.

Lessons learned

Lesson 1 – Citizen engagement
The Mobility Shop was an important tool to communicate with citizens. Useful comments and suggestions made by citizens, leading to changes in design in other measures. Also after the end of the project, the Mobility Shop will continue to support the communication on sustainable mobility with the citizens.

Lesson 2 – Importance of design
After the population survey showed that people did not know which services were available, the Mobility Shop changed the exterior design in May 2011 to show more clearly what type of information and services are available. As shown in Figure 3.35, this action was a success because the number of visitors increased significantly afterwards (average of 1100 visitors per month).

3.5.3.2.3. Measure 8.8: Mobile mobility information

Measure description
In this measure, a support decision tool was developed to help people planning their own mobility in public transport, based on real time information for schedules, provided by different operators whose services are available in Asprela. The general system results from a process design that integrates different technologies from several public transport operators and is named: IMS – Information for Mobility Support. The users can access to this tool through:

- LCD screens placed inside two institutions of the Asprela area: the hospital and the medical faculty. It shows a map of the area covered by the PT services and bus stops of the different means of transportation. The LCD doesn't allow any interaction with the user;
- MOVE-ME: Smartphone (android an iPhone) application or any device with internet: these tools allow interaction, the user can search for the best combination of transportation from the place of departure, which may not be the current location, and get updated information about the next departures near him and its final destinations.

The information displayed in these tools are: timetables, routes, destinations, stops and waiting time for the next service, all based in real time and planned information (in case real time data is not available).

The measure team organized several citizen engagement activities along project lifetime. During measure development OPT promoted a few sessions to present the main achievements during the implementation process, so the partners and main stakeholders could feel integrated in the project and in the main decisions. Also questionnaires and focus groups were used during prototype development in order to collect public opinion. After measure implementation flyers, stickers and posters were
distributed during the marketing campaign in order to disseminate the services. During operation questionnaires were organised again to gather users’ opinion about the systems and its usability. An e-mail contact was also visible in the information services were users could report problems and give their feedback.

There was a deviation from the original plan:

- **New research activities**: based on partners’ feedback and some potential users’ analysis, new research activities were initialized directly related to the development of mobile application for iPhone. Even without additional budget for this development work, OPT has decided to invest in this study in order to include it in the final evaluation of the measure.

**Evaluation approach**

The evaluation process of this measure included three sessions of learning histories.

The impact evaluation was used to measure the impact of:

- Mobility information services: number of requests of information sent to the system by the users, number of mobility information downloads, survey to evaluate if people use more PT with the MOVE-ME application;
- Usability of these services: interview to LCD users in focus group, online satisfaction to qualify the users’ satisfaction with the mobility service and its functionalities.

**Impact evaluation**

**Key result 1 – Mobility Information System is useful**

The IMS system is considered by the general public as useful and efficient. It has accomplished its main objectives: improved the ways of providing transport information; gathered data from 14 different operators in a single platform; centralized its functionalities in users’ needs; promoted the public transport in Porto.

**Key result 2 – High satisfaction with MOVE-ME service**

People return real good feedback on MOVE-ME and ask for the continuity of the service. They refer that a good service like MOVE-ME could be charged because it is really useful; they don’t even refer the fact that being a free service is an advantage.

**Key result 3 – Increased PT use due to MOVE-ME**

21% of the general public questioned during the interviews answered that they use private car less since MOVE-ME is available on the market.

**Key result 4 – Number of MOVE-ME users**

A total of 4055 active downloads were registered with an average rating of 4.2 (out of 5) on the Android market and 4+ (out of 5) at the Apple store. The total of downloads including also updates is 5487 in 6 months. Between February 2012 and July 2012, a total of 157 112 information requests (936 per day) were recorded to the MOVE-ME service.

**Process evaluation**

**Barrier 1 – Acquisition of data in real time**

The difficulty to acquire real time information of the PT operators was underestimated in the project: ANTROP has no real time data so the system displays planned information, only STCP and Metro, the two other partners, have these data. However, the STCP’s operational system is overused because many services of the company maintain a permanent access to it. OPT had to perform extra data and software tests with STCP server and their information system. This caused a delay in the integration of this information in the system, which was planned to be completed on April 2010, but was finally only accomplish during September 2012.

**Barrier 2 – Technological evolution of the mobile devices**

The quick technological evolution of the mobile devices has caused changes in the project execution. Because of this barrier OPT started the project with developments applied to LCD equipment and left
the smartphones and internet application to the second stage of the project – after 3rd year (2011). According to the plan this stage was the first, but to avoid the risk this investigation was transferred to the end of the project to assure all the technological evolutions were considered and monitored.

**Barrier 3 – The maintenance of the information from the operators**

The operators did not update the planned data in the system (for example reduced service during holidays), so the system becomes less attractive for the users. Final users do not joint to this new service due to lack of information or interest.

**Driver 1 – Partners**

There was a strong interest of the measure partners: they are always available to discuss technical and data problems to assure the best final result of the project. The constant contacts with the operators of ANTROP have guaranteed the persistence in continuing the success of the project. Their feedback and commitment on the final developments of their prototype was really important to assure the LCDs implementation on September 2011, as planned.

**Driver 2 – Institutions support**

The involved institutions and other entities were very supportive, mainly for data collection, dissemination of the positive actions and some clarifications about the service to the students and other future users: Hospital de S. João and Faculdade de Medicina had an important role on the success of this implementation. Despite they aren’t direct partners they are effectively associated to the project from the beginning. Other institutional departments at Asprela have been contacted but neither one has assure the support as they did.

**Lessons learned**

**Lesson 1 – Users as main force**

The final users are the main force that will assure that the maintenance of the system after CIVITAS finishes, so their evaluation is crucial for the final success of the project.

**Lesson 2 – Marketing campaigns**

The marketing campaign of the application started strong and had very positive results, promoting the use of the system and exponentially increasing the use of the available applications.

**Lesson 3 – Partners and stakeholder involvement**

Good communication with the local partners and stakeholders can show them that the project also concerns their business requirements. This will help you to gather more stakeholders supporting the project.

3.5.3.3. Other measures

3.5.3.3.1. **Measure 2.10: Participatory planning for new intermodal interchange**

**Measure description**

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). In this measure a preliminary study was conducted on the future construction of a transport interchange in Asprela.

The planning and preparation works focused on researching relevant information, requirements on transport interchange design and participatory planning involving all the stakeholders. The requirements expressed by the stakeholders 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 states the importance
of the economic viability of the project, which is an aspect many times neglected in the previous Portuguese experiences in the matter.

As a result, the conceptual design was developed for the implementation of this infrastructure within the study corridor. This document contains the architecture design for the transport interchange and its description. All the relevant stakeholders (Transport companies and Municipality) were involved in the development of this document and the final solution had their support. Moreover a face-to-face survey was done and the contributions given by citizens were in agreement with the conceptual design.

Furthermore, also a Business Model was developed. This document is a compilation of the technical, economic, social and industrial requirements for the transport interchange (location, areas, number of public transport stops, services to include, etc.) for the current supply and demand at the interchange. It also includes the economic viability plan for the investment and operation/management.

The construction phase is out of the range of CIVITAS ELAN.

There were deviations from the original plan:

- **Construction of a parking infrastructure for buses** – At the local of the intermodal interchange there was no space available to accommodate the parking of buses with a long Terminal Time, namely those that provide the interurban transport. Thus, the studies of the interchange predict an area nearby to provide a formal place where buses can stop. The public tender for this parking area was launched by CMP during September 2011, and the construction works were done in 2 (two) months with a total cost of €126 000.00. With the implementation of this parking lot it is expected that the pressure in the area will decrease.

- **No launching of the Public Tender for the construction of the intermodal interchange infrastructure during CIVITAS life time** – As it is well known Portugal is under a financial crises and a rigorous financial program which restricts any good will to build the interchange as it was predicted. CMP is still planning to implement the interchange in Asprela area according the measure, but it is not possible to launch the competitive public tender for the conception, construction and operation of the future transport interchange during CIVITAS life time as it has been announced in the measure description. Alternatively, a public tender for the construction of the aforementioned bus parking infrastructure was launched.

### Evaluation approach

Since the construction of the intermodal interchange is out of range of the project, the evaluation is limited to process evaluation. The impact of the parking infrastructure is also only expected to be visible after the construction of the terminal.

For this process evaluation, two learning history workshops were organised on this measure.

### Process evaluation

**Barrier 1 – Financial restrictions**

CMP does not have the economic conditions to launch the tender of the transport interchange. Transport companies have financial limitations too. This implies that the tunnel’s funding is not assured.

**Barrier 2 – Delays in the study**

The phase of study development took too much time, due to:

- the complexity of the problem, a lot of stakeholders and constraints
- political strategy does not always suit with the technicians’ opinions and studies
- elapsed time between the delivered studies and the political decision.

**Driver 1 – Good cooperation between partners**

All partners are sharing the sense of urgency on construction an interchange infrastructure. Interest and the pro-activity of the main partners, namely the cooperation of various stakeholders, was helpful
for the measure development. Also the new Transport Metropolitan Authority of Porto (AMTP), created in 2010, showed interest and involvement in measure development.

**Lessons learned**

**Lesson 1 – Involvement of decision makers**

The involvement of technicians of transport in solution development is not enough to have the acceptance of their board of directors. It is important to promote actions to involve the board of directors in order to avoid in working in a solution that have the acceptance of technicians but not of their directors. This action can significantly increase the probability of having a successful acceptance by directors about project selections.

**Lesson 2 – Citizens confirmed the plans**

In Portugal people aren’t used to citizen engagement activities, but in the face-to-face interviews inhabitants were interested to give their feedback what should be included in transport interchange. The contributions given by citizens confirmed the planned infrastructures considered in technical specifications by measure partners for the interface.

**Lesson 3 – Fit the measure into the local municipality policy**

Find a way to fit the measure into the local municipality policy, as a way to ensure their continuation in order to get the political support easier.

**3.5.3.4. Evaluation results on corridor level**

**Description of the corridor**

The city’s mobility policy is changing towards an urban transport system that is responding to people’s needs and aims at providing transport alternatives that guarantee a high quality of mobility, decrease the negative environmental impact of transport, enable accessibility of the transport network for all citizens and consequently contributes to a higher quality of life in the whole agglomeration.

Within the Asprela corridor, six innovative measures were proposed that tackle these complex issues in an integrated way.

Public transport services were improved by providing a demand responsive night bus service connecting the corridor with city centre (M6.4-OPO). Additional efforts to provide environmental friendly bus services were made by testing a new type of light weight bus based in innovative manufacturing technologies and fibre reinforced composite materials (M1.5-OPO). This vehicle was used in a new bus shuttle service for the citizens and visitors of the area connecting two metro stations to the main points in the area. The information about mobility was improved through the implementation of a mobility information shop within the corridor (M4.14-OPO) as well as innovative mobile real time mobility information (LCD, smartphone application, internet website) about public transports (M8.8). These information services make the many available transport services more transparent and more attractive. Other measures were those that focus in decrease the traffic congestion by implementing a carpooling platform (M6.4-OPO) and by the management of public space and access (M3.5-OPO & M2.10-OPO). This management at traffic level increasing the road capacity and becoming more attractive for public transport users, pedestrians and cyclists building and improvement exclusivity lanes for which users.

The different measures in the field of public transport intend to improve its image and to achieve a modal shift from the private car to public transport services.

Almost all ELAN measures helped to improve the air quality and noise level in the corridor by introducing new mobility options, promoting the public transports trough information services, stimulating sustainable modes like walking and cycling and reducing traffic congestion.
Figure 3.36 – Main measures in the Asprela corridor

Evaluation approach

The selection of the evaluation indicators was based on the objectives and expected outcomes of the measures within this IP.

- **Increase modal split of sustainable transport means:** This indicator gives the entire travel picture and it enables easy comparisons. Due to CIVITAS measures a modal shift towards sustainable transport means is expected. The indicator is collected through a face-to-face mobility home survey for inhabitants and an online survey for the workers/students of the corridor, in order to characterize the mobility of Asprela corridor, in a workday. The survey was collected before and after measures implementation.

- **Improve air quality:** The evaluation of the air quality in the Asprela area is based on measurement campaigns for two tracer pollutants and in numerical simulations for the principal criteria pollutants. The numerical simulation uses an emission database based on local traffic counting. The meteorological inputs were considered using the *Normal Climatic* situation for Porto region. The air quality maps were designed for two seasons (Winter, Summer) before and after measures implementation.

- **Decrease noise level:** The used indicators were: overall noise level during the day, evening and night; dose noise and peak noise. It is calculated through noise measurements in corridor and simulation based on traffic flow. The indicator was collected before and after measures implementation.

- **Increase the number of Public Transport users:** the PT patronage is a way of measuring the level of acceptance of people to the use of PT. Data is collected only for PT stops within Asprela corridor. The number of Metro and STCP trips was continuously collected since January 2009. The operator ANTROP was responsible for data collection in two periods: before (2009) and after (2012) CIVITAS measures implementation. The data collection of ANTROP was not continuous because almost all private operators do not have electronic ticketing system.
Impact evaluation

Key result 1 – Mixed results for traffic emissions
There was a decrease in traffic emissions of nitrogen dioxide (-4.2%), carbon monoxide (-0.1%) and particulate (PM$_{10}$ and PM$_{2.5}$) (-1.4%). The benzene traffic emissions increased by 10.5% and the carbon dioxide traffic emission increased by 4.3%. Nevertheless, due to delays on the measures implementation and following in time of campaigns, the results should be interpreted with care. The quantifiable target of a decrease of 5% was not achieved.

Key result 2 – Air quality
There were improvements in the air quality concerning the level of nitrogen dioxide (-0.4%), particulate (PM$_{10}$) (-1.7%) and particulate (PM$_{2.5}$) (-2.3%). Benzene levels (3.9%) and carbon monoxide levels (0.2%) increased. As previously mentioned, the results should be interpreted with care. The quantifiable target of an increase of air quality of 5% was not achieved.

Key result 3 – Noise level
In general the noise levels decreased and the defined target was achieved in full. These results are not only due to the modal shift registered in the area which implied less traffic but also to the renewal of the road network. Thus all the measures contributed to the registered decrease of noise levels.

Table 3-167: Noise level

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measuring point A</th>
<th>Measuring point B</th>
</tr>
</thead>
<tbody>
<tr>
<td>L$_{den}$</td>
<td>-1%</td>
<td>-14%</td>
</tr>
<tr>
<td>L$_{n}$</td>
<td>-3%</td>
<td>-18%</td>
</tr>
<tr>
<td>Peak noise</td>
<td>+1%</td>
<td>-3%</td>
</tr>
<tr>
<td>Dose noise</td>
<td>-17%</td>
<td>-93%</td>
</tr>
</tbody>
</table>

Key result 4 – PT trips
STCP and Metro are the two most important PT operators in the corridor, with both nearly 50% of all PT trips. The number of trips in the corridor using Metro increased by 7% between 2009 and 2012, but the number of trips originating in the corridor using STCP decreased by 1% between 2010 and 2012. A smaller operator ANTROP (0.2% of PT trips in the corridor) increased by 42% between 2009 and 2012. In general terms, the target of an increase of 5% on the number of PT trips was substantially achieved.

Key result 5 – Modal shift towards sustainable modes
The improvements in corridor concerning the conditions for walking and biking, the changes in public transport information and the implementation of the shuttle service contributed to the modal shift towards the sustainable modes. The defined target of modal shift towards more sustainable modes was exceeded for both the commuters and the inhabitants. However the increase around 40% for sustainable modes is not only due the CIVITAS measures, but due to the raise of the unemployment rate and higher costs of fuel and of public transport.
Process evaluation

**Barrier 1 – Financial**
Partners do not have the economic conditions to invest more than originally planned. This financial crisis also compromises life after CIVITAS activities. However the good results obtained convince the partners to think about the continuity of some measures.

**Barrier 2 – Administrative bureaucracy**
The bureaucratic functioning of the city administration is often responsible for delays in implementing measures like the implementation of mobility shop, circulation plan and the dissemination work of the infoboard. CMP needs several months for official approval of reports which it is needed to be approved to start the next task.

**Driver 1 – Problem related**
All partners are sharing the sense of urgency on CIVITAS measures like the construction of an interchange infrastructure.

**Driver 2 – Involvement, communication**
Interest and the pro-activity of the main partners, namely the cooperation of various stakeholders, are being essential for measure achievement.
Drivers 3 – Involvement of citizens

The involvement of citizen through marketing campaigns, surveys or focus group activities started had very positive results, promoting the use of the systems and exponentially increasing the use of the services.

Lessons learned

Lesson 1 – The CIVITAS-ELAN measures are well suited to address the key mobility issues in the Asprela area.

In this way they contributed to the rationalization of the transport services as well as to an effective modal shift in favour of more environmental forms of transport. The importance of the area for the whole city’s traffic patterns, suggests that these benefits would have impacts far beyond the local implementation zone and could be felt even at a metropolitan level, giving an example also for other European cities.

Lesson 2 – Political involvement in measure development is essential in order to take decisions in a timely manner and according to city strategies.

During the project there were several moments where the lack of political involvement changed decisions and the process was slowed down and planning was difficult. Further work and costs were needed, and the measure development was delayed.

3.5.4. Conclusions & recommendations for this city

CIVITAS ELAN gave mobility and transport issues a big push. Decision makers and citizens are now much more aware of the issues and are more willing to change their travel habits. Innovative campaigns and the high visibility of the measures contributed to this.

ELAN helped to bring forward activities that had been on the agenda before but didn’t have enough political support, such as the bicycle path in the Asprela. CIVITAS also acted as a motivator and catalyst to bring together 15 public transport operators to provide travel information via a smartphone application.

The visibility and the good results supported by the evaluation brought new Transport Companies to join MOVE-ME and also other cities demonstrated their interest in the application.

The recently formed metropolitan transport authority in the Porto region will further promote the results of CIVITAS and might take over the management of selected measures such as the mobility shop and the development of the Transport Interchange.

There have been also been challenges. For example, it is difficult to convince people of the benefits of citizen engagement when powerful stakeholders intervene and jeopardise the whole process. Thus the policymakers must be convinced that the involvement and participation of the different stakeholders as well as the citizens on the measures development targeting a more sustainable transport brings advantages not only in the development itself but also facilitates its implementation as CIVITAS showed.

In this way the actions taken and the evaluation results are useful to support the continuity of some measures after CIVITAS and the use of the new approaches when developing and implementing new Transport Policies namely the involvement of the different stakeholders.

Finally it must be stressed that since a program evaluation can be considered as simply as a systematic method for collecting, analysing, and using information to answer basic questions and extremely depends of data quality, the basis of the program must be defined on the proposal. In this way data collection can be the responsibility of the evaluation team.
4. Evaluation of citizen engagement

4.1. Objectives of citizen engagement

In the CIVITAS-ELAN project, the effectiveness of a large number of measures depended on effects of public involvement, therefore CIVITAS ELAN from the very beginning has been oriented towards citizens. It is obvious from the project's mission statement which was agreed at the initial phase between the representatives of the consortium cities: "To mobilise our citizens by developing with their support clean mobility solutions for vital cities, ensuring health and access for all."

The focus on citizen participation was a very important feature of the work plan. Putting citizens first means the essential shift from perceiving them as a "problem", towards their inclusion as the most important and constructive part of the solution.

The basis for achieving the project's mission was ELAN's Citizen Engagement Strategy, which was the basis for planning citizen engagement activities on the city level – for Citizen Engagement Plans and for measure related engagement plans. The specific objectives of this Strategy are:

- to raise awareness and understanding of citizen engagement,
- to define common principles for citizen engagement in transport planning and implementation,
- to assess the level of citizen participation with regard to transport in individual CIVITAS ELAN cities through situational analyses,
- to identify barriers and needs for capacity-building,
- to prepare guidelines for effective citizen engagement in CIVITAS ELAN cities,
- to support consistent evaluation of the process through identification of indicators.

4.2. Evaluation of citizen engagement activities city per city

The five ELAN cities represent five different societies with different traditions and different levels of participatory culture. ELAN cities also have different culture, legislation, different institutional setups and especially different practices in engaging citizens. Different practices are applied even in different sectors of the same city. Although the direction towards a more "participatory society" was a common goal in all ELAN cities, and although the approach was a common one, the achievements in citizen engagement in the cities differed. This was due to different participatory cultures in those five societies. The success depended in a great deal on the complex historical, cultural, political and legal background.

For this reason, the evaluation results of citizen engagement are reported here on city level. For detailed results on measure level can be referred to the MERTs in annex, or to D10.14, the Evaluation Report on Citizen Engagement.

4.2.1. Ljubljana

4.2.1.1. Objectives

Before ELAN, good practices of citizen engagement could mostly be found in the fields of development and spatial planning and environmental protection, whereas in transport-related issues citizen participation had no tradition at all. Ljubljana joined the ELAN project in order to greatly improve the practice of informing and consulting with citizens and visitors on the key aspects of urban mobility. In this regard Ljubljana’s aim in the ELAN project was to introduce numerous awareness-raising and consultation events which would motivate citizens to get involved and would raise mutual trust needed for effective participation. At the beginning it was almost too ambitious to expect that during the project...
period, Ljubljana would develop optimal participatory practices, however, significant progress in existing engagement practices has been made at the end. Within the four years of ELAN it has been achieved that in many mobility projects of the city administration citizens’ opinions are now being considered as a driver, not an obstacle.

The main objectives related to citizen participation at city level during the project were:

- to identify and satisfy the citizens’ needs,
- to avoid or reduce conflicts with citizens in the future,
- to improve availability and accessibility of information,
- to promote use of public transport modes against individual car use,
- to raise awareness of clean and sustainable modes of transport of which the use has significant impact on bettering environmental conditions,
- to raise awareness of traffic impacts on the quality of life,
- to combat the feeling of citizens’ powerlessness,
- to restore trust in city administration and revive democratic principle “Every voice should be heard”.

4.2.1.2. Quality of activities

Key result 1 – Improvement of availability and accessibility of information
Improving the availability and accessibility of information is one of the objectives for most of the measures of Ljubljana:

- Relevant, complete and correct information about the high-quality mobility corridor (M2.1), the cycling strategy (M4.6) and the other CIVITAS measures was shared through events in order to reach the larger public. In most cases, large groups of the population attended these events.
- Also brochures and leaflets were used to provide information and raise awareness.
- A web portal enhances and encourages the communication about sustainable freight deliveries. Also a mailing list was set up through which it was possible to send invitations, information, etc. (M7.2).
- In order to be correct and accurate, the information provided in the Individualised Mobility Marketing Campaign IMMC) had to be adapted accordingly to changes in other measures inside the project (M4.1). The leaflets and other information materials were distributed, and the implementation of the Mobility Shops was a step towards effective communication on the more efficient/cleaner transport modes.

Key result 2 – Balanced approach towards citizens
Different methods were used to identify citizens’ needs:

- In smaller public discussions and workgroups information was shared with stakeholder groups and feedback was gathered (M4.6, M4.9, M7.2). Unfortunately, workshops tended to attract people that were already interested or even convinced. That is why workshops alone are not the best way to inform people (M4.6).
- The personnel of the IMMC also spent up to 1h on face-to-face discussions about sustainable transport topics (M4.1)
- The best way to get feedback from the public, however, was found to be the use of questionnaires to target groups (M6.1). However, sometimes citizens were unwilling to cooperate in the surveys because they were too long and there was resistance towards home visits by interviewers. Also misunderstandings of the instructions, aims, and goals of the surveys played an important part in the rate of success of the measure, although the surveys were scheduled and background information was provided in advance (M4.1).

In all measures of Ljubljana a mix of all the different ways to inform and involve the public was sought: large versus small scale, personally versus by letter, general public versus smaller target groups,
passive versus active, etc. The IMMC (M4.1) helped to market some of the measures implemented within ELAN.

4.2.1.3. Impact evaluation

Key result 1 – Identification and satisfaction of citizens’ needs
To satisfy the identified needs of citizens, a number of measures were changed:

- Comments and suggestions made by the citizens during the public discussions and other contact moments were taken into consideration when the cycling strategy was revised (M4.6).
- The survey undertaken in the IMMC (M4.1) provided a large amount of information about the public opinion regarding the acceptance of CIVITAS ELAN measures and traffic in the city of Ljubljana in general. The survey has been an orientation point for further action within the project; since the response was good, the results of the survey clearly showed which measures have good public support, and which of the measures should be redefined, e.g. high support of the mobility corridor (M2.1) changed the politicians’ and experts’ attitudes towards the implementation of the measure.
- Proposals, findings and conclusions of several ELAN measures (M4.6, M4.9, M4.15, M3.1, M2.1, M5.5, M8.1, M8.4, M8.5) were included in the new “Traffic Policy of the City of Ljubljana until 2020” and the new Spatial Master Plan of the City of Ljubljana.
- Input from mentors and parents at schools lead to the change of design of a pedestrian crossing and the upgrading of the web portal with new information about the traffic situation and the location of dangerous points near schools (M5.4).
- Remarks from citizens led to the addition of some additional topics on the web portal (M7.2).
- Thanks to the public involvement (disability organizations) the public transport provider replaced a rather unambitious plan of purchasing only one vehicle for transporting people in wheelchairs, with a much more ambitious agenda for social inclusion of different groups with special needs. Only on the basis of peoples’ input, they took the strategic decision to allow different groups of disabled people an equal use of all their vehicles as their long term business and socially very beneficial decision (M6.1).

Key result 2 – Increased awareness
The city tried to make clear to the public why all these ELAN measures are implemented and hereby to raise the awareness of traffic impacts on the quality of life and especially the impact of sustainable and clean transport modes on the environmental conditions. This was done during the different information moments (events, roundtables, presentations ...) mentioned above.

- As a result of the citizen engagement activities, residents in other parts of the city demand the implementation of dedicated bus lanes on other streets besides the corridor. This is a clear indicator that the inhabitants are convinced that measures for the public transport are necessary, even at the expense of the car users (M2.1).
- The increase in the number of participants at events was a clear indication of an increased awareness and knowledge of citizens on cycling (M4.6).
- The fact that the subject ‘sustainable transport planning’ is more often covered in the media is a clear indicator that the citizen engagement activities have raised the public interest (M4.9).
- The ‘outreach campaign’ where the attention on the increased number of children in traffic was raised with billboards, posters, traffic signs and the presence of numerous volunteers in the vicinity of schools, was a great success. Also, the more important role of safety of children in local politics indicates that it has become a public issue (M5.4).
- Additional education and training of drivers contributed to greater susceptibility and sensitivity of drivers towards impaired people (M6.1).
- With the set-up of Facebook and Twitter accounts the public interest concerning sustainable freight logistics has increased (M7.2).

Key result 3 – Improved relation between citizens and public administration
There were very few measurable impacts from the different measures showing that the use of public transport increased, simply because it’s difficult to measure and because it was never the main objective. But it’s important to note that almost in every measure new and better ways to involve the citizens were found and how to appropriately communicate with them.

Concerning the feeling of citizens’ powerlessness and the trust in the city administration, the CIVITAS ELAN team in Ljubljana knew that the situation would not change overnight. On the other hand the local ELAN partners didn’t imagine that it would be so challenging to build up trust among citizens in the city government and the realization of CIVITAS ELAN measures. It took almost four years to mobilize citizens’ minds and dismiss the general belief that their opinions have no impact on decision-making. But despite several challenges, citizen engagement experienced some “breakthroughs”:

- The citizen engagement activities have created a dialogue culture between stakeholders. Instead of forcing their own opinions and arguments onto each other, they started to respect each other’s opinion and tried to find solutions on complex problems by discussions and collaboration (M2.1).
- The city and the different stakeholders recognised that communication and citizen engagement in urban and transport planning are important. This makes the organisation of future citizen engagement activities easier. Fun-based and appealing public events were organised to overcome the distrust and negative perception of public participation (M2.1).
- The willingness of the public transport company to take into account all the reasonable suggestions and proposals made by the users, supports the democratic principle ‘every voice should be heard.
- Establishment of the Cycling Platform where everyone in this open group was offered a chance to constantly express opinions, suggestions and ideas about how to improve cycling conditions (M4.6).
- Thanks to CIVITAS ELAN partners, the “Traffic Policy of the City of Ljubljana until 2020” also includes a concrete communication and citizen engagement plan with activities that will surely boost participatory culture in transport-related issues.

### 4.2.1.4. Process evaluation

**Driver 1 – Willingness to cooperate of all partners/stakeholders**

In order to reduce conflicts between the citizens and the city administration, communication is one of the most important drivers. It has to be made possible that everyone can share his/her opinion. Every good suggestion is a new step towards citizen-shaped and well-supported measures.

- The public had great expectations in terms of improvement of the cycling conditions in Ljubljana. There was a good response, a lot of good-will and participation of the public that triggered the drive to implement the measure (M4.6).
- Cooperation with stakeholders and NGOs are often a key to success (M2.1, M.5.4, M6.1 and M7.2)
- Good quality of gathered survey data in the IMMC (M4.1) could be easily used by other measures – this was the basis for good communication/cooperation with other Measure Leaders.
- The change of attitude of the PT providers’ employees in relation with the passengers since the beginning of the project really helped the measure to become a good example of citizen engagement and communication with the stakeholders/citizens (M6.1).
- The earlier the involvement of the public, the stakeholders and all of the crucial partners, the better (M7.2). If everyone is involved from the beginning, the entire process will be more efficient and the chance of success bigger.

**Barrier 1 – Lack of support from politicians and other stakeholders**

There were also a few measures that had some problems with the citizen engagement that made the process more of a struggle to get to the implementation of the measure:

- Turning the discussions into a political approach obstructed a straight-forward decision-making and/or implementation (M2.1).
• Negative media coverage (created by experts with other goals and opinions) created an opposition to the measure with the public and has to be avoided at all times (M2.1).
• Lack of motivation for participation (apathy) and the NIMBY (not in my backyard) effect (M3.1) with the citizens is a serious threat in Ljubljana. Some politicians and experts still believe that the public does not have enough technical knowledge to be involved in the planning process or decision-making (M2.1).
• Lengthy decision-making about the measure implementation has prevented strong communication with the public (M2.1, M4.1, M4.6, M6.1 and M7.2). The implementation has to be well-timed and implemented. Only then it is possible to communicate to the public in an efficient, clear and honest way. These changes and delays of measures affected also the dynamics and the content of the information that was to be communicated within the IMMC (M4.1). As a result the IMMC needed to be redesigned: it was spread to a city wide campaign, not only focussing on the CIVITAS corridor.
• Without sufficient political and financial support it is almost impossible to implement a good, well-supported and accepted measure (M4.6 and M4.9).

Barrier 1 – Lack of communication strategy
Throughout the different measures it became very clear that the communication strategy has to be planned and set in motion as early as possible in the process. A communication strategy is more than determining the proper manner to address the public, it is also:
• defining how the measure should be brought to the attention for the media. If there is already a press text and the media is contacted before they find out by themselves, the chance is smaller that the measure will be regarded as a negative development. The media is a very important factor determining the public opinion about a measure.
• timing and planning the citizen engagement activities: who is the target group and what is the most efficient way to inform and mobilize this target group?
• marketing, the measure is like a product. It has to be ‘sold’ to the public; they must want it to be implemented. A positive campaign is a helpful tool for that.

4.2.2. Gent

4.2.2.1. Objectives

Gent was already a city with high participation of citizens who are influencing decisions on several public matters. The citizens of Gent are active and respond well to invitations from the city authorities for public participation in planning matters, including those related to mobility. Public involvement in Gent has a long tradition and is now well-rooted in the system and functioning of urban institutions. In this respect, Gent significantly stands out amongst the other ELAN partner cities.

However, also in Gent the ELAN project was an opportunity to integrate further improved approaches for the involvement of citizens in the planning and implementation of mobility measures, especially through introduction of new consultation techniques and innovative approaches in the organisation of consultation processes.

The main city objectives on citizen engagement were the following:
• to identify and satisfy the citizens’ needs,
• to improve and optimize, taking into account citizens’ remarks, future projects and plans,
• to improve availability and accessibility of information in general and about city mobility,
• to raise awareness of clean and sustainable modes of transport of which the use has significant impact on bettering environmental conditions,
• to promote use of public transport modes against individual car use,
• to raise awareness of traffic impacts on the quality of life.
4.2.2.2. Quality of activities

Key result 1 – A wide variety in citizen engagement

One of the objectives of citizen engagement in Gent was to improve the availability and accessibility of information in general and about city mobility. In this way a high quality of the citizen engagement activities itself was an objective for the city.

An important observation is the wide variety of media used to approach the citizens taking into account the differences in user groups and type of measures supported by the citizen engagement activity:

- Information on walking (M4.7) and cycling (M5.6) possibilities in Gent was provided through a mix of intermediaries/media (city magazine, city website, Facebook, Twitter, etc.). A call to all citizens was published in the city magazine and on the city website.
- For the participatory redevelopment of the main train station area (M2.9), different kinds of activities with a different approach were set up to address as many stakeholders as possible. The central place for information is the info point, and a wide range of media was used to provide the stakeholders with information: local and national journals, radio and TV, website, information letters and posters at the railway station, brochures and social media. In 2011, all stakeholders were more satisfied with the communication than in 2009-2010.
- Mobility management for companies (M4.2) was organised by providing posters and flyers to the companies to spread the information to their employees; for some companies also a website with mobility-related information was set up. It was the responsibility of the companies to provide this information towards their employees but this didn’t always happen. Furthermore, Mobi-weeks were organised yearly. As it is not recommended to organise exactly the same activity for the same employees, these Mobi-weeks changed year after year, in order to avoid the risk of fatigue for the message of ‘sustainable home-to-work transport’.
- The general objectives of the bicycle activities (M4.5) were communicated to the citizens through questionnaires. The more specific details of the bicycle bins were communicated through flyers in which citizens were asked to join the pilot study. Citizens could also test and compare the bicycle bins themselves.
- Citizens are provided with a lot of information on the possibilities that cambio gives for innovative car-sharing (M6.2) on the website and the trial offer campaign for car-sharing gave citizens the chance to get to know cambio better in real.
- Holistic event management (M6.3) supported event organisers to solve mobility issues by an online tool to determine which measures can be taken. The event organisers seem to regard this as a very convenient tool with all the information on the different means and possibilities to limit the impact on the traffic. Event visitors were provided with information on alternative transport modes by a poster campaign and the possibility to ask for free personal travel advice.

Especially for big projects, it was important not to focus on just one communication tool, but to use a wide range of communication tools for the different stakeholders. It is necessary to make sure that there are interactive tools as well in order to give the stakeholders the chance to provide their opinion, complaints and ideas about the project. Also timing was indicated as an important success factor: citizens should be approached more at key moments in their life which cause often big chances in their (mobility) habits, like getting children, change of job, etc.

Key result 2 – Well-developed incentives to reach target group

To improve the penetration level of the activities well-developed incentives were important:

- In the mobility management for companies measure (M4.2) the employees who used a sustainable transport mode got presents like a breakfast, foot massage, concert, etc. at the Mobi-weeks at Technologiepark and Fnac Gent. The employees could also win a folding bike, group arrangements as a boat trip in city centre, a visit to museum, etc.
- To organise mobility management for schools (M4.3), each school got a subsidy to spend on the mobility campaign, and the schools with the best results of their mobility campaigns received an additional sum to spend on a mobility-related subject. Pupils were motivated by making a competition of the mobility campaigns.
- Participants at the photo competition in the campaign to promote walking (M4.7) could win multimedia vouchers, trip by balloon, walking outfit, boat trip on the canals of Gent. Also six consolation prizes were distributed among the participants.

- Participants of the “Our department is moving” campaign (M4.10) could win a folding bike and several departments could get some group arrangements like a boat trip or a visit to a museum.

- In the campaign “Keep on cycling in wintertime” (M5.6) by-passing cyclists received free winter gloves. The high satisfaction rate shows that gadgets are useful in the first place and they are a means of interacting with the public.

- The trial offer gives the chance for interested people to get to know cambio and to try car-sharing (M6.2). The participants of the Facebook competition could win several prizes like a folding bike, a subscription of De Lijn, a subscription on cambio, a cartoon, etc. Facebook proved to be an excellent tool to reach certain target groups like people between 20 and 35 years whose lives often are too busy to spend their evenings in a debate or workshop.

A very difficult target group to reach are the fervent car users because they don’t seem to be interested in sustainable transport modes, as they feel good with their car.

### 4.2.2.3. Impact evaluation

**Key result 1 – Changes in measure design after identification of user needs**

In several measures, citizen engagement enabled to better identify and satisfy the citizens’ needs. Taking their remarks into account, it was possible to improve and optimize future projects and plans:

- For the mobility management for companies (M4.2), a questionnaire formed an important source of information on the mobility behaviour of employees and barriers for the use of sustainable transport. This information was used for concrete mobility advice and the completion of the mobility plans. For the organisation of the Mobi-weeks, participants’ feedback from previous years was taken into account.

- Information from questionnaires revealed the willingness-to-pay for the bicycle bins (M4.5), which was taken into account in determining the renting fees. Also more than 200 suggestions were received about possible new locations for bicycle bins. After the pilot study, remarks from users on the practical use and the design of the bicycle bins were taken into account in the specifications for new bicycle bins.

- Inhabitants were involved in the reorganisation of their street into a cycle street (M5.6).

- By consulting the public, new and less-known walking (M4.7) and cycling (M5.6) problems were identified. Input from target groups resulted in lists of action points for walking and cycling. However, priorities of this action list do not always correspond with priorities in other departments, delaying the completion of the action list.

- Local residents indicated where a car sharing station would be popular (M6.2). The suggested places for a car sharing station were taken into account and researched. Based on this cambio did already start four new car sharing stations.

- In the context of holistic event management (M6.3), event organisers and event location managers were interviewed on all kinds of mobility issues they face. These issues were strongly taken into account to develop accessibility sheets, mobility plans and the decision making support tool. There has been a certain influence on decision-making for the supply of public transport and the mandatory use of the decision making support tool in the near future.

- The www.d-via.be inquiry provided the necessary insights to convince shopkeepers and distributors to develop solutions for loading and unloading. These results were the start of practical solutions for city distribution (M7.3). Stakeholders gave especially good suggestions concerning adjustments on the streets.

- In the workshop with property promoters, the city became aware of the consequences on building projects of possible parking measures and the suggestions of developers will be taken into account when further developing the parking policy of the city.
Key result 2 – Mixed results for awareness

The awareness of clean and sustainable modes increased for many target groups but not for all:

- All companies but one that were contacted for mobility management (M4.2) now have a company mobility plan, mostly set up in the framework of the ELAN project. A gentlemen’s agreement was made between the city, the companies of the Technologiepark and other partners according to which every partner engages himself in several tasks in the upcoming years.
- Most of mobility campaigns in schools (M4.3) succeeded to increase the awareness and knowledge of the pupils on sustainable mobility, but there were big differences in the reached scale and impact.
- Citizens are more familiar with the walking promotion campaign and the functional walking map (M4.7) than students in higher education.
- For 27% of the respondents, the Cycle Chic campaign (M4.10) led to a more positive attitude towards biking, but the other mobility campaigns were less successful. It was especially difficult to reach fervent car users. The people interested in participating in the action already used sustainable transport modes often.
- Event organisers and cultural venues were strongly involved in the process and as a result evaluated the tool for holistic event management (M6.3) as very useful. The mobility campaigns have also increased the awareness and knowledge of the visitors of the events. For example 84% of the interviewees on the ‘Culture with a low CO\textsubscript{2} emission’ campaign stated that it made them think about their own mobility behaviour. 48% of the interviewees on the second campaign stated that the message spurs them to make more use of sustainable transport modes.
- Discussions on freight management on city level (M7.2) are still difficult, as new ideas concerning freight distribution in the city centre need time to get accepted.

Key result 3 – Difficult to measure impact transport behaviour

It was clear that the citizens engagement activities promoted the use of sustainable transport modes, but the direct impact on the real usage is difficult to measure. However for some measures an increased use of sustainable transport modes was clearly observed:

- 16% of the interviewees in the Cycle Chic campaign (M4.10) indicated that the activity spurred them to cycle more often.
- The trial offer for car-sharing (M6.2) was a big success and led to an extra yearly growth of 36%, 32% and 30% respectively. Also the poolcard system was enthusiastically welcomed by the companies since the real amount of poolcards outnumbered the expectations seven times.

4.2.2.4. Process evaluation

Driver 1 – Diversified approach

In many measures, the most important driver was a well-diversified approach to all citizens with a personal contact with citizens. In this way citizens can convince citizens and everybody can express opinions directly. Linking activities with day-to-day experiences of citizens makes them more successful.

- The information markets on the redevelopment of the main train station (M2.9) were a good formal instrument as a first means of informing the public, but the emphasis was put on one-way communication and there was not really the opportunity for the citizens to explain their personal situation. Only the most articulate people were heard in this case. Therefore also more personal activities were designed, to reach less articulate people as well.
- In mobility management for companies (M4.2), it was important to give the employees immediately the chance to contribute to the activities in order to keep the activities dynamic and revamped. Therefore, a mobility workgroup was set up to organise the Mobi-weeks, consisting of mobility managers of several companies from different business areas, which made it easier to convince the employers that it is necessary to take action. These employees know best which issues their peers (colleagues) experience and how to motivate their peers to change their mobility behaviour positively.
• In the mobility management for schools measure (M4.3), the first three years have shown that personal guidance is a crucial element in the process. The fourth year was the most successful one, which can be explained by the presence of a very motivated Measure Leader who had good contacts with the schools. It is important that this person has a certain feeling with the school life in Gent. As it were the pupils themselves who had to set up the mobility campaign, it is also clear that they had a big influence on the decision-making and measure implementation. Furthermore, it is easier to involve people when the mobility campaigns focus on a mobility issue by which most of the students are affected. If the pupils couldn’t find a subject for the mobility campaign, the Measure Leader tried to find a concept by focusing on the things they are good at.

• In marketing campaigns (4.10) it is not sufficient to simply provide general information online or on paper in order to change mobility behaviour. After having experienced this in the first campaigns, target groups were redefined and a more personal approach was used. This made it a lot easier to motivate people. The “Our department is moving”-campaign went well. Among the main reasons were probably the facts that the participants are already connected with each other and that they could win a prize with the whole department. This created a certain group pressure which resulted in a successful campaign.

• To show event organisers which tools they can use to reduce the impact of their events (M6.3), it is important for a city to work together with the event organisers in order to estimate the impact of the event on the traffic in the city. Also to reach the visitors themselves it is best to approach them in a personally and not only by making some flyers and a banner.

**Driver 2 – Good cooperation between stakeholders**

Furthermore, a good cooperation between different stakeholders is crucial to reach the citizens in an efficient and well-accepted way.

• In the promotion of walking (M4.7) other departments as the community based planning organisation, and the social services department (representing e.g. handicapped people) are involved. In this way their experiences and knowledge could be used.

• In the redevelopment of the main train station (M2.9), bad cooperation between the measure partners was a barrier: the info point near the station depends on the information which is delivered by the (construction) partners. Certainly in the beginning, the information did not reach the info point on time, and changes that were not always known by the info point led to a lot of complaints by the local residents and to a certain loss of credibility.

• In the workshop on durable spatial planning (M3.3), all property promoters active in Gent were invited. Also representatives of the City Department of Urbanism, the AGSOB (city development company) and the alderman responsible for mobility joined the workshop. Thanks to this workshop, the importance of parking in a commercial context became clear. On the other hand, the developers understand now better the aims of parking policy.

**Driver 3 – Previous experiences with citizen engagement**

Political support for citizen engagement has always been great in Gent. Politicians showed their commitment and supported the dialogue with citizens, creating the necessary trust among citizens that their voices will be heard, and they are more motivated to participate. The long experience of the city of Gent was the guarantee of a high quality of the citizen engagement activities using the best method for each measure and target group. Learning from failures in the past the city made good choices in the approach.

**Barrier 1 – Lack of clear boundaries**

However, when comments are not taken into account, citizens can be disappointed losing their faith in the approach. This was the case in the redevelopment of the main train station area (M2.9), where the citizens only had an advisory role and the info point took their comments into account if these were useful and realistic. In this case it was important to explain clearly the level of participation and the context of the interaction of the citizen: which elements are already decided, which can be changed and why a specific solution is finally chosen.
Barrier 2 – Insufficient transport supply

In some cases, the available transport supply was insufficient to convince people to use more sustainable transport modes:

- Many employees that were participating in the mobility campaigns in companies (M4.2) were interested in using public transport for their home-to-work trips, but the current timetables of the public transport operator and the infrastructure were not adapted to the wishes of the employees.
- Visitors of events and cultural venues (M6.3) were difficult to convince to use public transport because of a lack of public transport in the evening and at night.

This indicates that strong citizen engagement activities can only be successful if they can refer to a good sustainable transport system that can be promoted.

4.2.3. Zagreb

4.2.3.1. Objectives

Although participatory policies and regulations were developed on a national level, the implementation of participation in practice was lagging behind in Zagreb, especially at the local level. Citizens could communicate their initiatives through local committees and city districts to the City administration and Council and also in some more direct ways. The most developed practice was in relation to urban planning. Regarding mobility issues, public participation was mostly limited to experts.

What was also noticed is that citizens as well as civil society and business organizations did not have sufficient knowledge and capacity to be involved in decision-making processes. Also, there was no recognizable venue open to citizens on city level – a place where they could get information, attend presentations of plans, offer their views and comments and take part in discussions on mobility issues. Thus, the ELAN project was a challenge to motivate citizens for active contribution in finding answers to mobility problems and an opportunity to raise the level of participatory culture when dealing with City development and upgrading the quality of life in Zagreb.

The main objectives of the citizen participation in Zagreb were:

- to establish regular informing mechanisms in order to raise citizens’ interest and to enable them to make well-informed decisions related to transport issues,
- to enhance participation of public in decision-making processes on sustainable mobility issues,
- to show that public participation in decision-making processes leads to better solutions for the city.

4.2.3.2. Quality of the activities

Key result 1 – Variety of citizen engagement channels

In all evaluated measures, regular information mechanisms in order to raise citizens' interest and to enable them to make well-informed decisions related to transport issues were established. In general measure 4.11-ZAG supported the citizen engagement activities on measure level, using various communication channels for the CIVITAS ELAN project: CIVITAS ELAN info point, local webpage, e-bulletin info service, Facebook fan page, project brochure, community board meetings, project leaflets, forming and updating mailing list, promotional videos, ZAGREB FORUM, posters, face-to-face information provided by volunteers, gadgets, participation on events organized by other organizations, fares, etc.

In the beginning of the project the media did not recognize mobility issues as an interesting topic. In some newspaper articles the information which was given to the journalists was even drawn out of the context. Therefore, measure results and findings were sometimes wrongly presented. This was later changed thanks to the considerable efforts of the Site Dissemination Manager and other partners. In order to raise the interest of journalists about the project, a mailing list was created with approximately 90 journalists from local and national media (newspapers, radio and TV stations). This increased
media support was highly valuable and productive, because a wide range of stakeholders was informed in this way. Moreover, ELAN gained on the visibility and recognisability among citizens and visitors.

For a lot of measures specific citizen engagement activities were done to involve or to inform the citizen in the best way. Learning also from the experience of the city of Gent the most appropriate approach was chosen:

- The concept of the future intermodal passenger terminal Sava-North and the planned train station in Buzin (M2.5) were presented in several ways: presentations at meetings and round tables, a brochure, a scheme and a 3D model. The constructive suggestions made by citizens prove that they were well aware and informed about the measure activities.
- From the beginning of the production of the study on congestion charging (M3.2), several round tables with experts and public discussions were organized where participants were encouraged to state their comments and suggestions. When the feasibility study was near its completion media interest was raised, by several media appearances and the distribution of a leaflet about the concept of congestion charging to the general public.
- A series of workshops with seniors were organized at senior nursing homes how to safely use PT service, and how to use new ITS systems to improve safety and security (M5.3). Also trainings for bus drivers were organised that included the analysis of senior user needs.
- Business subject in the demonstration zone and delivery companies were provided with information on the measure on freight delivery restrictions (M7.3). In 2009 they were informed about planned activities and the goals of the measure. In 2011 they were informed about activities taken and plans for new regulations of freight delivery and they could give suggestions. In 2012 a panel discussion was organized in order to inform citizens and stakeholders on the final proposal and status of implementation.

**Key result 2 – Addressing all stakeholders**

This variety of activities addressed all stakeholders of the measures: local committees, several city departments, public and private transport companies and taxi operators, the Croatian Automobile Club, civil society organizations, the Zagreb Traffic Police, the Agency for Commercial Business, shopkeepers, delivery companies, seniors, etc. For the freight delivery scheme (M7.3), it was new that also citizens were seen as partners – it was believed that the acceptance of restrictive measures would be higher if public support was present.

The absence of key persons (representatives from the City Traffic and Transport Office and City Traffic Police) in the workshops how to safely use PT service, and how to use new ITS systems to improve safety and security (M5.3) was the exception. They could have been key persons in the discussions which followed after each presentation.

**4.2.3.3. Impact evaluation**

**Key result 1 – Strong public participation**

The objective to enhance the participation of the public in decision-making processes was achieved: especially for the ELAN project in the city there was a stronger participation of citizens in the planning process. For some measure partners it was the first time that citizens were consulted in the design process, encouraged by the moderator to make comments or suggestions and to ask questions. Furthermore, citizens were always welcome to state their opinions about mobility issues at the CIVITAS ELAN info point or via e-mail, post, project webpage and Facebook fan page. This enhanced the participation of the public in the decision-making process.

**Key result 2 – Increased support for citizen engagement by city administration**

The city administration considers citizens now much more than before as experts on their local (mobility) conditions and the ones most interested in improvements. Mobility dialogues organised for inhabitants in nine local committees may lead to the introduction of similar encounters as a regular practice. The City coordination adopted the decision that the practice of communication with citizens on the local committee level should be improved. Through the opening of ZAGREB FORUM at the end of 2011 opportunities were created for a joint dialogue where citizens together with other stakeholders,
representatives of the public administration, the business, academy and civil sector, could discuss problems and needs and contemplate possible solutions, including mobility-related opportunities.

Key result 3 – Increased knowledge of citizens on mobility

Citizens know best which mobility issues are present in their neighbourhood. Of course, sometimes the comments or requirements can be irrational, but most of them present a useful input to project partners and involved stakeholders in specific measure. Several examples within the measures showed also that public participation led to better solutions in the city:

- In the final version of the study on the Sava-North terminal (M2.5) the following suggestions made by citizens were included: a pedestrian overpass over Savska Street, an additional traffic lane for the underground garage, horizontal tactile surfaces for visually impaired persons, location for the additional underground garage close to the terminal.
- Based on public discussions and consultations with experts the following suggestions were included in the study on congestion charging (M3.2): definition of price categories and boundaries of the congestion charging zone, suggestions about where to allocate congestion charging. However, most of the proposals came from stakeholders (e.g. the Croatian Automobile Club) and not from citizens.
- Through discussions with elderly people (M5.3) the need to communicate with specific target groups was recognised and public transport personnel is more aware about specific needs of specific users. In the future, driver trainings will continue to deal with specific user needs and requirements. The discussions with elderly people also led to some smaller concrete activities like adding more handrails in the second production series of new trams.
- Citizens' comments helped to identify some problems with the current freight regulations and several suggestions were included when the new delivery scheme was defined (M7.3). The measure was well accepted by the citizens. However, the acceptance of stakeholders was rather poor as the new and more restrictive delivery scheme which would affect their business activities and the critical mass was not sufficiently created from the beginning of the project. Therefore, the Measure Leader did not have success in convincing the decision-makers to implement the suggestions.
- Encouraged by participation and discussions on traffic in their neighbourhood at the meeting in one of the local committees (M4.11), the representatives of parents' councils of the Primary School, together with the head teacher, organised a school meeting on Children's Traffic Safety several days after the workshop, with participants from the Zagreb City Traffic Office, Precinct and chairpersons of local committee councils. They agreed on a field inspection regarding school children's traffic safety in the area that took place shortly after the meeting.
- The other local committee (M4.11) was motivated to resend the request to the City asking for decent space for operation of the Committee including conditions for meeting citizens.

4.2.3.4. Process evaluation

Driver 1 – Motivation of measure partners

Measure partners became more and more motivated to work on the project and on the setting up of a comprehensive mobility dialogue with the citizen (M4.11) because this approach provided a good opportunity to exchange knowledge and suggestions and to learn how to involve citizens’ into the project. All partners were aware that citizens simply have to be included in the measure activities. This was not always the case prior to ELAN: experts in the field were usually limited to expert solutions and failed to see citizens and other organizations (e.g. civil society organizations) as a part of a solution.

Throughout the whole project several workshops were organised on efficient and effective communication in order to enhance information sharing, joint planning and implementation of activities and citizen engagement planning. Representatives of the local self-government bodies (local committee and city district) were given a method on how to organize a local event engaging citizens.

As a result, the interest from citizens and other stakeholders did grow significantly. Especially seniors were motivated for public discussions (M5.3): they were happy because they were not treated as part of the problem which needs to be somehow solved; instead they were considered as part of a solution. It was observed that citizens’ interest increases further after it became evident that suggestions could be incorporated into the final solution.
Barrier 1 – Lack of experience with citizen engagement

However, when there is too little evidence that their opinion counts, as was perceived in the context of the freight delivery scheme (M7.3), this can be a strong barrier for citizen engagement activities. Despite the efforts to train decision-makers and experts in the field, they still had limited experience in organising encounters between citizens and representative city servants and were not used to listening to the citizens' voice. Doing this was also not considered as one of their mandatory working duties.

4.2.4. Brno

4.2.4.1. Objectives

Before the CIVITAS ELAN project, good practices regarding citizen engagement in Brno were consultation processes related to the planning and construction of infrastructure as well as spatial and traffic planning. Public involvement in this process was facilitated through public debates, public opinion research, working groups, etc. Citizens were in general not used to making their voice heard and to communicate with transport operators and local authorities. For historical reasons, the participatory culture was at its beginning when ELAN started. First attempts to involve citizens into the implementation of a big project were made. These participatory events were mainly mandatory according to the national legislation.

The objectives on citizen engagement were:

- to improve availability and accessibility of information about city mobility, on the basis of citizens’ needs,
- to raise awareness of clean and sustainable modes of transport of which the use has significant impact on bettering environmental conditions,
- to promote use of public transport modes against individual car use,
- to raise awareness of traffic impacts on the quality of life,
- to identify citizens’ needs and demands as well as to incorporate them afterwards into the local decision-making processes.

4.2.4.2. Quality of activities

Key result 1 – Several activities organised

During the citizen engagement activities in the city of Brno great efforts have been made to raise the awareness of both traffic impacts on the quality of life and sustainable modes of transport which has significant impact on improving environmental conditions. Events were organized (M2.7 and M4.13) and also public discussions were organised (M2.7 and M4.13). Presentations were given (M2.7), questionnaires were conducted (M4.12) and leaflets distributed (M4.12 and M4.13). There were information campaigns in newspapers (M2.7 and M4.13) and on the radio (M4.13). Given all these activities it can be presumed that citizens’ awareness with the objectives above will have increased.

Key result 2 – Improved availability of information

The city of Brno recognizes the importance of improving the availability and accessibility of information about city mobility, on the basis of citizens’ needs. Therefore the usage of traditional media in combination with new social media was a good way to inform the citizens about the different measures that Brno was going to implement. These media (website, Facebook, Flickr, You Tube, Integrated Mobility Centre, etc,) will become more important to share information about city mobility.
4.2.4.3. Impact evaluation

Key result 1 – Improved mobility solutions
Several awareness raising and consultation activities that were implemented within the ELAN project tried to improve the opinion on sustainable transport, public transport in particular. CIVITAS ELAN helped to establish the dialogue among all parties concerned which resulted in better solutions:

- Involving the disabled in the measure for the new bus service (M2.7) led to an increased satisfaction of disabled people. But the minibuses can also be used by other citizens and are hence a good economical solution for the problem of the low public transport supply and demand in low population density areas around the city. In this way the decision of the disabled people to preserve the bus service as a regular service (instead of a demand-responsive service) led to a better public transport in the city.

Key result 2 – Increased support for citizen engagement
Furthermore, the ELAN approach in citizen engagement was transferred and used by other departments of the municipality. Also for Brno the ELAN project was not only an opportunity to improve the traffic situation, but also to improve the practice of citizen engagement in planning and implementing measures to improve mobility and to make it more sustainable.

4.2.4.4. Process evaluation

Driver 1 – Involvement of right target groups
One of the main objectives of the city of Brno is identifying citizen’s needs and demands as well as to incorporate them afterwards into the local decision-making processes. The city succeeded in that, for example through involving disabled people in making the decisions about the type and equipment of minibuses and their operation (M2.7). This kind of active involvement was not only the right way to identify the needs of this target group, it was also a good mean to disseminate information and raise interest within the target group.

4.2.5. Porto

4.2.5.1. Objectives
Before the CIVITAS ELAN project, citizen engagement was a weak issue within the public administration. Public participation in Porto is far from rooted. Citizens are not only not used to expressing their opinions, they even reject this. The CIVITAS ELAN project was an important opportunity to involve the citizens and to change a rather traditional indifference towards such processes.

Before ELAN citizens were not consulted for two reasons: firstly, this was an unusual procedure in the city, and also in the country, and secondly, citizens were rather reluctant to give their opinions because they felt that their opinions or suggestions would not be taken into account anyway. However, since the start of the ELAN project this is gradually changing.

The main objectives of the citizen engagement activities in Porto were:
- to satisfy the citizens’ needs for the availability and accessibility of information on public management and investment in transport,
- to increase the interest and public debate on sustainable mobility issues,
- to prove that the public participation in the decision making processes is possible in the Portuguese reality and has clear advantages that allow better solutions for the city.
The public participation process aimed at allowing all citizens and users to participate whenever a decision process was open to public review. The communication and engagement strategy was targeted to a wider audience, to boost the public participation with a positive side-effect in terms of project’s visibility.

4.2.5.1.1. Quality of the activities

Key result 1 – Diversified approach

To satisfy the citizens’ needs for the availability and accessibility of information (the first objective of citizen engagement in Porto), a variety of different channels were used, in order to reach different target groups: information letters, magazines, newsletter, websites, flyers, face-to-face contacts, information panels, Mobility Shop, TV interviews, etc. The main lesson learned was that to reach different target groups, a standard approach is not sufficient:

- Citizens could travel on the light-weight bus (M1.5) free of charges. In this way, a big public could be reached. Yet, a personal approach was used, by direct contact between the crew member in the vehicle and the potential passengers, inviting them to participate and trying to clarify any doubts or questions.
- Surveys by the Mobility Shop (M4.14) indicated that it was better to use face-to-face surveys instead of online surveys. This advice was taken up afterwards in the measure.
- Citizens appeared more interested to gather in their smaller communities to discuss issues of common interest, instead of in a general information session. In this way, local committee representatives and other relevant city representatives can secure the interests of their local base on a higher level.
- To reach the inhabitants of the Asprela area for the survey on the new intermodal interchange (M2.10), the survey was conducted in their households after work hours (6 pm – 8 pm), in order to find people at their homes. Also a flyer was delivered describing the importance of the survey. As a result, citizens were interested and motivated to give their opinion.
- The flyer on the circulation plan (M3.5) that has been distributed provided information on the objectives of the measure and had a cuttable paper and an e-mail address in order to receive people’s opinion about the new circulation plan. However, a big part of the inhabitants were elderly people, which were difficult to reach: it was inconvenient to deliver their response to the Mobility Shop and they were not familiar with communicating by e-mail.
- OPT created an email address for people contact directly the company and share with them their opinion about the mobile mobility service MOVE ME. The email was disseminated and it was a success because people really contribute with more ideas and improvements to the system. The better part of this activity was that people weren’t obligate to collaborate – the contacts made by the final users were on their own initiative.

4.2.5.2. Impact evaluation

Key result 1 – Change in measure design

In a number of cases, the opinion of citizens affected the design of the measure:

- The circulation plan within M3.5 was redesigned after strong opposition of one stakeholder because it has originally been proposal to convert the street which also serves as the funeral route from the church to the cemetery into a one-way street. The circulation plan was adjusted, by increasing the accessibility, giving priority to public transport circulation, better facilities to pedestrians and implementing a cycle lane. After these changes, the public and political acceptance increased significantly.
- The DRT service operation (M6.4) was implemented based on citizen’s opinions that were gathered in a survey. This motivated the measure partners to further continue with citizen engagement.
- Thanks to citizens’ suggestions, new research activities were taken up for additional developments, so MOVE ME service could be available for new platforms (M8.8).
• During the door-to-door questionnaires on the circulation plan (M3.5), it was understood that a large part of the inhabitants in the corridor were elderly people. These questionnaires helped to better understand their worries and concerns and to optimise the planning. After the implementation of the circulation plan face-to-face interviews were conducted in citizens’ households at the end of the working day in order to gather their opinion about the measure implementation and the average score showed that people were satisfied.

Key result 2 – Information rather than communication
This showed that public participation in the decision making processes is possible in the Portuguese reality and has clear advantages that allow better solutions for the city, which was also one of the objectives. However, some activities focused rather on providing information to the citizens, instead of allowing the citizens to actually contribute to the solution:
• In the design of the light-weight bus (M1.5), the main objective was to reduce the weight of the bus which was considered too technical-oriented to involve citizens in the decision-making process. Therefore, citizens were only engaged at the start of the operation phase. At this stage, it was too late to improve the service based on citizens’ suggestions, but nevertheless the interviewed people were very satisfied with the measure.
• Only general information was provided about the new intermodal interchange (M2.10) and the ELAN project, but the different design proposals for the transport interchange weren’t presented to citizens at all. Citizens were asked about what should be included in a transport interchange. The contributions given by citizens were in agreement with the infrastructures considered in technical specifications by measure partners for the interface. They confirmed the needs, but nothing new was suggested.

Key result 3 – Increase in awareness on sustainable mobility
In general the public interest in sustainable mobility issues increased, which was one of the objectives of citizen engagement. For example the awareness and public trust in the Mobility Shop (M4.14) is still increasing together with the number of visitors.

Key result 4 – Improved participation not always achieved
Looking back on the four years of ELAN in Porto citizens were engaged successfully in some measures while in other measures citizen engagement had no impact at all. In several cases, citizens were not prepared and not very open to participate in discussions and decisions related to sustainable mobility and the city administration has learned that to involve the citizens it is necessary to meet them personally, otherwise it is difficult to get their feedback.
Although many efforts to get citizens involved were undertaken within the ELAN project, it seems that many citizens are not yet convinced that they can be part of the decision-making process. On the other hand, it must be said that the impact on political support remained limited: the continuation of the Mobility Shop (4.14) and the Demand Responsive Service (6.4) is threatened after the project ends. Further political support and more successful citizen engagement practices are needed to convince citizens of the benefits of participatory processes.

4.2.5.3. Process evaluation

Driver 1 – Cooperation between partners and stakeholders
The most important driver was the good cooperation between the local partners and the involvement of all stakeholders:
• A constructive partnership on project level, strong and clear leadership, highly motivated key measure persons had a positive impact on the implementation of the Mobility Shop (M4.14) and the Flexible Mobility Agency (M6.4), and on the citizen engagement activities in particular. Regular meetings with the partners show that everybody is aware of the fact that good and open communication is essential for the project.
The participatory planning of the new intermodal interchange (M2.10) focused on a strong involvement of all relevant stakeholders, like all transport operators, the metropolitan authorities and big institutions in the area like Hospital S. João; only the users association weren’t involved. The involvement of all the important stakeholders is an effective step forward in reaching more effective solutions and integrated transport services. Local institutions displayed also an enthusiastic attitude from the beginning of the project, showing their commitment and interest in the achieved solution.

Barrier 1 – Administrative delays
In order to successfully plan citizen engagement activities, sufficient political support of the municipality proved to be crucial:

- The timing of the citizen engagement activities depended on the information and approval of the project partners: the approval by the municipality caused sometimes serious delays e.g. for the new intermodal interchange (M2.10) and the Mobility Shop (4.14).

Barrier 2 – Lack of experience with citizen engagement
In the Municipality of Porto, citizen engagement is still not a common practice. Citizen Engagement activities remain a delicate subject because it interferes with the image of who is promoting the activity.
4.3. Quality of citizen engagement activities (on project level)

This section brings together the most important findings related to the quality of the citizen engagement activities that have been implemented on measure and on city level.

The evaluation of the quality of the citizen engagement activities led to the main conclusion that there isn’t one ideal or fit-to-all approach to involve citizens. In all cities it became clear that a good quality activity can only be put in place if there is a well-chosen variety of approaches in relation to different types of measures, level of participation (informing, obtaining information, consulting or co-deciding) and the range of target groups (citizens, shopkeepers, bus drivers, etc.), as defined in the Citizen Engagement Action Plans of each city.

A number of recommendations for implementing citizen engagement activities can be formulated:

- Citizens are more willing to get involved when they are acquainted with a concrete engagement plan, which includes objectives, issues for discussion, timing of consultations, and explanations of how their proposals will be considered.
- Citizen participation is most effective when stakeholders and citizens are asked to contribute in identifying needs and problems in discussions and deliberations on various possible solutions, and when they can provide local information and knowledge.
- Citizens need to be provided with all information on the topic that is necessary to formulate a well-considered opinion.
- An early start followed by continuous communication with citizens and stakeholders is crucial for the success of a consultation process.
- Providing feedback to citizens on how their opinion had been taken into account and informing them on the final decision or design of the measure is crucial to prevent that citizens feel neglected and to keep them motivated for further involvement.
- Most detailed information is obtained by using a personal approach.
- Experiments with social media have shown that using this tool can be very fruitful, especially in reaching young people who are too busy to engage in other activities like workshops and focus groups.
- Surveys prove to be the most efficient when using the combination of face-to-face and online methods. Sometimes a personalised approach was needed, while in other cases a generalised approach was more suitable, especially if the aim was to reach a broader public.
- Ensure representativeness of all key stakeholder groups to include different views in the discussion.
- To encourage citizens to share their opinion the right incentives can help significantly. On the other hand, when citizens feel that sharing their opinion can change something in the city in their own interest; this can be seen as an incentive itself.
- It is helpful to find people in important moments of their lives, e.g. birth, marriage, divorce, new job or when moving, etc. as they are more open for changes at such moments.
4.4. Impact of citizen engagement activities (on project level)

4.4.1. Impact on the planning and design of measures based on the identification of problems/needs

Consultation with stakeholders and the public in the scope of CIVITAS ELAN measures resulted in a set of gathered information, data, opinions and suggestions concerning citizen’s daily travelling habits and needs as well as their perception of the problems and barriers in the mobility field. In many ELAN measures citizens had an opportunity to test new technical solutions and services. Many citizens proposed practical solutions or commented on the proposed ones.

This feedback was carefully studied by the measure experts and included in the further process of planning and measure implementation. Stakeholders’/public opinions were thus added to the technical background and had an indirect impact on final decisions and solutions:

- At a dialogue café (M2.9-GEN), the Gent City Council asked the people from the neighbourhood of the central train station to decide whether a new tunnel under the train tracks should be open to traffic or not. Most participants were afraid that opening a new connection would attract a lot of traffic destined for the city centre, which would mean an extra burden on this residential neighbourhood. For this reason it was decided that motorised traffic was excluded from this tunnel.

- A survey among Asprela students in Porto enabled the transport operator to choose the best route and operating times of the DRT service (M6.4-OPO) and to make it a valuable option for students travelling between the city centre and the Asprela quarter.

- After consulting the shopkeepers and delivery companies in Gent (M7.3-GEN), the most important issue in freight delivery was the lack of loading spaces, and their abuse. For this reason the pilot project was set up for a new type of loading spaces. Shopkeepers got the chance to participate in the decision making for the best location of these loading spaces. In the final version of the study on the Sava-North terminal (M2.5-ZAG) the following suggestions made by citizens were included: a pedestrian overpass over Savska Street, an additional traffic lane for the underground garage, horizontal tactile surfaces for visually impaired persons, location for the additional underground garage close to the terminal.

- Local residents indicated where a car sharing station would be popular (M6.2-GEN). The suggested places for a car sharing station were taken into account and researched. Based on this cambio already start four new car sharing stations.

- Input from mentors and parents at schools lead to the change of design of a pedestrian crossing and the upgrading of the web portal with new information about the traffic situation and the location of dangerous points near schools (M5.4).

An important remark that needs to be made is that it is important to determine from the beginning to which extent changes are possible: Are only changes in the details of the measure allowed, or can the whole measure concept be influenced?

4.4.2. Impact on the acceptance and use of the measures

Mobility policies, plans and measures, formed in a participatory manner and including people’s needs, values and opinions, are of greater quality and have greater legitimacy.

Many measures were positively accepted by the public. Although it is not always easy to determine whether this was the direct impact of the citizen engagement activities, some positive results are evident:
• User numbers of the bicycle route planner (M8.10-GEN) increased significantly after promotional campaigns.
• Mobility management for companies (M4.2-GEN & M4.4-ZAG) led to a remarkable shift in the modes of transport used.
• Involving the disabled in the new bus service (M2.7) led to an increased satisfaction of disabled people.
• The trial offer for car-sharing (M6.2-GEN) was a big success and led to an extra yearly growth of 36%, 32% and 30% respectively.
• Citizens' comments helped to identify some problems with the current freight regulations and several suggestions were included when the new delivery scheme was defined (M7.3-ZAG). The measure was well accepted by the citizens.

4.4.3. Impact on the awareness of sustainable mobility

A common impact of public involvement was raised awareness, namely on problems of urban transport, how to solve them and on the specific solutions brought by the project’s measures:
• The CIVITAS ELAN Open Academy (M4.9-LJU) that was organised in Ljubljana in the context of the Sustainable Urban Transport Plan had some positive results. Participants now seem more interested in topics relating to sustainable mobility than before. According to the feedback, they are also more aware of the CIVITAS ELAN project. Also the media recognised the importance of the topic as many of the events were reported.
• the awareness and public trust in the Mobility Shops (e.g. M4.14-OPO) is still increasing together with the number of visitors.
• Nearly all companies that were contacted for mobility management (M4.2-GEN) now have a company mobility plan, mostly set up in the framework of the ELAN project.
• The increase in the number of participants at cycling events (M4.6-LJU) and increased media coverage of sustainable transport planning (M4.9-LJU) are clear indications of an increased awareness and knowledge of citizens in Ljubljana.

4.4.4. Impact on openness towards citizens

The effects of the citizen engagement activities in the CIVITAS ELAN project improved the participatory culture in all cities considerably. Many examples of good practice and mainly positive effects have contributed to a stronger belief in the usefulness of citizen engagement by the involved technicians and other specialists, as well as the decision makers. In many cases, mutual trust between various stakeholders, the public administration and experts significantly increased:
• In Zagreb many participants of the consultation events that took part during the course of the CIVITAS ELAN project expressed their great appreciation of such participatory approaches, and asked ELAN partners to strongly recommend city authorities to continue and even improve the participation of citizens, not only with regard to mobility but in all areas of public matters. Engaging the elderly was not a common practice but the situation completely changed due to ELAN.
• In Ljubljana politicians who were rather reserved towards citizen participation in the past, started to realize that they can't ignore the opinion of stakeholders and citizens any longer.
• In Brno the director of the city transport department became supportive of direct contacts with the target groups of measures. Furthermore, the ELAN approach in citizen engagement was transferred and used by other departments of the municipality.
• In Porto before ELAN politicians were not involved in citizen engagement activities but due to ELAN the involvement of citizens in decision-making processes will most likely increase.
• In Gent a strong participatory culture already existed.
4.5. Process evaluation of citizen engagement activities (on project level)

This section brings together the most important barriers and drivers that have been perceived on measure and city level.

4.5.1. Drivers for citizen engagement

The most important drivers were a good cooperation between the local partners and the involvement of all stakeholders: the successful implementation of citizen engagement activities was possible thanks to a constructive partnership on project level, strong and clear leadership and highly motivated key measure persons. Regular meetings with the partners showed that everybody was aware of the fact that good and open communication was essential for the project.

Furthermore, the interest of the citizens in the topic was one of the key success factors to citizen engagement. To encourage citizens to participate, it was very helpful to have a good knowledge about the characteristics and interests of stakeholders and citizens' groups. It was observed that citizens' interest increased further after it became evident that suggestions could be incorporated into the final solution.

Professional support for the Measure Leaders proved to be helpful in planning and implementing citizen engagement activities. Throughout the whole project several workshops were organised on efficient and effective communication in order to enhance information sharing, joined planning and implementation of activities and citizen engagement planning. Representatives of the local self-government bodies (local committee and city district) were given a method on how to organize a local event engaging citizens.

4.5.2. Barriers for citizen engagement

The most important barrier was the lack of experience with citizen engagement at the start of the project. In all cities except in Gent there were no previous good practices on public participation in mobility; policies and measures were developed and accepted in the expert and political circles.

This made it difficult for many Measure Leaders to plan and implement citizen engagement measures. Through partners' consultations and trainings this barrier was overcome.

Also on the political level, this lack of experience was obstructing the implementation of citizen engagement activities: it was often difficult to convince politicians to publicly declare their support for citizen involvement and to take a more active role in engagement activities. In some cases, for the citizen engagement activities NGOs were engaged to overcome the lack of political support on the city level. One of the reasons for the successful involvement of citizens and stakeholder in Gent and in Brno was that ELAN partners had full support for the implemented citizen engagement activities from the political level.

But also citizens were not used to being asked and to express their opinions, and therefore are not convinced that participating will have any effect and that their proposals will have any influence. In such cases it will take time and a lot of repeated attempts to establish greater mutual trust.
Another barrier was that the subject of the consultation is not in the citizens’ focus. In general it was
easier to engage people who were already interested in the measure and are convinced of sustainable
mobility. Car drivers and commuters are more difficult to reach. Another case is that citizens fear that
the measure will bring limitations to their lives; in this case it was necessary that citizens were
provided with alternative solutions.
5. PROJECT LEVEL EVALUATION OUTPUTS

This chapter brings together on project level the findings of the measure level evaluation to come to significant comparative interpretations for the different type of measures implemented within the ELAN project in the framework of the CIVITAS programme.

Since this type of findings is one of the key objectives of the CIVITAS programme, CIVITAS ELAN introduced an additional concept for this. As explained in chapter 2 of this report, Common Measures were a structural part of the CIVITAS ELAN approach to work together on the following specific themes:

- Energy management for public fleets,
- Participatory intermodal infrastructure planning,
- Comprehensive safety and security strategies,
- Integrated freight policy development.

Conclusions on these themes were based on the evaluation results of related measures to this themes and an in-depth exchange of experiences between the CIVITAS ELAN cities. These conclusions were reported in Working Documents related to these Common Measures. Here this info is restructured and also combined with the Impact and Process Evaluation of the related measures.

Additionally the results of the process evaluation of the cooperation in the common measures are reported.

In a second part of this chapter CIVITAS ELAN summarizes the findings of the measures around the 8 CIVITAS policy fields:

- Alternative fuels and clean energy efficient vehicles
- Collective passenger transport services & intermodal integration
- Demand management
- Influencing travel behaviour
- Safe and secure mobility
- Innovative mobility services
- Freight logistics and goods distribution
- Transport telematics

For some policy fields the findings for the Common Measures will provide an additional input for the conclusions. For all policy fields the findings of the implemented measures within the respective policy field will be structured in relation to the context of implementation, the target groups and the impact observed. Also the possible and desired links with measures of other policy fields will be highlighted.

As part of the discussion of some policy fields also a few interesting specific topics are discussed as it became clear during the implementation of the measures in the different CIVITAS ELAN cities, that a more detailed insight view and a discussion on the “Why” and “How” of success and failure and even more technical details would be interesting for other cities.

5.1. ELAN Common measures

In order to exchange knowledge and to foster take-up of good practice, CIVITAS ELAN defined 4 so called “Common measures”. These cover topics that were relevant and challenging at the same time for partner cities, namely clean vehicles in public fleets, stakeholder involvement in large infrastructure projects, safety & security and freight management. This way, the common measures served as a platform for mutual inspiration, learning and exchange while implementation mostly took place in other measures (within or outside CIVITAS ELAN).
At the start of the project, small groups with representatives from each city were formed for each common measure. They arranged workshops to share experiences among each other and with cities outside the project, organised surveys in order to compare the situation in the different ELAN cities and established close contact via regular meetings and telephone conferences.

As most common measures focus on the exchange of knowledge, the impact of the measures will be only visible after applying this knowledge on the field. The impact of the related measures that have been implemented, are reported in the conclusions of the related work package, to avoid overlap between these two chapters.

The evaluation of the common measures will therefore focus on the lessons learned by the exchange of information on the common measure during the workshops on this topic, referring – where relevant – to findings in the related measures. Also process evaluation results on the cooperation between the different partners are summarised.

5.1.1. Energy management for public fleets (1.1-COM)

5.1.1.1. Description & related measures

Clean and efficient vehicles were a central part of the CIVITAS demonstrations. But all cities shared the opinion that just replacing some standard vehicles by clean ones is not enough to come to a radical new approach having a major impact on the total energy use of the fleets of the city councils. This measure was geared towards the energy management of the fleets by the means of a joint action working together on the best strategies in this context with the following specific objectives:

- To introduce clean fleet vehicles and sustainable fleet management for city administration and public operators in support of local air quality objectives within each of the CIVITAS ELAN cities;
- To follow the most recent developments on the theme of biofuels and to spread this information to the ELAN partners;
- To increase the efficient use of a fleet;
- To come to the most energy friendly driving behaviour;
- To reduce emissions of, and human exposure to air pollution.

Through energy management of public fleets, the city councils set an example for sustainable fleet use to the citizens.

All CIVITAS ELAN cities appointed a dedicated energy manager. This person’s task was to establish an overview on the energy consumption of the municipal and city fleets to be considered and a matrix for assessing them.

The five ELAN cities collected data on their fleet. The plan was to compare the data, but this was changed to focusing on solutions and recommendations on how to proceed in the future and make the fleets cleaner in a low-cost way, as the financial crisis does not allow cities to renew their complete car fleets at once.

To bring all experience and knowledge together a number of internal workshops were organised with experts of the different cities:

- 22-23 April 2009, Zagreb: internal workshop on biofuels
- 19-20 November 2009, Gent: internal workshop on city fleet management
- 17 June 2010, Brno: intermediate session with all city fleet managers
- 21 January 2011, Zagreb: second internal workshop on city fleet management

Also a learning history session on clean vehicles was organised on 8 March 2010.

The results of the data analysis and the workshop were used to draw recommendations on how to further improve the energy efficiency of the fleets analysed throughout CIVITAS ELAN. These recommendations were put together in a joint action plan (1.1-WD2).
The work carried out under this measure integrated also the other developments and implementations of other measures of WP1:

- M1.2-GEN: Energy efficient city fleet management
- M1.12-LJU: Green procurement for public fleets.

In several cities efforts were done to increase the cleanliness of the (semi) public transport fleets as well:

- M1.9-GEN: Semi-public clean car fleet
- M1.10-GEN: introduction of hybrid vehicles
- M1.13-GEN: Clean public transport strategies
- M1.14-ZAG: Clean public transport strategies (CNG, biofuel & emission)
- M1.15-ZAG: Clean public fleet strategies (waste collection vehicles)

Ljubljana

In Ljubljana, 6 hybrid vehicles and 45 public bicycles were introduced in the city fleet. Also, 35 employees took part in an ecodriving training course. Furthermore, the PT company LPP introduced 5 hydraulic hybrid type buses and 20 CNG type buses in its fleet.

Gent

In general, a sustainable acquisition policy was introduced for the vehicle fleet of the city of Gent, the PT company De Lijn and the car-sharing company cambio. As a result, 14 electric vehicles and 1 hybrid truck were introduced in the car fleet of the city administration and 45 existing vehicles were removed from the fleet, as they were not used frequently. The fleet also received regular technical follow-up, such as tyre pressure checks. The employees itself were targeted as well by stimulating cycling and car-sharing for business trips, and ecodriving trainings (54 car drivers).

The PT company De Lijn introduced 20 hybrid buses in its fleet and improved the energy efficiency of its trams after an energy audit by improving the heating system.

The car sharing company cambio introduced 4 electric vehicles and Max Mobiel 3 CNG vans and 1 electric vehicle. Max Mobiel also convinced the subcontractor V-Tax (taxi service) to increase the cleanliness of their fleet by integrating LPG shuttle buses.

Zagreb

The city administration of Zagreb removed 87 low mileage vehicles from its fleet. In cooperation with another project (ECOWILL), 100 employees of the city administration, 300 PT bus drivers and 100 drivers of subsidiaries of the waste disposal company took part in an ecodriving training course. The waste disposal company introduced 50 new waste disposal vehicles and 2 pick-up cars on biodiesel in their fleet, the PT company introduced 100 biodiesel and 60 CNG buses.

Brno

During the CIVITAS project the PT operator DPMB continued replacing old buses with engines emission EURO 0 and EURO 1 by buses with EURO 5 engines. DPMB also introduced 5 low floor minibuses for wheelchairs (ELAN measure BRN 2.7.), which replaced old standard buses with high fuel consumption and high pollution. DPMB is also operating 150 trolleybuses, which produce zero emissions.

Porto

Due to the financial crisis in Porto, the city administration of Porto removed 111 low mileage vehicles from its fleet.
5.1.1.2. Evaluation approach
As the aim of this common measure was to exchange information rather than actually implement measures, the focus was on process evaluation. This resulted in findings on the common barriers and drivers that were experienced in the implementation of measures related to this common working field. The impact evaluation of the related measures is reported in chapter 3, and summarised in the conclusions on work package 1. Also the cooperation between the measure partners of the common measure was evaluated by an online survey.

5.1.1.3. Process evaluation of related measures
Barrier 1 – Expensive technology
Most cities are currently suffering budget issues, implying that new investments in the optimisation of the city fleets is not so easy at this time. But new technologies were more expensive than foreseen and many costs or problems are still not known. There are two main costs: fuel costs and maintenance costs. Fuel costs are fairly easy to estimate and will be in line with what suppliers predict, but the maintenance costs are harder to estimate as there is no data available for this new type of vehicle.

Barrier 2 – Unavailable technology and infrastructure
In Ljubljana the problem arose that the functional specifications were defined based on the understanding that the hybrid technology would be fully available by now. This is however still not the case: there are still only two suppliers for hybrid buses in Europe. Furthermore, the implementation of new technologies needs to be complementary with the existing transport system, which was not always the case. The limited availability of CNG filling stations and electricity charging stations in Belgium made extra efforts and budget necessary to install a CNG station and electricity charging station in Gent.

Driver 1 – Regulation and funding schemes
Regulation regarding maximum fuel consumption and environmental impact are motivating the PT operator to purchase the clean vehicles. Especially the homologation of these new vehicles, decided on national level, can influence the implementation process. Also the expected benefits of new technologies motivate partners to work on the measure.

5.1.1.4. Process evaluation of cooperation in the common measure
Barrier 1 – Lack of data
It proved to be difficult to compare the data from all the different cities, as not all data are available in all countries. This was due to several reasons: lack of information (administrative gathering of correct information), changes in Measure Leaders, etc. All five cities encountered problems finding the exact ecoscore for older and as well more recent vehicles, as this is not compulsory for vehicles sold on the European market. Therefore, using the ecoscore as an evaluation tool for all fleets was not feasible.

Barrier 2 – Irregular meetings
Personal meetings were difficult to organise between people from different cities. Personal meetings are however necessary for smooth cooperation and to discuss problems.

Driver 1 – Willingness to provide information
All involved people in the cities clearly were willing to provide the necessary information and to change things in their cities. An example of exchange of information between the cities is that Ljubljana shared its experience with Porto on the problems they encountered with the paraffinization of the fuel at low temperatures during the MOBILIS project.

Driver 2 – Workshop on biofuel
The workshop on biofuel provided several technicians in the field with a general (technical, ethical and political) background on the biofuel issue. It was a chance for technicians, mostly working for public transport companies, to share concrete information about their own experiences and it was above all a chance for each participant to learn something from each other’s positive and negative experiences.

**Driver 3 – Exchange of information between cities**

The cooperation between partners of the different cities was experienced as very useful to gain knowledge on similar measures and ideas for new implementations (e.g. car sharing).

### 5.1.1.5. Lessons learned

**Lesson 1 – Need for a common scoring method**

To evaluate the environmental friendliness of fleets in different EU countries, a common indicator would be useful. This could be then integrated in the acquisition policy as a basis for comparison and common policy towards clean, energy efficient fleet management. The ecoscore could be used for this, as it provides a well-to-wheel analysis and as impacts on greenhouse gas effect, air quality and noise are included.

**Lesson 2 – Different approaches to reduce energy consumption**

Several measures can be used to reduce the energy consumption of the city fleet (1.1-WD1):

- Efficient use of the fleet: optimising the use of the fleet by reducing the number of cars and introducing car sharing systems in the fleet, optimising maintenance of the fleet (reduce fuel use by checking tyre pressure), etc.
- Introduction of innovative vehicle technologies within the fleet (biodiesel, electric cars, CNG vehicles, etc.).
- Ecodriving leads to a reduction in fuel consumption, greenhouse gas emissions and accident/incident rates.
- Mobility management for fleet: prevent as much as possible service movements by car in the city administrations (centralisation of city departments, encourage/oblige the use of alternatives for car as use of bike or PT, abrogate “personal” service cars, etc.)

**Lesson 3 – City fleet management tool**

The fleet use of a city or organisation can be managed by an online tool that allows the fleet manager to have an overview of the car reservations. The existing databases containing information about maintenance, accidents, bookkeeping, insurance, registration, taxes, etc. could be incorporated in the new system so that in the future all information would be centralised. This system could also be used to effectively and orderly manage the city fleet:

- Organise maintenance activities
- Encourage other modes (cycling, car sharing) for short distances
- Remove low mileage vehicles from the fleet
- Decide on different vehicles types according to use (hybrid or electric for short distances, CNG or biofuel for longer distances)
- Decide on ecodriving lessons

### 5.1.2. Participatory intermodal infrastructure planning (2.8-COM)

**5.1.2.1. Description & related measures**

The aim of this common measure was the creation of sustainable intermodal integration by including all sectors of civil society in urban intermodal infrastructure planning.

Thus specific objectives in this respect were:
• To create a platform for discussion and exchange of the knowledge and experience in the field of public transport, building integrated public transport systems and systems of multimodal interchanges in the cities through cooperation between urban planning and transport planning;
• To improve the possibilities for cooperation among European cities, to show the various approaches in building of multimodal interchanges, with different roles of particular means of transportation;
• To show the roles of the railway, urban transport (trams, trolleybuses and buses) and regional buses in the system of multimodal interchanges;
• To present the best practices of the systems of multimodal interchanges and integrated public transport in cities and their agglomerations;
• To present the ideas of how to support sustainable urban transport, how to improve the quality of PT and how to increase the number of passengers.

An expert group was established, involving experts from each of the CIVITAS ELAN cities. The expert group organised targeted training workshops and conferences and discussions for technicians, architects, transport operators and city administrations. The activities, meetings and workshops focused inter alia on the following topics:

• The role of urban planning in the process of building the multimodal interchange
• Multimodal interchange and the organisation of transport
• Multimodal interchange and railway
• Multimodal interchange and urban mass transport
• Multimodal interchange and cycling and walking
• The role of the public in multimodal interchange
• The possibility of developing the area in the surroundings due to the existence of the intermodal interchange

Within this measure two workshops were held:
• 15 January 2009, Brno: establishment of a network between interested specialists and presentation of intermodal infrastructure projects from different ELAN cities

In addition, the CIVITAS ELAN cities exploited the discussions and experience gained in two learning history sessions on integrated planning to exchange information. The following CIVITAS measures helped gaining experience in the field of intermodal exchange points:

• M2.1-LJU: Integrated high-quality mobility corridor
• M2.5-ZAG: Intermodal high-quality mobility corridor
• M2.9-GEN: Participatory redevelopment of main train station area
• M2.10-OPO: Participatory planning for new intermodal interchange

**Brno**

One of the biggest transportation projects in the city of Brno and in the entire South Moravia region is a re-development of the railway junction in the city of Brno, called project EUROPOINT. This project consists of the development of a new urban area in the southern part of the centre of the city and the reconstruction of the railway infrastructure within the city area.

11 km of the railway tracks will be reconstructed in the city area. Also a new hold yard is in function since May 2010.

Four new intermodal interchanges will be built. The biggest of these proposed interchanges will be the new passenger’s railway station. This railway station is designed as a crossroad and transition point with international importance and also as important transition point for regional and public transport in Brno. Therefore the quality and the time necessary for changing between different modes were the most important conditions during the preparation of the project. In front of the passenger’s railway station a new interchange of the public transport will be built. The tram lines will be brought to this
The new passenger’s railway station is designed as a bridge structure; the area under the new station will be used as terminal for the regional buses. This solution was designed to enable intermodal change on international, regional and city level.

The three other intermodal interchanges are important for the public transport in the city and in the region. The new railway stations will be built on the different railway lines, which are entering the city from the east, south and north. As part of the new railway stations terminals for public transport will be built as well.

**Gent**

In Gent, the entire area around the main train station Gent-Sint-Pieters is being redeveloped. This area includes a part of the ELAN corridor. Works already started in 2006 and the entire project will be finished in 2020. It will have a massive impact on the area in terms of noise and dust nuisance, traffic rerouting and accessibility. In order to get public support for the projects the main stakeholders invested in an extended project communication policy. Some of the innovative communication methods are:

- Participative communication policy, for example reduced hindrance meetings on a two weekly basis, organisation of visits to the construction works, information market aimed at local residents, shopkeepers, retailers, etc.
- Permanent information point
- Digital 3D scale model

**Ljubljana**

Part of the implementation of the high quality mobility North-South corridor through the city centre (M2.1-LJU) was the implementation of a Park-and-Ride (P+R) service at each end of the corridor. However, the southern P+R was not constructed because of the national spatial planning requirements regarding the flood protection of the designated area.

**Porto**

The construction of Porto’s future North Transport multi-modal interchange in the highly congested area of Asprela is an essential development already recognised in the Porto General Development Plan (PDM). The construction phase is out of the range of CIVITAS ELAN. A preliminary study on the future construction the transport interchange was conducted in measure 2.10-OPO.

The planning and preparation works focus on researching relevant information, requirements on transport interchange design and participatory planning involving all stakeholders. The requirements expressed by the stakeholders have a strong emphasis on clean urban transport which had not been sufficiently considered in these studies up to now. 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 states the importance of the economic viability of the project, which is an aspect many times neglected in the previous similar projects in Portugal.

As a result, the conceptual design was developed for the implementation of this infrastructure within the study corridor (M2.10-WD2). This document contains the architecture design for the transport interchange and its description. Furthermore, also a business model was developed. This document is a compilation of the technical, economic, social and industrial requirements for the transport interchange (location, areas, number of public transport stops, services to include, etc.) for the current supply and demand at the interchange. It also includes the economic viability plan for the investment and operation/management.

**Zagreb**

In Zagreb, a high-quality mobility corridor (M2.5-ZAG) was planned stretching from the historic city centre in the northern part of the city towards and across the Sava River, where public transport, cycling lanes and pedestrians have priority over individual motorized traffic. The original objectives in the description of work were to improve quality, accessibility and attractiveness of PT, to include the
Croatian Railways into the PT system, to increase the number of passengers in PT, to decrease the number of cars going towards the city centre (change of modal split) and to enable shorter duration of journeys.

The original plan included the construction of the new intermodal interchange and railway station in the ELAN corridor. Due to financial and time constraints, during the project the focus was rather on a traffic and design study of the intermodal terminal SAVA-NORTH (intermodal PT terminal), and two smaller studies on the introduction of railway stations into the traffic system (i.e. Remetinec and Buzin train stations).

Also a communication scheme towards the general public was developed to collect their opinions and suggestions as well as to disseminate information about the measure.

5.1.2.2. Evaluation approach

In all cities a survey was carried out on the awareness and satisfaction of urban residents on intermodal transport, which were compared afterwards. Besides this, findings on the implementation process of intermodal interchange points were exchanged between measure partners and reported here. The cooperation between the various partners of the common measure was evaluated by an online questionnaire.

5.1.2.3. Process evaluation of related measures

Barrier 1 – Lack of integrated transport planning with clear objectives and overall timing

Without common objectives the differences between stakeholders are causing an important barrier for the implementation of intermodal interchanges. In Zagreb, the city administration and Croatian Railways had their own priorities and finances (M2.5-ZAG). The development of the study on the intermodal interchange (M2.10-OPO) took more time than planned due to conflicting opinions of technicians and politicians.

Barrier 2 – Lack of communication or cooperation between measure partners

It is important to establish good communication between the different partners of such large projects. (project management, consultancies, PT operators, etc.). This was not always established since the beginning, so resulted in delays and change of plans. In Gent, the communication between the construction partners and the info point (M2.9-GEN) did not always go well in the beginning. It happened that the construction partners did change the timing, for example due to bad weather or a late delivery. These changes were not always known by the info point which led to a lot of complaints by the local residents and to a certain loss of credibility. The location selected for the intermodal point in Porto (M2.10-OPO) was not accepted by the University of Porto, who owned the land. Therefore a new location needed to be found and this study took more time than planned due to the complexity of the problem and the high number of stakeholders and constraints.

Barrier 3 – Lengthy administrative processes

Procedures to make changes (to area or streets) often are very time consuming and complicated. Also obtaining the necessary building permits caused delays in building intermodal points. The long process of adopting spatial planning documents/permissions slowed down the planning and implementation process of the corridor in Ljubljana (M2.1-LJU).

Barrier 4 – Financial dependency

Especially for large-scale infrastructure measures as in this work package, the available financial resources have a large impact. The City of Ljubljana had only limited funding for the purchase of the land for the P+R (M2.1-LJU); still no consensus with the land owners has been achieved, which slowed down the process a lot. In Zagreb, it turned out during the project that an intermodal terminal (M2.5-ZAG) would be a too big investment for the local authorities and due to the economic situation and the crisis, all railway infrastructure investment projects were delayed. For this reason the construction of the terminal was replaced by a study of the potential impacts. The financial crisis in Porto affected the available budgets of the city administration and the transport companies. This
implies that the funding of the tunnel for the interface of the transport interchange is not assured (M2.10-OPO).

**Driver 1 – Support of media and decision makers for changes in transport culture and policy**

The information market on the redevelopment of the main train station in Gent (M2.9-GEN) could be organised in a school that supported the project. The info point got also the full support of the city of Gent, and the different citizen engagement activities attracted a lot of interested stakeholders. The main partners and stakeholders showed interest and proactive behaviour regarding the development of the exchange point (M2.10-OPO).

**Driver 2 - Useful input from stakeholders**

The research conducted by students of the University of Gent on the redevelopment of the train station area (M2.9-GEN), resulted in a lot of useful information, e.g. to determine on which topics the info point had to focus more. This research concluded with some suggestions to improve the communication strategy of the project Gent-Sint-Pieters and De Lijn as e.g. improving the websites.

**Driver 3 – Problem awareness**

Measure partners were motivated to implement the measures because they were aware that the projects help reducing congestion and increasing passenger satisfaction.

### 5.1.2.4. Process evaluation of cooperation in the common measure

**Barrier 1 – Lack of clear goal of common measure**

At the beginning the objective of the common measure was not entirely clear for all measure partners, and the focus was on technical issues. Later in the project, the content evolved more towards exchange of experience regarding participatory approaches.

**Driver 1 – Workshops**

Workshops are very useful to get an overview what is going on in other cities and transfer good practices, also concerning citizen involvement. Although each city has its specific background and starting point, it is useful to learn from cities in a similar situation as well as from the cities which are more advanced. Nevertheless, it remains important to adapt the strategies to the local context.

### 5.1.2.5. Lessons learned

**Lesson 1 – Consult citizens and gain interest**

It is important to consult your citizens on the draft plans of your project. This can be an important barrier (when not done or done wrongly) or driver (when done in a good way and in time) for the rest of the implementation process of your measure. The best way to consult your citizens is to be honest to them from the beginning. Also engineers can make mistakes in their plans. When citizens notice this on time, it can be changed. Public interest should be gained from the very beginning and gradually, especially for controversial topics. It is important to stress ‘what’s in it for them’ by presenting accurate and clear information on the project.

**Lesson 2 – Harmonizing the objectives between different stakeholders**

In this type of measures, many different stakeholders are involved. For a good participation between them, it is important to include them from the beginning of the project and to harmonise objectives. Also agreements on the financing and planning aspects of the measure should be made as early as possible. The relations between all stakeholders that were developed in the project can be useful as well for other projects in the future.

**Lesson 3 – Involve decision makers in the planning and design phase**

The Measure Leader in many cases had no real decision power over the measure. In order to ensure the implementation, the measures should be fitted in the local municipality policy. Within a long-term
framework political support for the measure/ project must be clear and defined in advance. The involvement of technicians of transport in solution development is not enough to have the acceptance of their board of directors. It is important to promote actions to involve the board of directors in order to avoid working on a solution that is being supported by technicians but not by their directors. When presenting the project to the decision makers, it is better not to get lost in technical details, but to try to explain in a clear way the project to the politicians so that they have a full understanding of the project. Results of the traffic modelling can serve as a good basis for future projects and highlights the benefits of measure activities.

Lesson 4 – Realistic implementation plan and timing

It is very important that sufficient study and analysis of the needs, conditions and objectives are done before defining the project of integrated planning on a contractual basis. In many cases, some things were defined based on premises that were not checked properly. In most sites changes in content and/or budget were needed. Enough time should be foreseen for the implementation.

Lesson 5 – Differences in awareness and satisfaction

The survey carried out in the different cities indicated that especially citizens from Gent, Ljubljana and Brno are aware about the on-going process of intermodal infrastructure planning. Inhabitants received information on the planning of intermodal transport from multiple sources, like the city published newspaper or city website. Several aspects that determine the satisfaction with intermodal transport points are information on intermodal transport, the punctuality of the connections in the interchange nodes, the offer of parking places for cars and bicycles in interchange nodes, the cleanliness of interchange nodes, safety in interchange nodes, the offer of services in interchange nodes and the availability of transport information.

5.1.3. Comprehensive safety and security strategies (5.1-COM)

5.1.3.1. Description & related measures

A comprehensive bundle of soft and hard measures is needed to ensure safety and security in public transport in order to increase people’s willingness to use public transport. The aim of this common measure was enhancing the capacity for cities to draw practical lessons on safety and security related public policies.

Therefore activities within this measure aim:

- to identify by means of security audits potential and real hazards relating to safety of all PT users within each of the CIVITAS ELAN cities;
- to suggest possible measures towards safer and more secure trips within PT;
- to increase the overall number of PT patrons.

The specific measure-related objectives were:

- to create platforms for the exchange of knowledge and the transfer of good practices from one city to another;
- to build up knowledge about common tools on securing safety in urban mobility;
- to have a real intensive cooperation on topics of strategic importance, going beyond the exchange in other fields, and to elaborate common strategies.

A list of topics that are essential for a comprehensive consideration of safety and security in public transport has been elaborated and analysed in every city:

- Terminology and statistic
- Categories of users
- Safety of disabled passengers
- Safety of children in public transport
- Prevention
- Education towards better safety & security
- Regional forum
• System control & surveillance
• System alerts (danger & info)
• Roads & infrastructure
• Traffic safety signs & traffic signalisation in general
• Access to PT stations
• Public transport stations
• Public transport station equipment
• Public transport station shelters
• Public transport station monitoring
• Public transport station maintenance
• Vehicle monitoring inside & outside
• Vehicle maintenance
• Public transport operator
• Information & dissemination
• Promoting better street design
• New technologies and techniques.

M5.1-WD5 describes in detail the status of each topic in the five cities. Within ELAN, the following measures were implemented in this field:

• M5.2-LJU: Safety & security for seniors and PT users
• M5.3-ZAG: Safety & security for seniors
• M5.7-GEN: Security enforcement in PT
• M5.8-ZAG: Security improvement in PT

Some of the best practices are reported below.

**Trammelant (Gent)**

This is an innovative youth prevention programme, aimed to reduce large and small conflicts and nuisance on public transport caused by secondary scholars and to enhance mutual respect between public transport personnel and youngsters. Mutual respect is the basis of a good prevention strategy. Secondary schools are being selected to participate based on the monitoring of incidents in the school areas. Per school one ‘project class’ has to be selected, preferably with many scholars that use public transportation to school. It is essential that this class is accompanied by a good and motivated teacher. This class undertakes several activities:

• a class conversation on small annoyances on public transport
• a depot visit with activities like an emergency stop with a tram/ bus, visit of the working spots, the ‘Trammelant’ bus
• School visit: peer-to-peer tutoring

**Maintenance in public transport (Gent)**

All buses have to undergo a periodic maintenance. Based on the type of bus, the period between two maintenances can be different. The AS400 system indicates when a vehicle needs to have maintenance. Audits on the maintenance procedure are done on a regular interval.

All buses are also cleaned based on a defined interval. The items to clean are defined in a cleaning programme. To have a good overview on the cleaning activities and the performance of these activities, regular quality controls and user questionnaire are organised. Based on the results actions can be defined in order to optimize the process or the customer satisfaction.

**PT adjusted to categories of users (Zagreb)**

To learn about the needs of people with reduced mobility in public transport, the following activities are implemented among the target population:

• a survey among people with disabilities on the shortcomings of urban public transport
• a survey among elderly and disabled people on the shortcomings of urban public transport
• a roundtable discussions with the target population

Public transport is equipped with systems that help people with disabilities, including a lifting ramp in buses and trams for people in wheelchairs, lower curbs for wheelchairs, announcement of the station inside the vehicle for blind and visually impaired people, seating area for wheelchairs, driver services to people with disabilities and people with reduced mobility, tactile guidance and direction for the blind and visually impaired people to vehicles.

Also guidelines for the tactile system at different locations have been developed.

5.1.3.2. Evaluation approach

As the aim of the common measure was to exchange information rather than actually implement measures, the focus was on process evaluation. This resulted in findings on the common barriers and drivers that were experienced in the implementation of measures related to this common working field. The impact evaluation of the related measures is reported in chapter 3, and summarised in the conclusions on work package 1. Also the cooperation between the measure partners of the common measure was evaluated by an online survey.

5.1.3.3. Process evaluation of the related measures

Barrier 1 – Complex administrative and institutional procedures

Some improvements to the safety and security are difficult to implement because of the administrative and institutional procedures that have to be followed. This concerns the limited usage of the surveillance camera records in case of violence (M5.2-LJU), prosecution of vandals (M5.2-LJU) and spatial restrictions for improvements of public transport stops (M5.3-ZAG).

Barrier 2 – Financial restrictions

A number of measures in this work package were facing financial restrictions that lead to changing the measure implementation. In Zagreb, instead of installing a CCTV system on PT stops (M5.8-ZAG), the system was installed in 40 additional trams. It is believed that a greater impact on public perception could have been possible if the CCTV system would have been installed on PT stops as well.

Barrier 3 – Lower number of volunteers than expected

Although potential new volunteers for the traffic warden service (M5.4-LJU) were regularly invited through workshops, the interest was not even close to what was expected.

Barrier 4 – Dependence on traffic network

Some safety measures on particular school routes could not be implemented because the existing spatial situation did not allow that.

Driver 1 – Dissemination & citizen engagement

Organized workshops, meetings, conferences and activities on the subject helped to accelerate the preparation of the safe route maps on the web portal (M5.4-LJU). Citizens were asked to give their input on the quality of the cycle lanes in Gent (M5.6-GEN). This was done through a publication of a call to all citizens in the city magazine and on the city website. By consulting the public, new and less known “cycling problems” rose to the surface. In the winter of 2011, the Gent City Council also organized a campaign to promote cycling even in winter by distributing gloves. In return, cyclists had to answer several questions on cycling in winter.

5.1.3.4. Process evaluation of cooperation in the common measure

Barrier 1 – Differences between cities
It was difficult to find common tools or strategies that could be used for all cities as there is a significant difference in the level on how the different involved cities handle the different related topics. For this reason, the common measure resulted in practically no common strategies or tools.

**Barrier 2 – Difficult data collection**

The objectives of development of public transportation and the strategy for development of safety and security are not always expressed in official documents, so it was difficult to collate data relating to the same or similar areas. Furthermore, the communication between the various measure partners was insufficient and common measure objectives were not clear to all.

**Barrier 3 – Lack of political support**

The common measure resulted in a list with possible actions that would improve safety and security. However, these proposed actions could not be implemented because political approval would have been needed.

**Driver 1 – Exchange of know-how**

Through the workshops and teleconferences, good practices in other cities were exchanged. For example the questionnaire on safety and security from De Lijn (M5.7-GEN) has been a major help in the data collection process in Zagreb (M5.8-ZAG).

5.1.3.5. Lessons learned

**Lesson 1 – Complementarity of measures**

In order to effectively increase safety and security in PT, it is important to implement a range of measures. A list of topics that are essential for a comprehensive consideration of safety and security in public transport contains the following elements: safety of disabled passengers and children, prevention, education, surveillance, roads, signalisation, PT stations, vehicles, information, etc.

**Lesson 2 – Improving safety is a continuous process:**

Even though the safety measures undertaken within this work package have significantly improved the safety situation in the cities, more efforts are needed to completely eliminate accidents. This applies for the different target groups (elderly, students, cyclists). This points to the fact that the measures should be continued, extended to other parts of the city, other target groups, etc.

**Lesson 3 – Differences between cities**

Every city has its specific situation, starting with the size of the city, public transport systems and habits of citizens. In principle, each city has its own objectives of development of public transportation in the future, as well as the fundamental strategy for the development of the safety and security sector. Measures aiming at improving safety and security are therefore city specific, rather than one-approach-fits-all.

**Lesson 4 – Prevention programmes for youngsters**

To make prevention programmes for youngsters work, all partners involved have to believe in the project: the school directors, the public transport company directors and participating drivers and controllers. Youngsters will more easily accept information from their peers than from adults. They will pass through the things they have learned in different activities.

Repeating the project annually is also necessary. For all new scholars entering the schools, prevention is an action that has to be maintained.

Before starting activities with youngsters, it is important to keep some advice in mind:

- Do not start from a negative background: youngsters do not always know the consequences of their behaviour
- Discuss why certain things happen instead of telling them what to do and not to do
- Let youngsters experience the effect of their own behaviour onto someone else
- Do not use a strict scheme of activities: the group dynamics and dialogues will steer the activities in the direction that is suitable
5.1.4. Integrated freight policy development (7.1-COM)

5.1.4.1. Description & related measures

The primary objective of this common measure was to convince all partners of the importance of clean and sustainable distribution of goods in ELAN cities. Additionally it was the objective to set up stable local freight partnerships among stakeholders in all participating cities and to increase the number of local network stakeholders where partnerships already existed. The aim was to create a more cooperative approach towards urban freight including all stakeholders concerned.

On 24 February 2010, an international workshop was organised on the role of local freight partnerships. The aims of this event were to increase knowledge on freight issues, to exchange best practice and know-how and to compare local practices.

In each city, some activities took place on freight policy development, in the framework of the common measure, as well as through the related measures:

- M7.2-LJU: Sustainable freight logistics
- M7.3-GEN: Institutional platform for city freight management
- M7.4-ZAG: Freight delivery restrictions (discontinued in February 2012)
- Porto and Brno had no local measures on freight delivery in the DoW

In the cities where local freight delivery partnerships were (planned to be) established the establishment of the partnerships went in parallel with the implementation and changes of these accompanying measures. In the cities with no local freight delivery measure the establishment of local freight partnerships was not feasible due to a lack of interest by the stakeholders.

It was realised that the first step for sustainable freight logistics measures is increasing the knowledge on sustainable freight delivery possibilities, raising awareness among stakeholders, citizens and politicians and the promotion of sustainable freight delivery.

Ljubljana

Originally the establishment of the partnership in Ljubljana was too strongly connected to the idea of a local freight consolidation scheme for the commercial inner zone of Ljubljana (M7.2-LJU). This would include regular meetings and practical agreements on cooperation. As this scheme was not accepted by the city council, the choice was made to strengthen the partnership through a web portal (M7.2-LJU). This web portal supported and promoted sustainable city logistics, by providing the following information: general information on sustainable freight logistics, examples of good practices from various cities, online surveys and questionnaires, an interactive map which calculates delivery routes to the city centre, an online forum where important issues are discussed, a member area for submission of ideas and new projects which promote sustainable city logistics.

The target groups of this web portal are: freight transport service providers, distribution and logistics centres, the local business sector, the Chamber of Commerce, local authorities – cities/ municipalities, universities, research institutions, and all other stakeholders and individuals that are interested in sustainable city logistics. The website encourages also participation from outside sources like social networks that further improve the accessibility and promotion of sustainable city logistics practices.

Soon after the announcement of the portal, two events were introduced in the context of strengthening the partnership through the portal:

- April 2012: Eco-driving for freight delivery drivers in Ljubljana – 23 participants
- June 2012: National conference for freight delivery – 50 participants

Gent

Before CIVITAS, 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,
focusing on measures and initiatives which are facilitating the distribution traffic: specific unloading spots, etc. A partnership in the project ‘D-via - demand driven clustering of supplies/ freight’ with the organisation VIM (Flemish Institute of Mobility) was elaborated in 2009. Four workshops with the platform of city distribution were organised, focusing on the distribution of goods in the city centre.

The bottlenecks of freight distribution mentioned in the platform were tackled in the pilot project on Vlaanderenstraat (part of GEN-7.3): a new type of loading spot was introduced at four locations in the neighbourhood around Vlaanderenstraat.

**Zagreb**

Based on the collected data, Zagreb Faculty of Transport and Traffic Sciences (ZFOT) defined a revised proposal concerning freight delivery restrictions in the Zagreb city centre (M7.4-ZAG). However, this proposal was not officially approved by the City of Zagreb, and no proposed solutions were implemented. After several attempts to implement the measure, the measure was discontinued.

However, the analyses of all aspects of the freight handling gave a clear view on the variation of the freight problems over the week which is crucial for the further contact with the involved partners.

The establishment of a local freight partnership was not possible since there was a high level of distrust between stakeholders and other issues that stakeholders were occupied with. There were demonstrations of local residents against the construction of a new business complex in the city centre; shopkeepers were also not satisfied with the situation.

In April 2011 a new plan for a local freight partnership, containing updated time tables and participant lists, was prepared which also included a detailed action plan for stakeholder involvement and on promotion activities. This was the starting point for new initiatives:

- A series of interviews with representatives of retailers were conducted and preparations for a Freight Partnership Meeting took place (early 2012).
- The City of Zagreb is currently preparing a public panel discussion about freight delivery to be held at Zagreb Forum as an alternative for the originally planned national event that was cancelled due to the cancelled implementation of measure 7.4-ZAG.
- Also a round table discussion with citizens on mobility management focused on car sharing and freight delivery solutions is planned to take place at Zagreb Forum.

These efforts showed that it was necessary to establish contacts before asking partners to participate in a platform.

**Brno**

The historical centre of the city of Brno is a pedestrian zone with limited access. New guidelines for traffic in the pedestrian zone and neighbouring helped to establish new rules for freight delivery as well.

Within the measure 7.1-COM, the city of Brno published an information leaflet about the rules for the freight deliver in city centre which was distributed in the Integrated Mobility Centre and at the respective Departments of the Brno City Municipality.

**Porto**

CMP had contacted several potential partners in the Asprela area to present and discuss a proposal to develop and implement a local freight plan but unfortunately only one partner responded positively. For this reason, all planned promotion activities had to be cancelled.

**5.1.4.2. Evaluation approach**

As the aim of the common measure was to exchange information rather than actually implement measures, the focus was on process evaluation. This resulted in findings on the common barriers and drivers that were experienced in the implementation of measures related to this common working field.
The impact evaluation of the related measures is reported in chapter 3, and summarised in the conclusions on work package 1. Also the cooperation between the measure partners of this common measure was evaluated by an online survey.

5.1.4.3. Process evaluation of related measures

Barrier 1 – Different stakeholder interests
A lot of stakeholders are involved in this type of measures (shopkeepers, delivery companies, restaurants, city authority, police department, citizens, etc.). Finding an agreeable solution for everyone is not always possible. The private sector is more concerned with its own economic performance than social responsibility. Because of fear of higher costs and stricter restrictions towards freight delivery, businesses in Ljubljana and Zagreb strongly opposed against the measure.

Barrier 2 – Lack of knowledge on possibilities at the decision making level
Especially the decision making level needs to be informed about the benefits of sustainable freight delivery. The public sector will not over take costs of social responsibility without a stick; therefore some decision (responsibility) on measure implementation must be taken by the politicians, possibly also through the EU agenda. Especially in Ljubljana, it was clear that the measure could not be successfully implemented without cooperation of the traffic department of the municipality. The city council did not perceive freight delivery as a problem. A good understanding of the reasons why and the context of each reaction, seems crucial to find the best compromises.

Driver 1 – Stakeholder cooperation
Work on the measures brought together professionals with different backgrounds and interests (police, city municipality, distributors and recipients of services, university, other projects, etc.) to work together on similar issues. This resulted in open dialogue workshops and exchange of know-how, points of view and good practices within the theme of city distribution. Also experiences from other cities were helpful to disseminate and educate the stakeholders about all the benefits of this type of policies.

Driver 2 – Initiatives from the private sector
There were some local initiatives of shopkeepers working together on the delivery in their common field, which can be an example for other companies.

5.1.4.4. Process evaluation of the cooperation in the common measure

Barrier 1 – Lack of communication
There was a lack of communication between the different measure partners of the common measures, so the exchange of information remained limited.

Driver 1 – Exchange of experience
Ljubljana had already established the partnership with stakeholders prior to the ELAN project: experiences were shared with other cities.

5.1.4.5. Lessons learned

Lesson 1 – Involve all stakeholders
The first step for establishing a partnership is to increase the knowledge on sustainable freight delivery possibilities, raising awareness among stakeholders, citizens and politicians and the promotion of sustainable freight delivery. The common goal of the freight policy needs to be clear to all
stakeholders; therefore it is useful to analyse the needs of the stakeholders, in order to learn about their motivation or lack of it. With the right tools for raising awareness, distribution of teaching material and searching for solutions, partnerships can be built up gradually.

**Lesson 2 – Start small and build up**

As it might be difficult to reach an agreement with all stakeholders, the strategy of first solving some practical freight problems is a good way to create the trust that is necessary for further discussions with the stakeholders to discuss new ideas to limit the freight traffic in the inner city.

**Lesson 3 – Web portal as starting point for a partnership**

Informing citizens on city logistics proves to be a first step in gaining interest and awareness from the interested public/stakeholders, showing other possibilities for distribution and convincing partners to introduce new schemes for freight distribution. A web portal also spreads awareness in other cities.

**Lesson 4 – Overambitious target**

During the course of the project it became evident that this common measure proved to be a bit too ambitious, especially in the cities with no accompanying local freight delivery measure within the ELAN project. In the cities where local freight delivery partnerships were (planned to be) established, the establishment of the partnerships went in parallel with the implementation and changes of these accompanying measures. In the cities with no local freight delivery measure the establishment of local freight partnerships was not feasible due to a lack of interest by the stakeholders. The motivation to establish a partnership would possibly have been higher if there would have been a local measure as a basis.

### 5.1.5. Lessons learned on the cooperation in the common measures

The cooperation process was evaluated by making use of the online questionnaire that was conducted with all Measure Leaders of the common measures and city representatives. The main outcomes of the survey are the following.

**Lesson 1 – Exchange of information**

Although each city has its specific background and starting point it is useful to learn from cities in similar situations as well as from the cities which are more advanced. Especially workshops and other forms of cooperation between the measure partners lead to a transfer of various ideas, which inspired others to think about new projects. Almost two thirds of the participants stated that the common measure was successful in transferring knowledge and good practice. But as there are big differences between the cities, the proposed solutions need to be adapted to the local context.

**Lesson 2 – Need for more active participation**

The effectiveness of such common measures will be higher if there is a more active participation by all involved cities. Different people from different countries and cities work together, but meeting regularly is not so easy, and requires time and budget. Face-to-face meetings like workshops proved to be very helpful for a smooth cooperation and to discuss problems, but the available travel budget was insufficient.

**Lesson 3 – Need for common objectives**

The aim of the common measure (exchange of information) was not entirely clear to all partners at the start of the project. This delayed the actual take-off of the common measure. A better planning of exchange activities from the start would have been required.

**Lesson 4 – No actual measure implementation**

Not all cities had measures in the field of the common measure. Their participation in the discussion was therefore limited. Therefore it is suggested that all cities should implement measures at the local level or a common measure should be chosen as a proper subject.
5.2. Findings per CIVITAS Policy Field

The CIVITAS Plus call indicated eight categories of measures as important to demonstrate a sustainable mobility evolution of the cities. In the organisation of the CIVITAS ELAN work the implementation of measures was structured into eight technical work packages in relation with the CIVITS Plus categories or Policy Fields.

Table 5.1 gives an overview of these work packages indicating also the measures part of them. The common measures are also part of these work packages.

Table 5.1: CIVITAS ELAN work packages and related measures per city
<table>
<thead>
<tr>
<th>No.</th>
<th>WP / Headline Objective</th>
<th>Common measures</th>
<th>Ljubljana</th>
<th>Gent</th>
<th>Zagreb</th>
<th>Brno</th>
<th>Porto</th>
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</thead>
<tbody>
<tr>
<td>WP1</td>
<td>Alternative fuels and clean energy efficient vehicles</td>
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<td></td>
<td>Energy efficient fleet management</td>
<td>1.1-COM</td>
<td>1.12-LJU</td>
<td>1.2-GEN</td>
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<td></td>
<td>Increasing energy efficiency</td>
<td></td>
<td></td>
<td>1.13-GEN</td>
<td>1.3-ZAG</td>
<td>1.4-BRN</td>
<td>1.5-OPO</td>
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<tr>
<td></td>
<td>Using alternative fuels</td>
<td>1.7-LJU</td>
<td>1.8-GEN</td>
<td>1.14-ZAG</td>
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<td></td>
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<td>1.9-GEN</td>
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<td>WP2</td>
<td>Collective passenger transport services &amp; intermodal integration</td>
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<td>Effective, high quality mobility services</td>
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<td>2.6-ZAG</td>
<td>2.7-BRN</td>
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<td></td>
<td>Efficient infrastructure</td>
<td>2.1-LJU</td>
<td>2.2-GEN</td>
<td>2.5-ZAG</td>
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<td>2.4-GEN</td>
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<td></td>
<td>Planning intermodal infrastructure with public participation</td>
<td>2.8-COM</td>
<td>2.9-GEN</td>
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<td>2.10-OPO</td>
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<td>WP3</td>
<td>Demand management</td>
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<td></td>
<td>Charging for access</td>
<td>3.1-LJU</td>
<td></td>
<td>3.2-ZAG</td>
<td>3.5-OPO</td>
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<tr>
<td></td>
<td>Managing public space and access</td>
<td></td>
<td>3.3-GEN</td>
<td>3.4-GEN</td>
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<tr>
<td>WP4</td>
<td>Influencing travel behaviour</td>
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5.2.1. Work Package 1: Alternative fuels and clean energy efficient vehicles

5.2.1.1. Description

This work package covers the CIVITAS ELAN measures addressing alternative fuels and clean vehicles in a comprehensive and integrative approach:

- Low-polluting at local and global level
- Energy efficient
- CO₂ saving
- Using alternative & renewable fuels, produced in the region
- Silent

This was achieved by:

- 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
- Influencing driving behaviour

There are promising energy saving technologies, such as hybrid engines or electrical vehicles that feedback electricity and thereby save power. But on the other hand, the perfect clean vehicle has not been revealed yet. The CIVITAS ELAN project has therefore a multiple approach and adopted a medium term perspective: various clean and energy saving concepts were tested and implemented and a variety of options were developed. The aim was to find out which concepts – or which combinations of concepts – are the most appropriate.

On the level of each CIVITAS ELAN city different measures were planned in different thematic areas:

Energy efficient fleet management

- Energy efficient city fleet management (M1.2-GEN)
  - Electric vehicles in city fleet
  - Ecodriving trainings for employees
  - Car-sharing in public fleet
- Green procurement for public fleets (M1.12-LJU)
  - New city fleet vehicles
  - Hybrid vehicles
  - City administration bicycle scheme
  - Ecodriving for city administration staff

Measures to increase energy efficiency
• Energetic recovery system for trams (M1.3-ZAG)
  o Low floor trams returning braking energy to the electricity network
• Optimised energy consumption in tram and trolley bus networks (M1.4-BRN)
  o Remote heating control in trams and trolley buses
• Light-weight bus shuttle (M1.5-OPO)
  o Transformation of old minibus to reduce weight
• Clean public transport strategies (M1.13-GEN)
  o Improved energy efficiency of trams after energy audit

Using alternative fuels (electric, hybrid, CNG, LPG, biofuel, pure plant oil)
• Pure plant oil for vehicle propulsion (M1.7-LJU)
  o Testing of pure plant oil (PPO), diesel and biodiesel on three vehicles and one laboratory engine
• Extended biofuel production (M1.8-GEN) (discontinued)
  o Implementing B30
• Semi-public clean car fleet (M1.9-GEN)
  o Sustainable purchase strategy
  o Electric cars in car-sharing fleet (cambio)
  o CNG vehicles and electric vehicle in fleet of Max Mobiel
  o LPG shuttle buses in taxi service V-Tax
  o Eco-driving for car-sharing users
• Introduction of hybrid vehicles (M1.10-GEN)
  o Energy-efficient low floor hybrid buses
• Hybrid and CNG bus implementation (M1.11-LJU)
  o Hydraulic hybrid buses
  o CNG buses
  o Driver training
• Clean public transport strategies (M1.14-ZAG)
  o Biodiesel buses
  o CNG buses
  o Driver training on safety and fuel use
• Clean public transport strategies (M1.15-ZAG)
  o Biodiesel waste collection vehicles
  o Driver training

A common initiative of all cities, as part of the Common Measure “Energy management of public fleets” (M1.1-COM) was a dedicated “green fleet manager” dealing with the management of the energy consumption of city fleets, as well as looking for reduced emissions and decreased fuel consumption.

5.2.1.2. Evaluation approach

The main indicators for this type of measures were the energy consumption and the related emissions. An important question was also the balance between costs for new technologies and the cost savings achieved. Also the awareness and acceptance level for some these new technologies were evaluated.

5.2.1.3. Impact evaluation
Most of the implemented measures achieved positive results looking to the environmental aspects and the energy savings and related costs.

**Key result 1 – Energy reduction after optimisation of heating and ventilation strategy in trams and trolley buses**

The new heating and ventilation strategy in trams (M1.13-GEN) leads to a reduction of 31% energy use. By its implementation on 41 trams, De Lijn Gent saves 850 MWh electricity and 234 tons of CO$_2$ per year. The costs are expected to be already gained back in 2014.

The remote control of heating in trams and trolleybuses (M1.4-BRN) reduces the reserve capacity by 6.2%. The savings in total costs of reserve capacity exceed the total cost of the system.

**Key result 2 – Lower emissions after weight reduction**

In Porto, a 16% reduction on the bodywork weight of the transformed bus (380 kg less) was achieved in comparison with the original bus (M1.5-OPO). A reduction of fuel consumption could not be measured but a reduction of CO$_2$ (-36%), CO (-48%), NO$_x$ (-45%) and HC (-39%) can be attributed to this weight reduction.

**Key result 3 – Hybrid vehicles reduce fuel use and emissions**

Hybrid buses (M1.10-GEN) have a 16.3% lower fuel consumption and 17.2% lower emissions compared to a standard articulated bus. The exterior noise level when leaving the bus stop is reduced by 10 dB. However, due to the high purchase cost the benefits do not outweigh the costs of hybrid buses.

Also in Ljubljana, the exploitation and testing results of the hydraulic hybrid buses (M1.11-LJU) showed that the polluting emissions from the EURO 5 compliant diesel driven hybrid bus are much lower in comparison to the conventional EURO 3 compliant diesel bus and fuel consumption is 10-20% lower. However, the best energy efficiency is obtained when the braking energy recovery system is disabled, which means that the hybrid drive technology considered here does not have any sense. Furthermore, the hybrid bus has only about ⅔ of the passenger capacity in comparison to a conventional diesel bus; its use is therefore recommended for low passenger demand lines. Similar as in Gent, the cost-benefit analysis revealed that the benefits do now outweigh the costs.

The average fuel consumption of the new city administration fleet of Ljubljana including six hybrid vehicles (M1.12-LJU) decreased by roughly 10%. The average EcoScore and Euronorm increased, thereby decreasing CO$_2$ emission by 14% (non-hybrids contributing 222 g CO$_2$/km, and hybrids only 142 g CO$_2$/km). Also here, the hybrid vehicles are 41% more expensive than the non-hybrid vehicles, taking into account operational and maintenance costs, rental price, fuel cost and pollution.

**Key result 4 – CNG and LPG reduces emissions**

The results of the CNG bus (M1.11-LJU) showed lower emissions than the diesel and hybrid alternatives, with a significant reduction in PM$_{10}$, NO$_x$, HC and CO$_2$. A significant reduction in fuel consumption (over 20%) and lower fuel cost compared to diesel lead to a positive result of the cost-benefit analysis: costs will be outweighed by the benefits after 6-8 years. However, there are additional uncertainties regarding the maintenance costs and realistic GHG emissions.

After changing their fossil fuel fleet to a LPG version (M1.9-GEN), V-tax observed in Gent very positive results concerning the emissions of PM (-100%), NO$_x$ (-91%) and CO (-10%); the emissions of CO$_2$ increased (+88%).

**Key result 5 – Sustainable purchase strategy and electric cars reduces fuel consumption**

In Gent the sustainable purchase strategy and the implementation of an electric car by cambio (M1.9-GEN) leads to a decrease of fuel consumption by 0.7 l / 100km or a reduction of 15%.

**Key result 6 – Positive results for pure plant oil (PPO)**

Tests with PPO (M1.7-LJU) showed that pollutant emissions are comparable or lower when using PPO fuel in comparison to D2 or B100 fuels. Results depend also on the engine’s speed and a further refinement of the engine’s ignition system is possible in the future. The combustion heat for PPO is 1% lower compared to diesel. The PPO fuel consumption is about 4-10% higher than for diesel but lower fuel prices makes PPO an economic alternative to D2 or B100 fuels. Also lower maintenance costs were observed than for regular diesel.
Key result 7 – Reduction in fuel use by introduction of new vehicles on biodiesel

The introduction of a fuel mixture of biodiesel and regular diesel in the waste disposal vehicles (M1.15-ZAG) leads to a reduction of 5% CO$_2$, 3% PM$_{2.5}$, 6% fuel consumption and 2 dB noise level. This leads to a reduction of operational costs by almost 40%.

Key result 8 – Mixed results for ecodriving trainings

Providing ecodriving training for car drivers resulted in a reduction of 7% of the fuel consumption in Gent (M1.2-GEN & M1.9-GEN). But unfortunately, the long term impacts of the ecodriving trainings were negligible. For this reason, it is recommended to maintain the ecodriving trainings and to follow up in detail the driving behaviour of the drivers.

However, in Ljubljana no distinct impact was observed on the economic and environmentally friendly style of driving after the training of the bus drivers (M1.11-LJU).

Key result 9 – City fleet management supports also bicycle usage by city staff

After the introduction of public bicycles (M1.12-LJU), the use of bicycles by the employees has increased significantly. The bicycle usage is increasing by 12% annually, and reduces the number of fuel-driven kilometres by an estimated 9,000 km per year. This reduction in fuel consumption, environmental benefits and health benefits covers around 60% of the initial investment cost in the first year.

By reducing the city fleet in Gent (M1.2-GEN) employees started thinking about their transport and were “forced” to take a bike. Sometimes this led to the positive conclusion that in the city centre it is faster to move by bike than by car. This even leads to 30% reduction of driven km in the car fleet of the city. Also the total number of km driven of the light freight vehicles was reduced by 11%. In combination with a sustainable purchase strategy, the total fuel use of the city fleet decreased by 24%.

Key result 10 – Public acceptance of new technologies

The acceptance of the cambio users of the electric cars (M1.9-GEN) in Gent was very positive and the results show that this positive experience led to increasing usage of the electric car. The respondents stated that it is pleasant and comfortable driving with an electric car; the only minor downside is the limited distance you can drive.

Also hybrid buses received very positive feedback, as in Gent, 65% of the PT users stated that they prefer travelling on a hybrid bus (M1.10-GEN). Moreover, some passengers, mostly seniors, reported to the drivers that on hybrid buses they drive more comfortable, especially the seats and the low noise production contribute to this comfort. Some travellers even waited especially on a hybrid bus at bus stops. Also in Ljubljana, 80-90% of the passengers showed strong support and a positive attitude towards the CNG and hydraulic hybrid buses (M1.11-LJU). After driver training for the city administration staff (M1.12-LJU), the hybrid vehicle drivers were more aware and supportive of the benefits of the hybrid technology.

In Porto, the light-weight shuttle bus (M1.5-OPO) attracted during its operation period a growing number of passengers that were very satisfied with the service (60% completely satisfied, 37% rather satisfied).

5.2.1.4. Process evaluation

Many of the energy related measures faced juridical and tax barriers for their implementation. As many of these new technologies are still in their infancy, the technology and the markets might not be fully developed yet. The uncertainties concerning these technologies also influence the public perception. For this reason supportive programmes like CIVITAS are important to help overcome the barriers.

But despite these barriers, a strong belief in the positive impacts of new technologies convinces partners to work on this and politicians to support the introduction of new technologies.

Barrier 1 – Tax rules

There is a duty tax on the use of pure plant oil in vehicles which impedes the application in real life (M1.7-LJU). Despite political promises the related authorities at the national level did not change the
tax rules. This is deemed unfair considering that there is no tax on biodiesel use in vehicles and no tax on pure plant oil use from cogeneration plants (electrical and thermal energy production) for energy purposes.

**Barrier 2 – Legal restrictions**

B30 is not an approved fuel yet in Belgium, so car manufactures and fuel suppliers keep reserved to stimulate the use of biodiesel. This legal situation leads also to the restriction that B30 can only be distributed in a closed circuit of registered partners (M1.8-GEN). The Croatian law changed during the project which made biodiesel supply difficult: the current Croatian norm for the use of biodiesel states that fuel mixture can contain a maximum 7% of biodiesel and 93% of regular diesel (M1.14-ZAG & M1.15-ZAG). Therefore, the existing contract for biodiesel procurement had to be cancelled in 2009. Since then, four public tenders for biodiesel procurement were published, of which three needed to be cancelled as well.

**Barrier 3 – Negative perception of biodiesel**

Despite of the many efforts taken by the University of Gent, the politicians and management staff were not convinced of the sustainability of biodiesel for traffic at this moment (M1.8-GEN). In Ljubljana, the oil cake is a by-product of an animal food ingredient, but still a conflict was perceived between food and fuel. However, after information and dissemination activities, the recognition and use of PPO as an alternative fuel for agricultural engines by farmers (especially through their own rape seed production) was gaining acceptance during the measure duration.

**Barrier 4 – Uncertainty of new fuel technologies and fuel types**

As little or nothing is known about the impact of biodiesel on engines the car manufacturers were reserved to give warranties (M1.8-GEN). Furthermore, the market for alternatives to fuel driven cars is evolving rapidly which makes it difficult to make a choice which clean vehicle will be integrated in the semi-public fleet (M1.9-GEN). Hybrid buses were in 2010 not yet commercially available on the market. Therefore hybrid buses could not be purchased within the available timeframe and the process of purchase was delayed (M1.11-LJU).

**Barrier 5 – Inadequacy of existing infrastructure**

The implementation of new technologies needs to be complementary with the existing transport system, which was not always the case. The limited availability of CNG filling stations and electricity charging stations in Belgium made extra efforts and budget necessary to install a CNG station and electricity charging station in Gent (M1.9-GEN). For the distribution of biodiesel (M1.8-GEN), a closed pump circuit is legally required, which was not available for all partners. Therefore extra pumps needed to be installed. In Zagreb, investments in the new tram fleet (M1.3-ZAG) were not accompanied by investments in the infrastructure which caused poor infrastructure quality at some network sections. Because the section length of the catenary was too short for the recovery systems and the power network and new trams were not equipped with certain power accumulators, the concept of energy efficiency could not be fully exploited. The implementation of the remote heating control system into the trams and trolley buses (M1.4-BRN) differs from one type to another. The installation of the remote control may in some cases be really complicated and requires consultation with the supplier of the system. Moreover, the efficiency of the system varies also in each type of vehicle.

**Barrier 6 – Technical problems**

As new technologies are implemented, some technical problems arose that were difficult to foresee. The hydraulic drive buses in Ljubljana (M1.11-LJU) were technically improperly manufactured, as leaking hydraulic oil caused two fires. In Porto, the equipment, the method and the materials needed to produce the bodywork of the light-weight bus with a hybrid propulsion system (M1.5-OPO), was too expensive. Therefore, it was necessary to change the concept to a vehicle powered by biodiesel only, and the intended size for the vehicle had to be reduced as well.

**Barrier 7 – Difficult to change user habits**

Changing the overall attitude of the employees towards new ideas for mobility was a challenge in Gent (M1.2-GEN). The city fleet manager convinced the managers of the several departments of a refreshing approach of mobility meaning: fewer cars, other ways of transport, car sharing, etc.

Also anticipated driving requires some habituation. The training that these drivers followed provided sufficient knowledge and insight, but there is also a certain familiarisation period necessary to get used to drive with a hybrid bus (M1.10-GEN).
Driver 1 – Expected benefits

The expected benefits of new technologies motivated partners to work on the measure: the financial crisis stimulated De Lijn to start an energy audit in trams to reduce energy costs. The study how to reduce electricity in trams (M1.13-GEN) was so successful that, besides the trams in Gent, all 113 new low-floor trams in Flanders were adapted following the results of the study. The expected economic benefits from using pure plant oil by the end user also was a strong driver in the accurate economic planning and market analysis to determine requirements for its implementation in real life (M1.7-LJU). Lower fuel consumption results in lower emissions, which improves the PT operator’s environmental friendly image. This motivated the PT operator to work on the measure (M1.11-LJU).

Driver 2 – Political support

The political and economic situation has been putting pressure on car manufacturers to work harder on cleaner vehicles which resulted in a very fast evolving market (M1.9-GEN). The recent EU directive on mandatory use of renewable energy sources helped to improve support in the future (M1.7-LJU). The fleet modernization process (M1.3-ZAG & M1.14-ZAG) was a good topic for earning political points at local elections which ensured political support to the project.

5.2.1.5. Lessons learned

Lesson 1 – Mix of fuel types and technologies

Fleet modernisation using a sustainable purchase strategy and the implementation of alternatives of fossil fuel car usually leads to a decrease in fuel consumption of the fleet. Furthermore, it also contributes to a positive image of PT. It is best not to focus on just one type of alternative fuel, as there are many different types and combinations that can be implemented, each having its own characteristics:

- Pure plant oil: positive test results indicate potential for take-up, but solving political issues like duty tax policy and dialogue with authorities are needed.
- Biofuel: before implementation it is necessary to increase support from politicians, car manufacturers and fuel distributors, consider the compliance with national regulations, ensure uninterrupted supply, and investigate impact on maintenance.
- Hybrid vehicles: the investment cost is not compensated by benefits in fuel use and emissions, so technical optimization is needed (increasing the energy storage capacity and weight optimization).
- CNG technology: positive results indicate a potential for take-up in other cities.

Lesson 2 – Small measures can increase energy efficiency significantly

Fleet modernisation does not necessarily imply the introduction of new vehicles. Also smaller measures related to the existing fleet can have a significant impact on the energy efficiency. Examples are a more energy efficient heating system in public transport or a detailed follow up of tyre pressure. These measures have a big potential for take-up on a larger scale.

Lesson 3 – Establish necessary preconditions for the introduction of alternative fuels

The introduction of new technologies or fuel types often raises the need for adjustments in the existing transport system: education of staff, fuel supply, investments in infrastructure, etc.

Lesson 4 – Realistic financial plan

Most measures involve a high investment, so a realistic financial plan is very important to improve the final results. Several modifications to the measures were introduced due to budget restrictions, which did not allow materialising some of the consortium’s initial ambitions.

Lesson 5 – Permanent and consistent communication supports appropriate choices regarding vehicles and driving behaviour

On-going communication on the advances of new technologies and fuel types is a must to raise public awareness and willingness to use. User-friendliness of the vehicles cannot be overlooked either. To
maintain the positive effects of eco-driving, it is recommended to continue the ecodriving trainings and to follow up in detail the driving behaviour of the drivers.

**Lesson 6 – Permanent city fleet manager**

To monitor the cleanliness of the city fleet, the decisions on the number and types of vehicles to be purchased need to be centralised, for example by appointing a permanent city fleet manager who determines the right vehicle choice: if the vehicle won’t be used frequently, car sharing needs to be stimulated. When the vehicle will only be used for short distances and within the urban area, the purchase of an electric vehicle needs to be stimulated as no impact of hybrid vehicle on fuel use/emissions was measured. For long distances the city fleet manager can suggest to purchase a hybrid or CNG alternative. Other tasks of the city fleet manager can be monitoring where the efficiency of the fleet can be improved and the organisation of ecodriving lessons.

**5.2.2. Work Package 2: Collective transport & intermodal integration**

**5.2.2.1. Description**

In this work package, all five CIVITAS ELAN cities committed themselves to achieve a real sustainable renewal of their cities and the public transport system, by planning towards a liveable city and putting the people’s needs first.

The key objectives of this work package were:

- 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

This work package included a wide range of measures working on the infrastructural and organisational aspects. Also the participation of citizens and stakeholders was a focus in some of the measures:

In the field of effective, high quality mobility services

- Collective taxi services (M2.3-GEN) (discontinued)
- Integrated ticketing system for the entire conurbation (M2.6-ZAG)
  - Ticket validation terminals in buses and trams
  - Updated ticket palette
  - Study on possible implementation of integrated PT tariff system on national level
  - Study on free PT for hotel visitors
- Improving bus services for the disabled (M2.7-BRN)
  - Minibuses for the disabled (and for lines with low demand)

In the field of efficient infrastructure

- Integrated high-quality mobility corridor (M2.1-LJU)
  - Mobility corridor with bus lanes and P+Rs at both side (mainly discontinued)
  - Developing mobility management plans for two institutions
- Improved Public Transport service levels (M2.2-GEN)
  - Improving PT stops
  - Redevelopment of main PT axis
  - Improving traffic lights in favour of PT
  - Implementing real-time information panels (RTIP)
- Intelligent Park&Ride enforcement (M2.4-GEN) (discontinued)
- Intermodal high-quality mobility corridor (M2.5-ZAG)
Focusing on the participatory process during the planning of intermodal infrastructure

- Participatory redevelopment of main train station area (M2.9-GEN)
  - Communication towards stakeholders on redevelopment (website, info point, 3D model, neighbourhood meetings, site visits, etc.)
- Participatory planning for new intermodal interchange (M2.10-OPO)
  - Study on future construction of transport interchange

The common measure “Participatory intermodal infrastructure planning” (M2.8-COM) helped the CIVITAS ELAN cities to learn from each other and to develop new ideas.

5.2.2.2. Evaluation approach

Many of the measures in this WP had some serious changes throughout the project duration. This had an important impact on the evaluation approach as well.

As the full reconstruction of the corridor was not implemented during the lifetime of the project (M2.1-LJU, M2.5-ZAG) the impact could only be modelled. The impact of the bicycle infrastructure (M2.5-ZAG) was evaluated by the number of cyclists at a number of counting points. The impact of the PT improvements in Gent (M2.2-GEN) could also only be evaluated for some examples of improvements, no final and conclusive evaluation on the redevelopment of the tram axis in the corridor was possible as the optimisation and implementation of the ramp metering system is not yet finalized. The P+R (M2.4-GEN) was also postponed, so only process evaluation was carried out for this measure.

Also for the participatory redevelopment of intermodal infrastructure (M2.9-GEN & M2.10-OPO), the focus was on process evaluation and user acceptance (M2.9-GEN), as the intermodal infrastructure was only planned to be completed after the end of the project.

The new mobility services (M2.6-ZAG & M2.7-BRN) were evaluated by user acceptance and usage of the services. The collective taxi services (M2.3-GEN) focussed on process evaluation, as the implementation of this measure was discontinued.

5.2.2.3. Impact evaluation

The measures in this work package show that both infrastructural improvements as well as organisational changes including the introduction of new service concepts are useful to improve the quality of public transport for the passengers.

Key result 1 – Infrastructural reorganisation results in higher commercial speed and can reduce congestion levels

In Gent the optimisation of PT stops and traffic lights during the project (M2.2-GEN) resulted in an increased commercial speed for the related trajectory. For example, the installation of traffic lights at a crossing of an important inbound route resulted in a more than doubled (+116%) commercial speed during the evening rush hour.

Impacts of other infrastructural measures such as bus lanes, the introduction of a new road in the traffic network and an intermodal terminal were studied by traffic models:

- The results of the traffic model in the corridor in Ljubljana (M2.1-LJU) show 4% less fuel consumption, 2% less emissions (CE, NOx, VOC), higher speeds and lower travel times (4 minutes saving for cars, 7 minutes for buses) when yellow lanes would be implemented on a broadened section of the corridor. When the yellow lanes would be implemented on the existing road profile, the model results are less positive.
The study conducted in M2.5-ZAG pointed out several key benefits of integrating Šarengradská Street into the traffic network. Mainly, Savska Street would be mostly relieved from car traffic which would lead to numerous benefits regarding the concept of sustainable mobility, like a decrease of 34% in the average operational time of the trams in Savska Street and a decreased average waiting time at the intersections in parallel Savska Street from 33 s/vehicle to 21.6 s/vehicle.

The study on the intermodal terminal SAVA-NORTH (M2.5-ZAG) pointed out that interconnecting various transport modes would lead towards a substantial reduction of car traffic in the corridor. Moreover, the terminal would provide a better connection between buses as trams, which would improve intermodal conditions in the corridor. Apart from less car traffic, the study highlights few more direct benefits: less traffic accidents and more space for alternative transport modes such as cycling.

**Key result 2 – Lower emissions and positive public perception of minibuses**

The minibuses for the disabled (M2.7-BRN) have significantly better results compared with the old buses or new low-floor buses, regarding fuel efficiency and fuel cost (2.6 times more efficient than low-floor buses). This resulted also in positive results of the cost-benefit analysis.

The target group (disabled citizens) also indicated in a group meeting that they appreciate the direct connections to the city centre and the hospitals provided by minibuses, especially during the winter when it is difficult to use other connections such as low-floor trams, trolleybuses or buses. However, the number of users is decreasing, but this can be explained as a result of the increasing number of low-floor vehicles in the public transport fleet. Therefore the disabled passengers have now more possibilities to travel and they are using other PT vehicles than minibuses.

**Key result 3 – E-ticketing system successful**

Since the introduction of an e-ticketing system (M2.6-ZAG) the number of sold prepaid tickets increased by 20% from 2009 to 2011; the number of sold e-purse tickets increased by 11% and they were charged 88% more often. Furthermore, user satisfaction increased as well: 59% of users are satisfied with the possibility to purchase the right ticket for the right destination, and 46% are satisfied with the information about ticket prices.

**Key result 4 – Difficult to create public support for redevelopment project**

In Gent (M2.9-GEN) the support for the redevelopment of the railway station area increased among all target groups, especially among retailers. This was also confirmed by the high visitor numbers for the website, increased number of bikes at the railway station and high number of complaints, questions and proposals that were received by the info point at the railway station. But despite the use of several communication tools to involve different target groups, the acceptance of the governmental communication strategy and participatory approach on the redevelopment projects is still rather low. No clear reason can be identified since the city continued and even intensified the efforts for a participatory process especially in relation with the redevelopment of the area around the railway station. A possible reason could have been a growing expectation level of the citizens and users of Gent to participate in the decision process on the redevelopment of the area or the length of the construction works itself.

In Ljubljana, there is a significant level of support for the transition to public transport, as more than half of the population supports the introduction of a separate yellow lane regardless of the impact on fluidity of cars (M2.1-LJU). Nevertheless, this support slightly decreased during the project, which might be related to the fact that the measure was not implemented.

**Key result 5 – Increased number of cyclists**

At all cycling counting points in the corridor in Zagreb a high increase in the number of cyclists was observed. This can be partly attributed to the realization of cycling lanes on Savska Street (M2.5-ZAG), but it might also be due to the low number of cyclists in the baseline year, and a general increase of cycling in the city due to the financial crisis and rising fuel prices.

5.2.2.4. Process evaluation
Especially the realisation of complex infrastructural works faced a lot of barriers: not only financial and procedural but also resistance from citizens and stakeholders. Creative and less expensive measures can partly achieve the objectives, but to overcome the mentioned barriers more intensive efforts are needed to communicate plans and to involve stakeholders. On the other hand, using the input of stakeholders in a constructive way can be a driving force for changes, when they are supported by different groups in society on all levels both political, technical and citizens.

Barrier 1 – Financial dependency
Especially for large-scale infrastructure measures as in this work package, the available financial resources have a large impact. The City of Ljubljana had only limited funding for the purchase of the land for the P+R (M2.1-LJU); still no consensus with the land owners has been achieved, which slowed down the process a lot. In Zagreb, it turned out during the project that an intermodal terminal (M2.5-ZAG) would be a too big investment for the local authorities and due to the economic situation and the crisis all railway infrastructure investment projects were delayed. For this reason the construction of the terminal was replaced by a study of the potential impacts. Because of financial ambiguities between the different partners the installation of the cameras to support the ramp metering system was delayed (M2.2-GEN). The financial crisis in Porto affected the available budgets of the city administration and the transport companies. This implies that the funding of the tunnel for the interface of the intermodal exchange is not assured (M2.10-OPO). For small taxi companies, the cost to fund the collective taxi service (M2.3-GEN) was also too high.

Barrier 2 – Lack of integrated transport planning with clear objectives and overall timing
Without common objectives the differences between stakeholders are causing an important barrier for the implementation of intermodal interchanges, P&R systems or similar transport infrastructure objects. The lack of vision and failure to implement the spatial strategic plans combined with an unclear political standpoint about the design of the high-quality mobility corridor (M2.1-LJU) made planning difficult and slowed down the implementation of the measure. Also there was the important political condition that the corridor would not be implemented before some other non-CIVITAS related traffic measures are implemented. Also in Zagreb, the city administration and Croatian Railways had their own priorities and finances (M2.5-ZAG). The development of the study on the intermodal interchange (M2.10-OPO) took more time than planned due to conflicting opinions of technicians and politicians. The development of an integrated ticketing system (M2.4-GEN) involves the cooperation of all Belgian public transport operators and a private parking company. However, the roll-out in Flanders is only planned for 2013/2014. Furthermore, nearby road works forced the current P+R to close down, so the measure was discontinued.

Barrier 3 – Lack of communication or cooperation between measure partners
Insufficient communication between measure partners can delay measure implementation significantly. In Gent, the communication between the construction partners and the info point (M2.9-GEN) did not always go well in the beginning. It happened that the construction partners did change the timing, for example due to bad weather or a late delivery. These changes were not always known by the info point which led to a lot of complaints by the local residents and to a certain loss of credibility. The development of the study on the intermodal interchange (M2.10-OPO) took more time than planned due to the complexity of the problem and the high number of stakeholders and constraints.

Barrier 4 – Resistance of stakeholders
In Gent there was strong protest against the plans to remove a small park with historical value after the installation of the car access restriction system (M2.2-GEN). After the protest, the city decided to adapt the plans for the R40 in order to keep this park. This is a possible threat for the traffic flow on the R40 as the original set-up will not be implemented. Local shop owners also resisted against the implementation of the ramp metering system because they were worried that people would not be able to reach the shops anymore with their car. Different information markets were organised to explain the goal and implementation trajectory of the project and to explain them that there wouldn’t be any problem to enter the Kortrijksepoortstraat by car as this street will be accessible any time. Also in Ljubljana the public objected to the idea of changing road usage by closing a part of the corridor for private cars (M2.1-LJU).

No partnership arrangements with other taxi operators (M2.3-GEN) could be made due to the fierce competition between the taxi operators. As a result, they don’t trust each other and refuse to work together. Neither City of Gent nor the union of the taxi sector has the legal means to force the taxi operators to work together as they are private companies that only cooperate on a voluntary basis.
Barrier 5 – Lengthy administrative processes
The long process of adopting spatial planning documents/permissions slowed down the planning and implementation process of the corridor in Ljubljana (M2.1-LJU). The cameras to support the ramp metering system (M2.2-GEN) are not yet in active use as the protocol to use the camera registration in law enforcement is still to be approved and signed by the different partners.

Barrier 6 – Technical problems
Some new systems were implemented, associated with some technical problems:

- The system that controls the rail points and the accompanying signalisation at the Korenmarkt and Cataloniëstraat (M2.2-GEN) did not work correctly at the start. As a result a number of the points had to be operated manually which caused additional delay for the trams. The contractor solved this problem by changing the software.
- There were some communication problems between the stop server and some of the RTIP-displays (M2.2-GEN). This was studied in cooperation with the contractor in order to solve this problem.
- The implementation of the ramp metering system (M2.2-GEN) was delayed due to technical issues with the installation of a part of the hardware for this system.
- The minibuses (M2.7-BRN) need special attention in their implementation and operation, technical problems occurred by overweighting the vehicles and the outside (winter) conditions. Rerouting the service was a solution to these problems.

Driver 1 – Support of media and decision makers for changes in transport culture and policy
The level of interest and public participation has improved; there is clear public support for the introduction of the corridor and the Slovenska street closure for personal car traffic (M2.1-LJU). Also at the political level encouraged and promoted the measures, especially the Mayor and Vice-Mayor. A big school in the neighbourhood of the Kortrijksesteenweg offered their great support to the redevelopment of the corridor (M2.2-GEN). The information market could be organised in this school. The info point got also the full support of the city of Gent, and the different citizen engagement activities attracted a lot of interested stakeholders (M2.9-GEN). The main partners and stakeholders showed interest and proactive behaviour regarding the development of the exchange point (M2.10-OPO).

Driver 2 – Useful input from stakeholders
Active and positive involvement of disabled people was a fruitful mean to design the minibus service (M2.7-BRN) and adjust it to their needs and to disseminate information on the measure and raise interest. Also the research conducted by students of the University of Gent on the redevelopment of the train station area (M2.9-GEN), resulted in a lot of useful information, e.g. to determine on which topics the info point had to focus more. This research concluded with some suggestions to improve the communication strategy of the project Gent-Sint-Pieters and De Lijn as e.g. improving the websites.

5.2.2.5. Lessons learned

Lesson 1 – Gaining public interest is the basis for acceptance and support for new projects
Public interest should be gained from the very beginning and gradually, especially for controversial topics. It is important to stress ‘what’s in it for them’, by presenting accurate and clear information on the project. For big projects it is important not to focus on just one communication tool, but to use a wide range of interactive communication tools for the different stakeholders, like discussions with citizens to propose solutions for the improvement in the design, info soundboard groups, dialogue cafés, info markets, visits to the construction works and public events. Some of these methods had a more collective approach, like involving the neighbourhood committee or NGOs, while others implied a more personal approach, like face-to-face interviews to give also less articulate people the chance to participate to the project. Also media attitude needs to be managed, because they have an important role in shaping public opinion. Furthermore, when major infrastructure works are done, the impact on the PT service should be kept as low as possible and also as stable as possible. It is preferable to maintain deviations on certain bus/tram routes as longs as possible, even if these deviations are not always the most optimal choices for a certain period of time during the project.

Lesson 2 – Harmonizing the objectives between different stakeholders
In this type of measures, many different stakeholders are involved. For a good participation between them, it is important to include them since the beginning of the project and to harmonise objectives. Also agreements on the financing and planning aspects of the measure should be made as early as possible. The relations between all stakeholders that were developed in the project can be useful as well for other projects in the future.

**Lesson 3 – Involve decision makers in the planning and design phase**

In order to ensure the implementation, the measures should be fitted in the local municipality policy. Within a long-term framework the political support for the measures/project must be clear and defined in advance. The involvement of technicians of transport in solution development is not enough to have the acceptance of their board of directors. It is important to promote actions to involve the board of directors in order to avoid working on a solution that is being accepted by technicians but not by the directors. Traffic modelling results can serve as a good basis for future projects and highlight the benefits of measure activities.

**Lesson 4 – Realistic timing for implementation and evaluation**

As this type of measures involve the participation of many stakeholders and the implementation of new systems, enough time should be foreseen for the implementation. Unforeseen technical issues and public opposition might arise that cannot be predicted in advance. Many large-scale measures in this work package could not be implemented during the four years of the project. This made impact evaluation impossible for some (sub)measures.

### 5.2.3. Work Package 3: Demand management

#### 5.2.3.1. Description

Demand management measures are developing in an increasing diversity and offer big potential to improve urban transport conditions. The following key objectives for this field have been defined in CIVITAS ELAN:

- Implementing 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

On city level the following measures were implemented within two key areas:

**Charging for access**

- Implementing a sustainable congestion charging scheme in cooperation with actors on national and regional levels (M3.1-LJU)
- Study of congestion charging and dialogue on pricing (M3.2-ZAG)

**Managing public space and access**

- Parking and public space management around main train station (M3.3-GEN):
  - On street parking policy (opening of a new, payable, underground commuter parking next to the train station and on-street parking limited in time)
  - Lower number of parking spaces for new building developments around the main railway station (implemented after ELAN)
- Pedestrian area enforcement with automatic number plate recognition (M3.4-GEN)
  - Installation of cameras for automatic number plate recognition
  - Development of new permit system for pedestrian area access (implementation in 2013)
- Integrated accessibility planning in Asprela quarter (M3.5-OPO)
  - Cycle lane network
5.2.3.2. Evaluation approach

Many of these measures were changed during the project, or will only be implemented after the end of the project. Therefore it was not always possible to evaluate the actual impact. For the measures on congestion charging, the possible impacts were assessed by a study/model. Only for some submeasures on public space and access the actual impact could be evaluated: on street parking policy (M3.3-GEN) and the partial implementation of the Asprela Circulation Plan (M3.5-OPO). For the other (sub)measures, the focus was on process evaluation.

5.2.3.3. Impact evaluation

The impact of demand management measures is mainly on the number of displacements of people and goods to (parts of) the city in general or using a specific mode. All measures showed that they have a strong capability of contributing to this both in the study analysis as in the real implementation. However in general the impact of this type of measures was rather limited in the CIVITAS ELAN project because of the limited number of implementations in the field. The studies on access charging simulated the impact of possible schemes and included surveys to learn about the acceptance level for such schemes. These surveys resulted in a better view on the reaction of the citizens.

Key result 1 – Diminished parking pressure

New parking regulations can have a strong impact on the parking pressure in an area. In this way the parking policy is an important demand management measure. A good example here is the implementation of new parking regulations around the main train station in Gent (M3.3-GEN) that decreased the number of parked cars in this zone by 11%. However, attention should be paid to possible side effects as in Gent the parking pressure increased in the adjoining neighbourhood, so a widening of this parking scheme to this area is being considered.

Key result 2 – Improvement of the multi-modal accessibility

If specific measures focusing on different target groups are integrated in a global approach of transport planning, a significant improvement of the multi-modal accessibility can be reached. A strong example is the Asprela Circulation Plan (M3.5-OPO) which was only partially implemented, but proved to be very effective. The mobility in the corridor was enhanced for cyclists, pedestrians and bus users. At the same time, parking spaces were reduced, leading to a decrease in illegal car parking.

Key result 3 – Differences in acceptance of congestion charging

In Zagreb most people accepted the idea of an eco-zone (M3.2-ZAG) already at the start of the project (62% of the citizens and 70% of the businesses). The acceptance level was further raised by comprehensive dissemination and citizens’ engagement activities. This was especially the case for business subjects, after realising that they could benefit from a congestion charging regime in a wider area (less congestion and faster delivery of their goods and potential for more customers). In Ljubljana however, the acceptance was a lot lower (between 20-30% in different surveys), and even further decreased (M3.1-LJU), mainly due to lack of interest and low participation in the organised dialogue events to discuss a possible congestion charging scheme with stakeholders, at local, regional and national level and to include citizens in the process. A possible explanation is that the traffic situation in the city improved and citizens don’t consider congestion charging as necessary.

Key result 4 – Access charging would have positive impacts on the liveability and air quality of cities

Both studies on congestion charging show that the implementation of such a system would result in better liveability and air quality of cities.
5.2.3.4. Process evaluation

In general the introduction of demand management measures seems to face two important barriers: limited acceptance by the citizens for changes in their travel behaviour and also technical problems because technological innovative systems are used. However citizens and politicians have a sense of urgency to limit the traffic in their city and can learn from successful experiences in other cities.

Barrier 1 – Lack of public acceptance towards fundamental measures

All measure from this WP faced some opposition from the public or politicians. For congestion charging schemes this can be explained by the financial impact that they impose to the citizens. For this reason, no congestion charging scheme was implemented in Ljubljana (M3.1-LJU). In Zagreb (M3.2-ZAG), lack of public support led to a more difficult communication with the citizens. Also measures that increase parking prices face political opposition, as was the case in Gent (M3.3-GEN). Compromises are needed here to find the right balances e.g. between the on-street parking and underground parking. Also in Gent, part of the city’s policy makers were strongly opposed to the use of cameras for access control in the pedestrian area (M3.4-GEN) out of fear of violation of privacy. In Porto, the new Circulation Plan (M3.5-OPO) was not accepted because of the opposition of the Paranhos Church turning the current two-way road to the cemetery into a one-way street.

Barrier 2 – Innovative systems in a real environment

Innovative systems that seem to work perfectly in a closed environment still have a lot of difficulties once implemented in a real urban environment. After the testing period, the functioning and technical quality of ICT systems (e.g. in Gent the pedestrian area enforcement system (M3.4-GEN) was functioning in an unsatisfactory way and led to a series of hardware and software modifications and thus extra delays.

Driver 1 – Sense of urgency

Traffic and air quality problems in the city are a strong driving force calling for action and an indisputable argument in favour for the debate about different restrictive measures to be implemented. In Ljubljana (M3.1-LJU) poor air quality is the main reason for the proposed implementation of the congestion charging scheme, but also congestion due to many construction sites in the city changes the perception of the citizens. Over 80% of the citizens of Ljubljana are aware of the problems that traffic generates. Also in Gent (M3.3-GEN), there is a growing awareness of the fact that parking management is a crucial factor towards a sustainable mobility.

Driver 2 – Availability of literature and best practice

Especially for demand management measures references to successful implementations and well-motivated analyses are crucial for cities to decide on the introduction of the measures and an adequate design of the measures. Both in Ljubljana (M3.1-LJU) and in Zagreb (M3.2-ZAG) examples from other European cities were used in the studies on congestion charging and the communication with the citizen.

5.2.3.5. Lessons learned

Lesson 1 – Need for an integrated approach involving the stakeholders

To achieve a positive impact from demand management measures they need to be in line with the rest of traffic policy: on-street and underground parking policies need to be aligned (M3.3-GEN), congestion charging is only relevant when the necessary alternatives to car traffic are available in the city (M3.1-LJU), transport planning is most effective when integrating different modes in a global approach (M3.5-OPO).

A wide range of stakeholders needs to be included to agree on common objectives and to ensure that the research covers different aspects and impacts, making it more complete and feasible. In the case
of the study on congestion charging in Zagreb (M3.2-ZAG), this meant investigating the impact in the field of traffic and transport, economy and ecology. To raise awareness on a sustainable parking policy in new project developments in Gent (M3.3-GEN), discussions with the involved departments and project developers were important. For the access management in Gent (M3.4-GEN), the police needed to be involved as they were concerned with their workload after the implementation of the camera system. In Porto (M3.5-OPO), it was important to involve the transport operator, inhabitants, major institutions and local political representatives.

Lesson 2 – Strong political support needed

Demand management measures generally face a lot of resistance from the citizens because of the expected financial impact (parking policy and congestion charging) or the impact on privacy (access cameras). Acceptance may increase by informing citizens about the full set of benefits of the measure. Nevertheless, it is very difficult to implement demand management measures without strong political support. A congestion charging scheme just based on the approval by citizens is not possible; strong political support is necessary as well.

Lesson 3 – From transition experiments to wider up-scaling

Smaller demonstrations can show the benefits of demand management measures convincing politicians and citizens to implement similar approaches in the rest of the city. In Porto the municipality is pleased with the changes in the Asprela area and it already started to prepare a plan to extend the cycle lane network from the Asprela quarter to the city centre. Also, some of the innovative aspects from the circulation plan will be up-scaled to other areas of the city, such as the time of passage of pedestrians at crosswalks and the so-called “clean phase” which eliminates conflicts between the passage of pedestrians at crosswalks and turning vehicles. As a consequence of the work in ELAN, a lot of thinking about parking management within new projects has become a hot policy issue in Gent. In the next few years, next to the main train station area, many new developments are being planned in the inner city. Sustainable development is becoming the key word within all these developments. Parking restrictions are an essential element in this discussion: clustering parking spaces, combined use of parking, intelligent pricing methods and the integration of car sharing schemes within these developments are all topics in planning new projects.

Lesson 4 – Congestion charging schemes differ for each city

The size and structure of the city in relation to its environment determines the type of charging scheme. The most suitable congestion charging scheme for Ljubljana would include (a) the introduction of a new City vignette for the entire urban area within the ring and (b) the introduction of a workplace tariff to be paid by employers offering free parking places for their employees. A classic cordon scheme would be inappropriate because the city is too small for the introduction of a large cordon system to operate on 31 entrance point on the circumference of the ring. The inner city centre is already closed for cars, but the existing free parking facilities within the city ring are the main driving force for the prevailing car use.

In Zagreb, the proposed solution consists as well of introducing an indirect model of billing (vignettes) for the use of traffic infrastructure. The main difference with the proposal in Ljubljana is the area where it is implemented: the eco-zone is actually a 2 km$^2$ area located around the main square. Drivers would have to pay a vignette before entering this zone (each vignette would be valid for one year). This difference in area might be explained by the difference in size between both cities.

5.2.4. Work Package 4: Influencing travel behaviour

5.2.4.1. Description

Human behaviour is a key determinant for urban transport. CIVITAS ELAN had the following objectives within the area of 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
CIVITAS ELAN implemented innovative measures on city level to influence travel behaviour in three complementary ways:

Establishing a mobility dialogue with the citizens

- Individualised mobility marketing (M4.1-LJU)
  - Large scale mobility marketing (brochure)
  - In-depth face-to-face mobility marketing (interview)
  - Mobility Shop
- Update of the Sustainable Urban Transport Plan (M4.9-LJU)
- Comprehensive mobility dialogue and marketing campaigns (M4.10-GEN)
  - Campaigns targeting local residents, cyclists, employees, etc.
- Comprehensive mobility dialogue and marketing (M4.11-ZAG)
  - CIVITAS Info Point
  - Support for dissemination and citizen engagement to other measures
  - Large-scale survey
- Comprehensive mobility dialogue and marketing research (M4.12-BRN)
  - Integrated yearly PT survey (Transport Barometer)
  - Development of new transport plan
- Integrated Mobility Centre (M4.13-BRN)
- The Mobility Shop (M4.14-OPO)
  - Mobility Shop
  - Mobility website
- Sustainable Electromobility Plan (M4.15-LJU)

Mobility management towards specific target groups

- Mobility management for companies (M4.2-GEN)
- Mobility management for schools (M4.3-GEN)
- Mobility management for large institutions (M4.4-ZAG)
  - Companies & university students

Making walking and cycling more attractive

- “The House of Bike” and bicycle activities (M4.5-GEN)
  - Bicycle website
  - Bicycle sheds (bins & boxes)
- Comprehensive cycling strategy (M4.6-LJU)
  - Comprehensive Cycling Strategy (implementation after ELAN)
  - Cycling related stakeholder workshops
  - Cycling website with interactive cycling map
  - City Cycling Platform
- Walking promotion (M4.7-GEN)
  - General walking campaign
  - Functional walking map
- Improving cycling conditions (M4.8-ZAG)
  - Development of a Cycling Master Plan
  - Introduction of parking spaces for bicycles
5.2.4.2. Evaluation approach

Evaluation of the measures aiming to improve mobility management and mobility marketing (M4.1-LJU, M4.2-GEN, M4.3-GEN, M4.4-ZAG and M4.11-ZAG) consisted mainly of measuring the modal split before and after the mobility management campaign. In Gent, this was complemented by the participation of students and employees in the campaign and their awareness on sustainable mobility. In Ljubljana the willingness to change travel habits was added to the survey, as no positive modal shift was observed due to the timing of the survey.

The evaluation of mobility shops (M4.1-LJU, M4.13-BRN, M4.14-OPO) focuses on recording user numbers, type of requests, user satisfaction, and if relevant, ticket sales in the mobility shop.

For the development of strategies towards sustainable development (M4.6-LJU, M4.8-ZAG, M4.9-LJU, M4.12-BRN, M4.15-LJU), the focus is on process evaluation, as the impact will only be visible after ELAN. Only for the transport plan developed in Brno (M4.12-BRN), the ticket sales, acceptance and satisfaction with PT are evaluated, although this is also influenced by other factors.

Measures that are aimed at the promotion of walking and cycling (M4.5-GEN, M4.6-LJU, M4.7-GEN) combine the promotion by dissemination campaigns, for example websites, as well as making walking more attractive by infrastructural changes on the field. The different activities are mainly evaluated by the usage and awareness of the new services. In Ljubljana, this is also complemented by the cycling rate and the safety of cycling in the city, although it needs to be mentioned that this is not solely affected by the CIVITAS measure.

5.2.4.3. Impact evaluation

The different measures approached the citizens in a complementary and successful way:

- having a general discussion with citizens and stakeholders on their travel habits and on the way the city should solve mobility related problems in a sustainable way
- approaching specific target groups presenting them clear appropriate alternatives for their travel needs
- taking specific smaller initiatives to make walking and cycling more attractive and to improve the image

Although the impact of the measures on travel behaviour could not always be measured in direct relation to these measures, a significant increase in the level of awareness of the need for a sustainable development of their city was significant in all of the CIVITAS ELAN cities. This changed attitude can also be a strong basis for future steps towards sustainable solutions. Of course this is not only due to the measures mentioned here but also due to the implementation of infrastructural and organization changes in the transport offer and due to external factors such as the financial crisis and environmental and climate changes.

Key result 1 – Increased level of awareness for the need of sustainable mobility

During the CIVITAS ELAN period the awareness of the mobility problems and the need for more sustainable solutions increased in all cities. More and more people were involved in public events related to CIVITAS ELAN. For example in Zagreb, thanks to various awareness raising activities, more citizens and business subjects agree that issues like delivery traffic, public transport and congestion charging should be part of an integrated traffic policy package. Only in Gent, the increase in awareness was less visible, since the city already had a strong tradition in this field and awareness levels were already very high. Here ELAN kept sustainable mobility on the agenda. 50% of the interviewees agreed that they received enough information about mobility changes and plans.

Mobility marketing campaigns, especially when they focused on specific target groups or on the specific needs of the individual citizen, increased the awareness on the need for sustainable mobility solutions. In Ljubljana 19,2% declared explicitly that they will change the travel habits because of individualised mobility marketing (M4.1-LJU); a good 50% have declared that they are reconsidering their mobility behaviour in the future. However, this change in behaviour is not reflected in the modal
split data for the short period between both measurements and unfavourable weather conditions during the campaign. In Gent (M4.10-GEN) the success of different campaigns varied but most of them were positive making citizens more aware of sustainable mobility (up to an increase of 27% in the cycling campaign). Also modal split changes were observed, e.g. up to 8% shifted to a more sustainable mode after the campaign “Our department is moving”.

**Key result 2 – Increased satisfaction with information on public transport**

In Zagreb (M4.11-ZAG) various communication mechanisms to communicate with the passengers about the improvements in public transport increased their satisfaction with the dissemination of PT related information. In Brno the satisfaction level among the passengers increased significantly during the project, both in general and for specific aspects of PT. Most of Brno’s citizens regard the transport information accessible and satisfactory and only a minor group of people (3%) has problems in finding transport information. The update of Transport Plans (M4.12-BRN) is much better known than the newly built Integrated Mobility Centre (M4.13-BRN), but this is explained by the fact that at the moment of the survey, the IMC has been open only for one year, whereas the transport plans were updated regularly for several years. Also the general satisfaction level among PT users increased significantly.

**Key result 3 – High popularity of the mobility shops**

In nearly all cities, a centralised information point was established. High visitor numbers indicate that there was surely a need for this type of information.

- In total 21,630 people visited the CIVITAS ELAN info point in Zagreb (M4.11-ZAG). This supported other dissemination tasks within specific measures.
- In Ljubljana, the number of visitors to the Mobility Shop (M4.1-LJU) exponentially increased from February to July 2012, but this can be in the first place attributed to the increased rate of tourists in Ljubljana. On average 600-700 local visitors are recorded per month. Most visitors are very satisfied with the services provided.
- The Integrated Mobility Centre (IMC) in Brno (M4.13-BRN) was visited by 9,320 people since its opening in September 2011 until the end of August 2012. 60% of the questions are on transport. Average ticket sales in the IMC in 2012 amounted to 643 tickets per month.
- In Porto, the Mobility Shop (M4.14-OPO) is visited by 1,100 persons per month on average. There was an increase in the number of visitors after changing the design of the Mobility Shop in May 2011, and there was a peak at the beginning of the new school year in September 2011. Visitors request mostly information about the transport operator and are very satisfied with the services offered in the Mobility Shop.

**Key result 4 – High number of website visitors**

In Gent (M4.5-GEN) and in Ljubljana (M4.6-LJU), a website was developed that combines all information related to cycling. In Gent, on average, more than 4,000 website visits were recorded per month, especially citizens and cyclists are familiar with the website, rather than students. In Ljubljana, a total of 6,820 unique visits of the webpage have been recorded since the implementation of the website in April 2010, which can be seen as a success as well, given the smaller number of cyclists in Ljubljana than in Gent. Also the number of visitors of the Mobility Shop website in Porto (M4.14-OPO) keeps on rising, with 870 visitors in May 2012.

**Key result 5 – Mobility management for companies changes travel choices**

In Gent the mobility campaigns and the introduction of the mobility plans (M4.2-GEN) created a modal shift towards more sustainable transport modes of over 5% for some companies. Most approached companies ended up with a company travel plan or are working at it. In Zagreb, an increase of 11.5% in the share of sustainable transport modes for employees was recorded (M4.4-ZAG).

**Key result 6 – Mobility management for schools creates awareness and reduces car usage**

In Gent 51% of students were aware of the mobility campaign (M4.3-GEN) and 36% of the questioned students participated in the activity. 38% of the interviewed students were familiar with the concept of sustainable mobility. The campaigns resulted in an increase of sustainable transport modes in the modal split of the students, mainly for public transport, whereas a decrease of more than 5% in the use of car has taken place. However, the results also differ from school to school and class to class. In Zagreb, an increase of 3% in the share of sustainable transport modes for students was recorded, resulting in a total share of 91% (M4.4-ZAG).
Key result 7 – Secured bicycle bins fill in a real need

Before the implementation of secured bicycle bins, almost 70% of the citizens of Gent (M4.5-GEN) were interested in the implementation. As a result, most bicycle bins are completely rented and the city decided to order 20 additional bicycle bins. Citizens are willing to pay a maximum renting price of 5€ per month per bicycle. However, citizens are reluctant to have a bicycle bin in the close vicinity. This unwillingness disappears once they have used the bicycle bin.

Key result 8 – More specific use of bicycle boxes

The success of the bicycle boxes in Gent (M4.5-GEN) took some time, but after a relocation of some boxes, 20 of 25 bicycle boxes are rented. Familiarity with bicycle boxes is lower than familiarity with bicycle bins, which can be explained by the fact that bicycle boxes aim at a more specific target group, commuters who park their bicycle and switch to their car or public transport in their commute trips. Also for this type of bicycle sheds, complaints rose from citizens living in the vicinity of the boxes, arguing that the bicycle boxes occupied too many parking places for cars.

Key result 9 – Stakeholders satisfied with cycling workshops

Cycling workshops can help in an effective way to show citizens and stakeholders the possibilities and advantages of cycling. In Ljubljana a satisfaction of over 80% was observed with the cycling related workshops (M4.6-LJU). The only exception is observed for the training workshop for the city officials regarding cycling related issues and citizen engagement where only 25% of respondents indicated that the goals were met.

Key result 10 – Promotion activities sometimes increase cycling

The different measure activities to promote cycling in Ljubljana (M4.6-LJU) have contributed to a general increase in cycling in the corridor and city wide. Bicycle counters have recorded significant increases and the results of the modal split analysis confirm this increase in cycling. Moreover, the number of accidents involving cyclists has decreased by almost 20%.

In Gent, the various promotion campaigns of cycling (M4.5-GEN) contributed to a more positive attitude towards cycling among the target groups. On the other hand, no increase in the number of cyclists was measured, but this could be related to the short incubation time after the road works (M5.6-GEN).

Key result 11 – Improved walking infrastructure does not immediately increase number of pedestrians

The redesign of sidewalks in the corridor (M4.7-GEN) contributed to the achievement of a better walking infrastructure. 1km 146m of sidewalks have been redesigned. The impact of the infrastructure works and the promotion campaigns on the number of pedestrians remains questionable, as the results are strongly influenced by the closure of a tram stop nearby the pedestrian counting points. Reconstruction works in the corridor also negatively influenced the attitude towards walking.

5.2.4.4. Process evaluation

Changing the travel behaviour of citizens cannot be done only by marketing and citizen engagement activities. In any case there is a strong link to the real possibilities to travel with sustainable modes which makes the success of these measures also dependent on infrastructural measures, organizational changes and specific improvements for cycling and walking. Delays in the implementation of these measures make it difficult to influence travel behaviour.

Additionally, approaching citizens and convincing citizens of new ideas is not easy since citizens are not used to this. They have a lot of other concerns in life and politicians are often afraid of a strong interaction with the citizens.

On the other hand many drivers supported the initiatives to change the travel behaviour of citizens, such as strong interest of target groups, cooperation of stakeholders, media support, etc.

Barrier 1 – Insufficient sustainable transport possibilities

When the transport possibilities do not correspond to the needs of the target groups it is difficult to change their transport behaviour. Since there were many delays in the implementation of measures in
the corridor in Ljubljana, the Mobility Marketing Campaign (M4.1-LJU) faced the problem of content of “what to market”. In Gent, the current timetables and infrastructure of the public transport was not always adapted to home-work travel, so it was difficult to influence travel behaviour of the employees by a mobility management campaign alone (M4.2-GEN).

**Barrier 2 – Dependency on other departments/stakeholders for infrastructural works**

Often, the implementation of the measures required infrastructural works that needed to be carried out by other parties. For example, several departments of the city of Gent who had to give permits to install bicycle bins (M4.5-GEN) were not convinced of the benefit of the project. The Measure Leader had to do lots of efforts to convince them to continue the project. Also for the pavement works in Gent (M4.7-GEN) it remained difficult to influence the planning of the different departments and external companies so that the actual implementation of the small infrastructure works was delayed severely.

Also the construction of the mobility shops was delayed because of the dependence on other actors: the IMC in Brno (M4.13-BRN) was delayed due to the fact that it was a part of wider project of the reconstruction of the city centre and the Mobility Shop in Porto (M4.14-OPO) was delayed because the original location seemed not feasible and a new location had to be sought.

**Barrier 3 – Financial crisis**

The current financial crisis makes companies more reluctant to invest in sustainable mobility. This was overcome in Gent by informing the companies on the possibility of getting a 50% subsidy of the Flemish government for investments related to solving mobility issues (M4.3-GEN). The recession-tailored budget significantly reduced finances for cycling development activities in Zagreb as well and caused the cancellation of many cycling-related activities (M4.8-ZAG).

**Barrier 4 – Difficult to reach the target group**

Some target groups are difficult to reach. For example in Gent, it was especially difficult to reach car drivers, which resulted in a low interest in the campaigns “Our district is moving”, “Our street is moving” and “I keep moving, even without my car”. When the Mobility Shop in Porto (M4.14-OPO) was just implemented, the citizens did not know what kinds of services were provided. This became clearer after changing the exterior design of the Mobility Shop.

**Barrier 5 – No tradition in citizen engagement**

Most of the cities did not have a strong tradition in involving the citizens in decision-making processes. From various public events it was evident that citizens in Zagreb feel distrust and lack of confidence regarding their possible proactive role in mobility dialogue and planning. This leads to a low level of citizens' interest for mobility dialogue (M4.11-ZAG) because they feel that they cannot have any influence on decisions.

**Barrier 6 – Lack of political support**

Political support is crucial for the implementation of the project, especially for the approval of strategic documents. Especially in Zagreb and Ljubljana this support was not always present. Various reasons were observed:

- Cycling is still not considered as a transport mode equivalent to car use (M4.6-LJU & M4.8-ZAG). This automatically leads to a limited budget for improving cycling conditions and insufficient understanding of user requirements for cycling infrastructure. The urban cycling NGO community in Ljubljana has little influence on the administrative processes.
- Lack of ownership of the project: during the first months of the project, a low level of interest of higher city officials for project activities led to delays in decisions in Zagreb (M4.11-ZAG). Also the SUTP (M4.9-LJU) in Ljubljana was considered as a CIVITAS ELAN measure, not as a policy document by the city administration itself.
- No tradition in comprehensive SUTP (M4.9-LJU) but rather an emphasis on hard measures. Therefore the SUTP approach is hard to understand and accept by the stakeholders.

**Driver 1 – Growing awareness of stakeholders and citizens on mobility problems**

Many stakeholders started realising that a change in mobility behaviour is needed. In Ljubljana, public awareness of problems related to public and individual transport in the city increased after informing 2,000 individuals about good practices (M4.1-LJU). Also many companies and their employees realize that something has to change on mobility because the traffic gets too busy in the area (M4.2-GEN).
The development of a Comprehensive Cycling Strategy has also benefited from the increased awareness and fear of EU sanctions for polluted air.

**Driver 2 – Integration with other plans/measures**

The promotion of walking (M4.7-GEN) is integrated in the existing “Pavement Plan” of the Road Department of GCC. The improved cooperation with this department helped improving the pedestrian infrastructure. The bicycle website (M4.5-GEN) was also integrated in other measures, so these other Measure Leaders also promote the use of the website by sharing their news and activities. The bicycle website will be completely integrated in the future website of the Gent Mobility Company as a digital information platform which centralizes all mobility-related information in Gent.

**Driver 3 – Direct involvement of participants.**

The target groups were directly involved in the mobility management campaigns. By organising a brainstorming session to conduct a bottleneck analysis (M4.3-GEN), all the pupils of the class or pupils’ council could give their view on the mobility issues they experience when they travel to school. They were further motivated by the opportunity of winning a prize to implement their idea in reality. Employees were encouraged to volunteer in the mobility campaigns as well (M4.2-GEN). When they got the chance to organise mobility-related events themselves they were more involved. Furthermore, there were a few companies willing to take the lead in discussing mobility issues with their neighbour companies. The input of employees was crucial for the development of transport plans and for shaping the structure and defining the topics of public events (M4.4-ZAG). Also for the development of plans on a higher level, such as the Comprehensive Cycling Strategy in Ljubljana (M4.6-LJU) and the Sustainable Electromobility Plan (M4.15-LJU), useful suggestions of citizens were taken into account.

**Driver 4 – Personal guidance**

Personal guidance is a crucial element in the whole process. Due to health problems of the first Measure Leader this was lacking during the first two editions of the mobility management for schools (M4.3-GEN). But the good personal guidance of the Measure Leader in the school year 2011/2012 made the competition very successful. She helped schools finding inspiration for a campaign or action in what they learn at school.

**Driver 5 – Media support**

The mobility management for large institutions (M4.4-GEN) was complemented by TV and radio interviews with the Measure Leader. This triggered the increased usage of the web portal for carpool arrangements and also a wider target group was reached more easily. Media attention showed also to be a big motivation for the students in Gent (M4.3-GEN).

5.2.4.5. **Lessons learned**

**Lesson 1 – importance of recognizing the complementarities of different measures**

Mobility management activities and activities providing new transport services in the field are complementary. On the one hand, mobility management campaigns aiming at changing travel behaviour are only effective when supported by a transport system that answers the transport needs of the targeted individuals. On the other hand, mobility marketing is necessary to make people aware of new transport services. For this reason, it is difficult to distinguish the impacts of these complementary actions.

**Lesson 2 – Guidelines to organise successful mobility campaigns**

To organise successful mobility campaigns, a number of recommendations can be formulated:

- Repeat mobility campaigns yearly, but be creative and not just copy the campaign of the previous year
- Leave enough time for the participants to adopt the measures that would lead to changed travel habits
- Approach citizens during a key moment in their life
- Use a personal approach
- Use a peer-to-peer approach to enthuse them for the sustainability and continuation of the action by giving employees the chance to contribute to the actions themselves
- Define clear target group (but it stays difficult to reach car drivers)
- Use a clear message
- Cooperate with companies at the same location to set up a common mobility plan
- Make use of media support

**Lesson 3 – Improved knowledge of travel options by mobility campaigns**

Mobility management and marketing campaigns are good ways to improve the insight in the travel options with sustainable transport modes.

**Lesson 4 – Websites and in general ICT based communication means allow to provide up-to-date information material**

Websites are a good way to provide information on a topic such as cycling. It is important that the website offers up-to-date information on cycling and cycling events so that frequent visitors remain visiting the website and new visitors are attracted. Its success can be further enhanced by integrating a bicycle route planner or interactive cycling map. Also a walking map needs to be constantly updated.

**Lesson 5 – Continuous promotion needed**

Promotion of walking and cycling as a sustainable transport mode cannot be based on a single event, but it requires a continuous effort. This can be done by other measures stimulating walking and cycling. Target groups have to be additionally encouraged to participate in the forums or submit their suggestions and it is important to target also persons who don’t use the bicycle yet.

**Lesson 6 – Consultation of the public results in valuable information to learn on the changes in attitude and to convince stakeholders on the importance of measures**

As citizens’ input can be very helpful in shaping measure activities, it is recommended to include citizens into the early phase of project implementation. Surveys can provide a large amount of useful information on citizens’ needs and preferences on a range of topics. Replication over time allows for deeper comparisons concerning satisfaction and acceptance of PT. Survey results can also be used to convince other measure partners on the usefulness of a measure. Their input provides also useful information on mobility issues that they are facing, which can help to encourage them to change their behaviour.

**Lesson 7 – Long term impact of transport strategies**

The results of the implementation of the strategies will not be evident during ELAN project lifetime, as the proposed actions are long-term oriented. The different strategies in Ljubljana (M4.6-LJU, M4.9-LJU and M4.15-LJU) are not approved separately in the city council, but the draft SUTP encouraged the city to create a separate transport strategy, adopting several elements/topics from the different strategies. Furthermore, the SUTP draft has reached a common understanding on the concept of an SUTP among the stakeholders and the methodology behind the preparation of such a document.

### 5.2.5. Work Package 5: Safety, security and health

#### 5.2.5.1. Description

Safe and secure mobility for all citizens is an elementary part of urban transport. The five CIVITAS ELAN cities were convinced that vulnerable groups such as children or older people need special attention, and it was a clear aim of all cities that their citizens feel well at any place in the city at any time. In that way, enhanced safety and security are crucial in order to guarantee accessibility and mobility of all users. The objectives for CIVITAS ELAN in this field were the following ones:

- Developing integrated & target-group specific safety and security strategies
- Increasing road safety (especially for vulnerable road users)
- Improving security in Public Transport

On city level the following measures were implemented in three thematic areas to enhance safety, security and the health of citizens:

**Developing integrated & target-group specific safety/ security strategies**

- Safety & security for seniors and PT users (M5.2-LJU)
- Video surveillance system
  - Driver training on video surveillance system and on needs of elderly
  - Training to elderly people

- Safety & security for seniors and pedestrians (M5.3-ZAG)
  - Training for seniors to use PT

Increasing road safety

- Safe routes to schools (M5.4-LJU)
  - Web portal with safe routes to school
  - Traffic warden service
  - Measures to reduce speed near schools

- Reduced speed zones (M5.5-LJU)
  - Reduced speed zones
  - Extension of pedestrian area

- Safe cycling corridor (M5.6-GEN)
  - Cycle street
  - Improvement of cycling routes in the corridor

Improving security in Public Transport

- Security enforcement in PT (M5.7-GEN)
  - Trained controllers on PT
  - Educational Trammelant programme in schools

- Security enforcement in PT (M5.8-ZAG)
  - CCTV cameras in PT vehicles
  - Improved information on incidents
  - Driver training

A common measure is dealing with “Comprehensive safety and security strategies” (M5.1-COM). This created a platform to exchange ideas and experience in different workshops.

### 5.2.5.2. Evaluation approach

Key indicators for this work package are the number of incidents as referring to the objective aspects of safety and security and the perception and awareness levels referring to the subjective elements.

### 5.2.5.3. Impact evaluation

Most implemented measures actually contributed to a better safety and security climate. Especially measures focusing on elderly and youngsters were successful, like the Trammelant approach in Gent. Also cameras in public transport showed mostly positive results.

**Key result 1 – Significant decrease in number of PT incidents by an innovative educational approach**

After the implementation of the educational programme Trammelant (M5.7-GEN), the number of documented incidents with youngsters in the area of the involved schools decreased by more than 50% on average, even though the total number of incidents with youngsters in the rest of the city has
increased. Furthermore, the involved controllers stated that often they see the positive impact of the project when they are doing control activities asked for an intervention for an incident in the neighbourhood of a Trammelant school. Due to the fact that the youngsters know the mission of the controllers or that they recognise the involved controllers it is easier to intervene and do their job. There is a mutual understanding and respect.

Key result 2 – Cameras in public transport vehicles decrease incidents and raise safety feeling

After the implementation of CCTV cameras in PT vehicles (M5.8-ZAG), significant improvements of the security in PT were observed: a decrease of 40% of damaged vehicles, a decrease of 35% in number of attacks on ZET employees and a decrease of 55% in the number of attacks on ZET bus drivers. This led also to an improved public perception on the security inside the vehicles.

Also in Ljubljana, surveillance cameras were installed in public transport vehicles (M5.2-LJU). As a result, the number of solved damage claims and vandalism costs decreased. This justifies the investment cost of the cameras. Yet the number of reported injuries and the number of complaints by PT users increased during the project. However, the number of praises shows an even higher increase, so this suggests rather an increased awareness on safety and security and a more open communication with the PT operator.

Key result 3 – Higher satisfaction with safety by senior PT users

After the training programme in nursing homes (M5.3-ZAG), senior PT users were more satisfied with the subjective feeling about the safety in PT, the level of safety during boarding and alighting, driving style and the level of safety during the ride. Also a significant decrease in the number of accidents and injuries was observed, although this is affected by other improvements in the PT system as well.

Key result 4 – Decrease in traffic speed:

By implementing traffic safety measures near schools and a traffic warden service (M5.4-LJU), the average speed at the majority of measuring points decreased by up to 20%, which contributes positively to increased transport safety. Also the acceptance of the safety measures has increased; mostly the speed radars, signalisation and volunteers are well accepted by the parents and traffic school safety mentors. But despite these improvements, the “zero injured pupils” objective was not reached.

Key result 5 – Increased safety in reduced speed zones

Reducing speed limits (M5.5-LJU), complemented by radar control, resulted in a reduction of the average vehicle speed by 12% or 5.2 km/h in reduced speed zones. The results show that the reorganisation of motorised city streets into a pedestrian area also contributed significantly to the improvement of safety in the city centre, as a reduction by 33% in minor injuries was observed. However, the number of accidents involving cyclists increased, but these are generally less serious than car-related accidents. The majority of the surveyed stakeholders have praised the general improvement of the image of the city, public transport, new traffic arrangements, lower noise levels, air quality and positive attitude they have regarding the changes, the only downsides that were perceived are the reduction of parking spaces and freight delivery services.

Key result 6 – Strong public support for the ‘cycle street’ concept

Strong support exists among residents of the Visserij, the street that was redesigned as a cycle street (M5.6-GEN). The implementation of the cycle street clearly encourages cycling. The number of cyclists has increased by 36% between 2010 and 2012. Nevertheless, cyclists raised several aspects that can be improved. For example, it needs to be better communicated to cyclists that they are allowed to cycle in the middle of the street even when a car approaches and bad application of the red coating. The success of this first cycle street has resulted in an official integration of the cycle street concept in the Belgian traffic regulations.

Key result 7 – Improved cycling infrastructure

The redesign of cycling lanes in the CIVITAS ELAN corridor (M5.6-GEN) contributed to the achievement of a better cycling infrastructure. More than 2km of cycling lanes have been redesigned and more than 2km of additional new cycling lanes were constructed. But despite these improvements, no increase in the number of cyclists could be measured. This can be related to the bad weather and a too short incubation time.
5.2.5.4. Process evaluation

Although safety and security measures are generally well accepted, implementation is not always easy because of administrative regulations and high costs. In many cases implementation of a good solution is not allowed by the existing infrastructure or the practical environment.

However it was a clear CIVITAS ELAN observation that a strong participation of citizens and involvement of stakeholders can contribute a lot to the improvement of the safety and security climate and it makes also the implementation of measures easier and much more acceptable.

Barrier 1 – Complex administrative and institutional procedures

Some improvements to the safety and security are difficult to implement because of the administrative and institutional procedures that have to be followed. This concerns the limited usage of the surveillance camera records in case of violence (M5.2-LJU), prosecution of vandals (M5.2-LJU) and spatial restrictions for improvements of public transport stops (M5.3-ZAG). The majority of the areas where speed was reduced (M5.5-LJU) is near to a river, and permits on a national level were required.

Barrier 2 – Financial restrictions

A number of measures in this work package were facing financial restrictions that led to changes during measure implementation. In Zagreb, instead of installing a CCTV system on PT stops (M5.8-ZAG), the system was installed in 40 additional trams. It is believed that a greater impact on public perception could have been possible if the CCTV system would have been installed on PT stops as well.

Barrier 3 – Dependence on road layout

Some safety measures on particular school routes (M5.4-LJU) could not be implemented because the existing spatial situation did not allow this.

Barrier 4 – Strong initial opposition by stakeholders

During the extension of the pedestrian area (M5.5-LJU) there was a strong opposition from residents and shop-owners. To increase understanding of the impacts of the measure, individual discussions were needed with them. Furthermore, City wardens were attacked for issuing parking penalties in reduced speed zones. To deal with this, security guards were appointed for accompanying the wardens and self-defence lessons for the city wardens were organised.

Driver 1 – Dissemination and citizen engagement

Organized workshops, meetings, conferences and activities on the subject helped to accelerate the preparation of the safe route maps on the web portal (M5.4-LJU). Citizens were also asked to give their input on the quality of the cycle lanes in Gent (M5.6-GEN) through a publication of a call to all citizens in the city magazine and on the city website. By consulting the public, new and less known “cycling problems” rose to the surface. In the winter of 2011, the Gent City Council also organized a campaign to promote cycling even in winter by distributing gloves. In return, cyclists had to answer several questions on cycling in winter.

Driver 2 – Positive feedback from stakeholders

The Trammelant project (M5.7-GEN) is well appreciated at schools, local media, and employees of the PT company (drivers and controllers). There is no problem in finding schools to participate in the project. In Zagreb, the public events and communication with the target group of elderly people (M5.3-ZAG) established a good relationship between the stakeholders, which motivated elderly people to take an active role in the measure and raised the public acceptance of new systems that were introduced in public transport. Since the installation of the cycle street (M5.6-GEN), the number of cyclists has increased. As a result of this, the concept of the cycle street was officially integrated in the Belgian traffic regulations. After the implementation of the pedestrian area in the city centre (M5.5-LJU), the public acceptance increased significantly. The new public spaces that were created are very well accepted by the public. The majority of city’s events now take place in these areas.
5.2.5.5. Lessons learned

Lesson 1 – Improving safety is a continuous process

Even though the safety measures undertaken within this work package have significantly improved the safety situation in the cities, more efforts are needed to completely eliminate accidents. This applies to the different target groups (elderly, students, cyclists). This points to the fact that the measures should be continued, extended to other parts of the city, other target groups, etc.

Lesson 2 – Successful innovative citizen engagement activities towards specific target groups have a high potential for transferability

Some concepts for citizen engagement activities that were implemented in this project have a large potential for replication. One of the main success factors is that they are targeted towards a specific target group, such as pupils or elderly. The concepts of the Trammelant educational campaign and the web portal for safe routes to school are taken up by other cities.

Lesson 3 – Complementarity of measures

In order to effectively increase safety and security in public transport, it is important to implement a range of measures, combining infrastructural measures like cameras and new vehicles and dissemination activities like trainings for drivers and users. Parallel improvements of safety and security conditions maximize individual measure effects, especially regarding the public perception. This of course requires coordination between different institutions which might be responsible for measure implementation on the local level.

Lesson 4 – Involve citizens

Citizens can be a valuable driving force for the implementation of the measure: consulting the public provides a better insight in the needs of the target group and they can cooperate in the operational phase, like a volunteering service. Therefore, it is useful to put continuous efforts in involving them. The reaction of inhabitants of the pedestrian zones and shopkeepers in the pedestrian area in Ljubljana had a rather negative opinion about the pedestrianisation at the beginning. Already during the construction and due to meetings with stakeholders it started to change. When the construction was finished the reactions of inhabitants and all other are now very positive.

5.2.6. Work Package 6: Innovative mobility services

5.2.6.1. Description

To make use of the combination of the advantages of individual and public transportation in urban transport solutions, the five CIVITAS ELAN cities wanted to establish new and innovative links between the different modes and wanted to encourage responsible car use and car free lifestyles. Three specific objectives in this area were envisaged by CIVITAS ELAN:

- Implementing flexible demand-responsive mobility services and agencies
- Developing car sharing concept further
- Providing a coordinated response to major events

The following measures were implemented:

- Demand responsive services (M6.1-LJU)
  - Study on transport needs of disabled people
  - Implementation of a tracking and communication system (equipment and software) as a tool for expressing service demand
  - Electric vehicle KAVALIR as an on-demand connection between the pedestrian zone and regular bus lines for elderly and people with walking difficulties
- Innovative car sharing (M6.2-GEN)
  - Installing new car sharing stations in the ELAN corridor for local residents
  - A pool card system for businesses
- New communication tools to promote car sharing
  - Holistic event management (M6.3-GEN)
    - Internet-based tool to manage all of the mobility information on upcoming events and to organise holistic event management
    - Promotion campaigns to promote free travel advice, specifically aimed at individual visitors of cultural events
    - Accessibility sheet and mobility plans for event organizers and event location managers
  - Flexible Mobility Agency (M6.4-OPO)
    - Carpooling agency, i.e. a web-based platform and a web forum, that allows users to find other users for a joint ride and to share their experiences with the system
    - DRT for the night bus service in the area, connecting the two main academic centres
    - Promotion of carpooling and the DRT service through specific marketing campaigns
    - Bike rental system (discontinued)

5.2.6.2. Evaluation approach

The main indicators were the number of people that make use of the mobility service. If relevant, also satisfaction levels were recorded.

5.2.6.3. Impact evaluation

A high variation in the success of this type of measures was observed. Services that fill in a specific, well-defined need, e.g. transport in the pedestrian area of Ljubljana or carpooling for companies in Gent, were very successful. Measures that didn’t have a strong added value to existing services or travel possibilities have a weaker score, e.g. the demand responsive services in Ljubljana.

Key result 1 – Varying success of demand responsive services

In Porto a strong marketing campaign revealed that 73% of Asprela commuters knew about the DRT service (M6.4-OPO) and 28% used the service. 1,106 passengers were transported, with an average of 26 passengers per night. In Ljubljana the number of users of the KAVALIR service (M6.1-LJU) offering on demand transport in the pedestrian area increased significantly and user satisfaction was very high since its implementation (88.4%). On the other hand, although extra impaired citizens used the PT features for the impaired people in Ljubljana (M6.1-LJU), not many of them registered for the demand responsive software system (M6.1-LJU).

Key result 2 – Carpooling not so successful

In Porto a large number of carpooling members (M6.4-OPO) were achieved due to a good marketing campaign. But only four trips were shared. People use the website as a network and not as a platform for planning trips. One of the reasons for this is the fact the citizens in Porto are not used at all to travel together in a car with people they do not know.

Key result 3 – Strong growth of car sharing

The car sharing company cambio has a strong growth of car users, cars and car sharing stations, although the relative growth during the project is somewhat lower compared to the years before ELAN. However, the trial offer (M6.2-GEN) can be seen as a success story, as in each trial period, the number of new users increased more than the usual growth rate of cambio. Also the poolcard system for companies is a huge success: 27 new companies or around 11% of the contacted companies joined the poolcard system which brings the total on 170 poolcards in Gent.

Key result 4 – Increased awareness, more initiatives to promote the choice of alternative modes by event organizers resulting in a model shift
All contacted organisations cooperated with the city to organise sustainable mobility actions (M6.3-GEN). The internet tool for the event organizers received positive feedback and the website has an average of 200 unique visitors each month. This resulted in an increased awareness of the event visitors on sustainable transport: 84% said that the campaign made them think about their own mobility behaviour and 48% use sustainable transport modes more often. Despite bad weather conditions, a modal shift of visitors of 3.68% towards more sustainable transport modes was observed.

5.2.6.4. Process evaluation

Especially new innovative services and approaches are threatened when budgets are cut but they also depend on a lot of actors and have to overcome that people are afraid of new concepts of travelling. However a strong user analysis and good cooperation can be driving forces to implement such new services:

Barrier 1 – Financial crisis

The negotiation process for the bike rental scheme (M6.4-OPO) failed because the measure had no funding and there are impeding regulations on allowing publicity on the bikes to economical support the system.

Barrier 2 – Dependence on different actors

Successful measure implementation often depends on different actors. For the realization of the integration of car sharing in new building projects, CAMBIO (M6.2-GEN) depended on the City Development Company and the Mobility Company to integrate a fixed car sharing station in a new building project. This has not yet been achieved. It was difficult to convince event visitors (M6.3-GEN) to use public transport because the public transport supply in the evening and at night was not always sufficient. Lack of communication with the software provider also led to a delayed implementation of the communication system for organizing the fares for disabled people (M6.1-LJU).

Barrier 3 – Security of carpooling

Carpooling service (6.4-OPO) is still facing some resistance by potential users. Although several dissemination campaigns have been done in the area, people are still afraid about their security.

Driver 1 – Cooperation between partners

The city of Gent helped CAMBIO to find and open car sharing stations at interesting locations and in the supply of specific data for new car sharing stations (M6.2-GEN). Closer cooperation between the Mobility Company and event organizers and cultural venues (M6.3-GEN) enabled quicker interaction on related topics. The DRT marketing campaign (M6.4-OPO) was sponsored by a beer brand, which allowed developing several communication activities.

Driver 2 – Knowledge of user needs

The PT company in Ljubljana cooperated closely with impaired/disabled people on an individual basis (M6.1-LJU), which helped recognising the problems that they are facing. Also CAMBIO decided upon its new car sharing stations (M6.2-GEN) after consulting the citizens in a survey on potential locations. Workshops on how to use a bus have a potential of attracting new passengers with disabilities.

5.2.6.5. Lessons learned

Lesson 1 – Successful mobility services respond to specific needs of the target group

In order to be successful, it is important to define first the target group and find out which mobility needs they are experiencing. The operational characteristics of the DRT service in Porto were designed after a study showing that a night service for students between the campus and the city centre would be the most successful. Specific information was obtained on possible locations for new car sharing stations by consulting local residents, as they know in general better than anyone else.
which places would be popular (M6.2-GEN). Event organizers warmly welcomed the mobility management tool (M6.3-GEN) as they do not always know that well which tools they can use to reduce the impact of traffic. Examples that were less successful are the carpooling service (M6.4-OPO), where some additional benefits to carpooling users could be taken into account such as special parking spaces or HOV lanes.

**Lesson 2 – Attract users by letting them try out the new services**

In order to persuade visitors to switch transport modes, it is important to give them the possibility to try out alternatives and not just to do an effort to convince them on paper. For this reason, the demand responsive service for disabled people was free of charge in Ljubljana. Also the trial period of cambio was very successful. Nevertheless, the concept of free travel advice for event visitors was not so successful, so this needs to be organised in a different way in the future.

**Lesson 3 – Personal approach makes the difference**

For several measures, the personal approach worked best, for example for event visitors and for companies that joined the pool card system.

### 5.2.7. Work Package 7: Energy-efficient freight logistics

#### 5.2.7.1. Description

To moderate the increasing transport demand in urban centres caused by urban freight handling, and hereby to reduce its negative impact, CIVITAS ELAN aimed to enhance energy-efficient freight logistics. The following were the key objectives:

- Rationalising freight distribution
- Improving institutional cooperation on “freight"

On city level, CIVITAS ELAN implemented the following measures to rationalise freight distribution:

- Sustainable freight logistics (M7.2-LJU)
  - Simulation model on freight delivery consolidation scheme
  - Web portal on city logistics (including online routing tool)
- Institutional platform for city freight management (M7.3-GEN)
  - Discussion platform on sustainable goods delivery
  - Enquiry of stakeholders on freight bottlenecks
  - Pilot project with new type of loading spots
- Freight delivery restrictions (M7.4-ZAG)
  - Proposal for freight delivery regulations in the city centre (not implemented)

A common measure brought together all cities for an active exchange of knowledge and experiences on “Integrated freight policy development” (M7.1-COM).

#### 5.2.7.2. Evaluation approach

For the related measures, relevant process and impact evaluation results are summarised here. Impact evaluation focused on the impact of new loading spaces in Gent, and on the acceptance of freight schemes in Ljubljana and Zagreb. As the freight consolidation scheme was not implemented in Ljubljana, the expected impact was modelled. Also the main evaluation results of the common measure are integrated here.

#### 5.2.7.3. Impact evaluation


Both in the cities of Gent, Ljubljana and Zagreb the efforts to bring stakeholders together resulted finally in a basis for future cooperation and new initiatives. However in Porto the efforts failed getting no real response. In Brno information on the importance of sustainable freight delivery was distributed.

Key result 1 – Freight partnerships in Gent, Ljubljana and Zagreb
In Zagreb, after many failures, finally a new plan for a local freight partnership, containing updated time tables and participant lists, was prepared which also included a detailed action plan for stakeholder involvement and on promotion activities. This was the starting point for new initiatives. In Gent the resistance against policy-based solutions for the distribution of goods was turned into a positive cooperation in a partnership through the initiatives to solve specific distribution problems. In Ljubljana the partnership was strengthened through a web portal.

Key result 2 – High use of the web portal
The web portal on city logistics in Ljubljana (M7.2-LJU) sees a gradual increase of the number of visitors. Especially after the workshops with stakeholders, an increase of the number of visits was observed.

Key result 3 – Positive results expected after implementation of consolidated freight scheme
As there was no implementation, the impact of a consolidated freight scheme was modelled (M7.2-LJU). Important reductions are expected in emissions, freight movements, kilometres driven and fuel consumption, when goods deliveries are consolidated and delivered by electric vehicles.

Key result 4 – Low acceptance of consolidation scheme in Ljubljana
A survey during the European Mobility Week in the pedestrian zone in the centre of Ljubljana showed that most citizens are not familiar with the idea of consolidation of goods (M7.2-LJU). Citizens are not aware of the problems or they don’t see any other possibility but bringing the goods into the shops by vans. Even after introducing other possibilities, only 25% of the respondents accepted a consolidated delivery system as a solution. This could be attributed to the fact that the general public does not perceive the freight delivery transport in the centre of the city as problematic, and therefore perceives the changes of the freight delivery system as unnecessary. The acceptance is slightly higher for the visitors of the web portal (29%), but it should be taken into account that the sample of the respondents included mainly the interested public.

Key result 5 – Lower abuse rate of new type of loading/unloading spots
The introduction of a new type of loading spots (GEN-7.2) led to an abuse rate that is five times lower than before, so the loading stops are always (at least partly) available for loading operations. These loading spaces solve also most of the other problems that were mentioned by stakeholders.

Key result 6 – Failing of implementation but starting point for new interaction in Zagreb
The plan to implement some freight delivery restrictions in the Zagreb city centre (M7.4-ZAG) failed. However, the analyses of all aspects of the freight handling provided a clear view on the variations of freight problems (e.g. offences) over the week which is crucial for the further contact with the involved partners. Also, new efforts after the first failure to communicate with the stakeholders were successful showing that it necessary to build up contacts before asking partners to participate in a platform.

5.2.7.4. Process evaluation
As all measures imply a large degree of stakeholder involvement, both the main barrier and driver in the implementation of freight related measures were related to these stakeholders. Stakeholder cooperation is necessary, but not always available.

Barrier 1 – Different stakeholder interests
A lot of stakeholders are involved in this type of measures (shopkeepers, delivery companies, restaurants, city authority, police department, citizens, etc.) which all have their own – often conflicting – interests. Finding agreeable solutions for everyone is not always possible. Especially in Ljubljana (M7.2-LJU), the city council did not perceive freight delivery as a problem. Also shopkeepers and
independent deliverers were unwilling to participate in the discussions on a consolidation centre after the implementation of the access restriction to the city centre in 2008. A good understanding of the reasons why and the context of each reaction seem crucial to find the best compromises. Good contacts with the stakeholders in which they trust the city can also help to convince to provide usable basic data.

**Barrier 2 – Violations of the existing laws**

In Gent (M7.3-GEN) and Zagreb (M7.4-ZAG), the existing regulations are frequently violated. Enforcement is needed, but not always easy to organise.

**Driver 1 – Stakeholder cooperation and exchange of experiences**

Work on the measures brought together professionals with different backgrounds and interests (police, city municipality, distributors and recipients of services, university, other projects, etc.) to work together on similar issues. This resulted in open dialogue workshops and exchange of know-how, points of view and good practices within the theme of city distribution. Also experiences from other cities were helpful to disseminate and educate stakeholders about all the benefits of this type of policies.

**Driver 2 – New legal possibilities**

The Belgian government approved a new traffic law that explicitly allows the use of colours for parking spots with a specific function. This was helpful for implementing the new type of loading/unloading spots in Gent (M7.3-GEN).

5.2.7.5. **Lessons learned**

**Lesson 1 – Importance of stakeholder cooperation at all levels**

The setting up of freight platforms was very difficult mainly because of the lack of cooperation between different stakeholders. The introduction of any restrictions or termination of current privileges cannot be done without a good interaction with the stakeholders. The common goal of the freight policy needs to be clear to all stakeholders and if some actors need to make compromises, they have to get something in return (carrot-stick approach). Therefore it is useful to analyse the needs of the stakeholders well in advance, to be able to take this into account in the proposed measures.

**Lesson 2 – Right tools for engaging stakeholders**

Informing citizens on city logistics proves to be a first step in gaining interest and awareness from the interested public/stakeholders, showing other possibilities for distribution and convincing partners to introduce new schemes for freight distribution. A web portal can be a starting point for this. Trust between stakeholders can also be created by using the strategy of first solving some practical freight problems.

**Lesson 3 – Enforcement of the freight regulations**

Freight regulations are only useful when their correct use is enforced. A clear indication of loading spots, compulsory parking tickets and regular controls are necessary.

**5.2.8. Work Package 8: Transport telematics**

**5.2.8.1. Description**

Recent information and communication technologies opened manifold new possibilities for sustainable urban transport. To exploit the potential of transport telematics for the more efficient management of urban transport, CIVITAS ELAN had the following key objectives in this area:

- Increasing the operational 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

CIVITAS ELAN implemented measures in three important areas:

Giving priority to public transport

• Public transport priority at intersections (M8.1-LJU)
  o Equipping 15 intersections and 210 vehicles with communication technology for PT priority
  o Training traffic light control operators
• Public transport priority and traveller information (M8.2-ZAG)
  o Traffic model to demonstrate PT priority in corridor
  o Test implementation of PT priority on three intersections

Enhancing traveller information & ticketing

• Public transport priority and traveller information (M8.2-ZAG)
  o 40 LED displays on PT stops
• Real time information for staff and passengers (M8.4-LJU)
  o LED information on bus stops
• E-ticketing and common PT portal (M8.5-LJU)
  o Integration of the ticketing system of urban and suburban bus company
  o Selling and recharging point of city contactless card Urbana in the Ljubljana train station
  o Station-specific information at the bus stops
  o PT information on the Google Transit web-based planning platform
• Sustainable multi-modal traffic management (M8.6-GEN)
  o On-street information and traffic guidance: information on upcoming events, congestion, Park+Ride, parking guidance and real-time traffic information
• Ticket vending machine diagnostics (M8.7-BRN)
  o GPRS information on functioning of ticketing machines
• Mobile mobility information (M8.8-OPO)
  o LCD screens with PT information inside two institutions
  o Smartphone application for PT route planning
• Conclusions on this topic also referred to the relevant findings of the electronic PT tariff system in Zagreb (M2.6-ZAG).

Introducing telematics for cycling

• IT-based bicycle theft prevention (M8.9-GEN)
  o Unique frame for rental bicycles
  o Anti-theft system using handheld computer
  o Secured bicycle sheds for students
  o Enticing bicycle
• Route planner for bicycles (M8.10-GEN)
  o Internet-based route planner for bicycles

5.2.8.2. Evaluation approach

The impact of PT priority on travel times of public transport was measured by GPS vehicle tracking (M8.2-ZAG and M8.1-LJU). In Ljubljana this was complemented by the relation of the actual arrival and departure to the estimated time of arrival.
The evaluation of improved traveller information and ticketing systems (M8.2-ZAG, M8.4-LJU, M8.5-LJU, M8.8-OPO) was mainly based on user satisfaction and the use of the service. The ticketing diagnostic system (M8.7-BRN) was evaluated by the number of defects and dead time. However, it cannot be expected that these services show an immediate impact on the number of tickets sold in PT. Also traffic management (M.6-GEN) was evaluated by user acceptance and the impact on traffic queues in the city centre.

The route planner for bicycles (M8.10-GEN) was evaluated by the number of requests and the familiarity among different target groups. Also the route planning for PT (M8.5-LJU & M8.8-OPO) was evaluated by the number of requests or familiarity. The handheld computer for the anti-theft system (M8.9-GEN) was evaluated by the time needed for checking whether bicycles were stolen or not. The impact on security of the handheld computer and the other submeasures could not be estimated with certainty.

5.2.8.3. Impact evaluation

The ICT-based measures showed a range of positive impacts on the multi-modal functioning of the transport system: better transport information, lower congestion levels, increased public transport commercial speeds, more efficient ticketing systems and support of cycling.

In general citizens appreciate a lot the innovative features and these innovations contribute strongly to the good image of public transport and cycling.

Key result 1 – PT priority at traffic lights improves tram performance

In Zagreb, although the PT priority was only implemented as a test on a limited number of intersections (M8.2-ZAG), the impact is remarkable:

- average tram operation time decreased by 6.5%
- cumulative running time of a tram decreased by 7.3%
- tram operating speed increased by 6.9%
- cumulative intersection delay for tram in the whole Savska Street decreased by 17.8% and the intersection delay for tram on Deželićeva intersection decreased by 84%
- average number of vehicles on all intersections in Savska Street decreased by 1.9%

In Ljubljana (M8.1-LJU), however, only a very small reduction of travel times was observed (around 1%). Also travel times of buses show no improvement. Although 95% of bus arrival information was received by the traffic light, it was often too late to allow for green time extension. However, these results are based on a small sample size, recorded in the first weeks of the operation, so further improvements might be expected in the further operation of the system and when the system would be extended to other intersections in the corridor.

Key result 2 – Traffic guidance reduces congestion and is strongly supported by the citizens

After the implementation of the traffic guidance system in Gent (M8.6-GEN), the queue length around the Kouter parking decreased by 10%. The positive attitude of citizens towards the “signposting of available parking spaces” rose from 43% to 84%. It is expected that the queue level will decrease further on when the ramp metering system linked to the traffic lights of the ring road crossing (M2.2-GEN), will be fully operational.

Key result 3 – Successful new integrated ticketing concepts and technical systems

By introducing an e-ticketing system in Zagreb (M2.6-ZAG), the number of sold prepaid tickets increased by 20% from 2009 to 2011; the number of sold e-purse tickets increased by 11% and they were charged 88% more often. Furthermore, user satisfaction increased as well: 59% of users are satisfied with the possibility to purchase the right ticket for the right destination, and 46% are satisfied with the information about ticket prices. Also the ticketing system integration by the urban and suburban bus service providers in Ljubljana (M8.5-LJU) was very well accepted by the regular PT users from the suburban area, with an average 34,000 users per month and an increasing trend of additional 600 users per month. The selling of the contactless cards and their recharging is below expectations (the targets were half-achieved), but the volume is increasing at a rate of 14 € per month.
on average. The poor result is related to the fact that the railway operator is not included in the ticketing system integration.

After the implementation of the GPRS system in the vending machines (M8.7-BRN), the number of defects dropped by half. DPMB and the ticket vending machine manufacturer tried to adapt the software so the vending machine can solve the most frequent and easy defects by itself, and the dead time of the vending machines has fallen by one third. Operational and maintenance savings should repay the initial investment in the GPRS module and the control centre within the first year. However, despite the improved functioning of the vending machines, the number of complaints doubled. An explanation for this might be the increase in ticket tariffs and an important increase the voluntary waste of the ticket vending machines by vandals.

Key result 4 – High use of route planning portals for bicycles and public transport

Both for bicycles and public transport, there proved to be a need for improved route planning information. In Gent more than 2,000 routes per month are requested on the bicycle route planner (M8.10-GEN). The evolution of the inventory of route planner contacts illustrates that promotion campaigns have a direct influence and result in an increase in the number of requested routes. For example, the first day after the press release, more than 1,200 citizens consulted the route planner. This increase is however only temporary, afterwards, the effect of the promotion campaign diminishes. Citizens and cyclists are more familiar with the bicycle route planner than students in higher education. The lower familiarity rates among students in higher education might be explained by the lower promotion towards this target group.

In Ljubljana the PT planning service Google Transit (M8.5-LJU) was very successful: almost one quarter of survey respondents are using the service at least occasionally after nine months availability. Since the implementation of the mobile application for public transport route planning information in Porto (M8.8-OPO), almost 1,000 information requests per day were recorded. Feedback is very positive and people ask for the continuity of the service; furthermore 21% of the respondents answered that they use their private car less often since the service is available.

Key result 5 – Handheld computer increases efficiency of handling stolen bikes.

The use of the handheld computers when checking the rental bicycles of StudentENmobiliteit (M8.9-GEN) resulted in an increase in efficiency, but only when a stolen bicycle is recovered. Checking a bicycle takes more time, but administration when a stolen bicycle is recovered is handled more efficiently and faster. In case a stolen bicycle is recovered, students are informed much faster. Controlling 200 rental bicycles (of which 13 can be assumed as being stolen) with the handheld computer results in a time saving of 1h28 which equals almost 30€. However, the results of the CBA indicate that this saving does not outweigh the capital and operation costs, but it has to be taken into account that there are other non-quantifiable benefits to this system. Due to the increased efficiency, the bicycle city guards have more time available for other work activities. On the other hand, more bicycles can be controlled and more stolen rental bicycles can be retrieved.

Key result 6 – Positive user appreciation for real-time information

Real-time information on public transport was implemented in various cities and was well accepted by the users. After the implementation of the LED displays in Zagreb (M8.2-ZAG), the share of users that is satisfied with the availability of information on PT stops increased from 38% to 46%. The share of users that is satisfied with the availability of information about incidents in PT increased from 23% to 37%. After the installation of the LED displays on PT stops in Ljubljana (M8.4-LJU), the accuracy of timekeeping increased by 3,4% for the announced arrivals and by 23,3% for the announced departures. Approximately 80% of PT users support the measure. The year after the implementation of the displays, an increase of 5% in PT use was observed, but for the year thereafter, a small decrease took place. Large increases in PT usage cannot be expected, other factors also play an important role in transport mode selection (prices, travel times, accessibility, etc.). The Mobility Information System (M8.8-OPO) is considered by the general public as useful and efficient. It improved the ways of providing transport information; gathered data from 14 different operators on a single platform; centralized its functionalities in users’ needs and promoted public transport in Porto.

5.2.8.4. Process evaluation
ICT-based systems often have to bridge the gap between development and operational implementation. Together with the fact that they have to link to other surrounding systems, this resulted in a lot of technical problems that needed to be solved. Also in CIVITAS ELAN this was the case with the consequence that many of these measures were delayed. Additionally, also administrative procedures and the problem of data availability were delaying factors.

However the fact that the ICT-solutions were linked with or part of other measures, stimulated the implementation. Also interactive processes with end-users were a driving force for an optimal design answering the real needs.

Barrier 1 – Technical problems

Nearly all measures in this work package were facing some technical issues during measure implementation:

- M8.1-LJU: The triggering of traffic lights does not happen early enough to allow the system to prolong the green interval for PT buses.
- M8.2-ZAG: Different types of traffic signalling equipment are installed on different intersections in the ELAN corridor and interfaces had to be developed in order to achieve necessary coordination and synchronization between different intersections. Also, the majority of installed equipment is 15 or 20 years old which made the implementation process impossible on some intersections: signal controllers on those intersections cannot support implementation of tram priorities. Replacing the old signalling devices by new ones was not possible during the project due to financial and administrative restrictions.
- M8.4-LJU: The LED display shows the information with a delay/ poor accuracy, so a person can be waiting for a bus that has already left the station. This leads evidently to a decreased user satisfaction.
- M8.6-GEN: When the newly arrived signs were fitted with radios and tested, there appeared to be discrepancies between the configuration of the test rig and the real-life sign. Furthermore, a majority of the signs had difficulties to connect with the server so the installation on the Belfry Tower and the position of the antennas on the poles needed to be adapted. The memory of the integrated prisms of the 69 VMS signs on the city ring was built to store 100.000 positions, which was not enough to store the data from the controller that was sent every four minutes. All these difficulties resulted in a few months delay.
- M8.7-BRN: The software of the system generated messages that were sent to the system and sometimes it repeated sending the same information. A mistake in printing, coin system and the operation system led to a restart of the machine and causes problems, so the provider had to adjust the software. Besides this, some technical problems occurred when replacing the SIM cards of the supplier by those purchased by DPMB for measure operation.
- M8.8-OPO: Because of the quick technological evolution of the mobile devices, the smartphones and internet application was postponed to the end of the project to assure all the technological evolutions were considered and monitored.
- M8.9-GEN: Test results of a “lokfiets” system of a Dutch company showed too much interference on the transmitter. Furthermore, bicycle tracking systems must be smaller and be protected against different weather conditions and vandalism like similar systems for cars. Several companies showed interest in developing such a product, but soon dropped out because of the rather low investment potential. Therefore, finding a specific partner/supplier was difficult. After market research and offer research, it appeared that existing handheld computers did not meet the criteria. Therefore, an external software supplier needed to be contacted to develop the software for the handheld computers. This caused a delay of a few months.

Barrier 2 – Complex administrative procedures

Many measures of this type were facing complex administrative procedures:

- Because the controllers for the PT priority (M8.1-LJU) needed to be exchanged instead of upgraded, negotiations on the higher costs delayed the implementation.
- Public procurement procedure for the LED displays (M8.4-LJU) has proved to be very time consuming, which caused delays in measure implementation.
- Secured bicycle sheds (M8.9-GEN) were initially planned at two locations on public domain nearby classified and protected monuments, which made it very difficult to obtain a building permit.
permission. As an alternative, secured bicycle sheds were eventually installed at the private
domain of Gent University and two university colleges.

- The enticing bicycle (M8.9-GEN) could only be used to provoke theft, but not to trace bicycles
that were already stolen. For the latter, a difficult procedure is necessary which did not seem
possible here. Therefore arrangements with the local police were made to only provoke theft
by using the enticing bicycle.
- The procedure for IT projects in the city of Gent is complex which delayed somewhat the
implementation of the bicycle route planner (M8.10).
- The national Ministry of Transport postponed the implementation of a standard preparation
form for integrated public transport ticketing systems to 2013, so no legal foundation and
unified standards for the electronic integrated ticket (M8.5-LJU) were available.

**Barrier 3 – Acquisition of real time data on PT operation**

Technologically advanced ICT-based information systems still rely on data. However real time
information was not always available for all transport operators in a usable format. In Porto this caused
a delay in the integration of this information in the system (M8.8-OPO). The operators did not update
the planned data in the system (for example reduced service during holidays), so the system became
unreliable for the users.

**Driver 1 – Integration with other measures**

Measures in the field of telematics are usually no self-standing developments. Their functioning is
improved when integrated in a bigger structure of mobility measures. For example, the bicycle route
planner (M8.10-GEN) is part of a lot of bicycle services developed in the Mobility Department of the
City of Gent. Consequently, the bicycle route planner was integrated in the general bicycle website
(M4.5-GEN). Furthermore, Measure Leaders of related measures promoted the bicycle route planner
through their own measures and the bicycle website is used in measures outside CIVITAS ELAN as
well. The Tourist Office promotes the bicycle route planner through their communication channels as
well. The bicycle route planner was adjusted for a large art event in Gent so that visitors were
stimulated to cycle to different art locations throughout the city. Also the ramp metering system that
keeps traffic away from the Nederkouter when queuing starts (M2.2-GEN) was successfully integrated
in the traffic guidance system (M8.6-GEN): when the ramp metering system is active, traffic to the
Kouter will automatically be rerouted. During the Light Festival, the city council employee that
supervises the VMS signs worked from the police coordination centre. This cooperation was very
appreciated by both parties.

**Driver 2 – Active participation of measure partners and stakeholders**

Input from various stakeholder groups helped improving the functional design of the measures.
Stakeholders as the cycle union, the cycle officer of the city of Gent and province of East Flanders,
colleagues, friends and family were actively involved in testing the bicycle route planner (M8.10-GEN).
Updates of the bicycle route planner are also partly based on the feedback that is received from users.
The supplier MIKROELEKTRONIKA cooperates on necessary changes in the ticket vending machines
diagnostics system (M8.7-BRN) to make it more useful for all the users within DPMB. The outcomes of
the system are being adjusted to the needs of DPMB in cooperation with MIKROELEKTRONIKA; they
incorporate the necessary changes and update the software in order to function well. In newer
versions mistakes are removed. To assure the LCDs implementation (M8.8-OPO), the feedback and
commitment of the measure partners on the final developments of their prototype was very important.
They were always available to discuss technical and data problems. Also the institutions and other
entities involved supported the implementation of the Mobility Information System (M8.8-OPO), mainly
during the data collection process, disseminating the positive actions and some clarifications about the
service near the students and other future users. Also for the implementation of the PT priority system
(M8.1-LJU), good cooperation with the traffic light operator and the traffic light controller software
developer were highly beneficial, for example to address technological issues regularly.

### 5.2.8.5. Lessons learned

**Lesson 1 – All relevant stakeholders should be involved**
Only when all stakeholders are recognized and included into the measure tasks, the measure implementation can benefit from their unique knowledge and support. Good communication with the local partners and stakeholders can help to gather more stakeholders and replicate the measure in other places, because the current group of partners will support measure objectives.

Lesson 2 – Continuous update of data is a basic precondition for any information system

Examples of this are the different route planner (PT and bicycle) in the CIVITAS ELAN cities. It is important to adjust the route planners to the newest technological developments (e.g. apps, Google maps, etc.). Also the content of the route planners should be updated regularly with new routes, timetables, etc. The knowledge of different stakeholders can be useful as input for these updates.

Lesson 3 – Promote and explain the systems

Strong marketing campaigns, based on continuous efforts, have the potential to increase the awareness on and the use of the system among different target groups.

When real time PT information is installed, there is a risk that people immediately expect the system to work with 100% accuracy. When implementing the new technology, it is important to make sure that it works properly, or use additional dissemination activities for explaining the circumstances surrounding the early phases of operation, i.e. prepare the public for possible problems that may occur in newly established systems.

Lesson 4 – Compatibility between various systems is a precondition

For an efficient integration of software systems, it is important that the new software is compatible with existing systems. This is especially the case for the signalling equipment on intersections for the implementation of a PT priority system. Using the same software provider is a solution, although this might not always be possible.

Lesson 5 – Traffic modelling is a strong tool to demonstrate and to optimise the functioning of ICT-based traffic management systems

Since the final performance level of a traffic system depends highly on the detailed design of the systems, traffic modelling is a strong approach to test possible solutions in interaction with complex traffic flows and public transport. In Porto the multi-modal traffic system of the Asprela area was optimised in this way.

Traffic modelling can also be very helpful to convince decision makers of the benefits of PT priority systems regarding car traffic and PT performance. In Ljubljana the possible layouts of the corridor were modelled in this way showing the politicians the feasibility of future reorganisation plans.

Lesson 6 – Implement priority system in sequential order

When implementing a PT priority system, it is important that the affected intersections are in a sequential order. If this is not the case, the full benefit of the system cannot be exploited.
6. Lessons learned and conclusions

6.1. Reflections on the evaluation process

With the start of the CIVITAS Plus projects evaluation was considered as very important to guarantee the added value on EU level of the work done in the cities. Based on the guidelines made in previous CIVITAS programmes an Evaluation Plan was designed providing a detailed overview of all the evaluation tasks that would be performed throughout the duration of the CIVITAS ELAN project. Taking into account additional recommendations from POINTER this plan was updated during the first year of the project.

The main objective of this plan was that it would present a clear view on all activities necessary for a good and solid evaluation. During the project it indeed proved to be a strong basis for a successful evaluation. However for many reasons the implemented approach can be improved further and a critical reflection on the evaluation process shall pave the way for future work.

A first important general observation – which was already mentioned in the Evaluation Plan – is the fact that the CIVITAS measures are implemented in the real complex environment of our cities. This has a direct impact on the approach of evaluation for many reasons:

- In most cases there is an important interaction between each implemented measure and other CIVITAS and non-CIVITAS measures across the policy fields.
- The context in which the measures are implemented is in continuous evolution, both due to city related factors as well as due to general societal and economic factors.
- The implementation of measures finally depends on a lot of factors not always clear at the beginning of the project and on political decisions that remain.
- A wide range of organisations and persons are involved in the implementation of the project and its measures.

Being aware of these aspects the CIVITAS ELAN project introduced already some new elements in comparison with previous CIVITAS approaches (partly proposed by POINTER):

- Structuring the measures in integrated packages (IP) of measures in order to combine the evaluation and to draw common conclusions.
- Clear definition of a baseline situation and a business-as-usual scenario to deal with the evolution of the context and the influence of other measures.
- Clear data collection schemes indicating the efforts related to the measures or the integrated packages of measures.
- A more in-depth evaluation of the implementation process of the measures identifying the role of organisations and persons.
- A specific evaluation of the citizen engagement activities supporting the measures implementation.
- Cost-benefit analyses to support the conclusions on the value of measures.

The CIVITAS ELAN project enabled improving these new elements and learning for future work facing the important challenge to keep a good balance between scientific reliability and practical feasibility.

Here we provide an overview of the lessons learned for the different aspects and stages of the evaluation approach. They shall serve as a basis for future approaches and further improvements.

6.1.1. Impact evaluation

Structuring the evaluation approach
The common evaluation of measures in Integrated Packages proved to be a useful approach to have a more transparent and feasible evaluation of the measures. In this way evaluation is in line with the key operational characteristics of the CIVITAS programme: measures in different Policy Fields working together in an integrated way to achieve the mobility, societal and environmental objectives. Impact indicators that can be linked clearly to one of the measures can still be measured in relation to that measure but these figures can be combined into a general conclusion for the group of measures. Impacts that are related to the different measures together are evaluated in general with a qualitative assessment of the importance of the measures for the observed results.

However, also the concept of Integrated Packages faces many challenges in the complex reality of urban mobility:

- In practice reality is complex as a measure might interfere with another measure with regard to some indicators and with another measure with regard to other indicators: a fully clear grouping of measures in relation to the scope of measures is still not possible but we can focus on the key expected impacts to decide on which measures are grouped. Probably, also a more indicator-oriented grouping of measures and a discussion on the impact on different levels (e.g. area, corridor) can help.
- The question of disentangling the impact of different measures remains since decision makers have to set priorities. Here, a qualitative expert ranking based on the opinion of involved and external experts can help but also other approaches need to be defined. Also, a wide analysis based on a large number of practical cases can result in useful findings.

The concept of the CIVITAS ELAN “Common measures” was a useful approach to draw cross-city conclusions on some key types of measures and to intensively exchange experiences among cities:

- Various ideas were transferred or inspired others to think about new projects, such as citizen engagement and fleet management in Gent. Almost two thirds of the participants stated that the common measures were successful in transferring knowledge and good practice.
- The effectiveness could be better if clearer agreements were made on tasks and on local activities with a more active participation by all involved cities and better planning of exchange activities from the start.

A specific evaluation approach of the citizen engagement activities is necessary to clarify the specific aspects of the way these activities can support the implementation of the measures:

- Type and quality of the activities
- Impact of the activities on the implementation of the measures
- Process of implementing the citizen engagement activities

Measure objectives and indicators

When preparing the CIVITAS ELAN Evaluation Plan it was a challenge for the evaluation team to understand the objectives of the measures in the right way and to define appropriate indicators. Most objectives were relevant but many objectives were very general and at a high level. Only for some measures clear quantifiable targets were defined. The in-depth discussion between the evaluation team and the Measures Leaders was very useful both for the Measures Leaders to have a clearer focus for their work and for the evaluation team to come to more realistic and more focused objectives and targets. An important criterion for this analysis was the requirement that the evaluation work would provide sufficient information to allow the evaluation team and the decision makers to draw useful conclusions on the importance of the measures. Despite of the good efforts at the start of the project we come to the conclusion that this process should be done even more sharper resulting in clearer agreements with Measure Leaders and other partners on the data to be collected or provided, on the survey methods and timing.

The list of “Common Core Indicators by Guard” (2006) was very useful to come to indicators which were significant for the impact of the measures. However, CIVITAS ELAN added three elements to it:

- Local translation of the existing common core indicators more concrete in the context of the local situation or represent a slightly different indicator to measure the same impact. For example, instead of using the general indicator for the acceptance level, the interest in several measures in Gent was evaluated before implementation and the familiarity with the measures after implementation.
- Intermediate Indicators serving 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, e.g. the number of damaged vehicles for the safety and security measures in Zagreb.

- Local Indicators: They were not taken up in the list of Common Indicators. Nonetheless they were considered crucial to measure the impact of the CIVITAS ELAN measures, e.g. the dead time of the ticket vending machines in Brno, to evaluate their improved operational characteristics.

The choice of indicators should be directly linked to the question of the collection of data needed for this. If existing data sources are used this may determine the indicators used. If new surveys are done a clear view is needed on responsibilities, budget aspects and the practical feasibility of collecting the data. Here, CIVITAS ELAN split the efforts between the measure related work (e.g. direct collection of data) and the analysis work by the evaluation team. However, the need to collect also data for Integrated Packages of Measures or for the whole corridor required a more layered organisation of the work.

There might be a need to change the selection of indicators during the project, especially when the measure content itself changes. Changes in measures have proven difficult to be followed by the evaluation as planned in the Evaluation Plan. When the measure content changes, a revised evaluation approach should be developed as soon as possible, to allow for a suitable evaluation.

For all cities, the modal split and air quality has been evaluated as the common impact of all measures. However, it must be stressed that these general indicators were not only affected by the impact of CIVITAS ELAN measures but also by changes in the society, namely changes in the economic situation, other transport measures, etc.

The time frame of a CIVITAS project is too short to evaluate profoundly large projects like large construction works, the redevelopment of important traffic, etc. In this case, the focus was on process evaluation but the evaluation over a longer time period is recommended to be able to account for all impacts of the measures.

Data availability and data collection

General background data are important both to understand the background evolution in the city as well as to be able to put measure specific figures in the general context. Especially due to the financial crisis, several important changes occurred in our mobility systems influencing the impact of measures considerably. This emphasises the importance of recording various background data because projects like this are implemented in a global environment, hence they are not immune to global changes, e.g. to understand the impact of the measures to improve the quality of PT in Zagreb it was important to understand the basic evolution of indicators due to the changes in the PT tariff system.

Linking the evaluation approach to existing data sources has a high added value but creativity is needed to link these data to the specific questions in relation to the implemented measures:

- Existing data sources can show historical trends which are very important for the interpretation of observed short-term effects in the long run.
- A good understanding of the situation before the start of the project and eventually historical trends can also help to set realistic targets, e.g. this will avoid targets of +10% for sustainable modes (for employees) when their share is already over 80% (Zagreb).
- Additional specific surveys can be linked to existing general surveys by using similar basic questions and adding specific questions providing more information on the “How” and “Why” of changes, e.g. the modal split survey of Gent used the same structure as the survey for the whole city every 3-5 years but added some specific questions to it. This made it possible to put the observed evolution in the corridor in the global city context and in a longer time perspective.

CIVITAS can’t expect from the cities that they would implement surveys and data collection campaigns according to one uniform format. Such an approach would be extremely interesting allowing much easier comparison of data and understanding the results for other cities, but this would require significant resources and would cut off many historical data series. Yet, a programme like CIVITAS can contribute considerably to harmonise the methods in the future by indicating important elements with regard to the use of the data for policy conclusions. An example of this is the data on modal split which are not only needed for the citizens but also for visitors and commuters to be able to draw consistent conclusions.

The good planning of the data collection is crucial for a complex project. In order to define the data collection time plan more realistically, the evaluation team could be included into the planning phase of
the measures. Usually, the time plan of all measures includes data collection, but this process is unique for every measure and carries its own time constraints.

Datasets need to be comparable to be able to draw valid evaluation conclusions. This is not possible when data from different periods/samples are used. This issue should already be checked in measure and evaluation planning. This has proven to be relevant in many measures.

Evaluation methods should be presented in sufficient detail before the start of a campaign/ action. Both the Measure Leaders and the Local Evaluation Managers should be aware of all data requirements and methods at the beginning of the project and stick to these agreements.

Especially the integrated evaluation of measures requires a good coordination between the measure implementation and the data collection. For example in Porto the DRT service and the light-weight bus shuttle service were implemented only for a testing period. So it was important to collect the data when both measures had been implemented.

CIVITAS timing for data collection does not always fit into the timing of the existing data collection processes. Another element that can conflict with the CIVITAS timing is the academic schedule. In several cities this strongly influences the mobility behaviour, hence data cannot be collected during holiday periods.

In many cities students were included in data collection activities and data processing. Without their participation it would be difficult, if not impossible, to conduct a good impact evaluation.

In order to understand specific impacts, technical monitoring systems are useful eventually as part of the measure implementation. In this way a more permanent monitoring can be done of the impacts of a measure allowing also the introduction of improvements during the implementation and operational phase of the measure. For example during the implementation of the measures in Gent on lowering the energy consumption of the city fleet, it became clear that a GPS-based monitoring system would help the fleet manager to decide how many and which types of vehicles need to be purchased. Also, a detailed follow up the tyre pressure or the effects of ecodriving lessons and over a longer period with regular feedback to the driver will be resulting in more savings year after year.

**Analysis techniques**

Traffic modelling was a useful technique to understand general effects of measures and to have a good understanding of the business-as-usual situation. Traffic models were used for the ex-ante evaluation of the design of the measure. In Porto it was very helpful to convince the representatives of the City’s Transport and Traffic Department that the reorganisation of the traffic in the Asprela corridor would not cause the disturbance of traffic flows.

Despite the effort to have clear agreements on data collection the before and after surveys for some measures used different categories of answers and included different segments of the target groups in the surveys. In that case efforts were done to make the data comparable based on a strong analysis on the representativeness of the data and the meaning of the answers. Examples of this are the user acceptance surveys on the citizen engagement activities with regard to the new railway station in Gent. Data from the before and after surveys were matched by a new interpretation of the answers.

Also the influence of external factors must be controlled when comparing before and after data. For this reason it is necessary to correct the after data excluding the effects of the change of external factors. As energy use on trams depends strongly on the outside temperature which differ from year to year, the average temperature per month collected between 1981 and 2010 was used in Gent. Financial restrictions also affected the impact of the measure, for example increasing fuel prices and PT prices.

**Cost-Benefit Analysis**

Initially a full cost-benefit analysis was planned for a large number of measures aiming to support the conclusions on the performance and the usefulness of the measure. However, such analysis requires much more data than the straightforward evaluation of impacts, especially to include secondary benefits on high level indicators as health and economical factors. Therefore it was decided for a lot of measures to prepare a financial analysis presenting in a clear way the direct financial aspects as cost of the implemented systems and direct cost savings or extra incomes. If also a clear qualitative assessment of the additional impacts of the measure is added this seems to be an acceptable approach for many measures.
Currently, the cost-benefit analyses are closely linked to one measure. However, also here the challenge remains to conduct also similar analysis for Integrated Packages of measures. Only then it will be possible to evaluate city strategies (or parts of them) in a better way.

### 6.1.2. Process evaluation

Although in previous CIVITAS programmes the implementation process of measures was discussed, now for the first time a full structured approach was implemented in order to understand better the process.

Learning from this approach CIVITAS ELAN has the following considerations:

- Process evaluation is necessary to fully understand the functioning of a measure. The way the measure is implemented has a high influence on the effectiveness of a measure and can open possibilities to links with other measures or general evolutions in the city.

- Process evaluation is especially useful if impact evaluation was not possible, for measures with severe implementation problems or without any implementation during the project lifetime. Valuable information about the planning/implementation traps has been identified and can be addressed more successfully in the future.

- During the implementation process, process evaluation helped to identify the key barriers for the implementation and helped us to try to find a way to overcome the barriers, as well as to use the drivers to progress with the implementation process. Process evaluation is an appropriate tool for addressing the problems while they begin to emerge, but still some issues that were addressed by the process evaluation could not be resolved.

- Methods to get the right insight information on the implementation process can vary a lot depending on the specific characteristics of the measure and the context of its implementation. The “Learning History” approach proved to be very useful for measures with a reasonable number of partners and stages of implementation. For simple processes already an in-depth discussion between the Measure Leader and Site Coordinator can reveal most of the crucial aspects. In some cases also bilateral interviews need to be used when partners are not able to explain completely their view on the process in a meeting with other partners. In general it seems important to be aware that the main objective of this analysis is the understanding of the process in order to learn from it and not to judge a specific partner. Sometimes it is important to communicate this message clearly.

- A crucial aspect of this analysis is a good view on the full process of the implementation and the exact role of every single body or person in it. This requires a good analysis of partners and responsibilities.

- Although process evaluation has also the objective to clarify the “story behind the figures” currently the impact and process evaluation are done rather separately and are reported in different parts of the Measure Result Forms. CIVITAS ELAN did a first effort to bring the elements together in the conclusions part of the Measure Result Forms but also a more integrated processing of the information of both aspects seems necessary to have a better understanding of the measures.

- The process evaluation was done for each measure separately. Finally, CIVITAS ELAN indicated also for the Integrated Package level the most important observations based on the process evaluation on measure level. However we see that a more structured approach with specific attention to the integrated implementation of the measures would reveal also important aspects of the implementation of the overall city strategies. This could also be the basis to more general conclusions and recommendations on the overall organisation of the cities and the cooperation between the cities with private partners and with other policy levels. A more advanced analysis of this aspect seems important for further steps towards the general objectives of the CIVITAS initiative.

### 6.1.3. Evaluation of citizen engagement activities
By “putting citizens first”, citizen engagement was a key element of the CIVITAS ELAN project. Initially the evaluation of citizen engagement was seen as part of the process evaluation of the measure. During the first two years CIVITAS ELAN came to the conclusion that this approach would not allow to assess in sufficient level of detail the value and quality of the citizen engagement activities. For this reason a specific evaluation approach of the citizen engagement activities was defined, focusing on the specific aspects of the way these activities can support the implementation of the measures:

- Type and quality of the activities
- Impact of the activities on the implementation of the measures
- Process of implementing the citizen engagement activities

This approach was implemented in the third year of the project which limited the possibilities to have a view on the before situation, for example on awareness and user acceptance. Nevertheless, for some measures in which citizen engagement activities were the core tasks itself, already intensive surveys were conducted at the start of the project. For others, conclusions were drawn bringing together the expert observations of Site Dissemination Managers, Site Coordinators and Site Evaluation Managers. Elements for further consideration are:

- The CIVITAS ELAN templates can be a strong basis for the implementation of an effective overall evaluation of citizen engagement activities in future projects.
- Implementing this approach from the start of the project will allow organising appropriate surveys to have a consistent understanding of the evolution of awareness, user acceptance and the general attitude towards sustainable mobility.
- Improvements can be made e.g. in the way we assess the quality of the activities structuring in a better way the matching levels and penetration levels between the activities and the target groups.
- For completing the evaluation of the citizen engagement activities the role of the Site Dissemination Manager was crucial. This proves that the project consortium as a whole has to closely cooperate.
6.2. **Summary of evaluation conclusions**

6.2.1. **Identification of successful measures**

Based on the CIVITAS ELAN findings for the measures on Measure, Integrated Package and Corridor/City level on the one hand and the comparative interpretations per Policy Field on the other hand, general conclusions are drawn on which measures have the highest potential to have a strong positive impact on the mobility in the cities referring to the different main objectives for sustainable development.

The success of a measure is strongly linked to the objectives and related targets of this measure. All 65 CIVITAS ELAN measures over the 5 cities intend to contribute to the 18 ELAN headline objectives. Based on the analyses in previous chapters, first the measures are indicated which were most successful in achieving these high level objectives. The purpose of this overview is not to rank the measures in order to indicate what a city should do first since this depends a lot on the local context of each city. But as a significant part of the impacts was evaluated on the level of the Integrated Packages, also the most successful links with other (types) of measures are indicated. This helps to come to solid integrated approaches to increase the impact of the separate measures.

6.2.1.1. **Successful measures**

The CIVITAS ELAN partners have developed a set of 18 common headline objectives. These serve as priority fields of action below the technical work package level:

- Increasing energy efficiency
- Using alternative fuels
- Cleaning up vehicle fleets
- Implementing effective, high quality mobility solutions
- Planning intermodal infrastructure with public participation
- Charging for access
- Managing public space and access
- Improving mobility management
- Making walking and cycling more attractive
- Establishing a mobility dialogue with the citizens
- Developing integrated & target-group specific safety/security strategies
- Increasing road safety
- Improving security in PT
- Implementing flexible mobility services
- Rationalising freight distribution
- Giving priority to clean modes
- Enhancing traveller information & ticketing
- Introducing telematics for clean modes

For each of these objectives, the measures that contributed most are determined. Some measures contributed to more than one objective.

**Increased energy efficiency**

- The ecodriving courses in Gent (M1.2-GEN & M1.9-GEN) resulted in a direct saving of energy of 7%.
- Optimised heating and ventilation systems on trams and trolleybuses (M1.4-BRN & M1.13-GEN) resulted in a decrease of energy consumption by 6-30%.
Using alternative fuels

- Tests with PPO (M1.7-LJU) indicated positive results in comparison to D2 or B100 fuels.
- The results of the CNG bus (M1.11-LJU) showed lower emissions than the diesel and hybrid alternatives, and a significant reduction in fuel consumption (over 20%).
- After changing their fossil fuel fleet to LPG (M1.9-GEN), V-tax observed in Gent very positive results concerning the emissions of PM (-100%), NOx (-91%) and CO (-10%).
- The implementation of an electric car by cambio (M1.9-GEN) led to a decrease of fuel consumption by 0.7 l/100km or a reduction of 15%.
- The introduction of a fuel mixture of biodiesel and regular diesel in the waste disposal vehicles (M1.15-ZAG) led to a reduction of 5% CO2, 3% PM2.5, 6% fuel consumption and 2 dB noise level.

Cleaning up vehicle fleets

- The introduction of public bicycles (M1.12-LJU) increased the use of bicycles by the employees, reducing the number of fuel-driven kilometres by an estimated 9,000 km per year.
- Reducing the city fleet in Gent and a sustainable purchase strategy (M1.2-GEN) led to a more sustainable mobility behaviour of the employees and reduced the number of driven km by car by 30%.
- Introduction of the new buses on biodiesel and CNG (M1.14-ZAG), new trams (M1.3-ZAG), hydraulic hybrid buses and CNG buses (M1.11-LJU), hybrid buses (M1.10-GEN) led to a significant modernisation of the PT fleet in Zagreb, Ljubljana and Gent, replacing older, less environmental-friendly vehicles.

Implementing effective, high quality mobility solutions

- The minibuses for the disabled (M2.7-BRN) have significantly better fuel efficiency compared with the old buses or new low-floor buses, and the service is highly appreciated by the target group of disabled people.
- The optimisation of PT stops and traffic lights during the project (M2.2-GEN) resulted in an increased commercial speed for the related trajectory.
- The introduction of an e-ticketing system (M2.6-ZAG) is well accepted by PT users and consequently ticket sales increased.

Planning intermodal infrastructure with public participation

- The support for the redevelopment of the railway station area (M2.9-GEN) increased among all the target groups, especially among the retailers.

Charging for access

- Comprehensive dissemination and citizen engagement activities on congestion charging led to a further increase of acceptance of an eco-zone in Zagreb (M3.2-ZAG), especially among business subjects.

Managing public space and access

- The implementation of new parking regulations around the main train station in Gent (M3.3-GEN) decreased the number of parked cars in this zone by 11%.
- The (partial) implementation of the Asprela Circulation Plan (M3.5-OPO) proved to be very effective in enhancing access in the corridor for cyclists, pedestrians and bus users. Also parking spaces were reduced, leading to a decrease in illegal car parking.
- The extension of the pedestrian area in the city centre of Ljubljana (M5.5-LJU) is well accepted by the stakeholders, they praised the general improvement of the image of the city, public transport, new traffic arrangements, lower noise levels and air quality.

Improving mobility management
Mobility management campaigns for schools and institutions (M4.2-GEN, M4.3-GEN and M4.4-ZAG) created a modal shift towards more sustainable transport modes and in Gent most approached companies prepared a company travel plan or are working at it.

**Making walking and cycling more attractive**

- The realization of cycling lanes in Zagreb (M2.5-ZAG), Porto (M3.5-OPO) and Gent (M5.6-GEN) contributed to a better accessibility for cyclists in the corridor.
- The redesign of sidewalks in the corridor (M3.5-OPO and M4.7-GEN) contributed to the achievement of a better walking infrastructure.
- The implementation of the cycle street (M5.6-GEN) clearly encouraged cycling and led to an increase of the number of cyclists by 36%. The secured bicycle bins and bicycle boxes (M4.5-GEN) are almost completely rented and the city decided to order 20 additional bicycle bins.
- Websites combining information on cycling in Gent (M4.5-GEN) and in Ljubljana (M4.6-LJU) attracted a lot of visitors.
- The different measure activities to promote cycling in Ljubljana (M4.6-LJU) have contributed to a general increase in cycling in the corridor and city wide and a decrease in the number of accidents involving cyclists by almost 20%. Also in Gent, the promotion campaigns on cycling (M4.5-GEN) contributed to a more positive attitude towards cycling among the target groups.

**Establishing a mobility dialogue with the citizens**

- The centralised information points that were established in Ljubljana (M4.1-LJU), Zagreb (M4.11-ZAG), Brno (M4.13-BRN) and Porto (M4.14-OPO) attracted a lot of visitors, asking for mobility information.
- Various mechanisms to communicate with passengers in Zagreb about improvements in public transport (M4.11-ZAG) increased their satisfaction with the dissemination of PT-related information.
- The update of Transport Plans that was established as a result of a comprehensive mobility dialogue (M4.12-BRN) is well-known by PT passengers and most of Brno’s citizens find the transport information accessible and satisfactory.
- In Ljubljana a satisfaction of over 80% was observed with the cycling-related workshops (M4.6-LJU).

**Developing integrated & target-group specific safety/security strategies**

- The educational programme Trammelant (M5.7-GEN) resulted in a decrease in the number of documented incidents with youngsters in the area of the involved schools by more than 50% on average, even though the total number of incidents with youngsters in the rest of the city has increased.
- The training programme in nursing homes (M5.3-ZAG) increased the subjective feeling about the safety in PT among seniors.

**Increasing road safety**

- Traffic safety measures near schools and a traffic warden service (M5.4-LJU) resulted in a decrease in the average speed by up to 20%.
- Reducing speed limits (M5.5-LJU), complemented by radar controls, resulted in a reduction of the average vehicle speed by 12% or 5.2 km/h. The reorganisation of motorised city streets into pedestrian areas also reduced minor injuries in the city centre by 33%.

**Improving security in PT**

- The educational programme Trammelant (M5.7-GEN) resulted in a decrease in the number of documented incidents with youngsters in the area of the involved schools by more than 50% on average, even though the total number of incidents with youngsters in the rest of the city has increased.
- The implementation of CCTV cameras in PT vehicles (M5.8-ZAG and M5.2-LJU) improved the security in PT by decreasing vandalism acts in both cities and the number of attacks on bus drivers in Zagreb.
Implementing flexible mobility services

- A strong marketing campaign achieved a high awareness and use of the DRT service (M6.4-OPO).
- The number of users of the KAVALIR service (M6.1-LJU) offering on demand transport in the pedestrian area increased significantly and user satisfaction was very high since its implementation (88.4%).
- The trial offer for carsharing in Gent (M6.2-GEN) increased the number of users significantly in each trial period. Also 27 new companies joined the poolcard system for companies.
- The internet-tool for the event organizers on mobility management (M6.3-GEN) received positive feedback and is being used frequently. This resulted in an increased awareness of the event visitors on sustainable transport and improved cooperation on mobility issues.
- The minibuses for the disabled (M2.7-BRN) are highly appreciated by the target group of disabled people.

Rationalising freight distribution

- The introduction of a new type of loading spots (GEN-7.2) led to an abuse rate that is five times lower than before, so the loading stops are always (at least partly) available for loading operations.
- The number of visitors to the web portal on city logistics in Ljubljana (M7.2-LJU) increased gradually, especially after the workshops with stakeholders.

Giving priority to clean modes

- The PT priority system on a limited number of intersections (M8.2-ZAG) increased the operating speed of trams by 6.9% and reduced the intersection delay at one intersection by 84%.

Enhancing traveller information & ticketing

- The traffic guidance system in Gent (M8.6-GEN) reduced the queue length around the Kouter parking garage by 10% and receives positive feedback from citizens.
- The introduction of an e-ticketing system (M2.6-ZAG) is well accepted by PT users and consequently ticket sales increased.
- The ticketing system integration by the urban and suburban bus service providers in Ljubljana (M8.5-LJU) is highly used and very well accepted by regular PT users from the suburban area.
- The implementation of the GPRS system in the vending machines (M8.7-BRN) reduced the number of defects by 50%.
- The implementation of the LED displays in Zagreb (M8.2-ZAG) and Ljubljana (M8.4-LJU) are well accepted by the public.
- The Mobility Information System (M8.8-OPO) improved the ways of providing transport information, unites data from 14 different operators in a single platform, centralized its functionalities in users’ needs and promoted public transport in Porto.

Introducing telematics for clean modes

- Route planning information for bicycles in Gent (M8.10-GEN) receives more than 2,000 requests per month.
- PT planning services in Ljubljana (M8.5-LJU) and Porto (M8.8-OPO) are highly used and receive positive user feedback.
- The use of the handheld computers to check whether rental bicycles of StudentENmobiliteit are stolen (M8.9-GEN) resulted in an increase in efficiency when a stolen bicycle is recovered.

6.2.1.2. Integrated approaches
From the start of CIVITAS ELAN project all partners were strongly convinced of the importance of a well-balanced strategy including a range of complementary measures. CIVITAS ELAN partners are strongly convinced that real changes can only be achieved if different aspects of the organisation of our transport system and the citizens’ travel behaviour are affected together.

CIVITAS ELAN introduced the concept of Integrated Packages of measures in the evaluation approach of the measures because different measures were working together to achieve a common objective and target and it is not possible to disentangle the impacts of individual measures in a quantified way. During the evaluation of the measures also a lot of operational and strategic reasons for a well-considered and balanced integration of the implementation of the measures became clear.

From this perspective we identified in CIVITAS ELAN different combinations of measures:

- Measures contributing to different elements of a solution: Only if all elements are implemented in a complementary way, a strong impact can be obtained. An example for this is the energy management of the city fleet of Gent:
  - Introduction of new vehicle with low of energy usage
  - Efforts to use the best vehicle (also bikes) for each trip
  - Eco-driving training to make the remaining car trips more energy efficient
  - Infrastructure for new fuel (biodiesel) and energy supply station for electric vehicles
- Measures working on different modes in an area or corridor: Gent, Ljubljana, Zagreb and Porto implemented a wide range of measures (or simulated them in preparation of the implementation) in a corridor of the city making it easier to cycle, improving service levels for public transport and controlling/limiting/stearing the traffic.
- Measures working on specific sub target groups with similar objectives, e.g. safety, modal split, public transport use: In many case general approaches are not that effective to reach the citizens or visitors of the city. Sometimes also a general strategy is effective but one subgroup is not reached because they have specific characteristics.
- In Zagreb a general approach on safety and security on public transport vehicles was combined with a focused approach towards elderly people making them more confident with travelling on trams. In Gent a range of target groups was approached with specific measures to change their travel behaviour, e.g. pupils, commuters, and visitors of events. For each of the groups the mobility dialogue focused on the specific elements in their travel choices.
- Combining infrastructural and organisational actions with soft measures, e.g. offering sustainable transport solutions and convincing people to use these sustainable modes changing their travel behaviour.

The following important observations were made:

- A package of complementary measures is much more effective if the implementation of the measures is also planned in an integrated way.
- Setting a clear timescale for the implementation of each measure will guarantee the best interaction of the measures and avoid unnecessary delays in the implementation of related measures. In practice this implies that also in the project or in the city a “general manager” is active working on the integrated implementation.
- Also the evaluation of these measures and the planning of evaluation activities need to be done in an integrated way in order to fully understand the impacts and processes and to assure the efficiency of the evaluation.
- Integrated evaluation will allow a layered interpretation of the impact of the measures identifying specific results related to one measure and common results. Integrated planning of the evaluation activities is crucial to combine the efforts of data collection and to make the best choices in the selection of indicators and evaluation techniques. Also on this level a strong cooperation between the “general manager” and the evaluation team is necessary.
- Finally it should be noted that not everything can be integrated and linked. Too many dependencies can be a barrier to implement measures as one delay will be multiplied. This could paralyze the dynamic of the city. For this reason “integration” should be carefully considered in a dynamic strategy including flexible approaches to implement measures and modify them, if needed.

For future CIVITAS projects it is recommended that an even higher attention is paid to this aspect of the definition, planning, implementation and evaluation of measures.
6.2.2. Process of implementation of measures

In the implementation of the different measures in CIVITAS ELAN, some common barrier and drivers were experienced. From this process evaluation, several lessons were learned on the critical success factors of the measures.

Lesson 1 – Need for common objectives
Many ELAN measures required the cooperation between a large number of measure partners and other stakeholders. The success of this type of measures depends strongly on the good cooperation and mutual understanding. To ensure a good cooperation, efforts might be needed to make the common objectives clear among all partners. If this is not the case, a successful implementation of the measure might not be possible, resulting in delays or a discontinuation of the measure.

Lesson 2 – Political support
Political involvement in measure development is essential for the implementation of the measures according to plan. In this respect, it is helpful if the measures fit in already existing strategies (of the city or on a higher level). There were several measures in the project where politicians feared negative reactions from the public, especially for the more controversial topics like restricting car traffic.

Lesson 3 – Public support
Citizens played an exceptional role in the CIVITAS ELAN project. It became clear in several measures that public support is crucial for a successful implementation. This worked in two directions: when the measure faced strong opposition, changes in measure design were needed, or the measure was even cancelled. On the other hand, consulting citizens in the early development of the measures led to a better understanding of user needs and constraints in many occasions and created a stronger acceptance of the measure afterwards. Also many positive reactions from citizens on pilot cases pushed the measure implementation forward. It can be concluded here that it is important to involve citizens as early as possible and put efforts in raising awareness on sustainable mobility. Specific efforts should be dedicated to target groups that are hard to reach, e.g. car drivers.

Lesson 4 – Personal motivation
In several ELAN measures certain individuals were key drivers during all stages of measure implementation. Motivated Measure Leaders can push measure implementation forward.

Lesson 5 – Technical problems
Many of the measures in CIVITAS ELAN had the aim to implement innovative technological systems, such as new vehicles technologies, communication software, route planners, etc. Especially for such measures, technical problems might induce delays in measure implementation. This type of barrier is difficult to prevent as new technologies are concerned. Nevertheless, its impact can be reduced by foreseeing sufficient time for testing a system before its implementation and by exchanging experiences with cities that have implemented similar measures.

Lesson 6 – Complex administrative procedures
Some measures were facing delays because of long and complex administrative procedures. This was especially the case for measures that required the construction of infrastructure or the purchase of equipment. This time needs to be incorporated in the measure planning.

Lesson 7 – Financial support
For many measures, the financial support from CIVITAS was an additional incentive to implement innovative measures or carry out in-depth studies that would otherwise not be feasible. On the other hand, the financial crisis affected the available budgets of the city administration or PT operator, which mainly affected the implementation of large-scale infrastructure projects in a negative way.
6.3. Policy recommendations

6.3.1. Political support and integration

Political support was a key success factor in implementing the CIVITAS ELAN measures. Without this support it proved to be difficult to take necessary decisions on a higher level, to reach consensus between stakeholders, and to ensure all financial resources.

Clear, unambiguous decisions from decision makers like senior staff and politicians are needed about the priority to be given to clean, sustainable transport. To achieve this, the inclusion of the decision makers into the CIVITAS ELAN is particularly helpful. For example in Ljubljana, because of a lack of ownership of decision makers on the project, the sustainable urban transport plan (M4.9-LJU) was not approved, and a separate transport policy was approved instead. Also in Zagreb, the transport department that is in charge of important decisions on transport measures was no CIVITAS ELAN partner. Their unwillingness to cooperate in the project resulted in the discontinuation or limited implementation of some measures.

Also national and international legislation that places a statutory duty to meet certain targets ensures that issues are prioritised. The threat of EU sanctions on air pollution created a sense of urgency to improve transport and mobility within the city which led to the development of the City Transport policy and increased awareness on cycling in Ljubljana. On the other hand, regulations on technical issues can also influence the achievement of the targets, as the national regulation on biodiesel in Zagreb has shown.

Innovative demonstration projects such as CIVITAS can help to drive and form new national standards, as has been the case for the cycle street in Gent that has been included in national regulation afterwards.

The presence of a well-planned and documented transport strategy has shown to be beneficial by providing a structure for the inclusion of innovative measures. An example of this is the walking strategy in Gent, which provided the basis for the infrastructural improvements regarding sidewalks. The same impact is expected from the new city transport policy in Ljubljana that has been recently approved. Also comprehensive plans of the public transport operator are encouraging innovative measures in this field. An example here are the yearly transport plans in Brno or the safety plan on PT in Gent.

6.3.2. Stakeholder involvement

Cooperation between the various measure partners, but also institutional stakeholders that are not a part of the measure, is another success factor. Transport is a complex working field that often requires interaction between various partners. In this respect it is important to determine all key actors in the planning phase of the measure, and to involve them as early as possible. An example is the cooperation between different PT operators for the provision of travel information, like for the mobile information system in Porto. Also for the info point for the redevelopment of the main train station area, a good communication between all actors (construction company, PT operators, city, etc.) was the prerequisite for providing correct information to the citizens. It proved to be particularly difficult to cooperate with the stakeholders concerning freight measures because of the lack of a common objective. Mutual understanding between private companies and public institutions is needed to reach an agreement.

Yet, the key element of CIVITAS ELAN was the engagement of the citizens during measure implementation. Several approaches have been tested in the project, with different success rates. Also the starting situation in the cities varied significantly. But the most important is that the approach is adjusted to the aim of the engagement (promotion, information, consulting, decision making, etc.).

In any case, citizens have proven to be a useful source of knowledge, so including their opinion in the design of the measures can lead to an increased acceptance and use of the measure. The CIVITAS ELAN project has provided many good examples for this, like the involvement of disabled people for the design of PT services in Brno and Ljubljana, asking citizens’ opinion on the location of car sharing points in Gent and the Cycling Platform of Ljubljana.
To be able to fully exploit this knowledge of citizens, it is crucial to establish an environment of openness and mutual trust. Citizens need to feel that they are listened to in order to actively participate. Structured interactions in local committees, with regular feedback on how their decisions have been taken into account, might be one of the possible approaches. It might be necessary that more technical oriented measure partners receive trainings on how to interact with citizens in a constructive way.

6.3.3. Comprehensive approach

A strong and consistent policy requires that different aspects of the organisation of our transport and the citizens travel behaviour are affected together. This implies the implementation of a wide range of measures. This is one of the CIVITAS messages from the start and is confirmed by the experiences in the CIVITAS cities.

Evaluation has shown that new vehicle technologies can lead to significant environmental improvements, but as they are still in a developing stage it should be avoided to focus on a single fuel type. These improvements in vehicle technology need to be combined with measures to promote other sustainable transport modes like cycling and public transport to reduce traffic demand. Also for these softer modes it is important that improvements in the system itself – like improving the travel times and comfort of public transport and enhancing cycling infrastructure – need to be complemented by measures that aim at promoting these modes in a softer way: information provision, education, awareness raising, etc.

The mix of measures that is suitable for a city depends on its cultural, social and economic context. This needs to be kept in mind when assessing the transferability of the measures.

6.3.4. Financial support

Subsidy programmes for innovative measures as CIVITAS have been an important driving force behind the implemented measures in the five cities. Experimental but promising approaches have been demonstrated and tested which otherwise might not have found the required resources because of the uncertainty of the outcome.

Especially in difficult economic times like the recent years, public finances were highly restricted and the implementation of measures was endangered. This was particularly the case for large (intermodal) developments like in Zagreb and Porto. But also measures on a smaller scale are now at risk of being discontinued because of lack of funding. Examples are the mobility shops and innovative transport services like the DRT service in Porto. In this respect, it is recommended that investments in sustainable mobility are selected based on a rational basis. The evaluation results provide the necessary data to decide whether the costs outweigh the benefits. It is important to consider also environmental savings and time savings as they significantly contribute to the wealth of the society as well.

If public funding is limited, other solutions need to be sought after to ensure the implementation of measures that aim at promoting sustainable mobility. The inclusion of private companies might work, as proven by the DRT service in Porto that was sponsored by a beer company.

On the other hand, expected economic benefits were often an important driving force behind the measure implementation. Increased energy efficiency of trams like in Gent and Brno leads to significant cost savings. Other examples are the improved functioning of the ticket vending machines in Brno and cleaning of the public fleets in Ljubljana and Gent.

6.3.5. Evaluation

A profound and well-balanced evaluation of the effectiveness of the initiatives of the city is crucial to steer the mobility policy and to optimise the solutions. It helps in discovering which measures are
performing well, and how one can improve others that are performing less well. This is crucial for deciding on future investments to achieve success in the long term.

As the starting point of the various sites was very different in terms of sustainable transport, a good general set of data describing the key indicators of the mobility in the city is important to monitor the progress in the city. Such a database would make the evaluation of specific measures also much easier and would allow understanding specific results in the right context.