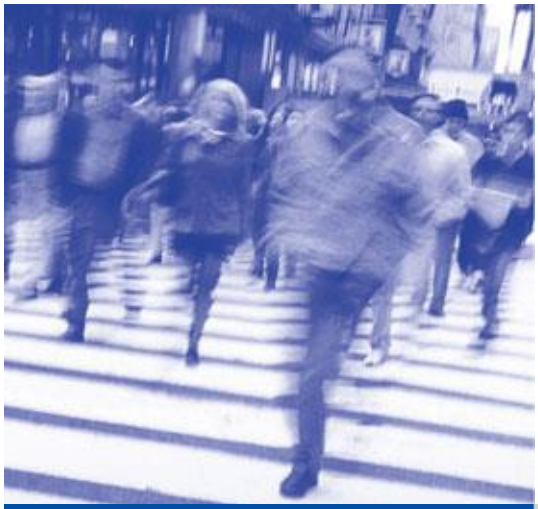

CIVITAS 2020
Cleaner and better transport in cities

SATELLITE

Refined CIVITAS process and impact evaluation framework

Deliverable No.:	D2.3
Project Acronym:	CIVITAS SATELLITE
Full Title:	
Support Action Towards Evaluation, Learning, Local Innovation, Transfer & Excellence	
Grant Agreement No.:	713813
Work package No.:	WP2
Work package Title:	Evaluation
Responsible Author:	
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Date: 31.08.2017	
Status:	Final
Dissemination level:	Public

CIVITAS 2020
Cleaner and better transport in cities
SATELLITE

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Abstract

Based on the previous work in the CIVITAS Initiative, an analysis of recent research studies defining indicators for urban mobility and an intensive cooperation with the new Innovation Actions and a first screening of the evaluation approaches in the Research and Innovation Actions, this deliverable provides an refined CIVITAS process and impact evaluation framework. This framework consist of detailed guidelines for a solid CIVITAS 2020 evaluation approach to achieve consistent and useful results currently applied by the new Innovation Actions. It also includes a first reference to the Research and Innovation Actions presenting elements to link with the CIVITAS 2020 evaluation approach.

Project Partners

Organisation	Country	Abbreviation
Transport & Mobility Leuven	Belgium	TML

Document History

Date	Person	Action	Status	Diss. Level
24/07/2017	Dirk Engels	First draft version	Draft	
14/08/2017	Dirk Engels Gitte Van Den Bergh	Draft version	Draft	Internal SATELLLITE
2008/2017	Ivo Cré	Quality control and comments on first draft version	Draft	Internal SATELLLITE
25/08/2017	Hana Peters	Quality control and comments on first draft version	Draft	Internal SATELLLITE
31/08/2017	Dirk Engels Gitte Van Den Bergh	Final version	Final	INEA, PEM, public

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List of abbreviations

CBA: Cost Benefit Analysis

CEM: CIVITAS Evaluation Manager

ECG: Evaluation Coordination Group

ELG: Evaluation Liaison Group

IA: Innovation Action

IP: Integrated Package of measures

LEG: Local Evaluation Group

LEM: Local Evaluation Manager

LEP: Local Evaluation Plan

MER: Measure Evaluation Results

ML: Measure Leader

PEM: Project Evaluation Manager

PEP: Project Evaluation Plan

PER: Process Evaluation Report

PET: Project Evaluation Team

RIA: Research and Innovation Action

SC: Site Coordinator

WBCSD: World Business Council for Sustainable Development

1 Introduction

This introduction describes the context and objectives of the CIVITAS 2020 evaluation activities, which are important for developing an optimal evaluation approach and selecting the right indicators and related analysis methods to understand the impact and implementation process of the CIVITAS 2020 measures.

Furthermore, the status of this framework is explained, showing that this framework is part of a process of permanently improving the CIVITAS approach regarding process and impact evaluation. Finally the structure of this document is presented.

1.1 Context and objectives

For many years cities have tested and demonstrated innovative sustainable solutions for cleaner and better urban transport and mobility in the context of the CIVITAS Initiative. A wide range of CIVITAS measures – specific actions contributing towards clean urban mobility – were implemented in European cities. In September 2016, three new projects (ECCENTRIC, DESTINATIONS and PORTIS) called 'Innovation Actions' (IA) brought 16 new cities into the CIVITAS family. Additionally, since 2015, other projects in the urban domain of the Horizon 2020 Mobility for Growth programme called 'Research and Innovation Actions' (RIA) will work as part of the CIVITAS Initiative.

From the start of CIVITAS the evaluation of the demonstrated measures' impacts and the understanding of the implementation process were crucial to achieving the CIVITAS objectives. Indeed, evaluation is a powerful tool for learning what works, what does not, and the reasons for this. In other words, we evaluate because we want to measure the performance, learn for future projects and exchange experiences. Evaluation delivers various benefits for both decision makers and citizens as it helps to improve future planning, better target measures on specific groups and optimise to allocation of resources (Dziekan et al, 2013). A thorough evaluation will provide knowledge on the effectiveness of specific measures and packages of measures. This will make it possible to identify good practice and transferability.

Considering all of its merits, it is an evidence that evaluation is a key part of all projects within CIVITAS, since it is important to understand the nature and extent of the impacts made by the measures introduced in the cities, as well as the processes involved.

For this the evaluation framework has been developed and improved to be used in all demonstration cities of the CIVITAS Initiative. The last year this work continued from July 2016 on as part of the coordination activities of CIVITAS SATELLITE. Work Package 2 'Evaluation' of CIVITAS SATELLITE co-operates intensively with the new IA projects to implement this refined CIVITAS 2020 evaluation framework to achieve a consistent, feasible and useful evaluation of the demonstrated measures in the new CIVITAS cities.

Additionally the cooperation with the current and new RIA projects entering the CIVITAS initiative is launched with the aim of incorporating their evaluation approaches into an overall CIVITAS 2020 approach. The first results of this cooperation are already included in this

refined framework and further cooperation with IA and RIA projects will result in a 'Completed Framework' in the autumn of 2018.

1.2 Status of this framework

At the start of CIVITAS SATELLITE an '**Optimised CIVITAS process and impact evaluation framework**' was developed based on the work of CIVITAS POINTER and WIKI by reviewing their deliverables and conducting interviews with project partners that were responsible for evaluation in the previous CIVITAS phases. Identifying the evaluation indicators to be used to evaluate the impact of the implemented measures continues to be a crucial element of the framework. The basis for this is the 'list of common CIVITAS indicators', as developed in CIVITAS POINTER and WIKI. However, this list should be regularly updated to take into account new data opportunities, new societal trends and technological developments and recent policy objectives. Therefore, a first optimisation considers possible new additional indicators based on:

- the specific experience of UITP on sustainable development and public transport
- the 'fast' set of indicators for an Urban Mobility Scoreboard developed by the Advisory Group on Data and Statistics of CIVITAS CAPITAL, giving guidance for cities on how to use data and statistics for evidence-based decision making.
- the indicators developed by the World Business Council for Sustainable Development on mobility indicators.

The draft version of this document was introduced at a meeting with INEA on 9th of September 2016 in Brussels, and on the first ELG meeting on 29th of September 2016 in Gdynia.

This optimised framework proved to be a solid basis for the new IA projects and CIVITAS SATELLITE to work together towards a refined CIVITAS framework to be used for an efficient and consistent evaluation of the CIVITAS IA project measures.

Based on the optimised framework and taking into account the results of an intensive cooperation with the new IA projects and a first screening of the evaluation approaches in the RIA projects, this document, the **'Refined CIVITAS process and impact evaluation framework'** is developed now with detailed guidelines for a solid CIVITAS 2020 evaluation approach to achieve consistent and useful results currently applied by the new IA projects. It also includes a first reference to the RIA projects presenting elements to be used to link with the CIVITAS 2020 evaluation approach.

More specifically the following actions were done to develop this new version of the framework:

- An improved description of the scope of the CIVITAS 2020 evaluation work, sharpening the basic measure evaluation activities and indicating additional evaluation work to come to better and more useful conclusions supporting the definition and choices in sustainable mobility strategies
- The list and description of impact indicators was restructured and further developed taking into account an analysis of the interrelations between the impacts of mobility

measures and an analysis of recent research studies defining indicators for urban mobility including an analysis of specific EU documents prepared in the context of the Roadmap 2030 and the Urban Mobility Scoreboard

- An intensive interaction with the recent IA projects bringing their planned evaluation approaches, their specific evaluation requirements and the new version of the framework in line with each other
- Identification of specific (additional) requirements for an effective evaluation, e.g. clusters of measures, general attitude and travel behaviour analyses, upscaling, ...
- Screening the evaluation plans of two clusters of RIAs (RIAs focusing on SUMPs and RIAs focusing on urban freight logistics) and meetings with the SUMP focused RIAs on their vision on and needs for evaluation
- Developing a planning and monitoring tool covering all evaluating related activities (the implementation stages, the data and information gathering activities and reporting) which is also more generally usable to follow-up the progress of the project in a city
- A refining of the Measure Evaluation Results (MER) template and the Process Evaluation Report (PER) template taking into account the concerns of the IAs, making both reporting tools consistent and complementary.

Finally the conclusions of these actions and the observations of the work of the current IA projects were discussed with INEA on a regular basis to define the focus of the refining of the framework.

In a next stage a '**completed CIVITAS evaluation framework'** (D2.4). will be developed. In this version of the framework relevant elements of the methods used in the RIA projects will also be incorporated to further strengthen the evaluation framework for the IA projects. A specific RIA survey will collect information on the indicators and data collection methods used in relation to the types of measures being developed.

Additionally, the 'completed CIVITAS evaluation framework' will provide a basic CIVITAS evaluation framework for (future) RIA projects. , so that the evaluation results of RIA projects will be harmonised with the general CIVITAS evaluation approach. This framework will include a minimum set of indicators for impact analysis and elements for an efficient process evaluation.

1.3 Structure of this document

This document presents the 'Refined CIVITAS 2020 process and impact evaluation framework', which is the current version of the CIVITAS evaluation framework as of September 2017.

Chapter 2 describes the overall evaluation framework and explains the way all CIVITAS 2020 projects should set up a consistent and effective evaluation approach.

The next two chapters describe in more detail the two complementary aspects of the CIVITAS 2020 basic measure evaluation approach: chapter 3 details the process of impact evaluation and chapter 4 describes the process evaluation approach.

Finally chapter 5 gives an overview of the general evaluation reports to be made up and the reporting tools to be used to plan and to report on the evaluation activities on different levels of analysis and conclusions.

2 The CIVITAS 2020 Evaluation Framework

This chapter describes the overall evaluation framework synthesising the way all CIVITAS 2020 projects should set up a consistent and effective evaluation process. For the Innovation Actions this framework is a strong guideline to be followed in order to achieve consistent and useful results. For the Research and Innovation Actions this framework should give inspiration to follow the main vision of the CIVITAS 2020 evaluation and include already relevant elements to link with the CIVITAS 2020 evaluation approach.

2.1 The scope of Evaluation in the CIVITAS 2020 context

2.1.1 Core objectives of the CIVITAS 2020 evaluation

Two types of actions are currently part of the CIVITAS 2020 calls:

- Innovation actions (IA): Activities directly aiming at producing plans and arrangements or designs for new, altered or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, piloting, large-scale product validation and market replication.
- Research & Innovation actions (RIA): Activities aiming to establish new knowledge and/or to explore the feasibility of a new or improved technology, product, process, service or solution. For this purpose they may include basic and applied research, technology development and integration, testing and validation on a small-scale prototype in a laboratory or simulated environment. Projects may contain closely connected but limited demonstration or pilot activities aiming to show technical feasibility in a near to operational environment.

In other words in the 'CIVITAS family' we have two types of projects at the moment:

- the IA projects: projects with a focus to test and demonstrate an integrated package of measures (part of a consistent mobility policy in a city) to come to innovative sustainable solutions for cleaner and better urban transport and mobility
- the RIA projects: projects with a focus to develop and validate a mobility measure (or a set of measures) to come to innovative sustainable solutions for cleaner and better urban transport and mobility

However, we observe that for some projects the types of activities are a mixture of both approaches. To keep the description clear this is not further discussed here. In reality these projects will have to take into account aspects of both types of projects.

In the context of these types of projects, the main objective of the CIVITAS 2020 evaluation is to **understand the process and impact of the mobility measures, to learn what works and what does not, and to understand the reasons why.**

This knowledge will allow optimisation of measures, to upscale them in the best way possible and to have relevant information available to assess whether a measure can be

What is a measure in the CIVITAS context?

A measure is a mobility related action implemented by a city (by the government or other stakeholders) e.g.:

- New infrastructure
- A new service
- A new organisation of the travel to work
- Activities to change awareness, acceptance or attitude and behaviour of citizens or visitors

successfully transferred to other cities or sites.

In this perspective building up a clear and transparent evaluation approach starts with the clear and sharp identification of the CIVITAS measures tested, demonstrated, developed and validated: **what are the measures we want to evaluate?**

2.1.2 Extended analyses

In many cases the straightforward impact and process evaluation of one mobility measure in an urban environment (a city or a site) is neither possible nor sufficient.

A mobility measure implemented in a city will have an impact on the citizens and on other users of the city but in many cases the observed impact will be also the result of other measures and general evolutions. Moreover, an urban strategy mostly consists of a combination of different mobility measures that reinforces each other. For this reason, the evaluation approach should include good methods to deal with the challenge of not only the understanding of one specific measure but also the integration and interaction of this measure in the general urban evolution. This understanding is crucial to come to useful and correct conclusions.

For this reason the CIVITAS 2020 evaluation framework includes further guidance to extend the basic comparison of the value of indicators in the before and after situation with analyses to complete the understanding of the before and after situation e.g. up-scaling of measures and their impact, cost-benefit analysis (CBA), expert judgements, etc.

2.1.3 Additional evaluation analyses

Furthermore, a range of additional evaluation analyses are important to support different activities or types of conclusions envisaged in a project, e.g. conclusions on the transferability potential of measures and choices in a roll-out strategy, understanding of the importance of specific aspects of a measure, design decisions to optimise a mobility product, best practice guidance, building up a business model, estimation of long-term effects, etc.

For this, different methods can be used e.g.:

- Land-use and multimodal traffic modelling
- Business model analysis (BMA)
- Transferability analysis

There are a wide variety of approaches available to be chosen by each project according to their needs. The CIVITAS 2020 evaluation framework will refer to some elements in these methods that are important to link with the core CIVITAS 2020 evaluation approach.

2.1.4 Project evaluation

For many projects it is important to assess the achievements and performance of the project itself, also in relation to the resources and funds used for it.

Specific objectives could be:

- To monitor and check whether a project fulfils its objectives, whether the project has delivered the outputs promised in the proposal.
- To monitor and check whether a work package of a project fulfils its objectives
- To identify the effect(s) of specific activities in the project
- To identify the effect(s) of the project on the take-up of the measures

Examples are:

- Evaluation of the general dissemination activities of an IA or RIA project: was the dissemination of the project results effective to reach the target audience?
- Evaluation of the innovation activities (e.g. a work package about 'Innovation') to increase the quality of the measures: evaluation whether the innovation activities brought a measure on a higher level of innovation
- Assessing whether a project approached the planned number of cities to validate the measure they developed

This type of evaluation is of course very important to assess the efficiency and results of the project. However to keep the conclusions clear, distinguishing the core CIVITAS 2020 evaluation, in which we try to understand the impact and process of the measures that are demonstrated, tested and validated, is crucial.

Project evaluation is not discussed further in this framework. For the completed framework good practices of project evaluations will be gathered.

2.1.5 Scope of this Framework

This framework describes the key elements of the core CIVITAS 2020 evaluation approach:

- A consistent straightforward impact and process evaluation of CIVITAS mobility measures
- The most important aspects of the extended evaluation activities needed to come to well-motivated conclusions on the role the mobility measures can have – individually or in a package of measures or as part of an overall sustainable development strategy.

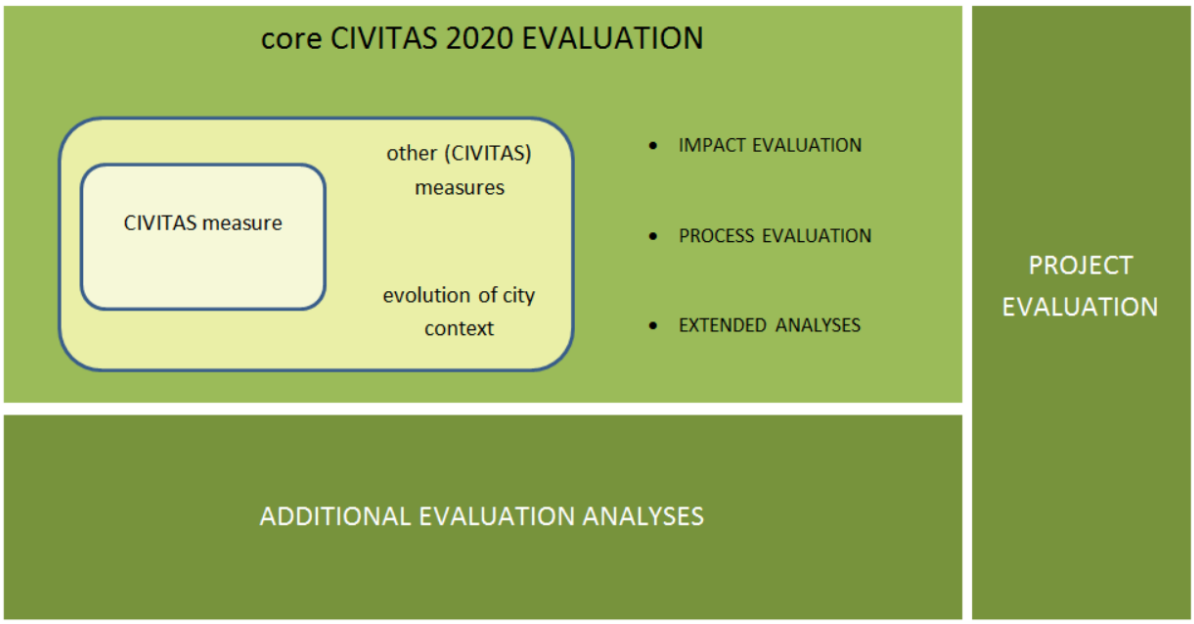


Figure 2-1 Scope of the core CIVITAS 2020 evaluation framework in relation with the different evaluation activities

Of course, depending on the objectives of a project other evaluation work may need to be included to evaluate the goals of the project and to support other activities in the project.

A crucial aspect in the approaches built up by all CIVITAS projects is that all additional and further extended evaluation analyses should be constructed based on the core CIVITAS 2020 evaluation approach; using the same terminology, the same categorisation of impacts, the same type of characteristics of the implementation processes, etc., eventually extended to include additional terms, categories, characteristics, indicators, etc.

2.2 Key elements in the core CIVITAS 2020 evaluation approach

The focus of the CIVITAS evaluation work are the CIVITAS measures implemented in a CIVITAS city. Evaluation aims to describe the impact of the implemented measures in impact categories with quantitative measurements in relation to quantifiable targets set in advance and qualitative observations.

Since the CIVITAS projects implement measures in a real, complex, functioning environment the CIVITAS evaluation needs an optimal balance between scientific, precise analyses and synthetic interpretation of observations of the evolution of urban mobility. This is an important challenge to address in order to make the evaluation work feasible, efficient, and useful for policy conclusions.

2.2.1 Efficient combination of impact and process evaluation

The evaluation work includes two complementary actions: impact evaluation and process evaluation:

- **Impact evaluation** includes the evaluation of a wide range of technical, social, economic and other impacts of the measures being implemented by the cities:
    - What is the impact of a measure or an integrated package of measures in the 6 CIVITAS impact categories based on before and after measurements?

- **Process evaluation** involves the evaluation of the processes of planning, implementation and operation, aiming to understand why measures have succeeded or failed, including the roles of information, communication and participation:
    - How was the measure implemented?
    - Which barriers and drivers we observe for the implementation of the measure?
    - What was the effect of supporting activities in the implementation of the measure, to facilitate the implementation, to increase the envisaged impact and to avoid/reduces not-wanted impacts?
    - Why do we have an observed impact? What are key elements in it?

The integration and interpretation of the results from both aspects will provide the necessary comparative insights and understanding of the effectiveness of the measures at city level showing also the importance of such measures at a European level.

Especially in the complex urban environment in which a range of factors influence changes, it is crucial to combine some quantitative measurements (the traditional impact evaluation) with specific efforts to validate and put the figures in the correct context. This validation effort then can be combined with the process evaluation efforts to evaluate the implementation process.

2.2.2 Clear understanding of measures and their context

To achieve a transparent and clear evaluation of the CIVITAS approaches, it is crucial to have a clear and sharp understanding of each measure. Since CIVITAS implements measures in a complex urban environment that is continuously evolving, with a lot of changing factors and other measures implemented, any evaluation work should start with the definition of the measures that need to be evaluated, clarifying the following aspects:

- What are **the objectives of the measure in terms of qualitative goals and, if applicable, quantifiable targets**? These objectives can be structured on local level, strategic level and city level in perspective of the CIVITAS goals, optionally indicating short and long-term goals.
- What is really done or realised as part of this measure in CIVITAS?
    - The **starting point (before situation)** for the measure (e.g. a fleet of 100 diesel buses)
    - Which **sub-measures** or **supporting activities** are part of the measure; e.g. citizens engagement or participation actions, measure related communication, etc.
    - **The output**: the immediate result of the measures (e.g. 20 new hybrid buses replacing diesel buses)
- What is the **expected impact** of the measure (outcomes)?
    - Envisaged impacts (see objectives)
    - Possible additional impacts (including negative undesirable impacts)

- What is the **target group** of the measure?
  - Whose attitude or travel behaviour is the measure trying to change?
  - Which part of the transport system is the measure trying to change?
- What is the **expected impact zone** (in space and time) of the measure?

- What are **other factors (of the city context), other CIVITAS measures and non-CIVITAS measures** affecting the impacts in the CIVITAS impact categories in the area where the measure has been implemented?

  This analysis is an important phase in the development of an efficient evaluation approach and it is the basis for an intelligent and effective structuring of the measures to be evaluated.

2.2.3 Structuring measures for evaluation

In many projects the definition of 'measures' is not made from the point of view of evaluation. A measure often brings activities together that have a similar working theme, or on the other hand strongly linked activities can be split into different measures. This often results in a complex set of measures with rather different sub-measures on one hand and different measures which work in practice closely together to affect the same target group with the same goal. Looking to different projects we observe that in one project the same action is defined as one measure in one project (e.g. the construction of a bicycle lane with an intensive promotion campaign to change perception of the citizens in favour of the mode 'bike') and in another project in one measure and a sub-measure of another measure (e.g. the construction of a bicycle lane and an intensive promotion campaign to change perception of the citizens in favour of the mode 'bike' as part of the measure changing the mind-set of citizens towards sustainable modes).

Additionally other factors (the evolution of the city context) and non-CIVITAS measures will have also an effect on the impacts we try to measure and understand.

Finally the impacts of measures which focus on the same target group with the same objectives can hardly be disentangled. In that case it is better to evaluate these measures (partly) together for the impact categories they work together and use qualitative methods to understand the importance of each measure in the observed impact.

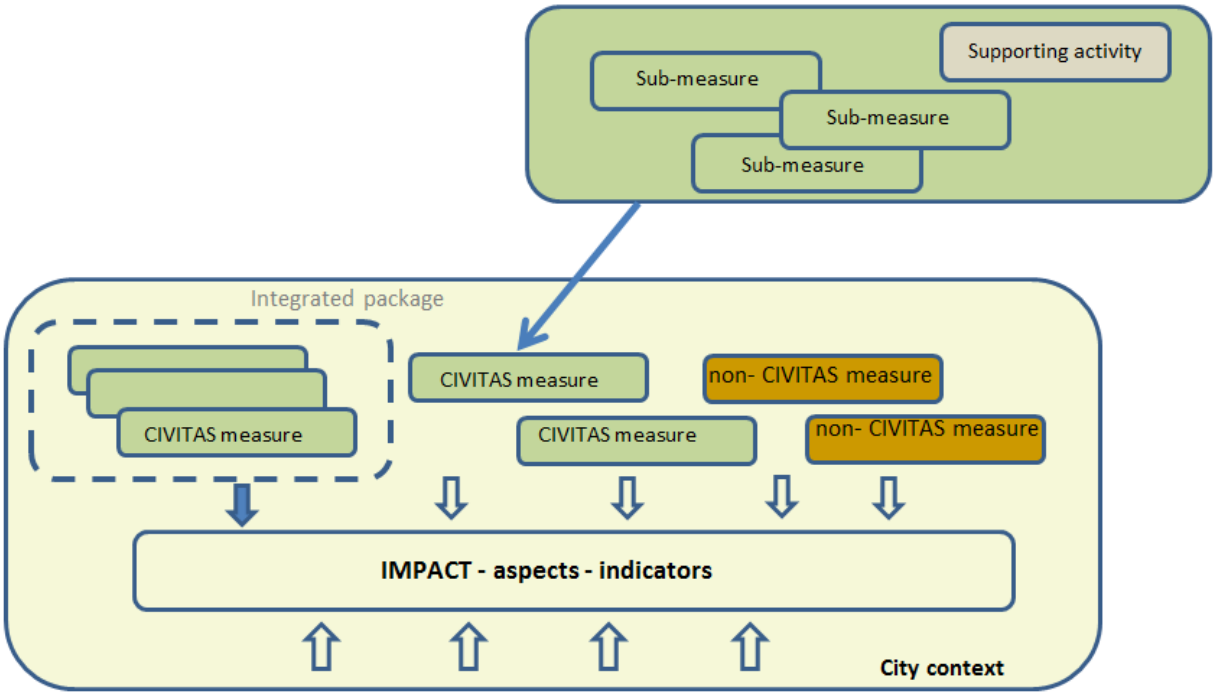


Figure 2-2 Structuring measures – sub-measures – supporting activities with impacts and indicators

In an IA project the ideal approach would be that the Project Evaluation Manager agrees with the Measure Leaders and Site Coordinator (see 2.4.1Roles) on the best structuring of the measures (without changing what is planned to be demonstrated) from the evaluation point of view. However this is sometimes only partly—or not at all—possible.

For this reason the initial analysis of the measures should be used to structure the evaluation approach in the best way, identifying the measures, the sub-measures and supporting activities. If there are measures that will be evaluated (partly) together, integrated packages (IP) of these measures can also be defined. Efficiency and feasibility will be two important criteria for doing this.

2.2.4 Further development of the evaluation plans

Based on this knowledge the evaluation of the measures should be developed further, defining e.g.:

- Which impact categories –impact aspects and indicators should be used?
- Which data will be collected, when and where?
- Which analysis methods will be used?
- Which process evaluation activities will be done?
- Which additional analyses will be done?

- How will we get all analyses to motivate evaluations on the envisaged levels (e.g the measure, the city or site, the project,…) answering the research and operational questions on these levels.

In order to avoid a situation in which the evaluation resources are spread too thinly across all measures**, it is important to decide which key measures should be evaluated in depth.** How to choose these key measures is further explained in the following chapters. For the other measures the standard evaluation approach, as described in the next chapters of this document, must be followed.

The result of this work should be presented clearly in both local evaluation plans (LEPs) and the Project Evaluation Plan (PEP) explaining how the evaluation work –from data collection to final analyses– will result in evaluation conclusions on measure, integrated package of measures, city and project level.

2.2.5 Key measures with an in-depth evaluation

In order to avoid a situation in which evaluation resources are spread too thinly across all measures, it is better to identify some key measures that will be evaluated in depth, and conducting a basic evaluation on the rest. The most important criteria to identify key measures for an in-depth evaluation are:

- measures expected to provide most useful output for policy conclusions
- crucial measures in the development of a city
- measures with a high potential for transferability
- measures for which the implementation process is very complex involving a lot of stakeholders, having a lot of barriers or measures that were even stopped because of serious problems

Other criteria are:

- promising results in the first phases of the measures;
- expected impact on five pillars of EU Green Paper on Urban Transport;
- possibility to carry out a complete cost-benefit analysis (CBA);
- degree of innovation of measure (technique, consortium, process, learning, etc.);
- number and kind of stakeholders;
- manageability of the measures;
- representative for a group of measures a specific context.

Each project can agree on the criteria most suitable taking into account the characteristics of the project. For the selected key measures higher efforts should be done to understand the impact and process of implementation of the measures e.g.

  - larger data collection campaigns, more frequent, larger samples, more indicators (part of impact evaluation)

- a cost-benefit analysis or at least a clear financial analysis (part of the impact evaluation)
- extra meetings and discussions to evaluate the process and to understand the impact
- interviews and more intensive meetings with stakeholders analysing the process of the measure (part of the process evaluation)

For IA projects it is expected that for a reasonable number of measures a cost-benefit analysis(CBA) will be done. For RIA projects whether a cost-benefit analysis is done depends on the general objectives of the project.

Based on the initial analysis of the measures, these activities should be planned in detail in the evaluation plans. During the project this planning should be updated based on the observations of barriers, drivers (part of the process evaluation), and other remarkable aspects. E.g. for a measure that is failing to be implemented, efforts should be made to better understand the reasons. The lessons learned of a failing measure can help other cities to make the right choices in measure implementation.

2.2.6 Consistency of approaches in all cities

To have a transparent and correct understanding of the impact of the CIVITAS measures it is necessary that evaluation in each individual city or site is of high quality and produces good, clear results. For this to happen, especially the IAs should follow the guidelines in this framework, especially:

- the general approach for evaluation
- the indicators used for measuring the impacts. However, this does not prevent cities from having their own additional local indicators for evaluation and assessment of important aspects of the impact.
- the methods of measurement; these must be in line with the guidance or at least be transparent, allowing the understanding of differences in results due to the method of measurement.
- the monitoring of related information that might contribute to understanding the nature and extent of the results collected, especially for context-specific situations

Also the RIAs should follow as much as possible the approach described in this framework.

As emphasised before, all CIVITAS projects should build up all additional and further evaluation analyses starting from the core CIVITAS 2020 evaluation approach to evaluate the mobility measures they want to demonstrate, test and validate. In general they should use the same terminology, the same categorisation of impacts, the same type of characteristics of the implementation processes, etc. These elements can eventually be extended with extra terms, categories, characteristics, indicators, etc.

By using a common framework and terminology, the impact of measures reported in a city or site can be understood easily by others.

2.3 Evaluation levels and levels of conclusions

A solid and transparent evaluation approach should be clearly structured: on which levels we collect data and evaluate changes? And which will be the focus of the conclusions we want to draw using information from the different levels of evaluation?

2.3.1 Levels of evaluating the measures

Evaluation of the CIVITAS measures should at least be done at the following levels:

- **Measure level**: evaluation of the individual measures. This is the basic level of evaluation on which all other levels depend. The evaluation work will be done for the target group for which and in the area in which the measure is active.

- **Integrated package level**: evaluation of packages of measures implemented together. The measure in one package have (at least partly) the same objectives and target groups. It is necessary that you try to understand which measures are most important and which measures are important to support the other measures to make them more effective.

Additionally an overall **evaluation at city level** is very relevant and helpful in reaching well-motivated conclusions. At this level a more coherent interpretation of measure level results can be achieved. Data at city level are collected (surveys and measurements). **Upscaling techniques** are also useful to show the further impact of measures implemented in CIVITAS on a small scale. If CIVITAS works on a specific **demonstration zone**, this overall evaluation can be done for this demonstration zone, making it more feasible to collect the data and precisely evaluating the affected area and approached target group. In such cases it is also important to check that the demonstration zone is not too small, as this can result in some negative side effects that are induced in the neighbouring zones but are not measures nor part of the evaluation.

2.3.2 Level of evaluation conclusions

Based on the evaluation findings at the different levels, conclusions can be drawn with different levels, trying to answer a range of policy questions, e.g.:

- Conclusions at the level of one measure:
    - what is the impact?
    - which important elements were observed in the implementation?
    - which supporting activities influenced the impact?
- Conclusions at the level of one Integrated Package:
    - what is the impact?
    - which measures were crucial in the package and how did they interact?
    - which supporting activities influenced the impact?

- Conclusions at city level:
  - which approaches (which measures) seemed to be the most effective for a particular (type of) city?
  - which combination of measures (packages) are most effective to implement to achieve the goals?
  - are the observations for that evaluated demonstration zone in line with the objectives for the city?
- Conclusions for a specific type of cities

  If a project consists of similar cities with specific characteristics and challenges (e.g. port cities, island cities, metropolitan cities with large suburban city districts) the conclusions can be strengthened at the project level.
- Conclusions for the CIVITAS themes:
  - What can be learned from the evaluation of the effectiveness of the measures under the specific theme?
  - Which themes are the most effective to contribute to the general CIVITAS goal of 'Cleaner and better urban transport in cities'?

The CIVITAS thematic categories/ policy fields

'Organisational and infrastructural mobility measures':

- **Car-Independent Lifestyles** – cycling, walking, car-sharing, bike-sharing, car-pooling, co-modality, ride-sharing
- **Collective Passenger Transport** – accessibility, intermodality, service improvements, ticketing systems, innovative PT systems, fleet management, procurement schemes
- **Clean Fuels and Vehicles** – electric mobility, fuelling infrastructures, hybrid vehicles, use of biodiesel, biogas and compressed natural gas, cleaner fleets
- **Demand Management Strategies** – congestion charging, access restrictions, parking management and strategies, low emission zones, car-free zones, priority lanes, mobility credits, financial incentives and disincentives
- **Urban Freight Logistics** – urban delivery centres, distribution schemes, fleet management, cycle logistics, freight partnerships, urban freight transport plans

General aspects of the mobility system

- **Safety and Security** – traffic calming, infrastructure design, shared space, cycle highways, secure school paths, anti-vandalism measures

Technological support of the mobility systems:

• **Transport Telematics** – intelligent transport systems, communication, routing, smartphone applications, plate recognition systems Measures directly working on the users acceptance and attitude and their travel demand: • **Integrated Planning** – land-use, housing, new developments, sustainable urban mobility plans • **Mobility Management** – marketing and communications, personal and company travel plans, mobility info centres • **Public Involvement** – multi-stakeholder consultations, information campaigns, participatory processes

Table 2-1 The CIVITAS thematic categories/ policy fields

- Conclusions on the objectives of the IA project:
  - Which measures are crucial in responding to the specific challenges of the cities of the IA project?
  - What impacts can be achieved with CIVITAS measures in this type of cities?
- Conclusions on the objectives of the RIA project:
  - Does the measure that was developed, tested and validated, fulfil the expectations resulting in the envisaged impacts?
  - Is the proposed solution an effective response on a specific type of challenge in such type of urban environment?

Bringing together the findings from all projects and from all the cities and measures in the IA projects, cross-site conclusions **at CIVITAS level** can be drawn: well-motivated and balanced conclusions with stronger lessons learned for a wider range of cities and mobility challenges. These conclusions can be further completed and strengthened taking into account conclusions of previous CIVITAS projects and the findings of the recent and current RIA projects.

2.4 Organisation of the evaluation process

2.4.1 Roles

For a consistent and effective evaluation work in the IA and RIA projects, the following roles and responsibilities in the evaluation process are important:

- The CIVITAS Evaluation Manager (CEM) is responsible for coordinating all evaluation activities of the CIVITAS 2020 projects, mainly the IA projects. Together with the PEMs, the CEM coordinates the evaluation work in the CIVITAS cities of the IA projects, summarises the evaluation results of the RIAs and draws conclusions at the CIVITAS level.

- The Project Evaluation Manager (PEM) supports the cities in a specific IA or RIA project in performing the evaluation and is responsible for the end result of all the evaluations carried out in the project. Together with other actors in the project the PEM will also draw conclusions specifically related to the focus of the IA or RIA project.
- The Local Evaluation Manager (LEM) is responsible for the evaluation of all measures in the city or site.
- The Measure Leader (ML) is responsible for organising the preparation, implementation and operation of a specific measure in his/her city. The ML also has an important role in the evaluation of his/her measure, mainly in the collection of data and information on the implementation.
- The Site Coordinator (SC) is responsible for providing a general supervision of the implementation process of all measures in the city or site and provides support in evaluation where requested by the LEM and the ML.

For IA projects in which (integrated packages of) measures are implemented in different cities or parts of cities these roles seem clear and well-structured in this way for the different levels where evaluation activities are needed.

An important requirement is that the LEM has an independent position in relation to the measures allowing them to have a wide view over all the measures in the city and to have an efficient and objective interaction with the SC and MLs. The latter can have some responsibilities in collecting the basic data, but the analysis and interpretation of the data should be the first responsibility of the LEMs supported by the PEM.

For a RIA project the structure can be different in relation to the specific needs of the project. However, the main responsibilities should be clearly identified guaranteeing an effective and transparent interaction between the implementation of measures and the evaluation resulting in well-motivated conclusions.

2.4.2 Cooperation platforms

An intensive cooperation between CIVITAS SATELLITE and the IA projects and RIA projects is crucial to roll-out the CIVITAS message and knowledge. As a basis for this a Memorandum of Understanding (MoU) has been conclude with all projects. The objective of this MoU is to define the responsibilities of CIVITAS SATELLITE as well as the CIVITAS 2020 projects within the cooperation between different stakeholders in the CIVITAS2020 group of projects. This document outlines for each CIVITAS SATELLITE work package of how Innovation and Research and Innovation Actions will be supported and coordinated, and how they should in turn contribute.

Part of this cooperation are the different cooperation platforms on coordination, dissemination and evaluation.

For evaluation the following cooperation platforms are organised:

- The Evaluation Coordination Group (ECG)
    - On the CIVITAS 2020 level
    - Role: Exchange of experiences and approaches between IA and RIA projects; discussing the future CIVITAS 2020 Evaluation Framework
    - Participants: the PEMs of the IA projects and person responsible for evaluation in the RIA projects
- The Evaluation Liaison Group (ELG)
    - On the level of the current CIVITAS IA projects
    - Role: coordinating the evaluation activities of the IA projects; exchange of experiences and approaches between IA projects
    - Participants: the PEMs of the IA projects

For an efficient organisation of the evaluation activities in an **IA project**, the following platforms are necessary:

- The Project Evaluation Team (PET)
    - On the project level
    - Role: coordinating the evaluation activities in the IA project and the demonstration cities
    - Participants: the PEM and LEMs of the cities
- The Local Evaluation Group (LEG)
    - On the city or site level
    - Role: organisation of the evaluation activities in the city (data collection, data interpretation and information on the implementation of measures)
    - Participants: the LEM, SC and MLs

Important elements in this cooperation structure are:

- The ELG works as a team to coordinate the evaluation work in the cities in a consistent and effective way.
- The PEM monitors the evaluation activities in the IA project, performing quality control and drawing conclusions specifically related to the focus of the IA project. This is especially important for IA projects that focus on a specific type of urban mobility e.g. the current IA projects:
    - ECCENTRIC: suburbs of large metropoles
    - DESTINATIONS: island cities
    - PORTIS: port cities
- The links between the evaluation work and other tasks in the projects should be clearly defined showing how the evaluation teams interact with the implementation of the measures and with other activities in the project.

- CIVITAS SATELLITE guides, coordinates and coaches the evaluation work, steers the ELG, and draws the conclusions on CIVITAS level.

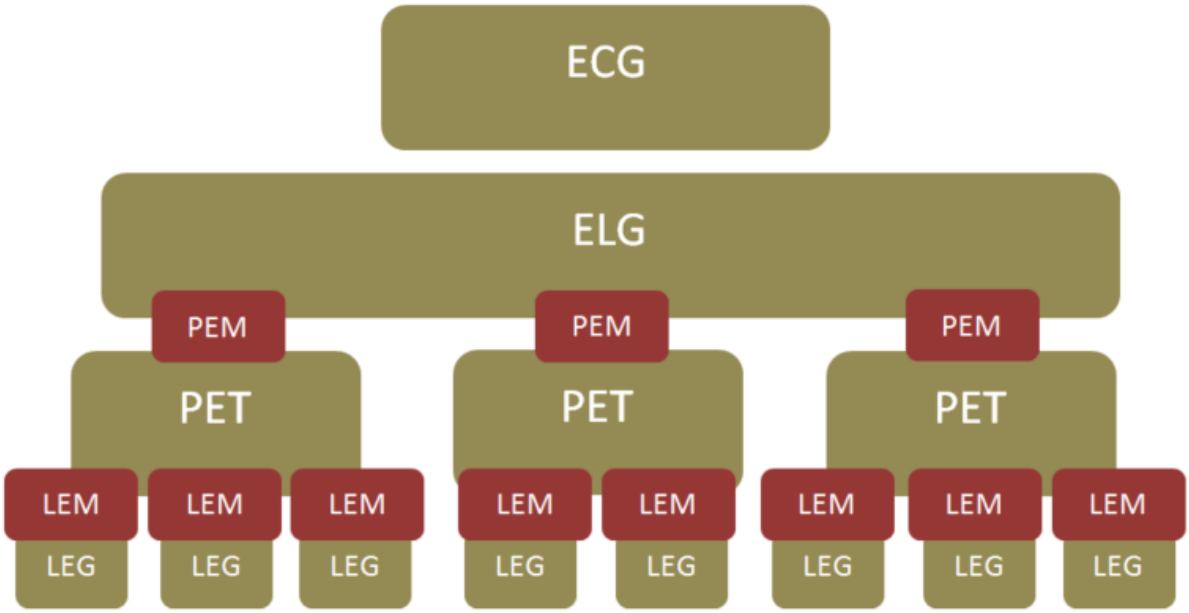


Figure 2-3 Structure of the cooperation platform

Also for a **RIA project** a similar transparent cooperation structure dealing with the evaluation activities should be set up with clear links to the other tasks in the project.

2.5 Key steps for a consistent evaluation in the IA projects

Later in this document, the elements for both impact evaluation and process evaluation are discussed, highlighting which factors are crucial and which less so. However a high-quality evaluation also requires that all evaluation efforts are combined in an optimal way and, even more important, carried out with the right timing. Elements of both impact evaluation and process evaluation should be integrated in an efficient way.

The table below gives an overview of the main evaluation tasks indicating responsibilities and timing for a IA project.

Impact evaluation	**Process evaluation**	**Main responsible actors**	**Indicative timing** Month from the start of the IA project
Analysis of measures • Precise definition with identification of sub-measures and supporting activities • Target group, objectives and quantifiable targets		LEM, LEG ML SC	1-2

Impact evaluation	**Process evaluation**	**Main responsible actors**	**Indicative timing** Month from the start of the IA project
Structuring the measures with identification of 'Integrated Packages' of measures (IP)			
• Identification of expected impact and indicators • Identification of Integrated Packages of measures (IP) • Methodology for measurements and data collection • Responsibilities evaluation activities and resources	• Clarifying timing of implementation • Defining actors and roles • Planning actor meetings and interviews	LEM LEG	3-5
Production of evaluation plans • Local Evaluation Plan • Project Evaluation Plan		LEM LEG PEM	4-6
Data collection baseline • First version of Measure Evaluation Results (MER) sheets		ML LEM SC Subcontractors	2-12
Data collection current situation and evaluation of available intermediate impact data	Monitoring of implementation process	ML LEM SC Subcontractors	6-42
Intermediate findings on the impacts	Intermediate observations on the implementation process	ML LEM	12- 42
Impact evaluation on measure level and IP level • Processing collected data and calculation of	Evaluation of implementation process • Actor meetings to analyse	ML LEM SC	36-44

Impact evaluation	Process evaluation	Main responsible actors	Indicative timing Month from the start of the IA project
quantitative indicators • Actor meetings to understand the impact • Interpretation of indicators (up-scaling)	the process • Actor interviews • Identification of barriers and drivers • Understanding the implementation process		
In depth analyses e.g. cost-benefit analysis (CBA) for key measures		LEM, LEG	40-44
Final version of MERs • Impacts per measure or per IP • Findings on supporting stakeholders and supporting activities for the implementation		LEM PEM	40-44
Drawing conclusions at city level		LEM, LEG PEM support	40-42
Conclusions at project level • Conclusion in relation to the focus of the project • Conclusions per CIVITAS policy field • Conclusions on measures and combination of measures		PEM LEM support	44-48

Table 2-2 Overview of evaluation activities in a IA

3 Impact evaluation

Impact evaluation is the assessment of the changes which are attributed to a specific measure or integrated package of measures. During this evaluation both the intended and unintended impacts of the measure are examined.

This chapter explains how to organise an impact evaluation and what is needed to carry out a well-structured and meaningful evaluation.

First the need for context data is explained referring also to the possibilities to add also city level evaluation activities. Then the basic elements of the impact evaluation of a measure are detailed.

3.1 General context data at city level and city level evaluation

3.1.1 General context data

A measure will have an impact at a specific scale within the mobility system of the city with its citizens, visitors and commuters. Sometimes the scale is more regional or more limited to a specific area of the city or restricted to a specific target group.

However, to achieve a good interpretation of the observed impact of the measures it is crucial to have a basic knowledge of the general mobility situation. Therefore, a range of data should be collected in order to describe the baseline context of the mobility in the city or region. This way the obtained impacts due to the CIVITAS measures can be put in the right perspective, and can be understood by the whole CIVITAS community and compared across different CIVITAS cities and projects.

In most cases the context data should be gathered for the city as a whole, but depending on the scale of the project, it could be more reasonable to focus on a specific district or, on the other hand, to look at the wider region.

Below, the most important context parameters are listed that are needed with a level of priority which indicates how crucial a parameter is. At least the data with priority 1 should be available for each CIVITAS city, either through existing data collection campaigns or through specific CIVITAS measurements and surveys.

Parameter	Example of development of the parameter	Priority
Modal split of the trips made by the citizens	Share of trips made by the citizens using each mode, divided at least over the following modes: • Car driver • Car passenger • Public Transport • Cycling • Walking	1

Modal split of the trips made by the commuters	Share of the trips made by the commuters using each mode, divided at least over the following modes: • Car driver • Car passenger • Public Transport • Cycling • Walking	1
Car ownership of the citizens	Number of cars per 1000 citizens.	2
Car congestion level in the city	Weighted average travel times of car traffic during peak hours on up to 10 major corridors compared with free-flowing travel times	2
Public transport congestion level	Weighted average travel times of public transport during peak hours on up to 10 major corridors compared with free-flowing travel times	2
Parking situation	Number of parking spaces available and average occupancy rate of the parking spaces in different city areas	3

Table 3-1 Proposition of context parameters to be collected in a CIVITAS city

If during the project lifetime, an important change occurs, independent of the CIVITAS measures, an update of these parameters may be necessary. At the end of the project it is necessary to have a critical look at these context parameters and check whether they must be updated.

These context parameters should be part of a general description of the baseline context in the city consisting of the following information:

- General characteristics city and region (if relevant)
  - Geographic
  - Governance
  - Population
  - Main activities: working, school,
- Specific characteristics in relation with the Project Focus e.g. Port, Tourism, etc.
- State of mobility: modal split figures, usage and flows of different modes, etc.
- Provision of transport options: infrastructure for walking, cycling, car driving, public transport and other modes and services organised (e.g. public transport, car sharing, …)
- Current mobility management and traffic management initiatives including communication with the public
- Goods and freight movements: movements, infrastructure, services, etc.

In this way the measures can be put in the right perspective improving the understanding of their impact.

In Annex 8 Survey methodologies an example of a survey developed in the CIVITAS PORTIS project collecting this information is added.

3.1.2 City level evaluation

It is important to mention that the context parameters can also be used to measure the impact of the measures. An example of this is a measure to increase the level of carpooling of the commuters of a business park at the edge of the city. In the baseline situation the modal split of the envisaged target group should be measured and after the implementation of the measure this modal split will be monitored again. For the understanding of these results it is important to have knowledge of the general modal split figures in the city.

Each project should decide which data should be collected on city level and for which impacts estimations will be added based on an upscaling of the impact of the measures evaluated as described in next chapters.

3.2 Impact evaluation approach

3.2.1 General concept

In theory the impact evaluation of a measure is very easy:

- A **set of indicators** that describe the important characteristics of the situation is proposed,
- we observe the value of these indicators **before and after** the implementation of the measure,
- while **preventing other elements from influencing** the indicators or removing the impact of the other elements before assessing the “after” situation,
- then we **compare** before and after situation
- and finally we **draw conclusions** about the impacts induced by this specific measure.

However in practice many elements can make impact evaluation difficult and even impossible, especially in a real, complex urban environment.

For this reason it is important to agree on an evaluation approach that is both highly qualitative and practically applicable in each CIVITAS city. The following sections describe the building blocks for a feasible and effective impact evaluation.

3.2.2 Before and after comparisons

The impact evaluation in CIVITAS is based on ‘before-and-after’ comparisons and must be carried out consistently across the CIVITAS cities and projects to provide the opportunity to exchange experiences and learn from each other.

The evaluation design that should be followed as much as possible is the design that is described below and that is illustrated in Figure 3-1.

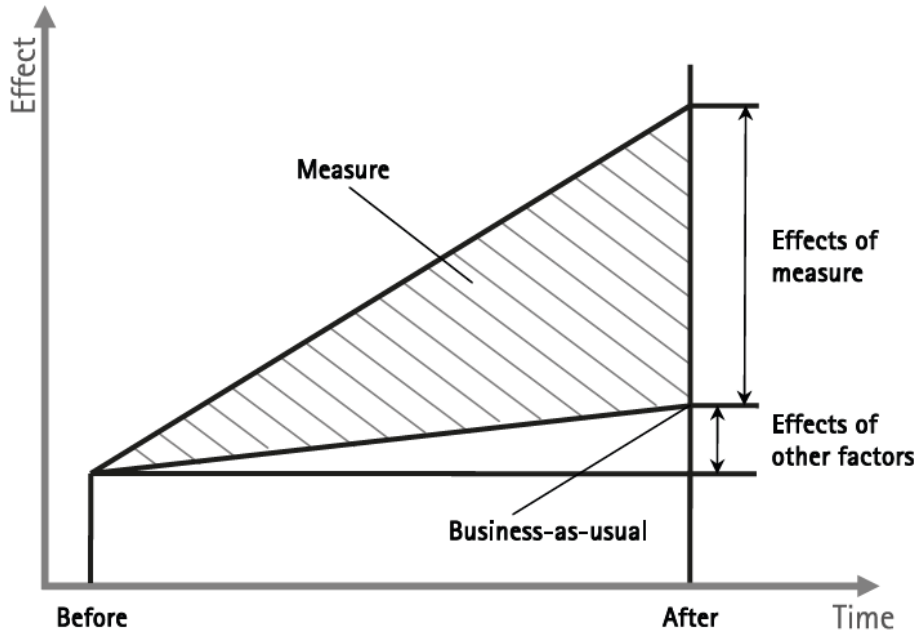


Figure 3-1: Before (Baseline), Business-as-Usual & After scenario; Source: "Evaluation Matters, A practitioners' guide to sound evaluation for urban mobility measures", 2013

- A first step in the evaluation approach is the measurement of the '**baseline'** or '**before**' situation. Baseline surveys and measurements are necessary to assess subsequent changes resulting from CIVITAS measures and are carried out *prior* to the introduction of the measures. The baseline measurements should be of sufficient scale to enable expected changes, both intended and unintended, to be judged statistically where this is appropriate and possible. It should encompass all measure-related indicators that may change. The baseline surveys may also help to fine-tune the design of the measures.
- In order to draw conclusions, it is then necessary to identify what would happen if the measure was not introduced. Therefore a **business-as-usual scenario** must be established. One of the main objectives of business-as-usual scenarios is to determine the impacts of the measures by comparing results between scenarios with and without the measures.

  Possible ways to estimate the 'business-as-usual' situation include forecasting from historical data (that can be provided by the baseline measurements), modelling (where appropriate local models are available) or monitoring a parallel 'control' site with the same characteristics without applying the project measures to it. In transport projects, this latter solution is often very expensive and not always very precise or appropriate.

  All the factors which may change during the evaluation period and which could influence travel and its impacts in the cities need to be identified at an early stage of the project and included in the baseline records. These **other factors** may be identified as other (CIVITAS or non-CIVITAS) measures that are implemented during the same time period, or context changes that occur over time (e.g. an increased car ownership or a decline in average family size). These effects may be adopted from

other studies, modelled, interpreted through processes of extrapolation and prediction, or some mixture of both may be used. This will depend on the data and models available on a city-to-city basis. Each city must propose a credible approach.

At the end of the study, it may be necessary to update the business-as-usual predictions in the light of actual changes in other factors which are different from what predicted. At least a critical check must be carried out that concludes whether an update of the business-as-usual predications is necessary.

- After implementation of the measures, an '**after' or 'ex-post' evaluation** needs to be carried out. This consists of a final set of measurements for evaluation which can be compared with baseline and business-as-usual measurements to assess the effectiveness of the measures implemented. With the measures having been implemented, it is possible for many impacts to be measured directly in real conditions. However, such measurements have to be statistically sound to ensure the high quality of the evaluations.

  An important method to understand changes is the organization of **before and after end-user questionnaires** asking persons to report on their travel behaviour and explain their attitudes and reasons for change or no change. Such a survey can be organized on city level or on the level of the envisaged target group taking into account statistical requirements.
  Alternatively **a transport panel** can be installed. A transport panel consists of a set of people (the larger, the better) who use the city's transport system and are contacted a number of times during the different phases of the measure to take part in a survey or to fill in a questionnaire. The benefits of a transport panel are that the shifting opinions based on the effects of a measure are well recorded. This is more accurate compared with different people that are contacted a number of times.

  A project can also decide to organise a so-called '**after-only survey'** with questions on current behaviour but also change and the motivation for change. However, this option is only applicable if there are other before and after data available (e.g. counts). The survey is then an extra source of information to explain the change that occurred.

3.2.3 Ex-ante evaluation

Except from the before-and-after approach, evaluation can also take place before implementation, the so-called ex-ante evaluation. Basically CIVITAS aims to demonstrate measures and validate measures implemented in real urban environments using ex-post evaluation technics. However if a CIVITAS measure is limited to a feasibility study, and nothing will be implemented yet during the project period an ex-ante evaluation can be useful.

In such a feasibility study, a problem or issue that needs to be tackled with a specific intervention is defined. Ex-ante evaluation will show what impact certain possible solutions are going to have. Also the related costs can be estimated. Based on this information of the alternative solutions, one can decide which solution to implement to reach the objective.

In this framework we will discuss mainly ex-post evaluation although some elements can be used for ex-ante evaluation too. If a measure is limited to a study the results of the ex-ante evaluation can be reported in similar ways as the ex-post evaluation.

3.3 Selection of impacts and indicators

For the evaluation of each measure, we need to agree on which expected impacts they are going to evaluate and what kind of indicators they will use in order to quantify the selected impacts.

In this section, an overview is presented of the impact areas to be assessed and relevant aspects to be analysed. Additionally a list of indicators is discussed as a basis for the further improvement and completion of a standard CIVITAS list of indicators.

3.3.1 Identification of impacts of measures

The implementation of a measure is expected to have an impact on the different aspects of the complex mobility system in the city. Many approaches are available to structure this mobility system, identifying the relevant aspects of people and goods (the users), of the transport (sub)systems, and the environment in which these systems operate.

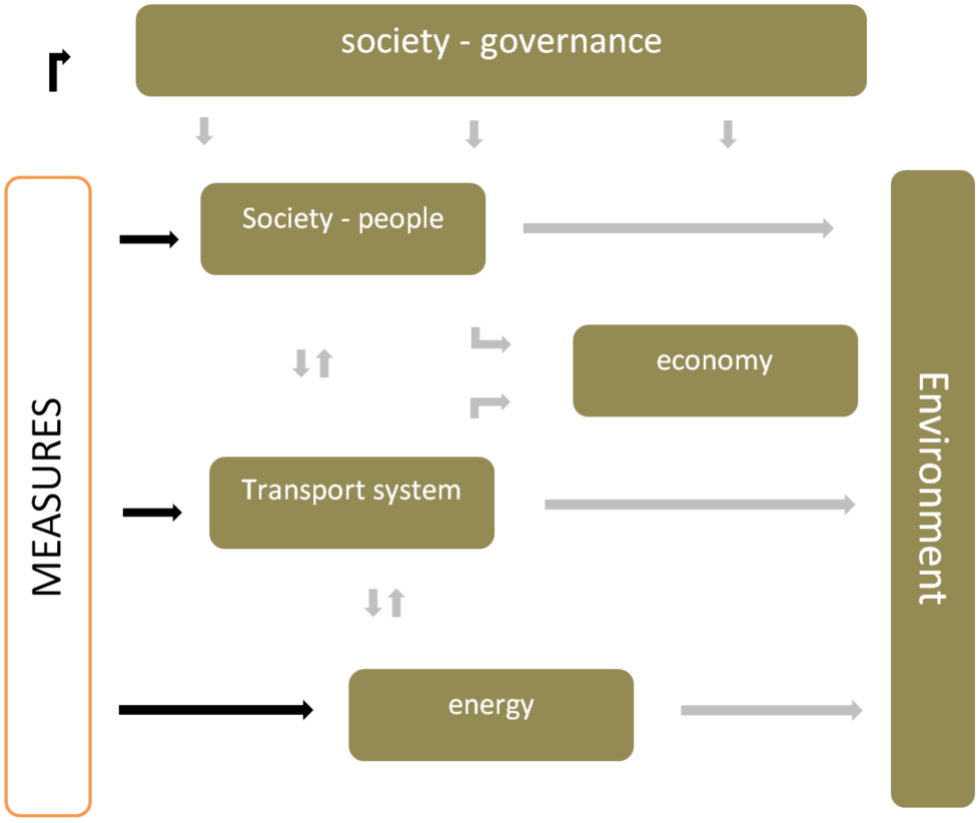


Figure 3-2: The mobility system with the main impact links

To make the understanding of the impact of measures clear and transparent it is important to start from a clear structured understanding of the way measures can affect the mobility system. The scheme in Figure 3-2 is a way to present the different categories of the mobility

system showing the most important impact links. Although it is just one way to simplify the complex urban reality, it helps to structure the evaluation approach.

Measures can work directly on a specific impact category or indirectly through other categories; for example, if a bus fleet is converted to optimise the heating system by re-using the heat of the engine, there will be a direct impact on the energy usage but there may also be an indirect impact on the air quality in the bus corridor (the environment).

The following impact categories are identified:

- **Society** considers the people with their characteristics and mobility mind-set but also the organisation of society, which is crucial for the quality and effectiveness of the mobility policy.
    - **Society-people** covers all person-related aspects with a link to the mobility system. This includes for example characteristics of activity structures, accessibility levels to the transport system, but also health aspects linked to mobility behaviour.

      Effects on society may in turn have further effects on other factors such as employment opportunities, usage levels of the different modes, etc.
    - **Society-governance** includes the way society is organised both in terms of land-use (affecting the travel demand) and in terms of governance (affecting the way measures can be implemented and will be accepted).
- **Transport system** focuses on the performance of the mobility system in terms of usage and its technical characteristics. The emphasis here is on understanding how much the CIVITAS measures can contribute to improving the performance of the different modes of the mobility system.
- **Economy** focuses on the estimation of the effectiveness or benefits derived from a measure in relation to the costs associated with its preparation, implementation and operation. In economic efficiency terms, the balance between the impact of a measure and the willingness of users to pay the cost of achieving this impact has to be judged.

  This impact category also includes the effectiveness in increasing the income of citizens or creating jobs.
- **Energy** describes the consumption of energy. Using alternative fuels is one of the main measures proposed in CIVITAS. In addition, many other measures can also contribute to the reduction of fuel consumption (e.g. increasing public transport use) mainly through an impact in the other impact categories.
- **Environment** recognises that many of the CIVITAS measures aim to improve the environment by using clean vehicles and alternative fuels and reducing the modal share of private motorized transport. Environmental evaluation focuses on pollution/nuisance and resource consumption.

The impacts can be further described using:

- **Sub-categories** of the impacts e.g. the impact category ‘transport’ is further broken down into sub-categories: general, safety, car, public transport, etc.

- **Impact aspects** of the sub-area describing important characteristics of the sub-category

An example of this is shown in the table below (Table 3-2) for the impact area 'Economy'. A similar structure is built up for the other impact areas as shown in Figure 3-2.Data collection

When deciding which indicators to select, an important consideration is how the indicator is measured and what data will be used for this. In general there are two different kinds of data you can use for impact evaluation: data that is already available and data that must still be collected by additional measurements or surveys. It is always advisable to look for available data, because using high-quality existing data could save a lot of time and money. This data could include accident statistics, tickets sale numbers, periodic traffic counts and speed measurements, annual mobility surveys, etc.

When using available data, it is critical to ensure that this data is relevant and reliable. As this data may not be tailored specifically for the needs of one measure, it is important to avoid the trap of using secondary data just because it is available.

In most cases, the available data will not be sufficient for monitoring the effects of a measure for all selected indicators. Therefore it will often be useful to collect data to fill in the missing information, or do a more detailed assessment. The advantage to collecting new data is that you can customise the measurement to the specific evaluation needs. It therefore is critical to think through what you are going to measure and in what detail, in order to get the best value with the available budget.

In general mobility-related data can be either behaviour-related and/or traffic-related. Behaviour-related data can be collected by asking people (e.g. interviews, questionnaires, focus groups) but also by observing behaviour (e.g. behaviour observations of pedestrians at crossings). Collecting traffic-related-data can be done by counts (e.g. vehicle counts, ticketing information) or measurements (e.g. emissions measurements).

Recently a lot of new data collection possibilities have emerged, using e.g. the location of mobile phone and other devices to track trips of people, routes of cars and bicycles. Taking into account privacy regulations, these technics can provide much cheaper, more detailed data on traveling behaviour covering in a better way the whole target groups.

In some cases these new data collection techniques can be used to calculate values for the existing indicators, in other cases the indicators need to be refined. In the latter circumstances, it is important to check that the desired impact categories are sufficiently covered.

Annex 8 **Survey methodologies** provides more background information on the methodology for surveys.

IMPACT CATEGORY	SUB-CATEGORY	KEY IMPACT ASPECTS
ECONOMY	**Benefits**	Operating Revenues

IMPACT CATEGORY	SUB-CATEGORY	KEY IMPACT ASPECTS
		Economic development
	Costs	Investment costs
		Operating costs

Table 3-2 Areas sub-categories and impact aspects for the impact category 'Economy'

Deciding which impacts (category-subcategory-aspect) should or should not be included in the evaluation is not straightforward. In this process, both the measure objectives (with the intended impacts with quantified targets) and the measures itself (potential impacts) should be considered while reviewing the following questions:

- What (intended and unintended) impacts does the CIVITAS measure have?
- Do the impacts influence the achievement of the CIVITAS objectives?
- Are the impacts direct or indirect?

3.3.2 Selection of indicators

Taking into account the general objective of CIVITAS, i.e. 'working towards sustainable clean urban transport', the selection of indicators should convey any progress made in the CIVITAS cities towards sustainable mobility.

As there are often many indicator options for measuring an impact, the selection of the right indicators is very important for an evaluation with limited resources.

For the selection of indicators, the main criteria to follow should include:

- **Relevance**: each indicator should represent an assessment criterion, i.e. have a significant importance for the evaluation process;
- **Completeness**: the set of indicators should consider all aspects of the system/concept under evaluation;
- **Availability**: readily available for entry into the monitoring system;
- **Measurability**: the identified indicators should be capable of being measured objectively or subjectively;
- **Reliability**: clarity of definition and ease of aggregation;
- **Familiarity**: the indicators should be easy to understand;
- **Non-redundancy**: indicators should not measure the same aspect of an assessment criterion;
- **Independence**: small changes in the measurements of an indicator should not impact preferences assigned to other indicators of the evaluation model.

Table 3-3 below gives an overview of possible indicators to be used to describe the impact aspects in the different impact categories. This new version of the table is build-up through an analysis of CIVITAS SATELLITE possible impacts and indicators starting from the

previous list of indicators developed by the CIVITAS METEOR project completed by CIVITAS POINTER and CIVITAS WIKI and enriched with relevant additions from:

- the list of 'City-level Sustainable Mobility Indicators' proposed by CIVITAS CAPITAL Advisory Group 5 Data and Statistics (2016). (http://civitas.eu/document/civitas-capital-sustainable-mobility-indicators)
- the list of indicators in the 'Methodology and indicator calculation method for sustainable urban mobility' proposed by the World Business Council for Sustainable Development (WBCSD) (version 2016 SMP2.0). (*www.wbcsd.org/contentwbc/download/3006/38273)*
- the ad-hoc definition and description of indicators by previous and current CIVITAS IA projects.

The indicators are classified into three types:

- **Key indicators**: important indicators to understand the impact of the CIVITAS measures in the six main CIVITAS impact categories; if possible at least these indicators should be used with the proposed definition, units and measurement methods to make the results transparent for others
- **Intermediate indicators**: indicators used to derive with further calculations, eventually using also other indicators, the impact in the CIVITAS impact categories; eventually these indicators are used to show the influence of the measure on an interesting aspect of the mobility system
- **Additional indicators**: additionally other indicators can be used to understand specific aspects of the impact of a measure or as an alternative for the key indicators making use of available data.

The table presents the following information:

- Impact category
- Impact sub-category
- Impact aspect
- Type of indicator
- Indicator
- Description of the indicator
- Availability of "Indicator Definition & Methodology Sheet" with more detailed description and guidance (see Annex 1 Indicator Definition & Methodology Sheets)

This list will be further completed in the 'Completed Framework' which is due for the autumn of 2018.

Apart from this list of indicators, some cities/projects may wish to use other 'local' additional or intermediate indicators for their evaluation. Such indicators may be used:

- to make an assessment at a more detailed level;
- to assess the impacts concerning a particular local problem; or
- to assess specific or exceptional impacts of a measure.

The results from the use of local indicators for such evaluation will enhance the understanding of CIVITAS impacts provided by the list of key indicators.

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
SOCIETY-PEOPLE					
Acceptance	**Awareness**	**Key Indicator no. 1**	**Awareness level**	The percentage of the target population with knowledge of a measure on account of provided information. This indicator is used to assess the awareness of the general public or a particular target group on CIVITAS measures.	x
	Acceptance/ attitude	**Key Indicator no. 2**	**Acceptance level**	The percentage of the population who favourably receive or approve of the measure. This indicator is used to assess the acceptance levels of general public or target groups on CIVITAS measures. A measure is deemed to be well-accepted if users (citizens, operators, PT customers, etc.) are satisfied with its existence and/or use.	x
	Satisfaction	Additional indicator	Citizens satisfaction with transport services	User/provider/stakeholder average reported satisfaction with • the overall quality of the transport system (public transport, cycling, walking, etc.) • the quality of a specific service It measures the experience of the user/provider, against its expectations.	x
Accessibility	**Physical distances between activities/ Land-use**	Intermediate indicator	Population density	Total population per hectare of urbanized land area.	
		Intermediate indicator	Land-use structure	Assessment of the structure of a city in relation to the fact that corridor structures and a urban structure with poles of high density have better opportunities to be served in a qualitative way by public transport.	
		Intermediate indicator	Mix of spatial functions in an area	Average presence (value 1) or not (value 0) of out of 10 spatial functions related to daily activities except for work in grids of 1km x 1km	
		Intermediate indicator	Accessibility to primary services	Percentage of population living within close distance of (public) primary services: nursery, primary school, doctor, pharmacy, food store, postal service and public meeting places	

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
	Physical accessibility of transport services	**Key Indicator no. 3**	**Perception of level of physical accessibility of service**	The user's perception of the physical accessibility of the service. This concerns, for instance, the distance to the nearest PT stop and the convenience of getting there.	x
		Additional indicator	Share of population with appropriate access to mobility services	Percentage of population living within walking distance of public transport (stop or station) or shared mobility (car or bike) system	x
		Additional indicator	Physical accessibility for deficiency groups to transport services	The average reported convenience of city transport for physical disabled persons	
	Operational accessibility of transport services	**Key Indicator no. 4**	**Operational barriers**	The operational accessibility to transport and transport services, as the average reported convenience of city transport.	x
		Additional indicator	Operational barriers for deficiency groups	The accessibility for deficiency groups (groups with training deficiencies or reduced knowledge) to transport and transport services, as the average reported convenience of city transport for target groups.	
	Economic accessibility of transport services	**Key Indicator no. 5**	**Relative cost of service**	Cost of service relative to average personal income	x
		Additional indicator	Relative cost of service for the poorest group	Share of the (public) transport cost for fulfilling basic activities of the household budget for the poorest quartile of the population.	
	Car availability	Intermediate indicator	Car ownership	All cars (including company cars) owned per 1000 of the population aged 18 or over. Percentage of households that have no car, preferably disaggregated by city district.	x
		Intermediate indicator	Car share cars and stations per capita	This indicator is derived by dividing driving age population (18 and over) by the number of car share cars, that is, those cars in commercially or community run car share clubs that provide hourly hire of cars parked on street in local areas, bookable and payable by the hour, by club members only.	x
	Bike availability	Intermediate indicator	Bike ownership	Bikes (pedal cycles) owned per 1000 population, disaggregated by city district if possible. Toy bicycles and those for children aged under 5 should not be counted.	x

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
		Intermediate indicator	Bike sharing bikes and stations per capita	This indicator is derived by dividing total population by the number of bike share bikes. Bike share bikes are those that are available on street for users (who sometimes have to go through a registration process and pay a registration fee) to hire, although often the first half hour of use is free of charge.	x
Mobility demand	**Total Travel demand/need**	Intermediate indicator	Average number of trips per person	Average number of trips per day (weekday, week-end day) or per hour (peak hour, off-peak hour, …) of a target group	x
	Freight transport demand	Intermediate indicator	Total number of freight transport movements	Total number of freight transport movements departing or arriving in a specific area	x
Health	**Health (physical activity)**	**Key indicator No. 6**	Average walking/cycling time per week	Average number of minutes that an adult between 20 and 74 years old is walking per week. Average number of minutes that an adult between 20 and 64 years old is cycling per week.	x
SOCIETY-GOVERNANCE					
Planning	**Planning process**	**Key Indicator no. 7**	**Quality of the Sustainable Urban Mobility Plan**	Qualitative check of the content and process of the Urban Mobility Plan verifying to which extent the content of the plan and the process of developing it corresponds with the EU guidelines on Sustainable Urban Mobility plans.	x
		Additional indicator	Quality of policies, plans, and programs	Qualitative description of the change in the process to develop policies, plans, and programs (including SUMPs).	x
Operational cooperation structures	**Quality of cooperation structures with stakeholders**	**Key Indicator no. 8**	**Quality of cooperation structures with stakeholders**	Level of quality of cooperation structures between all public and private stakeholders to develop and implement sustainable mobility solutions	x
TRANSPORT SYSTEM					
General	**Modal split persons**	**Key Indicator no. 9**	**Average modal split in number of trips**	Percentage of trips using each mode for a specific target group during a day (weekday, week-end day) or per hour (peak hour, off-peak hour, …). For an area the model split of both the trips of the residents and the in- and outgoing people are analysed.	x

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
		Additional indicator	Average modal split in passengers-km	Percentage of passenger-km for each mode for a specific target group during a day (weekday, week-end day) or per hour (peak hour, off-peak hour, …). For an area the model split of both the trips of the residents and the in- and outgoing people are analysed.	x
	Modal split freight	**Key Indicator no. 10**	**Modal split in freight transport**	Percentage of goods using each (sub) mode for a specific target group during a day (weekday, week-end day) or per hour (peak hour, off-peak hour.	x
	Total distances of vehicles	Intermediate indicator	**Km/type of vehicle**	Total distances driven in an area during a day (weekday, week-end day) or per hour (peak hour, off-peak hour, …) by different type of vehicles (private cars, trucks, public transport vehicles, …)	
Safety	**Transport safety**	**Key Indicator no. 11**	**Number of people killed and seriously injured (KSI) caused by transport accidents**	The number of recorded transport injury accidents and the resulting number of fatalities and casualties caused by any means of transport. A fatality is a death within 30 days after the traffic accident as a corollary of the event.	x
		Intermediate indicator	Number of transport accidents	Number of transport accidents	
		Intermediate indicator	Percentage of vehicles speeding	The percentage of motor vehicles on a sample of urban roads that exceed the posted speed limit.	
Security	**Security**	**Key Indicator no. 12**	Perception of security	Perception of security when using service	x
Walking	**Opportunity for walking**	**Key Indicator no. 13**	**Quality of pedestrian infrastructure**	Percentage of the total distance of the city's streets (including squares: the “distance” of a square is the sum of the length of its sides) with a good quality for walking on the total length of the city road network (excluding motorways)	x
		Additional indicator	Quality of sidewalks	Calculation of the walkability index of all streets in an area describing in detail all aspects of quality for a sidewalk.	
	Number of pedestrians	Additional indicator	Number of pedestrians	Number of pedestrians passing at set of reference points in area during specific hours a day or during the whole day.	x

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
	Walking perception	Additional indicator	Image on the walking conditions (subjective)	Attitude towards walking conditions based on the answers of a survey among citizens and visitors or pedestrians on the street.	x
	Quality of public area	Additional indicator	Presence in the city of attractive areas such as pedestrian street or squares	Reported social usage of streets and squares and subjective appreciation of the public area quality	
Cycling	**Opportunity for cycling**	**Key Indicator no. 14**	**Quality of cycling infrastructure**	Percentage of the total distance of the city's streets (including squares) with a good quality for cycling on the total length of the city road network (excluding motorways)	x
		Additional indicator	Quality of bicycle paths	Calculation of the bikeability index of all streets in an area describing in detail all aspects of quality for a sidewalk.	
	Number of cyclists	Additional indicator	Number of cyclists	Number of cyclists passing at a set of reference points in area during specific hours a day or during the whole day.	x
	Cycling perception	Aditional indicator	Image on the cycling conditions (subjective)	Attitude towards cycling conditions based on the answers of a survey among citizens and visitors or cyclists on the street.	x
Public transport	**Service reliability**	**Key indicator no. 15**	**Accuracy of service**	Number and percentage of services arriving / departing on time	x
		Key indicator no. 16	**Commercial speed**	The average journey speed of public transport services between two points, including any delay at stops	x
		Additional	Peak/off-peak travel time difference	The percentage difference of travel times between peak hours, and off-peak hours. The peak and off-peak hours must be defined by each city to correspond with the local conditions.	
	Vehicle occupancy	Intermediate indicator	Average occupancy	Average number of persons per vehicle/day	
Car	**Vehicle Occupancy**	Intermediate indicator	Average occupancy	The average number of passengers per vehicle per trip.	x
	Traffic Flows	Intermediate indicator	Traffic flow by vehicle type (peak/off-peak)	The average daily vehicle flow during the peak and off-peak hours.	x

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
	Congestion Levels	**Key indicator no. 17**	**Average vehicle speed (peak/off-peak)**	The average network or route speed by vehicle type during the peak and off-peak	x
		Additional indicator	Delays in road traffic peak versus free flow traffic	Weighted average ratio of peak period travel times to free-flowing travel times with respecting rules in road traffic during peak hours on 10 reference routes	x
	Parking	Intermediate indicator	Parking demand	Number of parking places needed in an area	
		Intermediate indicator	Parking cost	Cost per hour of on-street parking in city's most expensive on-street spaces, as a percentage of gross monthly individual income.	x
		Intermediate indicator	Use of space for parking	Space devoted to parking (total, includes on street, off-street, private residential and non-residential) as proportion of the ground surface an urban area.	x
		Intermediate indicator	Turn-over	Number of cars parked per parking place during a day.	
		Additional indicator	Peak usage	Usage of the parking places at peak hours.	
Trucks	**Freight Movements**	**Key indicator no. 18**	**Number of freight movements**	The number of freight vehicles moving into a demonstration area (e.g. city centre).	x
	Service reliability	Additional indicator	Reliability of just-in-time freight deliveries	The number and percentage of just-in-time freight deliveries that arrive within an acceptable interval around the planned times	
New shared systems	System usage	Intermediate indicator	System usage	Average system usage (bookings, rentals, deliveries, users, passengers, etc.), in a given unit of time.	x
ECONOMY					
Benefits	**Operating Revenues**	**Key Indicator No. 19**	**Average operating revenue**	The ratio of total income generated from fares and tickets divided by the total passenger-km or vehicle-km completed by the service in a given time period (for example day, week, month or year).	x

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
	Economic development	**Key indicator No. 20**	**Job/sales impact**	Average monthly sales and yearly number of employees of businesses 100 meters around the transportation node (for public transport or station-based systems), along the intervened street (for roads/bike lanes/sidewalks, parking, etc.), or covered area.	x
Costs	**Investment costs**	**Key indicator No. 21**	**Capital investment costs**	The total capital costs for purchase of infrastructure, equipment and vehicles. It can also include the total costs expended in setting up the measure and cover a period from the initiative of the measure preparation until the start of the measure implementation.	x
	Operating costs	**Key indicator No. 22**	**Average operating costs**	Operating costs including for example, the personnel costs, fuel, electricity and maintenance costs for the vehicle(s) involved.	x
ENERGY					
Energy Consumption	**Fuel Consumption**	**Key indicator No. 23**	**Vehicle fuel efficiency**	the energy consumption per unit of transport activity	x
		Intermediate indicator	Fuel mix	The percentage of the market share of transport fuel for each type of fuel used in a given period.	x
Energy resources	**Energy resources**	Additional indicator	Use of clean energy resources	The total volume of non-conventional energy resources. It can also be measured as a percentage of the total energy used.	
ENVIRONMENT					
Pollution	Emissions	**Key indicator No. 24**	**CO2 emissions**	The average CO2 emissions per vehicle-km by vehicle and fuel types or by city resident/system user.	x
		Additional indicator	CO emissions	the annual average CO emission per vehicle-km by vehicle and fuel type or by city resident/system user	x
		Additional indicator	NOx emissions	NOx per vkm per vehicle-km by vehicle and fuel type or by city residents / system users.	x
		Key indicator No. 25	**Small particulate emissions**	The annual average particulate matter (PM10 and PM2.5) emission, or by city residents / system users.	x
	Air Quality	Additional indicator	CO2 level	The average hourly (or peak/off-peak) CO concentration over a full year.	x

IMPACT CATEGORY & SUB-CATEGORY	IMPACT ASPECT	INDICATOR		Description	Detailed sheet available
		Additional indicator	CO level	The average hourly (or peak/off-peak) CO concentration over a full year.	x
		Additional indicator	NOx level	The average hourly (or peak/off-peak) NOx concentration over a full year.	x
		Key indicator No. 26	**Small particulate levels**	The average hourly (or peak/off-peak) PM10 and PM2.5 (if possible) concentration over a full year.	x
		Additional indicator	Level of Hydrocarbons		x
Nuisance	Noise	**Key indicator No. 27**	**Noise perception**	The percentage of people troubled by transport noise, based on people's perception.	x
		Key indicator No. 28	**Noise level**	Noise level (dB(A)) measured on-site in the area or corridor under study.	x

Table 3-3 CIVITAS SATELLITE list of indicators

3.3.3 Data collection

When deciding which indicators to select, an important consideration is how the indicator is measured and what data will be used for this. In general there are two different kinds of data you can use for impact evaluation: data that is already available and data that must still be collected by additional measurements or surveys. It is always advisable to look for available data, because using high-quality existing data could save a lot of time and money. This data could include accident statistics, tickets sale numbers, periodic traffic counts and speed measurements, annual mobility surveys, etc.

When using available data, it is critical to ensure that this data is relevant and reliable. As this data may not be tailored specifically for the needs of one measure, it is important to avoid the trap of using secondary data just because it is available.

In most cases, the available data will not be sufficient for monitoring the effects of a measure for all selected indicators. Therefore it will often be useful to collect data to fill in the missing information, or do a more detailed assessment. The advantage to collecting new data is that you can customise the measurement to the specific evaluation needs. It therefore is critical to think through what you are going to measure and in what detail, in order to get the best value with the available budget.

In general mobility-related data can be either behaviour-related and/or traffic-related. Behaviour-related data can be collected by asking people (e.g. interviews, questionnaires, focus groups) but also by observing behaviour (e.g. behaviour observations of pedestrians at crossings). Collecting traffic-related-data can be done by counts (e.g. vehicle counts, ticketing information) or measurements (e.g. emissions measurements).

Recently a lot of new data collection possibilities have emerged, using e.g. the location of mobile phone and other devices to track trips of people, routes of cars and bicycles. Taking into account privacy regulations, these technics can provide much cheaper, more detailed data on traveling behaviour covering in a better way the whole target groups.

In some cases these new data collection techniques can be used to calculate values for the existing indicators, in other cases the indicators need to be refined. In the latter circumstances, it is important to check that the desired impact categories are sufficiently covered.

Annex 8 **Survey methodologies** provides more background information on the methodology for surveys.

3.3.4 Indicator definition and Methodology sheets

Indicator definition and methodology sheets have been developed to serve as practical ‘information and use guidelines’ for each key indicator. The aim of these sheets is to assist cities in understanding specific methods, to help ensure data uniformity and to provide assistance with data collection. The structure of the sheets is shown below in Table 3-4.

Key indicator No. xx/ Additional indicator	**Number and name of core indicator** or **Name of Additional indicator**
Category	Impact category as described in section 3.3.2
Sub-category	Impact sub-category as described in section 3.3.2
Impact aspect:	Impact aspect as described in section 3.3.2
Context and relevance	Description of the wider context surrounding the problem area which the indicator seeks to evaluate and consideration of the relevance of the indicator within the CIVITAS context and of the appropriateness in measuring the impact.
Definition	Definition of the indicator and Unit of measurement
Methods of measurement	Specific information on how to measure the indicator, with particular attention to: • Method of data collection • Frequency • Accuracy • Target group • Area of measurement
References	Examples of similar uses of the indicator based on the literature or projects

Table 3-4 'Indicator Definition & Methodology Sheet' Structure

Annex 1 Indicator Definition & Methodology Sheets provides the full set of the Indicator Definition and Methodology Sheets for each of the key indicators, supplemented with the sheets of some of the additional indicators.

3.4 Expert assessment and validation

Measuring the impact using quantitative approaches is crucial in order to objectify the results of the measures. However taking into account the limitations of data collection efforts and the complex environment in which the measures are implemented, additional efforts are needed to validate the observations and to complete the understanding of the impacts.

At a basic level this can be done by a **validation by the** responsible person for evaluation with the local coordinator and the person responsible for the implementation of the measure. In such an interactive analysis the responsible person for evaluation should question all significant aspects of the observed impact, trying to understand how, why and how much change occurred because of a specific measure. Based on this, decisions can be made to analyse some aspects in greater detail, even collecting additional data or launching additional (after) surveys. In the IAs a meeting with the LEM, ML and SC can have this goal.

For more complex situations it will be very helpful to have an **expert meeting** with experienced people active in mobility, such as the mobility team of the city, and other working fields, such as land-use and spatial planning. In this meeting the observed impact aspects are discussed in the context of the city, taking into account the key elements of the

measures that could affect the initial situation and the impacts of similar measures observed elsewhere. The expert meeting will validate initial conclusions and fill in the caps in the understanding of the impacts and the role of supporting activities such as communication, citizens' engagement actions and stakeholders' involvement.

To further extend the scope of input, a **stakeholders meeting** with all involved actors can be organised. In this meeting the whole implementation process can be discussed (as part of the process evaluation) and a consensus can be achieved on the impact of the measure(s) in the different impact areas. Techniques, such as those developed in the BYPAD and QUEST projects, can be used to structure the meeting and obtain generally accepted conclusions. Involvement of even a wider assortment of actors involved or affected by the measure can assure a balanced conclusion.

3.5 Up-scaling

A measure can be implemented at a small scale, as a pilot, to test its effects and find out if there are any unforeseen side-effects. In that case, up-scaling can be a very useful method to show the real impact of the measure if implemented on larger scale and to understand whether it is feasible and sensible to implement this measure on a larger scale. Also, to conduct an evaluation at city level in a consistent way, up-scaling can help to build up an overall image of the city in which the demonstrated measures are implemented at a city scale.

Up-scaling refers to the estimation of the effects of a measure (or group of measures) if it/they were applied fully throughout the city (where appropriate). It provides guidance to the city concerned about the potential for further deployment and is also useful to other cities in Europe which may be considering implementation of such a measure. Up-scaling is not limited to the city level, it can also take place within the region, e.g. if a public transport network covers not only a city but extends to the surrounding region, implementing a new ticketing system might be tested at city level and after successful implementation be scaled up to be used for the entire region.

In some cities, some measures will be applied in a sufficiently coherent manner and widely enough that the effects will not need to be scaled up to a city level. However, most measures will not be of such a scale, and the effects of wider application must be estimated.

The core of the up-scaling is to take into consideration all the factors that will change if you implement your measure at a larger scale and what implications this will have for the impact of the measure, and in what direction the impact will change. Together with surveys, studies and statistics from the impact evaluation, these data are put into an empirical assessment using extrapolation or using a model, to estimate the total impact of the up-scaling. External data (e.g. historic data, data from previous surveys) might be included to get a more reliable picture.

Some important considerations regarding the up-scaling are:

- **Behaviour and technology**. Users of a pilot application may not be accustomed to the new technology or measure; the use or impact in the demonstration project may

thus be lower than in a full-scale implementation, or when time has been allowed for adjustments.

- **Acceptability**. If, for example, a shared space area is realised, and after a while people become used to it and there is overall acceptance, there is still the risk that the concept could be too radical to apply to the entire cities; further experience will show whether it is practical at larger scales at all.
- There may be **network effects** if the project is implemented at full scale. For instance, the introduction of a single bus lane and a reduction of road capacity at that section may have limited impact, since cars will probably divert from their regular routes and the travel time gains for the bus are limited. If, however, bus lanes are constructed full-scale as a network, diversions will be much more difficult, while the bus travel time gains are likely to be more substantial. Therefore the impacts on the modal split and congestion are different, resulting in scaling-up problems.
- **Time** is sometimes a very relevant factor. Some measures will have impacts which take time to develop and the impacts of these should also be estimated for the larger scale.

4 PROCESS EVALUATION

Complementary to the evaluation of the impact of a measure the analysis of the process of implementing the measure from idea to the operational stage is crucial. This so-called 'process evaluation' ensures a real understanding of the role the measure can have in a sustainable mobility strategy and provides insight into which elements are crucial to observed impact.

In this chapter we discuss the key elements of developing an effective and efficient process evaluation approach. Of course, the process evaluation should be developed in interaction with the impact evaluation activities.

Especially in the phase of drawing evaluation conclusions on the level of a measure or an integrated package of measures, process evaluation should also improve the direct findings of the impact evaluation, by:

- Understanding why measures have succeeded or failed,
- Understanding the roles of supporting activities e.g. information, communication and participation (citizen engagement, stakeholder involvement)
- Validation of the impact of the measures:
    - Support of interpretation of the impact indicators
    - Understanding the importance of sub-measures
    - Understanding the influence and importance of supporting activities

The main goal of process evaluation is to develop new findings about factors of success, and strategies to overcome possible barriers during the implementation phase, by analyses of all relevant information. Together with the results of the impact evaluation the outcome of the process evaluation will be the basis for the recommendations for other European cities, which is one common goal of the CIVITAS Initiative.

4.1 The concept of process evaluation

The success of a CIVITAS measure is influenced not only by its technical solution but also by optimising the process of preparation and implementation, including accompanying activities such as information, communication, engagement and participation of stakeholders. Process evaluation is concerned with the process of how initial proposals for a measure are developed into a feasible design, and how the measure is then constructed or implemented.

In general, process evaluation is conducted for a measure, but depending on the way the CIVITAS work is structured, it can also be done for a sub-measure (if it has significant own characteristics) or for an integrated package of measures (if there are sufficient significant communalities between the measures).

4.1.1 Measure stages

Process evaluation is clearly linked to the different stages of a measure from first idea into the operational stage. In general we can identify stages:

- **The design stage** including idea development, planning, preparation, and design efforts: Options for possible measures are discussed in order to select one at the end of this phase. The selected measure is developed in detail and design work for the

measure is conducted. If appropriate during the preparation phase, engagement activities for stakeholders are organised to manage potential barriers at an early phase of the measure and to achieve a high level of acceptance. At the end of this phase all planning details are fixed, including all decisions and permissions that are a pre-condition for starting the implementation phase.

- **The implementation stage** including the construction, introduction, announcement efforts to get the measure operational to the users: The measure will be implemented in real life. This phase can be accompanied by information activities for the public providing information about the implementation phase, if transport users are affected, and providing information about the upcoming operational stage (awareness and information campaigns). At the end of this phase the measure starts operation.
- **The operational stage:** The measure is opened to the public, i.e. users are able to use the measure or are affected by the measure.. It might be appropriate to conduct specific information and communication campaigns to bridge possible information gaps of users or potential users of the measure. The first phase of operation lies within the time-frame of the CIVITAS Initiative. The long-term running is the outstanding time (beyond CIVITAS 2020) until the measure comes to the end of its life, which could be caused by technical facts, programme termination, end of funding, redesign, or reconstruction.

In some cases it is difficult to distinguish between the three stages: design, implementation, operational. For example, does the design of an app (i.e. the functional structure of the software, the requirement analysis, etc.) to inform tourists about new mobility services refer to the design phase or to the implementation one? To which phase does the design of a questionnaire for a survey pertain? And again, in the case of a survey, which is the difference between the implementation and the operational phase? In that case the most logical name for the stage should be used and the other stages can be left out. E.g. for an awareness campaign, following stages can be defined:

- the design stage: developing the campaign, defining the actions, analyse the target groups
- implementation: doing the awareness-raising activities

Thus, the operational stage is omitted for this measure.

The subdivision of the measure implementation process in three stages is just a formal requirement, to which we should adhere as closely as possible to provide a required common communication standard for all CIVITAS projects. Furthermore, it is especially important to indicate the measure's milestones within each measure timeline. The milestones represent points of control of the measure's implementation roadmap and are critical information for both the process management and the evaluation.

4.1.2 A measure from the process evaluation point of view

As emphasised before, a well-structured understanding of a measure is crucial to do the evaluation in an efficient and high quality way. This is also the case for process evaluation.

The following characteristics of a measure should be clearly identified:

- Has the measure sub-measures with a specific target group and implementation area?
- Are there supporting measures implemented as part of the measure which are expected to have a significant influence?
- Which is/are the target group(s) and implementation area(s) of the (sub-)measure(s)?
- Which are the stakeholders with a significant role in the implementation of the measure and what is their specific role?

The scheme below shows how these elements work together in relation to the impact of the measure and the implementation process.

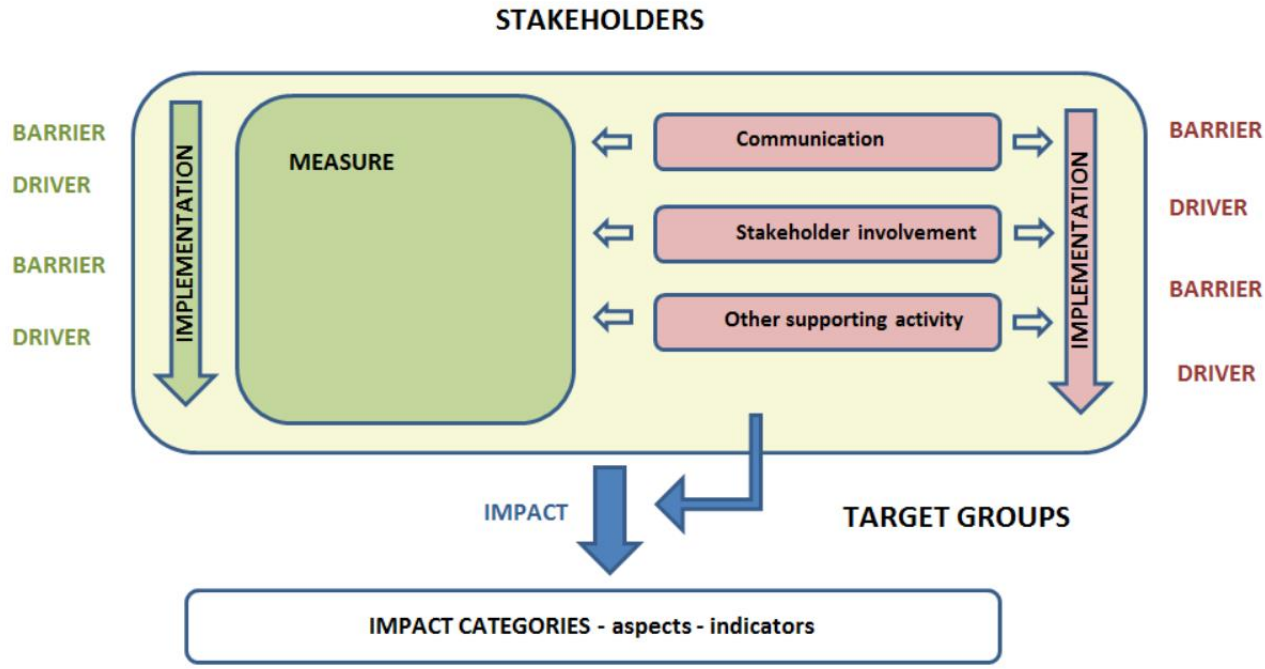


Figure 4-1 The different characteristics of a measure that are crucial for process evaluation

Supporting activities are activities implemented together with the measure aiming to make the implementation of the measure better, easier, more efficient and/or increasing the impact of the measure in the CIVITAS impact categories. Examples of such activities are measure communication, introduction of a new design method, planning or decision making methods, stakeholder involvement and citizen engagement activities. For example, if a measure consists of the construction of a new bicycle lane with the objective to motivate citizens to cycle more and replace the car by the bike for their commuting trip, involving the citizens living along the road in the design of the bicycle lane, will have a positive influence to get a building license, especially when some parking places have to be removed to make space for the bicycle lane (positive influence on the implementation of the measure). Promoting the usage of the bike with a strong communication campaign emphasising the benefits of cycling, will increase the number of user (positive influence on the impact of the measure).

4.1.3 Main process evaluation phases

To plan and organise the process evaluation work, a pre-analysis of the measure should be done in order to have a clear view on the elements important for the implementation of the measure, e.g. the stakeholders, the risks for barriers, the possible drivers.

During the different stages of the measure, it is essential to monitor all relevant events and reflect regularly and critically to understand what has happened and why.

For IA projects, formal reporting on the implementation process is expected, linked to the progress reporting of the project. Most projects have a local reporting on a more regular basis, facilitating the management of the project by providing insights on mitigating actions and suggestions for optimisation of the implementation of the measure, based on a structured understanding of all elements of the implementation process.

At the end of the project lifetime, we have to bring all observations together and make a final reflection on what happend: how did we get where we are now? What was the importance of all elements and the role of all stakeholders? What were the drivers, barriers, the role of supporting activities, etc.?

4.2 Process evaluation activities

4.2.1 Pre-analysis of measures

As part of the general understanding and structuring of the measures, some key elements for process evaluation should be identified in order to decide at the beginning of the project on the best approach to understand the implementation of the measure.

The following items are important:

- Responsible stakeholders (CIVITAS project partners and other important actors) and their roles for the implementation of the measure, including existing relationships and possible tensions between them
- Specific target groups and/or people living in the affected part of the city or region
- Detailed description of the supporting activities to approach the target group(s):
    - Type of activity
    - Target group
    - Methods used to approach the target group
- (Limited) risk analysis per measure: possible specific barriers in the implementation process in relation of reaching the objectives

In most cases this information can be collected through an interview with the site coordinator (SC) and the measure leaders (MLs).

Based on this information e.g. the following decisions can be taken:

- For which measures do we need to organise a focus group meeting (see section 4.2.3 for more information), inviting stakeholders to the discuss the implementation process
- Will we evaluate supporting activities in more detail?
- Depending on the complexity of the implementation process and the expected risks, which activities will we organise to understand the implementation process (frequency, number of meetings, persons/stakeholders involved)?

Depending on the observations during the implementation process, the approach can be further optimised. For example, if the implementation slows down or fails, a higher effort can be made to understand the reasons why, as well as which actions are needed to overcome the barriers.

4.2.2 Monitoring the implementation process

To make it possible to look back to the implementation process and to discuss how and why things have happened, it is helpful to have a log of all relevant events in the implementation process. Especially for more complex measures this will result in a better understanding, instead of relying only on the memory of the involved actors.

Different techniques can be used for organising this monitoring, e.g.:

- A record of communications (e.g. emails, telephone records, notes from face-to-face meetings) that have contributed to or inhibited the implementation of the measure
- A logbook of all relevant events in the implementation process with comments on how they supported the process
- A follow-up of relevant milestones set before
- The recording of other project management information

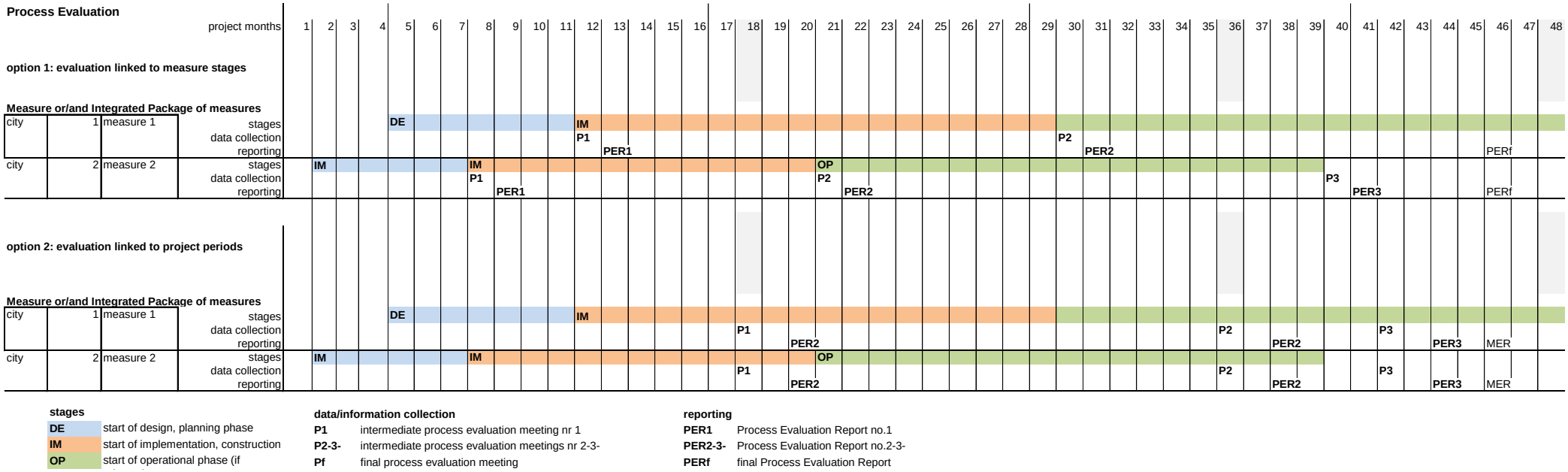
The way this information is gathered and synthesised can depend on the local project management habits. The effort to monitor this should be in balance with the added value for the process evaluation of the measure.

4.2.3 Periodical evaluation of the implementation process

Timing

At specific moments during the project we can assess the implementation process of a measure. There are two options:

- These moments can be linked to the stages of the measures focusing on the process in a specific stage.
- However, to get a general overview of all measures in a project at a specific moment, the assessment can also be done at a pre-agreed moment looking back to a specific period of the lifetime of the project. In this way the process evaluation reporting can be linked to the (more administrative) progress reporting of the project.



stages

DE	start of design, planning phase
IM	start of implementation, construction
OP	start of operational phase (if

data/information collection

P1	intermediate process evaluation meeting nr 1
P2-3-	intermediate process evaluation meetings nr 2-3-
Pf	final process evaluation meeting

reporting

PER1	Process Evaluation Report no.1
PER2-3-	Process Evaluation Report no.2-3-
PERf	final Process Evaluation Report

Figure 4-2 Options of periodical evaluation

The CIVITAS 2020 IA projects agreed to follow the second option at the general CIVITAS level: a formal process evaluation reporting will be done after 20, 38 and (if relevant) after 44 months of the project. Finally, the general findings on process evaluation are reported in the measure evaluation results (MER).

At city level and project level, more frequent evaluation and reporting can be planned (as most projects do). These approaches at the different levels are helpful both in terms of using the results of the process evaluation to optimise the implementation of the measures and having a better recording and understanding of all crucial elements that are influencing the implementation process.

RIA projects can decide on their own approach taking into account the specific characteristics of their project.

Process evaluation questions

Understanding the implementation process up to the moment of evaluation can be structured in different items which are important for a successful implementation:

- Which **barriers** have been encountered during the reporting period while trying to reach the objectives of the measure? Which actions have been taken by one or more measure partners to overcome the barriers?
- Which **drivers** might have been encountered during the reporting period in trying to reach the objectives of the measure? Which actions have been taken by one or more measure partners to make use of the drivers to reach the measure objectives?
- Which influence do we observe on the **risks** in the implementation of the measure? Which are the risks in the remaining process to reach the objectives?
- What is the quality and influence of the supporting activities during the reporting period?
    - Which events did determine the current status of the implementation of the measure?
    - What was the quality of the supporting activities?
    - What was the influence of the supporting activities on the implementation process?
    - What was the influence of the supporting activities on the impact of the measures?
    - What are the current ‘lessons learned’ on the supporting activities?

In many cases these questions cannot be answered in a quantitative way. For example, in a real urban environment it is not possible to ascertain the influence of an information campaign on the usage of a new cycle lane.

For this reason the CIVITAS evaluation approach proposes at least a qualitative assessment, categorising e.g. the influence of supporting activities as

- no influence
- limited
- significant
- high

motivated with observed aspects and eventually available results of surveys of the users.

For the IA projects a standard reporting template (the process evaluation report or PER) is available. This is included in Annex 4 Measure Process Evaluation (PER) template with detailed guidelines to use it.

The RIA projects can also use the PER as inspiration to develop their own approach.

Process evaluation data gathering

A range of activities can be done to gather the information needed to understand the implementation process and assess the status of the implementation, e.g.

- Info from SC and ML
- Stakeholder survey
- Stakeholder interview
- User survey
- Focus group meeting
- Learning history session
- Expert (validation) meeting

For a measure with a straightforward and simple implementation process, the information needed to assess the process can be available in a direct discussion with the Site Coordinator and the Measure Leader. They will be able to identify barriers and drivers, and assess the implementation period, based on their observation in their management and coordination work.

If many stakeholders are involved it can be useful to know their opinion on the implementation of the measure and their role in it as well. A survey of these stakeholders asking for their appraisal of different aspects and their feedback on pre-formulated observations, can complete the view on the implementation process.

If one or two stakeholders have a major role in the implementation of the measure, it can be relevant to have a bilateral contact with these stakeholders allowing them to clarify their point of view more clearly and to bring forward delicate matters more openly.

For some measures a survey of the users of the measure (the target group affected by the measure) can be organised. Such a survey can help to better understand some aspects of the implementation process. Besides, if such survey is already planned for impact evaluation, some questions helpful for process evaluation can be added. Especially to assess the influence and importance of supporting activities approaching these users, questions such as ‘what did convince you to use the measure’ can result in motivated conclusions about the influence of a specific supporting activity.

More complex measures, and in any case if the measure is marked as a key measure, with an in-depth process evaluation, a more intensive discussion with the stakeholders is appropriate. In this case techniques from management and social sciences can help, such as focus group meetings and learning history sessions. In Annex 7 Learning history sessionsguidelines for organising a learning history session are available.

Additionally, a meeting with mobility experts or experts in related domains not directly involved in the implementation of the measure can be helpful in getting better insights into the implementation process. Moreover, an expert with good knowledge of the local administrative and juridical procedures can contribute to understand the process.

These activities, especially an expert meeting, can also help to understand why the measure has the impact observed in an ex-post measurement as part of the impact evaluation. Therefore it is relevant that in the different type of meetings also the interpretation of the observed impact (if already known) is a point of discussion.

4.2.4 Final reporting

Finally all the periodical process evaluation observations should be summarised in a final assessment of the implementation process of the measure discussing at least the following aspects:

- The important events during the implementation of the measure
- Identification of implementation barriers
- Identification of implementation drivers
- Reporting on activities to overcome barriers and/or to make use of the drivers to reach the measure objectives
- Supporting activities: activities – penetration – quality – influence on implementation and impact of the measure
- Identification of lessons learned in the period

For some measures a meeting, survey or interview can be organised overlooking the whole implementation process.

For the IA projects it is agreed to include the overall conclusions on process evaluation in the measure evaluation results (MER) sheet. The periodical process evaluation reports (PERs) will be annexes of this final MER.

RIA projects can use the presented approach as an inspiration to develop their own concept to better understand the implementation process.

5 The CIVITAS evaluation reporting

This chapter presents an overview of the reporting documents currently defined for the IA projects. Similar guidelines and templates are not yet available for the RIA projects, but they can draw inspiration from these documents to develop approaches appropriate for their projects. Further interaction with the RIA projects will help ascertain to what extent the reporting by the RIA projects on the developed and validated measures can be or should be harmonised.

The two main types of evaluation reports are the Evaluation Plans and the Evaluation Reports both on the level of the projects and on the level of the cities.

Additionally the reporting templates 'Measure Evaluation Results (MER)' and 'Process Evaluation Report (PER)' are important basic documents for improving the quality and understanding of the impact of the CIVITAS demonstration in the EU cities. They consist of all the basic information of the evaluation on a measure or integrated package of measures (IP) level to be used both by the IA projects and the CIVITAS SATELLITE project to come to conclusions with the focus on the city, the project and the CIVITAS policy fields and general CIVITAS objectives.

5.1 The evaluation plan

In the first period of the project the evaluation plan will describe in detail how the evaluation will be organised in order to draw well motivated conclusions with all the envisaged focuses throughout and after the project.

The main challenge is to build up a feasible and effective evaluation approach in each city and to develop the best approach for all further analyses and making conclusions.

In practice it is more efficient to have one hand the Local Evaluation Plans (LEPs) referring to the conclusions the conclusions on measure and city level to be drawn and on the other hand the Project Evaluation Plan (PEP) referring to the LEPs they build on.

In this CIVITAS framework the following structures are proposed. Of course taking into account the specific characteristics and concept of the project these structures can be optimised and additional aspects can be added.

Local Evaluation Plan

1. **Introduction**

   Reference to the CIVITAS project and its specific focus.
   Reference to the global evaluation objectives and approach.

2. **The city (site)**

   - General characteristics city and region (if relevant)
     - Geographic
     - Governance

- Population
- Main activities: working, school,

- Specific characteristics in relation with the project focus e.g. port, tourism, etc.
- State of mobility: modal split figures, counts
- Provision of transport options: infrastructure and services
- Current mobility management and traffic management initiatives including communication with the public
- Goods and freight movements: movements, infrastructure, services, …

3. The CIVITAS measures

3.1 Overview

General description of CIVITAS measures in the city indicating the way they work together to achieve the general CIVITAS objectives: main expected impact area and target groups (no need to do this per work package)

3.2 Detailed evaluation info per measure

Per measure (in a table):

- Specific objectives and quantifiable targets
- Specific target groups and/or effected part of the city or region
- Supporting activities to approach the target group(s)
- Link with other measures
- Responsible stakeholders and their roles
- Main expected impacts: textual description of the impacts (the 'story' of the measure)
- Implementation timing

3.3 Structuring measures for evaluation

Overview of measures, sub-measures and integrated packages (IPs) of measures and main impacts to be evaluated for each measure or an integrated package of measures (in an IP some impacts can be evaluated for one of the measures)

4. Impact Evaluation

4.1 Evaluation on city level

Description of the evaluation work on city level:

- Impacts to be evaluated on city level: expected impacts, indicators, data collection methods
- For specific cases the level of a site (part of a city or regional level) can be taken or added.

4.2 Measure evaluation choices

Per measure or IP:

- Impacts to be evaluated: impact area, impact sub-area and aspects
- Indicators to be used to measure the impacts: data/unit of measurement, calculation of indirect indicators, ….
- Methods of data collection: method, frequency, quantity, sample size,

area and/or target group
- Responsibilities
- Upscaling approach (if relevant)

4.3 Synthesis of data collection

General overview of data collection activities indicating synergies for the different measures

4.4 Additional analyses and activities towards conclusions

data analysis work including eventually upscaling towards first conclusions per measure and IP level and activities to validate the conclusions: validation meeting of ML, LEM and SC, expert meeting, stakeholder validation meetings

5. Process evaluation

Overview of all basic information to choose the best process evaluation activities for each measure and first version of a plan of activities for this (on measure level, city or project level):

- Responsible stakeholders and their roles for the implementation of the measure, including possible or tensions links between them
- (Limited) risk analysis per measure: possible specific barriers in the implementation process
- Detailed description of the Supporting activities to approach the target group(s): Type of activity - Target group - Approach of the target group
- Planning of process evaluation activities taking into account the agreed periodically reporting
- Planning other activities to understand the process of implementation: expert meetings, focus groups, learning history, end user surveys

6. Conclusions

6.1 Overall planning local evaluation activities

Scheme (Gantt chart) with timing of the main implementation stages and evaluation activities and reporting per measure towards conclusions per measure and/or IP

6.2 Contribution to conclusions on city, project and CIVITAS level

Synthesis of the way the evaluation work on measure (and IP level) will contribute to conclusions on city, project and CIVITAS level

Table 5-1 Structure of the local evaluation plan (LEP)

To work in the most efficient way, it is recommended that in the LEP the tables as proposed for the MER and PER are used, copying the information directly in both templates and work further on this reporting during the project. Of course in the LEP additional tables can be added.

Because the LEP is also a real working document at the local level, this document is preferably a self-standing document with clear reference to the CIVITAS and project context. As part of the formal reporting of a project the LEPs can be added as annexes to the PEP.

Project evaluation plan

1. **Introduction**

   Explaining the purpose and content of this document.

2. **The Project**

   2.1 The CIVITAS Initiative

   Situating the project in the CIVITAS Initiative

   2.2 The project

   Focus and specific objectives of the project

   Structured overview of the measures referring to the specific objectives of the project and the CIVITAS themes.

   2.3 The demonstration sites/cities

   Overview of the key characteristics of the demonstration and validation cities/sites such as area, population, density, trips/day, modal split, etc.

   2.4 Strategies and measures

   Structured overview of the measures referring to the specific objectives of the project and the CIVITAS themes.

3. **General approach to Evaluation**

   3.1 Goals of the evaluation

   What type of conclusions we want to draw, which objectives we want to evaluate e.g. specific objectives of the measures, objectives for the city, objectives of the project, conclusions on the CIVITAS themes, ….

   Links whit others work packages in the project

   3.2 Overall organisation of evaluation in the project

   Overall structure of the evaluation in the project

   Roles and responsibilities

   Interaction between the evaluation work on different levels (local, project, ..)

   3.3 Methods and evaluation activities

Which activities are planned on the level of the cities/sites and on the level of the project
3.4 Building conclusions on different levels
Interaction between the evaluation work on different levels (local, project, ..)
How we come to conclusions on city, project, CIVITAS themes and project level.
4. Timing and reporting
Which reports are planned and what will be the content.
General timing of the evaluation activities and reporting.
5. Related elements and actions
Discussion of related issues to evaluation e.g. ethical aspects, allocation of resources, risks, …
6. Conclusions

Table 5-2 Structure of the project evaluation plan (PEP)

For the RIA projects these structures can be used as a starting point for evaluation plans, but must be further detailed to apply to a specific project. The structure of the local evaluation plans in particular can vary, depending on the way local sites are used in the project to validate the developed measures.

Updating the evaluation plans

An evaluation plan should have the flexibility to respond to new elements and observation during the project. Especially for larger demonstration projects as the IAs, a lot of changes can take place concerning the measures and the context of these measures over the course of the project.

To handle this, an update mechanism should be foreseen to revise the plans over time. A possible approach can be that changes in the approach of the evaluation of the measures are reported in the MER and changes in evaluation on a higher level (e.g. city level evaluation, project level activities, etc.) are described in the evaluation progress reporting during the project and reported in the final evaluation reports.

In the case of a four-year demonstration project, the Local Evaluation Plan made after 3-5 months, is recommended to be updated after 7-10 months because then a range of elements will we more clear allowing a more appropriate detailed approach of the evaluation.

5.2 The evaluation report

The demonstration cities will produce a series of building blocks of knowledge that must be combined to form a clear interpretation to appropriately promote sustainability applications across Europe. The results and insights gained by both the impact and the process evaluation will be interpreted in the project evaluation report.

For IA projects the project evaluation report will include:

- A quantified assessment of the impacts of the CIVITAS measures across individual cities covering the CIVITAS impact categories
- An analysis and interpretation of the results in relation to context-specific situations that might contribute to explain the nature and extent of the results obtained;
- General conclusions about the impacts of CIVITAS for each of the cities in the project;
- General conclusions about the impacts of CIVITAS at project level;
- General conclusions about the specific challenges of the project;
- Lessons learned about CIVITAS measures and evaluation.

In this report the findings of both impact evaluation and process evaluation will be integrated into clear well-motivated conclusions on different levels:

- At measure/IP level
  - for a specific (sub-) measure: see the Measure Evaluation Result sheets (MERs)
  - for the IP: see the MERs
  - discussing the interaction of different measures
- At city level
- At project level
- At the level of the CIVITAS policy fields

5.3 Basic CIVITAS reporting templates

To harmonise the reporting, increasing the transparency and understanding of the findings on the implementation of each measure in the different cities (or sites) a set of templates were developed to structure all information in a standard way.

These reports mainly present all the data and information collected on measure level. However, if some conclusions specifically relating to the reported measure are drawn on city or project level, they should also be included in the MER. For example, some projects discuss the implementation process of the measures and the interactions between the measures on city or project level. Then these conclusions should also be included in the MER completing the understanding of the measure.

For the IA projects the use of these templates is mandatory although additions and limited optimisations can be made responding to specific needs in the project. For the RIAs the current versions can be used as an inspiration for the specific reporting format to be developed for the project.

The following templates are available:

- The Measure Evaluation Results (MER)
- The Process Evaluation Report (PER)
- The CIVITAS measure evaluation planning and monitoring scheme (Gantt chart)

These templates are briefly explained below. The templates are also added in Annex 2 The CIVITAS measure evaluation planning and monitoring scheme (Gantt chart) , Annex 3 Measure Evaluation Results (MER) template and Annex 4 Measure Process Evaluation (PER) template, together with detailed guidelines on the usage of the PER and MER templates in Annex 5 Guidelines for the usage of MER and PER.

5.3.1 Measure Evaluation Results (MER)

The Measure Evaluation Results (MER) is the main basic report containing all information related to the evaluation of the implemented measures.

It serves multiple purposes including:

- Ensures reporting of all evaluation-relevant information (“completeness”);
- Ensures a common reporting style;
- Facilitates analysis of evaluation results for the CIVITAS IA and CIVITAS SATELLITE;
- Enables evaluation conclusions at the level of the City, the CIVITAS Innovation Action (IA), the CIVITAS themes and the CIVITAS program;
- Helps to provide information for dissemination of evaluation results, in particular measure results, in a clear and concise manner.

The main inputs for this report are on one hand the impact measurements and surveys processed by the evaluation team into quantitative and qualitative descriptions of selected indicators and conclusions on the assessment aspects of the impact categories. On the other

hand also the process evaluation findings (see the PER) are crucial inputs to validate and understand the findings and the implementation process.

To keep the report accessible and manageable it is not the idea to include any “raw data” in the sheet, but only the results of the data analysis done by the evaluators.

To make it usable as the basic informative document on the measures e.g. for dissemination purposes, findings should be reported in a comprehensible and well-structured manner. In addition, a summary will be added explaining the key elements of the findings and conclusions in a synthetic way. This summary can be the first view interested persons can get when consulting the measure through the different CIVITAS channels.

To optimise the efforts, it is the idea that individual sections (or building blocks) of the completed Measure Evaluation Results can be used for other project reports, for example final project reports and recommendations. Likewise, elements of such reports that are available early on can be included in the MER.

This report will be build up during the project lifetime, adding new information in each stage.

5.3.2 Process Evaluation Report (PER)

Complementary to the MER a **Process Evaluation Report (PER)** will be used to report the key findings on the implementation process of the Measure on regular basis. In the last phase of the evaluation work (eventually also in an intermediate phase) these findings will be combined with the findings of the impact evaluation to come to a well-motivated understanding of the measure. The conclusions of the process evaluation will be also included in the MER.

The PER starts with the same general information as presented in the MER but focuses further on the specific aspects of the implementation of the measures, e.g.

- the barriers and the actions to overcome the barriers
- the drivers and the actions to make use of the drivers
- the lessons learned
- risks in the further implementation process
- the specific findings on the supporting activities (if relevant)

The main input for this report are the findings out of the different efforts of the evaluation team to understand the implementation process e.g. discussions with Measure Leaders and Site Coordinators, meetings with experts and stakeholders.

This reporting template will be filled in for each reporting period.

5.3.3 The CIVITAS measure evaluation planning and monitoring scheme (Gantt chart)

Planning all activities to get the needed data on the right moment - linked to the implementation timing - is crucial to achieve a high quality evaluation in an efficient way. The basis for this is the work that needs to be done on measure level because at this level the basic data are gathered.

In addition to the planning, the monitoring of this work during the project lifetime is also important.

Therefore a standard and easy planning tool (Excel-based) has been developed by CIVITAS SATELLITE to be used for monitoring the progress and possible changes. This tool can also be used to report the status of the work on the level of the measure towards the city, the project and CIVITAS SATELLITE.

With this tool the LEM is expected to build up the evaluation planning and monitoring per city presenting all measures of the city eventually grouped in Integrated Packages or split into sub-measures. For each measure (or IP or sub-measure) 3 types of information are presented:

- implementation stages and (possibly) important milestones,
- the evaluation data and information gathering activities and
- the reporting.

On regular moments the sheet can be copied and updated showing the changes in the progress and the planning of the future steps.

The tool is added in Annex 2 The CIVITAS measure evaluation planning and monitoring scheme (Gantt chart) with more detailed instructions including a list of events with standard notation to be used:

Activities M = mandatory O=optional	**Abbreviation to be used in the scheme**	
stages		
M	**DE**	start of design, planning phase
M	**IM**	start of implementation, construction phase
M	**OP**	start of operational phase (if relevant)
O	**MS1**	milestone 1: explain in comments
O	**MS2-3-**	milestone 2,3,..: explain in comments
data collection		
M	**B**	baseline data
O	**I1**	1st intermediate data
O	**I2-3-**	intermediate data 2-3-
M	**F**	final data: data at the end of the CIVITAS operational period
M	**V**	validation meeting
O	**P1**	intermediate process evaluation meeting nr 1
O	**P2-3-**	intermediate process evaluation meetings nr 2-3-
M	**Pf**	final process evaluation meeting
M	**Pf**	final process evaluation meeting

reporting		reporting to your Project Evaluation Manager
M	**M1**	MER - version with evaluation method and baseline
O	**M2-3-**	MER - intermediate versions (version with intermediate results or draft version of the final MER)
M	**Mv**	MER- version with validated conclusions (impact&process)
M	**Mf**	MER - final version
M	**PER1**	1st process evaluation reporting
M	**PER2**	2nd process evaluation reporting
O	**PER3**	3rd process evaluation reporting
O	**PERf**	final process evaluation reporting

Table 5-3 Overview of events to be used in the CIVITAS planning and monitoring tool

A similar presentation can be built-up to plan and monitor the evaluation activities on city and project level.

6 What is coming next ?

In this document the current status of the CIVITAS 2020 is presented as a result of the CIVITAS SATELLITE effort to coordinate the evaluation approaches in the CIVITAS family.

As mentioned in the first chapter of this document in a next stage a 'completed CIVITAS evaluation framework' (D2.4). will be produced incorporating relevant approaches from the RIA projects to strengthen the evaluation framework for the IA projects and providing a basic CIVITAS evaluation framework for (future) RIA projects.

This document is part of the planned activities of CIVITAS SATELLITE on evaluation to harmonise and improve further the evaluation work in the CIVITAS family to come to good and useful conclusions regarding the impact and evaluation of the CIVITAS mobility measures. Complementary to this CIVITAS SATELLITE will also activate the exchange of knowledge and results of the evaluation work among the IA projects and RIA projects and will produce general conclusions on CIVITAS level together with synthesis documents of the work done in the projects and the validation and demonstration cities.

To achieve these objectives CIVITAS SATELLITE will work together in an intensive way with the IA projects and RIA projects and will produce the following documents:

Guideline documents for IA projects:

- D2.6 First general analysis of IA projects' Measure Evaluation Result sheets (MERs) (August 2018)
- D2.4 Completed CIVITAS process and impact evaluation framework for IA projects (October 2018)
- D2.7 Set of in-depth reviewed and improved IA projects' Measure Evaluation Result sheets (MERs) (August 2019)
- D2.8 Second general analysis of IA projects' Measure Evaluation Result sheets (MERs) (April 2020)

Guideline documents for RIA projects:

- WD Survey for RIA projects on the indicators and data collection methods used in the RIA projects (November 2017)
- D2.9 Basic evaluation reporting template for RIA projects (April 2018)
- D2.5 Minimum CIVITAS evaluation framework for RIA projects (October 2018)

Results and conclusions documents on the evaluation work

- D2.10 Summary of evaluation findings from RIA projects for IA projects (October 2018)
- D2.19 Overview on long-term impact of CIVITAS measures in previously-funded CIVITAS cities (December 2019)
- D2.20 Long-term success stories from cities funded by CIVITAS (April 2020)

- D2.11 Focus report on results from CIVITAS measures (June 2020)
- D2.12 Focus report on optimal combination of different types of CIVITAS measures (June 2020)
- D2.13 Focus report on cross-cutting aspects of implemented CIVITAS measures (June 2020)
- D2.14 Report on evaluation results from CIVITAS IA projects (August 2020)
- D2.15 Overall synthesis of the CIVITAS SATELLITE evaluation experiences (August 2020)
- D2.16 Lessons learned from the CIVITAS RIA projects funded 2015-2018 (August 2018)
- D2.17 Lessons learned from the CIVITAS RIA projects funded since 2016 (August 2020)
- D2.18 CIVITAS 2020 policy recommendations (August 2020)

For more information and any interaction on the evaluation approaches in the context of CIVITAS one can contact CIVITAS SATELLITE with the main contact persons for evaluaton:

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ANNEXES

ANNEX 1
Indicator Definition & Methodology Sheets

1 Society – people

1.1 Acceptance

Key Indicator no. 1	**Awareness level**
Category:	Society -people
Sub-category:	Acceptance
Impact aspect:	Awareness
Context and relevance	People are more likely to take advantage of new measures if they are aware of them, i.e. if they are informed about them, and the performance of a given measure usually increases with awareness levels. Operators (or other authorities with an interest in an increased awareness of new measures) may initiate information campaigns in order to raise awareness of the new integrated measures among potential users. Information regarding these new measures may be disseminated by means of advertisements, leaflets, posters in PT vehicles, etc. In this context, the core indicator will show what percentage of people has been reached and to what extent they have actually gained knowledge about the new measures, and thereby, whether or not (or to what degree) such an information campaign has been successful. The core indicator intends to assess whether the awareness of the policies and integrated measures (integrated measure package) has changed since they were implemented.
Definition	**Awareness level** is defined as the percentage of the target population with knowledge of a measure on account of provided information. This indicator is used to assess the awareness of the general public or a particular target group on CIVITAS measures. **Unit**: %
Measurement	• **Method**: Sites or areas where CIVITAS measures would have significant impacts should be identified first. Data could be collected by means of surveys (e.g. questionnaires by mail or by face-to-face interviews). Awareness can be at a variety of levels e.g. having heard of project/measures, recognise a logo, and understand the aim of the project and the potential benefits and dis benefits of the measures. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of awareness levels in the areas investigated. • **Observed group**: general public (including residents and visitors), operators, PT customers, etc. • **Area of measurement:** demonstration area and/or city
References:	CIVITAS WIKI - Core Indicator 13: Awareness level ECCENTRIC 19; DESTINATIONS 34

Key indicator no. 2	**Acceptance level**
Category:	Society - people
Sub-category:	Acceptance
Impact aspect:	Acceptance
Context and relevance	Key indicators 1 and 2 on awareness and acceptance are closely related and should be analysed in conjunction. Those aware of a measure may or may not be satisfied with its existence and/or use. The core indicator intends to assess satisfaction with the existence and/or use of the measure.
Definition	**Acceptance level** is defined as the percentage of the population who favourably receive or approve the measure. This indicator is used to assess the acceptance levels of general public or target groups on CIVITAS measures. A measure is deemed to be well-accepted if users (citizens, operators, PT customers, etc.) are satisfied with its existence and/or use. **Unit**: %
Measurement	• **Method**: Sites or areas where CIVITAS measures have significant impacts should be identified first. User acceptance can be assessed through surveys (e.g. questionnaires by mail or by face-to-face interviews). In the questionnaire, user acceptance could also address: - **Understanding level** (% of users with good understanding of the measures) - **Usefulness level** (% of users feeling measure is useful) - **Willingness to change** (% of users likely to change mobility behaviour) • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of acceptance levels in the areas investigated. • **Observed group**: general public (including residents and visitors), operators, PT customers, etc. • **Area of measurement:** demonstration area and/or city
References:	CIVITAS WIKI - Core Indicator 14: Acceptance level ECCENTRIC 20 DESTINATIONS 35

Additional indicator	**Citizens satisfaction with transport services**
Category:	Society - people
Sub-category:	Acceptance
Impact aspect:	Satisfaction
Context and relevance	The overall quality of transport services encompasses a variety of aspects - comfort, travel time, reliability, safety, privacy, etc. - but travellers usually share a holistic concept of quality, which this indicator seeks to measure. Public transport for instance, is in continuous competition with other transport modes, particularly the private car, and the general perception of the overall PT satisfaction is one of the aspects influencing individual choices. This indicator feeds directly into the formulation of PT policies aimed at attracting more users and at avoiding further shifts from public transport users to other means of transport. However, the indicator may also be used to assess the quality of other innovative services, and satisfaction of other stakeholders beyond the users. The perception of the quality of a service is a key measure related to its success or failure.
Definition	User/provider/stakeholder average reported satisfaction with • the overall quality of the transport system (public transport, cycling, walking, etc.) • the quality of a specific service It measures the experience of the user/provider, against its expectations. **Unit**: % of shares with a qualitative score (1-5) of the perception of quality
Measurement	• **Method**: User satisfaction can be assessed through surveys (e.g. questionnaires by mail or by face-to-face interviews). It can be part of a household survey. An alternative will be to piggy back onto any general survey about quality of public services. A question in either survey should be “How satisfied are you with the quality of your regular walk/cycle/bus/train/metro/car journeys in the city?” and the answer can be given on a five point scale of “very satisfied” to “very dissatisfied”. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of acceptance levels in the areas investigated. • **Observed group**: general public (including residents and visitors), operators, PT customers, etc. • **Area of measurement:** demonstration area and/or city
References:	CIVITAS WIKI - Core Indicator 14: Acceptance level CIVITAS CAPITAL 22 ECCENTRIC 21 DESTINATIONS 36

1.2 Accessibility

Key indicator no. 3	**Perception of level of physical accessibility of service**
Category:	Society - people
Sub-category:	Accessibility
Impact aspect:	Physical accessibility of transport services
Context and relevance	The main barriers to social inclusion in transport are accessibility, affordability and travel horizons. In terms of social inclusion and accessibility, this indicator concentrates on spatial accessibility and assesses the extent to which user perception of spatial accessibility changes compared to the situation prior to the implementation of the measure Accessibility in the context of this core indicator is limited to the spatial access to the service. User perception of accessibility should thus focus on such spatial dimension and disregard other accessibility factors such as economic (price of using the service in relation to personal income) or physical (e.g. problem-free access to a PT vehicle) accessibility. Spatial accessibility not only includes the distance to the closest PT stop, but also the convenience of getting there (through walkways, bicycle paths, access ways, etc.).
Definition	**Perception of service accessibility** is defined as the user's perception of the physical accessibility of the service. This concerns, for instance, the distance to the nearest PT stop and the convenience of getting there. **Unit**: index of "accessibility perception" on a 5-point scale
Measurement	• **Method**: CIVITAS measures having significant impacts on PT accessibility should be identified. Data can be collected by means of surveys (e.g. questionnaires by mail or by face-to-face interviews). For a question on how easy it is to reach your nearest public transport service (i.e. in terms of distance and convenience), the following categories can be used: - Very easy - Quite easy - Neither easy nor difficult - Quite difficult - Very difficult - Don't know • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of accessibility level in the areas investigated. • **Observed group**: Service users • **Area of measurement:** city or demonstration area
References:	CIVITAS WIKI - core indicator 15: Perception of service accessibility DESTINATIONS 37 MATISSE (Methodology for Assessment of Transport Impacts of Social Exclusion), a preparatory action funded by the EC's DG Employment and Social Affairs serves as a reference. MATISSE aims to increase the understanding of relationships between transport and social policy makers. See www.matisse-eu.com

Additional indicator	**Share of population with appropriate access to mobility services**
Category:	Society - people
Sub-category:	Accessibility
Impact aspect:	Physical accessibility of transport services
Context and relevance	To have a node of access to a transportation system is the minimum condition to make use of it. The proposed parameter analyses accessibility to mobility services in terms of "the percentage of population living within a public transport service area in the demonstration area". This is the percentage of people living within walking distance meters from a given system. This distance is measured considered the topology of the network available for pedestrians. The indicator attempts to measure the share of population with appropriate access to mobility services.
Definition	Percentage of population living within walking distance of public transport (stop or station) or shared mobility (car or bike) system. 300 meters has been used as standardized waking distance for buses and trams, while 500 meters is common for subways and regional railways.
Measurement	• **Method**: Surveys and literature provide thresholds for walkable distances for different user groups in each city. Street-network catchment areas, and corresponding population within, can be calculated using GIS tools. Geographic distribution of population is normally available for most of the cities, but depending on the scale it might be necessary to localize it more precisely in blocks or even buildings. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: Street networks in CAD and GIS geo**d**atabases is normally available. On the other hand, georeferenced population and jobs is not that largely widespread. Correlating inhabitants with other variables such as use, constructed area, etc., should provide enough precision. • **Observed group**: Households • **Area of measurement:** city or demonstration area
References:	WBCSD 6 ECCENTRIC 6

Key indicator 4	**Operational barriers**
Category:	Society - people
Sub-category:	Accessibility
Impact aspect:	Operational accessibility of transport services
Context and relevance	Having a node of access is not sufficient condition to access a transportation system. Other barriers have still to be overcome to make use of it, or prefer it over other (less sustainable) transportation modes. Certain knowledge is necessary to operate or make use of transportation systems and technological platforms. Training and information should help to overcome this barrier and enable real equal accessibility for all citizens.
Definition	The operational accessibility to transport and transport services, as the average reported convenience of city transport.
Measurement	• **Method**: Survey • **Accuracy**: For data collected through surveys, the sample chosen should be sufficient to give a good representation of the typical mobility patterns of the system users. A standard error of 5% with a probability of 95% is acceptable. • **Observed group**: Citizens • **Area of measurement:** City or demonstration area
References:	WBCSD 2

Key indicator 5	Relative cost of service
Category:	Society
Sub-category:	Accessibility
Impact aspect:	Economic accessibility of transport services
Context and relevance	This core indicator provides useful information in the context of transport and social inclusion. There are many categories of social inclusion, namely physical, geographical, exclusion from facilities, time-based exclusion, fear-based exclusion, economic exclusion and spatial exclusion. In terms of social inclusion and accessibility, this indicator concentrates on economic accessibility. PT fares are usually not directly adjusted to the personal available income. Frequent exceptions are children, students, senior citizens, welfare recipients and unemployed who can usually use PT at reduced fares in order to compensate for their anticipated lower personal income. Under the assumption of fixed fares, the lower the income of a PT user the higher the share (percentage) of their personal income that has to be spent on PT. The pricing regime in conjunction with the personal income of a potential PT or other service user can be a major obstacle to using PT or the other service (and thereby to getting access to some factors of social well-being, such as employment, education, health care provision, etc.). Many CIVITAS measures may have impacts on travel mode choice, and then on travel costs. These include access control, road pricing, parking control, and promotion of bicycle use and walking. The core indicator can be used to addresses the travel cost in proportion to average personal income. It also provides insights to indicator 26-27 “modal split”.
Definition	**Relative travel cost** is defined as the average travel cost (for the PT or other service) as a percentage of the average personal available income **Unit**: % or percentage based index
Measurement	• **Method**: Travel modes on which CIVITAS measures are likely to have significant impacts on cost will be identified first (road charging, parking control, promotion of bicycle use and walking). Information about personal travel cost and income may best be collected through questionnaires, since this gives anonymity which is important for obtaining personal financial information. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of personal travel cost in the areas investigated. • **Observed group**: commuters • **Area of measurement:** demonstration area and/or city
References:	The Social Exclusion Unit (SEU) of the UK government on “Transport and Social Exclusion”, Interim Report “Making the Connections – Transport and Social Exclusion”. CIVITAS WIKI 16 ECCENTRIC 19

Intermediate indicator	**Car ownership**
Category:	Society - people
Sub-category:	Accessibility
Impact aspect:	Car availability
Context and relevance	A measure of the degree of diversity of mobility options, and an extremely important determinant of the use of other modes of transport.
Definition	All cars (including company cars) owned per 1000 of the population aged 18 or over. Percentage of households that have no car, preferably disaggregated by city district.
Measurement	• **Method**: This piece of information can be gathered from a household survey, but if not available, the national statistics department in your country will most likely have data on car ownership at a lower level of spatial resolution. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of accessibility level in the areas investigated. • **Observed group**: citizens/households • **Measurement area:** city or demonstration area
References:	CIVITAS CAPITAL 20 ECCENTRIC 18 DESTINATIONS 38

Intermediate indicator	**Car share cars and stations per capita**
Category:	Society - people
Sub-category:	Accessibility
Impact aspect:	Car availability
Context and relevance	Each car share club car may replace several individually owned cars. Car sharing reduces the mileage driven and increases the use of other modes such as walking, cycling and public transport.
Definition	This indicator is derived by dividing driving age population (18 and over) by the number of car share cars, that is, those cars in commercially or community run car share clubs that provide hourly hire of cars parked on street in local areas, bookable and payable by the hour, by club members only.
Measurement	• **Method**: Driving age population is available from national censuses. The number of car share club cars in a city is available from the operator(s) of those car clubs. • **Frequency**: Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: • **Observed group**: freight transport service and delivery service for large shops. • **Area of measurement**: city or demonstration area
References:	CIVITAS CAPITAL 21 Examples: www.cambio.be, www.citycarclub.co.uk. DESTINATIONS 33

Intermediate indicator	**Bike ownership**
Category:	Society - people
Sub-category:	Accessibility
Impact aspect:	Bike availability
Context and relevance	A measure of the degree of diversity of mobility options. Bikes owned, if used, support an active healthy lifestyle. In some cities, extensive bike share systems perform a similar function, and should be monitored as well.
Definition	Bikes (pedal cycles) owned per 1000 population, disaggregated by city district if possible. Toy bicycles and those for children aged under 5 should not be counted.
Measurement	• **Method**: If a household survey of travel behaviour is carried out (see indicator on Modal Split) then this indicator can be gathered at the same time. If not, a smaller sample survey of residents should be carried out, preferably of a random sample of households by telephone, or if not, by an on-street survey in two to three locations in the city (e.g. city centre, out of town shopping centre), aiming for a sample of 200 households. Only bikes that actually function should be counted. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of accessibility level in the areas investigated. • **Observed group**: citizens and tourists • **Area of measurement:** city or demonstration area
References:	CIVITAS CAPITAL 12 DESTINATIONS 39

Intermediate indicator	**Bike sharing bikes and stations per capita**
Category:	Society - people
Sub-category:	New shared systems
Impact aspect:	Bike sharing availability
Context and relevance	Bike sharing adds to and diversifies the existing set of mobility options within a city. It can contribute to increased levels of cycling, and to changing motor vehicle driver attitudes and behaviour towards cyclists.
Definition	This indicator is derived by dividing total population by the number of bike share bikes. Bike share bikes are those that are available on street for users (who sometimes have to go through a registration process and pay a registration fee) to hire, although often the first half hour of use is free of charge.
Measurement	**Method**: The method is defined in the indicator definition. The bike share operator in a city can supply data on the number of bikes. The population is derived from national statistics. **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. **Accuracy**: **Observed group**: freight transport service and delivery service for large shops. **Area of measurement:** city or demonstration area
References:	There is an interesting study done in Spain by Alberto Castro and Esther Anaya https://bicicletapublica.wordpress.com https://bicicletapublica.wordpress.com/datos CIVITAS CAPITAL 13 DESTINATIONS 32

1.3 Mobility demand

Intermediate indicator	**Average number of trips per person**
Category:	Society - people
Sub-category:	Mobility demand
Impact aspect:	Total Travel demand/need
Context and relevance	As a basis for living people need to get access to activities and services. Our mobility system is trying to fulfil this need for all persons. However if we want to limit the negative impacts of the mobility system, some measures can work on the need for this physical mobility both in replacing the physical way into a digital way or bringing activities and services together with housing locations. In this way the number of trips can be decreased or the distances to travel can be reduced having an influence on energy usage and environmental impacts. To understand this process this indicator is an important intermediate indicator making the final impact of the measure transparent.
Definition	Average number of trips per day (weekday, week-end day) or per hour (peak hour, off-peak hour, …) of a target group
Measurement	• **Method**: The data can be collected through surveys, asking persons living in an area to record their travel modes and route each day in a travel diary. This survey can be combined with a modal-split survey and be organised on the level of households. If we want to evaluate the impact of measures on the need with a specific purpose (as part of the all the trips persons are doing) a more focused survey can be organised questioning the travel behaviour for that purpose e.g. home-work travels. • **Frequency:** Measurements should be made preferably twice during the project, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. If a before survey was not possible, an 'only-after' survey can be organised asking for the change in travel behaviour caused by the CIVITAS measure. • **Accuracy**: For data collected through surveys, the sample size chosen should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% is acceptable. • **Target group**: persons living in an area or participating in a specific activity • **Area of measurement:** city or demonstration area
References:	/

Intermediate indicator	**Total number of freight movements**
Category:	Society - people
Sub-category:	Mobility demand
Impact aspect:	Freight transport demand
Context and relevance	In many cities freight traffic have an important impact on the congestion levels and the quality of life in the urban area. For this reason cities started to limit freight transport in the cities. This indicator tries to make the impact of measures transparent describing the intermediate figure of the freight to be transported.
Definition	Total freight goods to be transported departing or arriving in a specific area during a chosen period: hour, day, year. Unit: goods can be quantified in different ways: parcels, tons, etc. depending on the way the impact can be described.
Measurement	• **Method**: Sites or areas where CIVITAS measures have significant impacts on freight movements need to be identified (e.g. innovative goods distribution systems, urban transhipment centre, access control through low emission zones). The counting of freight movement should include mass freight transport and small items: - For small item delivery, data may be collected by a survey of goods delivery services (web shopping), counts or modelling. - For mass freight transport, a survey of arrival or starting points (companies, …) - Other specialised freight (e.g. waste) should be identified and described in a good quantitative way • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: / • **Target group**: freight delivery services, attraction poles • **Area of measurement:** city or demonstration area
References:	/

1.4 Health

<table>
<tr><td>Key indicator No. 6</td><td>Average walking/cycling time</td></tr>
<tr><td>Category:</td><td>Society - people</td></tr>
<tr><td>Sub-category:</td><td>Health</td></tr>
<tr><td>Impact aspect:</td><td>Health from physical activity</td></tr>
<tr><td>Context and relevance</td><td>Leading an active lifestyle may contribute to maintaining and improving health; using active travel modes helps to support sustainable transport objectives. There are also huge financial benefits in terms of health costs saved. Ideally all physical activities would be measured in total, with walking and cycling being assessed as part of the total. Since these are transport related indicators, the focus on the amount of walking and cycling only is justified.

The relative risk data for cycling is 0.90 for regular commuter cycling for 100 minutes per week for 52 weeks of the year (equivalent to 87 hours of cycling per year). In any given year, regular cyclists receive a protective benefit of 10% (1.00 minus 0.90) – that is, they are 10% less likely to die from any cause than non-cyclists. Assuming a linear relationship between cycling and mortality (like the HEAT model does), the benefits of other cycling volumes can be calculated. If the user enters a cycling volume equivalent to 29 hours per year (i.e. three times less), the protective benefit of this amount of cycling will be roughly 3%. If the user enters 174 hours (twice the time cycled in the reference population), the resulting protective benefit is 20%. This is twice the protective benefit of the reference population. The same calculation can be made for walking, but with a relative risk data of 0.89 for regular walking for 168 minutes per week. To avoid inflated values at the upper end of the range, the risk reduction is capped. Inspection of the data points of the new meta-analyses suggested that, after about 45% risk reduction for cycling and 30% for walking, no significant further risk reductions were achieved. For more information: see Health economic assessment tools (HEAT) for walking and for cycling.

Summary of basic values used for HEAT
<table><tr><th>Mode</th><th>Applicable age range</th><th>Relative risk</th><th>Volume</th><th>Benefits capped at</th></tr><tr><td>Walking</td><td>20-74 years</td><td>0.89 (CI 0.83–0.96)</td><td>168 minutes/week</td><td>30% (458 minutes)</td></tr><tr><td>Cycling</td><td>20-64 years</td><td>0.90 (CI 0.87–0.94)</td><td>100 minutes/week</td><td>45% (450 minutes)</td></tr></table>CI: confidence interval.</td></tr>
<tr><td>Definition</td><td>Average number of minutes that an adult between 20 and 74 years old is walking per week.

Average number of minutes that an adult between 20 and 64 years old is cycling per week.</td></tr>
<tr><td>Measurement</td><td>• Method: The following data are needed:
- an estimate of the average time spent walking or cycling in the observed population, which can come from surveys or estimates and can be entered in a number of ways:
▪ duration (average time walked or cycled per person, e.g. 30 minutes walked on average per day), which is the most direct data entry route;</td></tr>
</table>

Key indicator No. 6	Average walking/cycling time
	▪ distance (average distance walked or cycled per person, e.g. 10 km cycled on average per day); ▪ trips (average per person or total observed across a population, e.g. 250 bicycle trips per year); or ▪ steps (average number of steps taken per person, e.g. 9000 steps per day). If a household survey of travel behaviour is carried out then this indicator can be gathered at the same time. Some cities and countries have also health surveys besides their travel surveys with relevant data collection. If not, a smaller sample survey of residents should be carried out, preferably of a random sample of households by telephone, or if not, by an on-street survey in two to three locations in the city (e.g. city centre, out of town shopping centre), aiming for a sample of 200 people. • **Frequency:** Measurements should be made at least twice during the project, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). • **Accuracy**: The main concern with short-term counts is that they do not accurately capture variations in walking or cycling over time (i.e. time of the day, day of the week, season or weather). If counts are done on a sunny day, larger numbers may be seen than on a rainy day. Cycling also typically declines in the winter months compared with spring and summer in many countries. This issue will affect single-site evaluations (such as a footpath or a bridge) where counts are conducted at the site itself, or community- wide evaluations that are based on surveys conducted only during a certain time of the year. Short-term counts may also be adjusted for temporal variation to better reflect long-term levels of walking or cycling. Spatial variation, particularly in walking, may affect evaluations that are based on counts at a single or a few locations. The choice of location may strongly influence the count numbers, which may not be representative of the wider level of walking (or cycling). Results need to be interpreted carefully, and should in general not be extrapolated beyond the locations where actual data were collected. Not affected by this issue are evaluations based on surveys that sample subjects randomly from a defined area (such as large household surveys) and, to a lesser extent, count-based evaluations on linear facilities such as trails. • **Observed group**: citizens/commuters • **Area of measurement:** city or demonstration area
References:	CIVITAS CAPITAL 23 Health economic assessment tools (HEAT) for walking and for cycling

2 Society – governance

2.1 Planning

Key Indicator no. 7	**Sustainable Urban Mobility Plan (SUMP)**
Category:	Society - Governance
Sub-category:	Planning
Impact aspect:	Planning process
Context and relevance	EU encourages cities to develop Urban Mobility Plans, bringing together a set of elements which were previously parts of separate planning processes (e.g. land-use planning, pricing schemes, infrastructure provision, etc.). Within CIVITAS several cities will develop a Sustainable Urban Mobility Plan. This indicator can be used in order to assess whether the plan produced goes further than the traditional transport planning process and includes areas necessary for the sustainable long term planning in the cities. Also the process of developing the plan is crucial and should be assed here. This indicator is also strongly linked with key indicator 8 on the cooperation structures with stakeholders because in many case the introduction of a Sustainable Urban Mobility Plan according to the EU guidelines will also effect in general the way the city is working together with all other stakeholders in urban mobility.
Definition	Qualitative check whether an Sustainable Urban Mobility Plan exist and the level of its conformity to EU standards
Measurement	• **Method**: The content and process of the existing transport plan should to be compared with the content and process of the developed SUMP. This Comparison has to cover the following areas: - Strategic level vision (often short-term perspective without strategic vision of the traditional plans versus a long term/strategic vision of a SUMP - Geographic scope (focus on practical city in the traditional plan versus the functional city concept in the SUMP) - Level of public involvement (limited input from operators and other local partners in traditional plan versus high citizen and stakeholder involvement as an essential characteristics of the SUMP) - Types of measures (proposed measures in SUMP should balance social, environmental and economic development characteristics) - Sector integration (flow transport and infrastructure focus in traditional plan versus integration of practices and policies between policy sectors) - Institutional cooperation (non-mandatory cooperation between authority levels in the traditional plan versus integration between authority levels in SUMP) - Monitoring and evaluation (often missing in the traditional plan versus regular monitoring process focus on the achievement of measurable targets and outcomes in the SUMP) - Finance (type of financing schemes, inclusion of PPP schemes, etc.) - Implementation (mainly led by government in traditional plans versus high involvement of industry in the SUMP) This analysis can be done using a questionnaire in which these aspects are assessed filled in by the mobility department or more widely by different stakeholders.

Key Indicator no. 7	Sustainable Urban Mobility Plan (SUMP)
	• **Frequency:** The comparison can be conducted at the end of the project • **Accuracy**: / • **Target group**: Local/Regional government • **Area of measurement:** city or demonstration area
References:	CIVITAS WIKI 30 CIVITAS DYN@MO

Additional indicator	Quality of policies, plans, and programs
Category:	Society - governance
Sub-category:	Planning
Impact aspect:	Planning process
Context and relevance	CIVITAS measures are not expected to remain as a one-time implementation. Through the dissemination and cross-fertilization activities it is expected that they influence future decisions, impacting planning tools at different levels. In some cases the measure is expected to have an impact during the lifetime of the measure, or during the duration of the CIVITAS project. This indicator measures the outreach of the measure, considering the influence of Sustainable Urban Mobility Plans (SUMP) as the maxim
Definition	Qualitative description of the change in the process to develop policies, plans, and programs (including SUMPs).
Measurement	• **Method**: Surveys and interviews to decision makers. • **Accuracy**: / • **Target group**: decision makers • **Area of measurement:** Demonstration area/stakeholders
References:	CIVITAS ECCENTRIC 22

2.2 Operational cooperation structures

Key Indicator no. 8	**Quality of cooperation structures with stakeholders**
Category:	Society - governance
Sub-category:	Operational cooperation structures
Impact aspect:	Quality of cooperation structures with stakeholders
Context and relevance	The feasibility and the efficiency with implementing sustainable mobility measures as CIVITAS measures depends strongly on the quality of the cooperation structures in the city (in the city services and with external stakeholders) and between the city and the regional/national level. For this reason this indicator wants to assess in a qualitative way the change in the quality of these cooperation structures thanks to actions as part of CIVITAS.
Definition	Level of quality of cooperation structures between all public and private stakeholders to develop and implement sustainable mobility solutions
Measurement	• **Method**: Surveys and interviews with decision makers and stakeholders • **Accuracy**: / • **Target group**: all partners in the city • **Area of measurement:** City and region
References:	/

3 Transport system

3.1 General

Key Indicator no.9	**Average Modal Split (trips)**
Category:	Transport system
Sub-category:	General
Impact aspect	Modal split persons
Context and relevance	Motorised vehicles pose a burden on the environment in terms of emissions, noise, congestion, etc. Alternatives should be systematically encouraged, and the performance of the corresponding measures should be monitored through the dynamics of modal split. In particular, the modal shares of non-motorised modes (cycling, walking) are directly relevant for short distance trips, while long distance trips lend themselves to shifts towards public transport. Overall, it is essential to monitor how the modal split develops during awareness campaigns, improvements of public transport, improvements of bicycle paths and other campaigns for the promotion of non-motorised modes, etc. Many CIVITAS measures will have impacts on modal split including: access and parking control, promotion of PT, bicycle use and walking etc. These indicators are quite widely used since it gives insight to the entire travel picture and it enables easy comparisons (among target groups, different areas and so on). **Modal shift** is derived from model spilt indicating the change of modal spit because of the implementation of the CIVITAS measures.
Definition	Percentage of trips using each mode for a specific target group during a day (weekday, week-end day) or per hour (peak hour, off-peak hour, …). For an area the model split of both the trips of the residents and the in- and outgoing people are analysed. **Unit:** % of trips Modes: walk, bicycle, bus, tram, metro, train, car (driver and passenger), motorcycle
Measurement	• **Method**: The data can be collected through surveys, e.g. asking travellers or citizens in the considered area to record their travel modes and routes each day in a travel diary. Samples should be chosen appropriately to cover those areas where CIVITAS measures are likely to have an impact on modal split. For a specific target group the modal-split can also be measured for trips with a specific purpose e.g. home-work. • **Frequency:** Measurements should be made at least twice during the project, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. If a before survey was not possible, an 'only-after' survey can be organised asking for the change in travel behaviour caused by the CIVITAS measure. • **Accuracy**: For data collected through surveys, the sample size chosen should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% is acceptable. • **Target group**: Citizens or travellers • **Area of measurement:** City or demonstration area
References:	CIVITAS WIKI 28 DESTINATIONS 17

Additional indicator	**Average Modal Split (passenger km)**
Category:	Transport system
Sub-category:	General
Impact aspect	Modal split persons
Context and relevance	Motorised vehicles pose a burden on the environment in terms of emissions, noise, congestion, etc. Alternatives should be systematically encouraged, and the performance of the corresponding measures should be monitored through the dynamics of modal split. In particular, the modal shares of non-motorised modes (cycling, walking) are directly relevant for short distance trips, while long distance trips lend themselves to shifts towards public transport. Overall, it is essential to monitor how the modal split develops during awareness campaigns, improvements of public transport, improvements of bicycle paths and other campaigns for the promotion of non-motorised modes, etc. Many CIVITAS measures will have impacts on modal split including: access and parking control, promotion of PT, bicycle use and walking etc. These indicators are quite widely used since it gives insight to the entire travel picture and it enables easy comparisons (among target groups, different areas and so on). **Modal shift** is derived from model spilt indicating the change of modal spit because of the implementation of the CIVITAS measures.
Definition	Percentage of passenger-km using each mode for a specific target group during a day (weekday, week-end day) or per hour (peak hour, off-peak hour, …). For an area the model split of both the trips of the residents and the in- and outgoing people are analysed. **Unit:** % of passenger km Modes: walk, bicycle, bus, tram, metro, train, car (driver and passenger), motorcycle
Measurement	• **Method**: The data can be collected through surveys, e.g. asking travellers or citizens in the considered area to record their travel modes and routes each day in a travel diary. Samples should be chosen appropriately to cover those areas where CIVITAS measures are likely to have an impact on modal split. For a specific target group the modal-split can also be measured for trips with a specific purpose e.g. home-work. For the calculation of the modal-split in passenger-km the use of traffic modelling is common. • **Frequency:** Measurements should be made at least twice during the project, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. If a before survey was not possible, an 'only-after' survey can be organised asking for the change in travel behaviour caused by the CIVITAS measure. • **Accuracy**: For data collected through surveys, the sample size chosen should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% is acceptable. • **Target group**: Citizens or travellers • **Area of measurement:** City or demonstration area
References:	CIVITAS WIKI 26 DESTINATIONS 16

Key Indicator no.10	**Average Modal Split in freight transport (trips)**
Category:	Transport system
Sub-category:	General
Impact aspect:	Modal Split in freight transport
Context and relevance	In many cities freight traffic have an important impact on the congestion levels and the quality of life in the urban area. For this reason cities started e.g. to work on the distribution traffic entering the city to deliver to shops and – more and more – to citizens trying to limit this traffic and/or replace heavy trucks into smaller and more environmental trucks (electric, hybrid, gas,..) and into other modes e.g. bike and even boats. Also an optimisation of the freight movements combining deliveries from more manufactures and to more shops is envisaged by distribution centres. This indicator tries to make the impact of measures transparent describing the intermediate figures. Possibly this indicator is only used to give more details on the split over different submodes e.g. heavy trucks and light trucks and other road related modes as cargobikes. **Modal shift** is derived from model spilt indicating the change of modal spit because of the implementation of the CIVITAS measures.
Definition	Percentage of goods using each (sub) mode for a specific target group during a day (weekday, week-end day) or per hour (peak hour, off-peak hour, **Unit:** % of goods (measured in number of parcels, tons, etc. depending on the way the impact can be described) transported by the different modes and submodes Modes: heavy and light trucks, cargobikes, etc.
Measurement	• **Method**: The data can be collected through surveys, e.g. asking companies in the considered area to record their transport each day in a freight diary. Samples should be chosen appropriately to cover those areas where CIVITAS measures are likely to have an impact on modal split. • **Frequency:** Measurements should be made at least twice during the project, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. If a before survey was not possible, an 'only-after' survey can be organised asking for the change in travel behaviour caused by the CIVITAS measure. • **Accuracy**: Taking into account the strong variation in the organisation of transport of different companies in area samples are only in exceptional cases possible, preferable a full analysis of all actors in an area is done • **Target group**: Companies, shops, households (if focus on home deliveries) • **Area of measurement:** City or demonstration area
References:	/

3.2 Safety

Key indicator No. 11	**Number of people killed and seriously injured (KSI) caused by transport accidents**
Category:	Transport system
Sub-category:	Safety
Impact aspect:	Transport safety
Context and relevance	The chance of getting involved in a traffic accident provides a direct contribution to measuring the quality of life. Fatalities and injuries caused by traffic accidents are one of the most important social costs associated with transport systems. Accident rates are known to vary with the quality of road infrastructure, the technology of vehicles, the behaviour of drivers, traffic regulations, vehicle density, enforcement, etc. While policies must address each and every such aspect, this indicator provides an aggregated measure of the overall policy performance with regard to safety. This indicator is used because the numbers fatalities and casualties provide an important view of the traffic safety situation and are normally recorded by city police departments. The focus is on the resulting number of fatalities and casualties. The underlying reasons for an accident can vary considerably and are not directly addressed by this indicator. Many CIVITAS measures aim at increasing transport safety directly (e.g. safe access for pedestrians, monitoring centre for road safety and accident prevention) or indirectly (e.g. reducing traffic demand by access control, road pricing, car pooling, car sharing, promotion of using PT etc.)
Definition	**Transport safety** is defined as the number of recorded transport injury accidents and the resulting number of fatalities and casualties caused by any means of transport. A fatality is a death within 30 days after the traffic accident as a corollary of the event. A recorded injury accident is any transport incident causing death or injury which is recorded by the police. **Unit**: number of accidents, number of fatalities and number of casualties.
Measurement	• **Method**: Fatalities and casualties are related to the number of vehicle-km or person km, so such data also need to be obtained to provide relative rates. The accident data will need to be obtained from the police or city authorities as appropriate. Police and preferably hospital records can normally provide total numbers of KSI (hospital records are useful because police records normally underreport the number of collisions involving KSI). A household survey is required for time spent in traffic. • **Frequency:** Accident records will need to be maintained for the full period of the project for subsequent analysis. To understand changes statistically some historic data records for the previous 2-3 years may also need to be used. • **Accuracy**: Since the dependence on external sources for collecting the data cannot be avoided the accuracy of these databases has to be accepted. It is therefore important to understand the basis of collection and accuracy of the databases to be used. Police authorities of different countries use different criteria to include accidents and their status (fatality and injury) in their reports. This can lead to difficult comparisons. Thus, for reasons of accuracy and comparability it is important to detail the criteria and describe the way they are used in practice when recording the data. • **Observed group**: Road users • **Area of measurement:** The area covered must be sufficient to understand the changes occurring and may need to include a ‘control’ area.

Key indicator No. 11	Number of people killed and seriously injured (KSI) caused by transport accidents
References:	CIVITAS WIKI 20 WBCSD 5 CAPITAL 8 ECCENTRIC 10

3.3 Security

Key indicator No. 12	**Perception of security**
Category:	Transport system
Sub-category:	Security
Impact aspect:	Security
Context and relevance	The perception of security is critical to the improvement of the attractiveness of PT particularly and social inclusion in general. In PT, there are some concerns (and even fear) among passengers for their personal security, health and general well-being. Fears for personal security can lead to reluctance or actual avoidance of using PT. This is particularly evident at specific times of the day (at night or during darkness) or in specific areas perceived as being “dangerous”. In general, fear of personal safety is particularly articulated by women and elderly people, and for people travelling during the evening or early morning. It is difficult to obtain an indication of security by relying solely on quantitative measurements, since incidents that occur are often not reported. Reasons for not reporting a large portion of incidents may include a reluctance to delay the journey, a lack of confidence that the offender will be caught, the absence of someone to report to, and the belief that a report will not be taken seriously. Incidents such as abuse, harassment and intimidation are in general even less likely to be reported. Often only a limited number of security incidents are reported. However, PT passengers still (may) reveal their perception of fear for their personal security when asked by means of an anonymous questionnaire. Therefore, subjective measurements (perceptions) are necessary in order to obtain an indication of security This core indicator evaluates the changes in terms of the perception of security rather than focussing on quantitative data that is nearly impossible to collect (e.g. number of attacks). A higher degree of perceived security may result in increased attractiveness of PT, while a lower number of reported incidents may not be a sufficient indication of increased security (e.g. because of reluctance to report an incident).
Definition	**Perception of security** is defined as the perceived security of a service by its users. For PT this concerns PT vehicles as well as at and around the PT stops. **Unit**: index
Measurement	• **Method**: CIVITAS measures having significant impacts on security will need to be identified. In the sites/areas, perceived PT security can be assessed though a survey which take the form of mailed questionnaires, face-to-face interviews, telephone interviews etc. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: The sample chosen should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of the user opinions on PT security in the areas investigated. • **Observed group**: PT or other service users • **Area of measurement:** city or demonstration area
References:	CIVITAS WIKI 17

3.4 Walking

Key indicator no. 13	**Quality of pedestrian infrastructure**
Category:	Transport System
Sub-category:	Walking
Impact aspect:	Opportunity for walking
Context and relevance	If walking should be an important urban mode, the facilities for walking should be of a high quality including the reduction of the negative impact of other modes. This needs a combination of optimal infrastructure and traffic regulation. This indicators makes an synthesis of 4 important ways to assure a good quality for walking in the street of and area or the whole city combining infrastructural measures and traffic calming: • Street with good sidewalks • Streets with a 30 km/h (or 20 mph) speed regime or below • Car free streets • Dedicated paths and links of at least 50m in length that are off-street These measures also makes walking more competitive in terms of journey time. Traffic calming is a key measure in cities that are recognised to be leaders in sustainable transport in making these cities more liveable and welcoming with a higher quality of life and safety for their residents.
Definition	Percentage of the total distance of the city's streets (including squares: the “distance” of a square is the sum of the length of its sides) with a good quality for walking on the total length of the city road network (excluding motorways) Good quality means that the streets meets at least one of the following requirements: • good sidewalk (minimum 1.5 meters without mayor obstacles) • a 30 km/h (or 20 mph) speed regime or below • car free • dedicated paths and links of at least 50m in length that are off-street
Measurement	**Method**: Most easily done via GIS. Otherwise it is recommended to conduct a manual survey. The gathering data is not technically difficult but could be moderately resource-hungry when first measured. Manual surveys can survey around 4 km of streets per hour. Another low cost option is to use Google Earth for pedestrianised streets. A prequisite is to know the entire length of streets in the city but this is a basic piece of data that all cities should have **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. **Target group**: / **Area of measurement:** city or demonstration area
References:	CIVITAS CAPITAL DESTINATIONS WBCSD

Additional indicator	**Number of pedestrians**
Category:	Transport system
Sub-category:	Walking
Impact aspect:	Number of pedestrians
Context and relevance	Walking can play an important role in the accessibility of activities in the city. For this reason also the evolution of this mode should be monitored and evaluated.
Definition	Number of pedestrians passing at set of reference points in area during specific hours a day or during the whole day.
Measurement	• **Method**: First a well-structured set of reference points should be defined which are representative for the walking movements in the city. Also routes with important growth possibilities should be taken into account. Then the pedestrians should be counted manually or automatically during a reasonable period to give a representative view. Eventually different periods can be identified to show variations due to different weather conditions. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. • **Target group**: pedestrians • **Area of measurement:** City, demonstration area or corridor.
References:	CIVITAS ELAN

Additional indicator	**Image on the walking conditions (subjective)**
Category:	Transport system
Sub-category:	Walking
Impact aspect:	Walking perception
Context and relevance	The renewal of the walking infrastructure combined with the promotion of walking as a interesting mode might contribute to a more positive image of walking in general. This will have an positive impact on the level of walking in the city.
Definition	Attitude towards walking conditions based on the answers of a survey among citizens and visitors or pedestrians on the street.
Measurement	• **Method**: Significant factors of the quality of walking will need to be identified. Based on this a compact survey can be developed both for citizens or specific target groups or walking people on the street. Examples of relevant aspects are: - Most sidewalks are wide enough - Pedestrians have enough time to cross the street at traffic lights - Most sidewalks are well maintained - I'm not hindered (by bicycles, waste, bollards, …) Respondents can answer with totally agree, agree, neutral, disagree, totally disagree. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. • **Target group**: pedestrians, citizens, commuters,visitors • **Area of measurement:** City, demonstration area or corridor.
References:	CIVITAS ELAN

3.5 Cycling

Key indicator no. 14	**Quality of cycling infrastructure**
Category:	Transport System
Sub-category:	Cycling
Impact aspect:	Opportunity for cycling
Context and relevance	In many cities cycling still have a high growth potential. This indicators makes an synthesis of 4 important ways to assure a good quality of cycling facilities combining infrastructural measures and traffic calming: • Street with good bike lanes • Streets with a 30 km/h (or 20 mph) speed regime or below • Car free streets • Dedicated paths and links of at least 50m in length that are off-street These measures also makes cycling more competitive in terms of journey time. Traffic calming is a key measure in cities that are recognised to be leaders in sustainable transport in making these cities more liveable and welcoming with a higher quality of life and safety for their residents.
Definition	Percentage of the total distance of the city's streets (including squares: the “distance” of a square is the sum of the length of its sides) with a good quality for cycling on the total length of the city road network (excluding motorways) Good quality means that the streets meets at least one of the following requirements: • good bike lanes (minimum 1.5 meters one-way and 2.5 meters two ways) • a 30 km/h (or 20 mph) speed regime or below • car free • dedicated paths and links of at least 50m in length that are off-street
Measurement	**Method**: It is important to define clearly the area for which te survey is done. Most easily done via GIS. Otherwise it is recommended to conduct a manual survey. The gathering data is not technically difficult but could be moderately resource-hungry when first measured. Manual surveys can survey around 4 km of streets per hour. Another low cost option is to use Google Earth. A prequisite is to know the entire length of streets in the city but this is a basic piece of data that all cities should have **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. **Target group**: / **Area of measurement:** city or demonstration area
References:	CIVITAS CAPITAL DESTINATIONS WBCSD

Additional indicator	**Number of cyclists**
Category:	Transport system
Sub-category:	Cycling
Impact aspect:	Number of cyclists
Context and relevance	Cycling plays an important role in the accessibility of activities in the city. Counting the number of cyclists in the city is an important indication of the importance of cycling in the city.
Definition	Number of cyclists passing at set of reference points in area during specific hours a day or during the whole day.
Measurement	• **Method**: First a well-structured set of reference points should be defined which are representative for the cycling movements in the city. Also routes with important growth possibilities should be taken into account. Then the cyclists should be counted manually or automatically during a reasonable period to give a representative view. Eventually different periods can be identified to show variations due to different weather conditions. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. • **Target group**: cyclists • **Area of measurement:** City, demonstration area or corridor.
References:	CIVITAS ELAN

Additional indicator	**Image on the cycling conditions (subjective)**
Category:	Transport system
Sub-category:	Walking
Impact aspect:	Walking perception
Context and relevance	The improvement of the cycling infrastructure combined with the promotion of cycling as a interesting mode might contribute to a more positive image of cycling in general. This will have an positive impact on the level of cycling in the city.
Definition	Attitude towards cycling conditions based on the answers of a survey among citizens and visitors or cyclists on the street.
Measurement	• **Method**: Significant factors of the quality of cycling will need to be identified. Based on this a compact survey can be developed both for citizens or specific target groups or cycling people on the street. Examples of relevant aspects are: - Most bike lanes are wide enough - I feel safe when cycling here - Cycling lanes are well maintained - The city has a cycle-friendly policy - I take a detour to a more cycle-friendly route Respondents can answer with totally agree, agree, neutral, disagree, totally disagree. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. • **Target group**: cyclists, citizens, commuters,visitors • **Area of measurement:** City, demonstration area or corridor.
References:	CIVITAS ELAN

3.6 Public Transport

Key indicator No. 15	**Accuracy of service**
Category:	Transport system
Sub-category:	Public Transport
Impact aspect:	Service reliability
Context and relevance	Public transport is in continuous competition with other transport modes like the private car. Most passengers still prefer to use the private mode irrespective of distance rather than using public transport or non-motorised modes. Public transport has real and perceived disadvantages compared to the car: lower comfort, (often) longer travel times, unavailability of door-to-door service, (often) lower reliability, trips subjected to interval times, safety, lack of privacy, etc. Lack of reliability can be regarded as one of the most important barriers to using public transport. PT passengers must be able to rely on the scheduled arrival and departure times or frequency (in case of a high enough frequency) in order to plan a journey with confidence, and in particular, make connections without unpredictable waiting times. This means that the public transport service should neither depart earlier than is stated on the time table nor arrive later than a couple of minutes from the time stated on the time table in case of a low frequent PT service, or that the frequency of the service is as high as expected in case of high frequent PT service (an average headway of 10 minutes or less). Many CIVITAS measures will have impacts on public transport time keeping including PT priority, bus lane control, using telematics for PT monitoring and control etc. This indicator provides an objective measure of public transport service quality. It may also be used as a measure of reliability of just-in-time freight deliveries.
Definition	**Accuracy of time keeping** is defined as the number and percentage of public transport services that arrive within an acceptable interval around the planned times given by timetables. However, for public transport lines with a headway of 10 minutes or less, the frequency is more important than the timetable, because it is generally assumed that passengers arrive at transit stops independent of the timetable. Therefore, the deviation of the headway is measured for these cases. This indicator accounts for the real (not the perceived) reliability of arrival times of public transport services at PT stops and stations. **Unit**: number and % of the total arrival times per year that are within a given interval around the time shown in the timetable.
Measurement	• **Method**: Services (e.g. bus service) on which CIVITAS measures have significant impacts on time keeping (e.g. bus priority, access control, road pricing) should be identified first. Data can be collected from PT service operators if they keep records of vehicle arrivals at stops or through observations at bus stops. If the number of stops is large, a sample of 10 key stops can be used for the evaluation. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: For observations at bus stops, the amount of data collected should be sufficient to give a good representation of the typical PT service in the areas investigated. • **Observed group**: PT services • **Area of measurement:** demonstration area or city

Key indicator No. 15	Accuracy of service
References:	Wilson, N., Nelson, D., Palmere, A., Grayson, T.H., Cederquist, C. (1992) “Service quality monitoring for high frequency transit lines”, Transportation Research Record 1349, http://onlinepubs.trb.org/Onlinepubs/trr/1992/1349/1349-001.pdf CIVITAS WIKI 18 DESTINATIONS 25 ECCENTRIC 14

Key indicator No. 16	Commercial speed
Category:	Transport system
Sub-category:	Public Transport
Impact aspect:	Service reliability
Context and relevance	Commercial speed is a key factor in the operation of public transport systems because it represents a direct measure of the quality of service provided to users and also considerably affects system costs. Commercial speed refers to the average speed of buses over stretches, including all operational stops. Evaluating system performance by monitoring the commercial speed provided by bus services is highly desirable; however, in dense networks, it becomes a difficult task because of the amount of information required to implement such a monitoring procedure.
Definition	Commercial speed is defined as the average journey speed of public transport services between two points, including any delay at stops. **Unit**: km/h
Measurement	• **Method**: The introduction of GPS technology in buses can overcome the difficulties in the past in terms of information availability, although it presents the challenge of processing huge amounts of data in a systematic way. GPS-generated data allows to systematically monitor average commercial bus speeds. The framework can be applied to each bus route as a whole, as well as over segments of arbitrary length, and can be divided into time intervals of arbitrary duration. (Cortes et. al. 2011) • **Frequency:** • **Accuracy**: Widespread use of GPS on-board equipment enable full sampling and very detailed information. Precise values of the indicators are expected. For data collected through surveys, the sample chosen should be sufficient to give a good representation of the typical speed in the corridors targeted. A standard error of 5% with a probability of 95% is acceptable. • **Observed group**: Fleets • **Area of measurement:** Road section or demonstration area
References:	ECCENTRIC 12

3.7 Car

Intermediate indicator	**Average occupancy**
Category:	Transport system
Sub-category:	Car
Impact aspect:	Vehicle occupancy
Context and relevance	Occupancy rates have a direct impact on traffic intensity, and therefore on congestion, air quality etc. For a given level of travel demand (in pkm), the higher the occupancy the lower the number of vehicle km. On the other hand, occupancy rates of PT services also contribute to their economic performance. Many CIVITAS measures will have impacts on occupancy including: carpooling, access control and pricing schemes, and promotion of PT use by improving service quality.
Definition	**Average occupancy** is defined as the average number of passengers per vehicle per trip. **Unit**: number of passengers per vehicle Vehicles: Buses, trams, metro and cars
Measurement	• **Method**: Sites or areas where CIVITAS measures would have significant impacts on occupancy need to be identified (e.g. access control, road pricing, P&R). Data should be collected by mode both during the peak and off peak periods. - For PT vehicles, data can be collected by patronage counts, - For private cars by manual roadside counts, or from traveller surveys Other approaches may also be appropriate e.g. modelling. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. • **Target group**: Public transport vehicles and passenger cars • **Area of measurement:** city or demonstration area
References:	CIVITAS WIKI no.29 DESTINATIONS 23

Intermediate indicator	**Traffic flow by vehicle type (peak/off-peak)**
Category:	Transport system
Sub-category:	Car
Impact aspect:	Traffic levels
Context and relevance	Congestion is possibly one of the foremost problems faced by most European cities. It is responsible for negative effects both at the economic level and with regard to fuel consumption and air quality. Congestion levels, however, are difficult to measure in a robust and homogeneous way. This indicator (together with indicator 23-24 - average vehicle speed) provides a rough but objective input to traffic intensity and congestion measurement. Many CIVITAS measures will have impacts on traffic levels including road pricing, access control, parking control, promotion of PT, bicycle use and walking. The indicator can be used together with indicator 23/24 (peak, off-peak average vehicle speed) to indicate traffic levels on city road networks.
Definition	**Traffic flow (peak / off-peak)** is the average daily vehicle flow during the peak and off-peak hours. The peak and off-peak hours must be defined by each city to correspond with the local conditions. The city must choose relevant reference points; the trajectories between these points are measured. **Unit**: vehicles/hour
Measurement	• **Method**: Sites or areas where CIVITAS measures have significant impacts on traffic flows need to be identified (e.g. access control, road pricing). Many methods can be used to measure traffic flows including loop detectors, counts from video recordings, roadside counting, etc. Data collection should cover both peak and off-peak periods. • **Frequency:** Data are collected on weekdays (Monday to Friday) to provide typical average daily flows, at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data can be collected on an annual basis. • **Accuracy**: • **Target group**: general traffic • **Area of measurement:** city or demonstration area
References:	CIVITAS WIKI no.21-22 DESTINATIONS 19-20

Key indicator No. 17	**Average vehicle speed (peak/off-peak)**
Category:	Transport System
Sub-category:	Car
Impact aspect:	Congestion levels
Context and relevance	Congestion is possibly one of the foremost problems faced by most European cities. It is responsible for negative effects both at the economic level and with regard to fuel consumption and air quality. Congestion levels, however, are difficult to measure in a robust and homogeneous way. This indicator (together with indicator about traffic flow) provides a rough but objective input to congestion measurement. Many CIVITAS measures will have impacts on traffic levels including: road pricing, access control, parking control, promotion of PT, bicycle use and walking. The indicator can be used together with the previous indicator (peak, off-peak average vehicle flow) to indicate traffic levels on city road networks.
Definition	**Average vehicle speed** is defined as the average network or route speed by vehicle type. The peak and off-peak hours must be defined by each city to correspond with the local conditions. **Unit**: km/hr.
Measurement	**Method**: Areas where CIVITAS measures have significant impacts on traffic speeds need to be identified (e.g. access control, road pricing). Many methods can be used to measure speed including loop detectors, speed radars, number plate matching (by cameras), journey time estimates, and modelling. Data collection should be carried out for both peak and off peak periods. **Frequency:** Data are collected on weekdays (Monday to Friday) to provide typical average daily speeds, at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data can be collected on an annual basis. **Accuracy**: For data collected through surveys, the sample chosen should be sufficient to give a good representation of the typical speed in the areas targeted. A standard error of 5% with a probability of 95% is acceptable. **Target group**: general traffic **Area of measurement:** city or demonstration area
References:	CIVITAS WIKI no.23-24 DESTINATIONS 21-22

Additional indicator	**Delays in road traffic peak versus free flow traffic**
Category:	Transport System
Sub-category:	Car
Impact aspect:	Congestion levels
Context and relevance	Congestion is possibly one of the foremost problems faced by most European cities. It is responsible for negative effects both at the economic level and with regard to fuel consumption and air quality.
Definition	Weighted average per trip of the ratio of peak period travel times to free-flowing travel times with respecting rules inroad traffic and travel time adherence of public transport during peak hours on up to 10 major car routes. **modes. Unit**: minutes
Measurement	**Method**: the travel time measured during morning and evening peak hours (averaged peak travel time per route) as opposed to the travel time for these routes under free flow conditions. Floating car measurement method for car traffic can be used. An easier way is to use the data obtained for travel times during peak hours versus travel times in off-peak conditions obtained with online route planners (apps) which are based on realtime traffic conditions. **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). **Accuracy**: **Target group**: cars **Area of measurement:** city or demonstration area
References:	WBCSD 14

Intermediate indicator	**Parking costs**
Category:	Transport System
Sub-category:	Car
Impact aspect:	Parking
Context and relevance	In the short and long term, the cost of parking has a very significant impact on how many people choose to travel by car (price elasticities of demand are around -0.3, meaning that for example a 10% increase in parking charges can lead to a 3% reduction in car use if real incomes do not also increase). Therefore, it is important to gather data to show whether parking is becoming more or less affordable.
Definition	Cost per hour of on-street parking in city's most expensive on-street spaces, as a percentage of gross monthly individual income. Cost per hour of off-street parking in city's most expensive off-street spaces, as a percentage of gross monthly individual income.
Measurement	**Method**: Average gross monthly income for city or region is usually available from national statistics departments. The cost of parking on street should be easily available from the City's own parking operator, whilst for off-street, rates will be published online or can be established from visiting the car park concerned. It is important to choose the on-street spaces and the car park with the highest hourly rate in the city. **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. **Accuracy**: **Target group**: **Area of measurement:** city or demonstration area
References:	CAPITAL 19

Intermediate indicator	**Use of space for parking**
Category:	Transport System
Sub-category:	Car
Impact aspect:	Parking
Context and relevance	This measure is a driver behind mode shift away from car, has the potential to reduce congestion and parking search and improves street space and therefore quality of life.
Definition	Space devoted to parking (total, includes on street, off-street, private residential and non-residential) as proportion of an urban area. Off-street parking means parking your vehicle anywhere but on the streets. These are usually parking facilities like garages and surface car parks. Off-street parking can be both indoors and outdoors. On street parking means parking your vehicle on the street, anywhere on or along the curb of streets, in contrast to parking it in a parking garage. In some streets you can always park your vehicle on the street, but sometimes there are restrictions. There are also on-street parking situations where you need a parking permit to park. To make sure people follow these rules and restrictions, cities may employ enforcement officers, or enforcement may be the responsibility of the police. Private residential parking refers to areas for short-term and long-term storage of cars and other private vehicles which is not open to the general public. Most commonly these are only available to owners and tenants. Private non-residential parking (PNR) is generally associated with parking at a workplace which is reserved for the use of employees and is not available to the general public; or at shops and other facilities, where it is reserved for their customers and visitors. PNR parking can affect mode choice by encouraging workers to continue to travel to work by private car.
Measurement	**Method**: Requires count of parking spaces. There may be problems counting private non-residential (e.g. workplace, shopping centre) spaces as they are on private land. **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. **Accuracy**: Data collected should be sufficient to give a good representation over the year. A standard error of 5% with a probability of 95% per transport mode is acceptable. **Target group**: passenger cars **Area of measurement:** city or demonstration area
References:	CAPITAL no. 18 DESTINATIONS 24 ECCENTRIC 17

3.8 Freight

Key indicator no. 18	**Number of freight movements**
Category:	Transport system
Sub-category:	Freight
Impact aspect:	Freight movements
Context and relevance	Freight distribution, pickups and deliveries (sometimes there is a distinction between delivery traffic and goods transport), while essential to ensure the vitality of cities, bear an important responsibility in determining high congestion levels, traffic disruptions, and, therefore increased levels of emissions, noise, and other social costs. City centres are often areas with small streets and high population densities. The performance of urban freight systems is geared to a variety of factors related to vehicle types, delivery schedules, load optimisation etc. In CIVITAS, the measures within "new concepts for goods distribution" aim at improving freight services. This indicator will be used to provide a simple – though rough – measure of the overall impact of freight traffic on the overall urban transport system.
Definition	**Freight movement** is defined as the number of freight vehicles moving into a demonstration area (e.g. city centre). **Unit**: number of movements per day.
Measurement	• **Method**: Sites or areas where CIVITAS measures have significant impacts on freight movements need to be identified (e.g. innovative goods distribution systems, urban transhipment centre, access control through low emission zones). The counting of freight movement should include mass freight transport (by trucks) or small items deliveries (e.g. by vans) - For small item delivery, data may be collected by a survey of goods delivery services (web shopping), counts or modelling. - For mass freight transport, roadside counts can be used to record the number of freight vehicles moving into the areas investigated. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: • **Target group**: freight transport service and delivery service for large shops. • **Area of measurement:** city or demonstration area
References:	CIVITAS WIKI no.25 DESTINATIONS 31

3.9 New shared systems

Additional indicator	**System usage**
Category:	Transport System
Sub-category:	New shared systems
Impact aspect:	System usage
Context and relevance	It is expected that the implementation of new shared systems change the transportation patterns by attracting users to sustainable transportation modes. A measurement of the success of these new systems is the number of users of the system, whether it be a technologic platform (websites, apps, etc.), a transportation system (bikes, electric vehicles, public transport, etc.), or a complementary services (delivery support, training, etc.). The number of users in fixed units of times allows to track the demand along the evaluation periods.
Definition	Average system usage (bookings, rentals, deliveries, users, passengers, etc.), in a given unit of time. Passengers, bookings and deliveries are standard users units to measure performance of infrastructures and transportation systems. Bookings, visitors, registers, attendees, etc. can be used as user units for complementary services or virtual platforms. One day is recommended as the standard measure of time, although for some measures targeting specific periods of the day, hours can be more appropriate. Unit: Frequency (users/unit of time)
Measurement	• **Method**: Household or on-site surveys can provide the necessary data if the sample can be expanded with parallel measurements. On-site counts might be suitable for closed systems. In technology-enabled systems, operation logs can provide complete information for the system/group under study. • **Frequency:** Measurements should be made at least twice during the project, i.e. before CIVITAS measure is introduced (baseline) and at the end of the project (ex-post). Where appropriate, data could also be collected on an annual basis. • **Accuracy**: Precise values can be retrieved from operation logs and counts. If data is inferred from household surveys, the sample must be representative. For data collected through surveys, the sample chosen should be sufficient to give a good representation of the typical mobility patterns of the system users. A standard error of 5% with a probability of 95% is acceptable. • **Target group**: Users/passengers/commuters/deliveries • **Area of measurement:** System
References:	ECCENTRIC 5

4 Economy

4.1 Benefits

Key indicator no. 19	**Average operating revenue**
Category:	Economy
Sub-category:	Benefits
Impact aspect:	Operating revenues
Context and relevance	This indicator focuses on the changes in operating revenues as a result of CIVITAS measure(s) and, therefore, on the economic perspective of the intended measure packages. In addition to social and environmental perspectives, the inclusion of the economic perspective of new measure(s) is important for a complete sustainable development assessment. Many CIVITAS measures will have direct or indirect impacts on operating revenues, including demand change (e.g. more PT users due to improved service), changed cost (e.g. using clean vehicles or using alternative fuels), new services (carpooling and car sharing). This indicator should be applied to all transport services including passenger and freight transport. For a complete picture of the economic performance of new measures, this core indicator needs to be considered in conjunction with core indicators 2A “Capital Costs” and 2B “Average operating costs”.
Definition	**Average operating revenue** is defined as the ratio of total income generated from fares and tickets divided by the total passenger-km or vehicle-km completed by the service in a given time period (for example day, week, month or year). So: A = B / C where: A = Average operating revenue for the service (€/pkm or €/vkm) B = Total operating revenue for the service (€) C = Total passenger-kilometres (pkm), or total vehicle-kilometres (vkm) for the service **Unit**: €/pkm or €/vkm
Methods of measurement	• **Method of data collection**: The data needed can be provided by service operators or derived from other data available. Services with and without CIVITAS measures (e.g. buses using alternative fuels against those using traditional fuels such as petrol/diesel) should be counted separately to show the impacts of the measures. The results from cases without CIVITAS measures can be used for baseline or business-as-usual assessments. • **Frequency:** Once a year until the end of the project • **Accuracy**: The data about operating revenues and vkm or pkm of each type of vehicle should be kept as complete as possible. • **Observed group**: transport services operators • **Area of measurement:** demonstration area and/or city
References:	WIKI 1 DESTINATIONS 1

Key indicator no. 20	**Jobs/sales impact**
Category:	Economy
Sub-category:	Benefits
Impact aspect:	Economic development
Context and relevance	Accessibility and mobility patterns have an impact on retail sales and other economic activities on the area of influence of measures. The sustainable approach implies to have a balance between economic performance, society, and the environment. CIVITAS measures therefore should increase or at least maintain in current levels the economic performance of those businesses which rely on the transport system to attract and provide services to their communities.
Definition	Average monthly sales and yearly number of employees of businesses 100 meters around the transportation node (for public transport or station-based systems), along the intervened street (for roads/bike lanes/sidewalks, parking, etc.), or covered area.
Methods of measurement	• **Method of data collection**: Surveys to retail and service businesses within the buffer area • **Frequency:** • **Accuracy**: For data collected through surveys, the sample chosen should be sufficient to give a good representation of the typical businesses in the areas targeted. A standard error of 5% with a probability of 95% is acceptable. The risk in this case is to have distorsioned figures due to biased answers. Official databases might be used as well. In this case availability, confidentiality and detail of reports might be an issue. • **Observed group**: Businesses • **Area of measurement:** Buffer, road section or demonstration area
References:	DOT, The Economic Benefits of Sustainable Streets ECCENTRIC 16

4.2 Costs

Key indicator no. 21	**Capital investment costs**
Category:	Economy
Sub-category:	Costs
Impact aspect:	Costs
Context and relevance	This indicator focuses on the capital costs as a result of CIVITAS measure(s) and, therefore, on the economic perspective of the intended measure packages. In this indicator two cost categories are distinguished: capital investment costs in infrastructure, equipment, vehicles and preparation and design costs. In addition to social and environmental perspectives, the inclusion of the economic perspective of new measure(s) is important for a complete sustainable development assessment. Most CIVITAS measures will have preparation and design costs and at least some capital investment costs in purchasing infrastructure and equipment necessary for the measure. This indicator should be applied to all transport services including passenger and freight transport. For a complete picture of the economic performance of new measures, this core indicator needs to be considered in conjunction with core indicator 1 “Average operating revenues” and indicator 2B “Average Operating Costs”
Definition	**Capital investment cost** is defined as the total capital costs for purchase of infrastructure, equipment and vehicles. It can also include the total costs expended in setting up the measure and cover a period from the initiative of the measure preparation until the start of the measure implementation. **Unit**: €
Methods of measurement	• **Method of data collection**: The data needed should be provided by service providers or derived from other data available. • **Frequency:** Once at the start of the project ***/*** revised following implementation • **Accuracy**: The data should be as complete and accurate as possible. Where such information is particularly sensitive a cost range may be acceptable. Comments on the elements of the costs which are specific to an initial trial rather than a more general application should be made. • **Observed group**: transport services providers • **Area of measurement:** demonstration area and/or city
References:	/

Key indicator no. 22	**Average Operating costs**
Category:	Economy
Sub-category:	Costs
Impact aspect:	Operating costs
Context and relevance	This indicator focuses on the changes in operating costs as a result of CIVITAS measure(s) and, therefore, on the economic perspective of the intended measure packages. In addition to social and environmental perspectives, the inclusion of the economic perspective of new measure(s) is important for a complete sustainable development assessment. Many CIVITAS measures will have direct and indirect impacts on operating costs, including demand change (e.g. more PT users due to improved service), changed cost (e.g. using clean vehicles or using alternative fuels), new services (car pooling and car sharing). This indicator should be applied to all transport services including passenger and freight transport. For a complete picture of the economic performance of new measures, this core indicator needs to be considered in conjunction with core indicator 1 “Average operating revenues” and indicator 2A “Capital costs”.
Definition	**Average operating cost** is for measures with a direct relation to transport defined as the ratio of total operating costs incurred by a service divided by the total passenger-km, vehicle-km or tonne-km completed by the service in a given time period (for example day, week, month or year). Operating costs include, for example, the personnel costs, fuel, electricity and maintenance costs for the vehicle(s) involved. The maintenance costs should include not only the regular weekly/annual maintenance, but also longer term maintenance, such as engine replacement. They do not include the initial investment costs in vehicles and infrastructure, etc, which should be identified separately. So: A = B / C, where: A = Average operating cost for the service (€/pkm or €/vkm), B = Total operating cost for the service (€), C = Total passenger-kilometres (pkm), or total vehicle kilometres (vkm), or total tonne kilometres (tkm) for the service **Unit**: €/pkm or €/vkm or €/tkm There is also a second category of average operating costs for measures not directly related to transport (e.g. mobility information campaign, mobility service center). For this category the operating costs are for example, the personnel costs and maintenance costs. These costs should be divided per time period to calculate the average value. **Unit**: €/time period
Methods of measurement	• **Method of data collection**: The data needed can be provided by service operators or derived from other data available. Services with and without CIVITAS measures (e.g. buses using alternative fuels against buses using traditional fuels, such as petrol/diesel) should be counted separately to show the impacts of the measures. The results from cases without CIVITAS measures can be used for baseline or business-as-usual assessments. • **Frequency:** Once a year until the end of the project • **Accuracy**: The data about the operating costs and vkm or pkm of each type of vehicle should be kept as complete as possible. • **Target group**: transport services operators • **Area of measurement:** demonstration area and/or city
References:	/

5 Energy

5.1 Fuel consumption

Key indicator No. 23	**Vehicle fuel efficiency**
Category:	Energy
Sub-category:	Energy consumption
Impact aspect:	Fuel consumption
Context and relevance	Worldwide, the transport sector consumes more than 60 per cent of oil products, which constitute about 98 per cent of transport energy use (OECD, *Working Group on the State of the Environment*, Oct. 1999). The structure of energy consumption by transport is directly related to the composition of pollutant emissions. Furthermore, growth in road transport was the main cause of the increase in energy use up to 1997 (*EEA*, 2001). The increasing use of heavier, more powerful cars and trucks, together with low occupancy rates and load factors, have offset improvements in fuel economy – mostly related to engine technology. Higher vehicle fuel efficiency means less fuel consumption and lower emissions (at the same level of traffic demand). Many CIVITAS measures will have impacts on fuel efficiency including clean vehicles (freight and passenger transport), alternative fuels, car pooling and increased PT use (resulting in higher PT occupancy, reduced private car use and reduced congestion).This is one of the main indicators used to measure the environment impacts of CIVITAS measures.
Definition	**Vehicle fuel efficiency** is defined as the energy consumption per unit of transport activity. This should be derived by vehicle type and fuel type. In CIVITAS, the indicator is used to compare vehicle fuel efficiency with and without the measures. Vehicles: car, bus, lorry, tram, metro. For road vehicles, the distribution of vehicles should ideally be based on COPERT categories. Fuels: petrol, diesel, liquefied petroleum gas, compressed natural gas, alcohol mixtures, hydrogen, bio-fuels, electricity and others. So: A = B / C where: A = Average vehicle energy efficiency (MJ/vkm) B = Total energy consumed for the vehicle(s) (by type and fuel) considered, unit: (MJ) C = Total amount of vehicle-kilometres completed by the vehicle(s) (by type and fuel) considered, unit: (vkm) **Unit**: MJ/vkm
Methods of measurement	• **Method of data collection**: - For commercial vehicles (PT and freight fleet), fuel consumption by each type of vehicle and the corresponding vehicle-km and passenger-km can be collected from service operators, by recording fuel used and passenger-km or vehicle-km completed during the given periods. Vehicles using both traditional fuels and alternative fuels should be included. The results from former cases can be used for baseline or business-as-usual assessments. - For passenger cars, the data may be obtained from local or national sources such as transport statistics report or others. Information from other relevant sources are also useful for the measurement including vehicles manufacturers, fuel producers and distributors, national automobile Clubs, specialised magazines, national (or regional) environment protection agencies, goods transport associations, other

Key indicator No. 23	Vehicle fuel efficiency
	transport associations. • **Frequency:** Data should be collected on an annual basis. Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), and once a year during the project where appropriate. • **Accuracy**: For commercial vehicles, the records of fuel consumption and vkm or pkm associated with a group of vehicles (by vehicle type and power source) should be kept as complete as possible. Additional efforts are required to estimate energy equivalents of the different sources of power used (by type of fuel, electric power required including electric energy losses, etc.) • **Observed group**: commercial vehicles (PT and freight transport) • **Area of measurement:** demonstration area and/or city
References:	CIVITAS WIKI no.3 DESTINATIONS 3 ECCENTRIC 26 - Methodology Report of COPERT III Computer to calculate emissions from road transport (http://vergina.eng.auth.gr/mech/lat/copert/copert.htm) - Sustainable Seattle, 1998. Indicators of Sustainable Community: www.sustainableseattle.org - UN Department for Policy Coordination and Sustainable Development (DPCSD), 1997. Indicators of Sustainable Development, Framework and Methodologies, 1996-1997. Gopher: //gopher.un.org/00/esc/cn17/1996-97/indicators/SOCIAL.IND%09%09%2B - 'Cities for Climate Protection': http://www.iclei.org/transit.htm

Intermediate indicator	**Fuel mix**
Category:	Energy
Sub-category:	Energy consumption
Impact aspect:	Fuel consumption
Context and relevance	Despite efforts at the EU level to promote alternative (electricity, natural gas, fuel cells) and renewable energy sources (bio-fuels) for transport, these still have a low penetration. The consumption of all petrol sold in the EU, expressed in oil equivalents, increased by 2.5 % per year between 1985 and 1998. The consumption of LPG and natural gas for transport increased less rapidly (about 1.8 % and 2.0 % per year, respectively, between 1985 and 1998). The share of LPG and natural gas in total energy consumption by road transport has thus decreased (from 1.5 % in 1985 to 1.4 % in 1998). However, this share was lowest in 1992 (1.2 %) and has since increased (except for a minor decline in 1996). Although alternative fuels still account for only a small fraction of total fuels sold, their usage is increasing (EEA, *Uptake of Cleaner Fuels*, 2001). Many CIVITAS measures will have impacts on fuel use including clean vehicles (freight and passenger transport), alternative fuels, car pooling and increased PT use (resulting in higher PT occupancy, reduced private car use and reduced congestion).
Definition	**Fuel mix** is the percentage of the market share of transport fuel for each type of fuel used in a given period. Fuel mix can be measured at the transport operator level or at a wider level (e.g. city). Fuels: petrol, diesel, liquefied petroleum gas, compressed natural gas, alcohol mixtures, hydrogen, bio-fuels, electricity and others. So: A = B / C where: A = Fuel mix, or percentage for the fuel considered (%) B = total energy consumption for the fuel considered (MJ) C = Total energy consumption for all transport vehicles (MJ) **Unit**: %
Methods of measurement	• **Method of data collection**: Data about fuel mix can be collected at service level or a city level. - For assessment at a service level (PT and freight fleet), the service operators are required to record all information about each type of fuel consumed on an annual basis. By comparing the results with and without CIVITAS measures, the indicator can be used to measure the impacts of CIVITAS measures on alternative fuel use. - For assessment at a city level, the total annual vkm of all vehicles should be split by vehicle type and fuel type. For each fuel type, the total amount of vkm driven multiplied by the corresponding vehicle fuel efficiency factor will provide the market share for the fuel type considered. Information about fuel consumption and transport can be obtained from local or national source such as transport statistics reports or others. Information from other relevant sources is also useful such as vehicles manufacturers, fuel producers and distributors, national automobile clubs, specialised magazines, national (or regional) environment protection agencies, goods transport associations, other transport associations. • **Frequency:** Data should be collected on an annual basis. Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), and also, if possible, once a year during the project as appropriate.

Intermediate indicator	Fuel mix
	• **Accuracy**: For assessment at a service level, the records of fuel consumptions of all vehicles (by vehicle type and fuel) should be kept as complete as possible. • **Observed group**: transport operators or city • **Area of measurement:** demonstration area and/or city
References:	Directive 98/70/EC1 relating to fuel quality sets quantitative targets for 1 January 2000, including (1) phase out leaded petrol; (2) reduction of the sulphur content in petrol and diesel to a maximum of 150 and 50 mg/kg, respectively; (3) reduction of the benzene content of petrol to a maximum of 1 %. With Directive 98/70/EC, an almost complete phase-out of leaded fuel should be achieved in 2000. Due to derogations, however, a complete phase-out will not be achieved before 2005. CIVITAS WIKI 4 DESTINATIONS 4

6 Environment

6.1 Emissions

Key Indicator No. 24	**CO_2 emissions**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact Aspect:	Emissions
Context and relevance	Carbon dioxide is the most significant greenhouse gas, contributing about 80% of total EU greenhouse gas emissions. In Europe, carbon dioxide emissions result primarily from the combustion of fossil fuels in energy industries (32% in 1998), transport (24%) and industry (22%). Other sources, including domestic and commercial, contributed 20%. Emissions from transport increased by 15% between 1990 and 1998, while emissions from other sectors fell or remained almost stable. Carbon dioxide emission reductions from the use of energy could be achieved by fuel conversion, increased efficiency, reducing energy demand and increased use of non-fossil energy sources. The upward trend in CO_2 emissions from transport is due mainly to growing traffic volumes, as there has been very little change in average energy use per vehicle-km. Recent projections (EC, 2000) suggest that existing policies and measures would at best limit the increase of total EU carbon dioxide emissions to 3% by 2010, from 1990 levels (based on projections by Member States that have measures in place). Initial results from the (draft) study on the economic evaluation of sectoral emission reduction objectives for climate change (EC, 2000) suggest that the increase of total EU emissions will be 4%. According to the EC, the largest increase in CO_2 emissions would be in the transport sector: 25% from 1990 levels assuming implementation of the EU strategy to reduce emissions from cars ('ACEA agreement') or 35% without the ACEA agreement. Many CIVITAS measures will have impacts on CO_2 emissions directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction measures). This indicator can be used to assess the impacts of such measures on CO_2 reduction.
Definition	**CO_2 emissions** is defined as the average CO_2 emissions per vehicle-km by vehicle and fuel types or by city resident/system user **Unit**: g/vkm or tonnes of CO2 Vehicles: car, bus, lorry, tram, metro. For road vehicles, vehicle split should be based on the COPERT category. Fuels: petrol, diesel, electricity, liquefied petroleum gas (LPG), natural gas, alcohol mixtures, hydrogen and bio-fuels
Measurement	• **Method**: CO_2 emissions can be measured by many methods including field trials or modelling. The COPERT software can be used to estimate emissions of all regulated air pollutants (see http://vergina.eng.auth.gr/mech/lat/copert/copert.htm) (CO, NOx, VOC, PM) produced by different vehicle categories (passenger cars, light duty vehicles, heavy duty vehicles, mopeds and motorcycles) as well as CO_2 emissions on the basis of fuel consumption. Other software may also be appropriate. This data can be also derived from operational data, or surveys for private transportation. It is required data on trip distances but also the details of vehicles used for motorized trips, including the bus fleet in the city, electric vehicles and the fuel mix, including source and equivalent emissions of electric power. • **Frequency:** Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), or once a year during the project where appropriate. • **Accuracy**: as good as can be obtained within limits of models/resources available

Key Indicator No. 24	**CO_2 emissions**
	• **Observed group**: vehicles in demonstration area • **Area of measurement:** city and/or demonstration area
References:	The limits for CO_2, CH_4 and N_2O emissions at national levels are regulated by the UN Framework Convention on Climate Change (UNFCCC) Kyoto Protocol. Countries that ratify the Protocol agree to reduce aggregate anthropogenic CO_2 equivalent emissions of greenhouse gases by at least 5% below 1990 levels in the period 2008-2012. CIVITAS WIKI no.8 DESTINATIONS 11 ECCENTRIC 23 CIVITAS CAPITAL

Additional indicator	**CO emissions**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact aspect:	Emissions
Context and relevance	Emissions from the transport sector represent a high proportion of overall man-made emissions in industrialized countries. Most of these emissions are directly related to the consumption of energy by transport activities world-wide, the transport sector consumes more than 60% of oil products, which constitute about 98% of transport energy use. These emissions are further influenced by a number of factors, including type and size of engine, type and quality of fuel used, average fuel efficiency, age of vehicle, etc. (*Working Group on the State of the Environment*, OECD, 1999). Specific CO emissions (per pkm) from passenger cars fell significantly (73% in 1998 compared to 1981). Emissions of CO from public transport remained substantially unchanged in the same period. Specific emissions of CO from public transport could fall significantly by increasing occupancy rates. Without such improvements public transport has relatively high specific emissions per pkm compared to passenger cars. Many of the measures in CIVITAS projects aim either directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction) at reducing the emissions and the level of air pollutants. Moreover, as far as PT is concerned, one of the main CIVITAS objectives is to increase PT patronage (to the detriment of the "car mode") thus increasing the occupancy rates of PT vehicles. In such a context, the success or failure of the measures must be assessed by taking into account emission indicators. Yet some of the indicators were excluded either because their determinants are going to be gradually reduced (or substituted) from fuels (e.g. sulphur, benzene) – making it difficult to assess whether the improvements are to be attributed to CIVITAS - or because their impact on health has not been fully demonstrated yet (VOC).
Definition	**CO emissions** are defined as the annual average CO emission per vehicle-km by vehicle and fuel type, or by city resident/system user **Unit**: g/vkm or tonnes of CO Vehicles: car, bus, lorry, tram, metro. For road vehicles, vehicle split should be based on the COPERT category. Fuels: petrol, diesel, electricity, liquefied petroleum gas (LPG), natural gas, alcohol mixtures, hydrogen and bio-fuels.
Measurement	• **Method**: CO emissions can be measured through many methods including field trials or modelling. The COPERT software (see http://vergina.eng.auth.gr/mech/lat/copert/copert.htm) emissions of all regulated air pollutants (CO, NOx, VOC, PM) produced by different vehicle categories (passenger cars, light duty vehicles, heavy duty vehicles, mopeds and motorcycles) as well as CO_2 emissions on the basis of fuel consumption. • **Frequency:** Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), or once a year during the project where appropriate. • **Accuracy**: as good as can be obtained within limits of models/resources available • **Target group**: vehicles in demonstration area • **Area of measurement**: city and/or demonstration area
References:	Kyoto Protocol targets for emissions on a national level (no targets set on a city level). CIVITAS WIKI no.9 DESTINATIONS 12

Additional indicator	**NO_x emissions**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact aspect:	Emissions
Context and relevance	After increasing slightly in the early 1980s, specific NO_x emissions (per pkm) from passenger cars fell significantly (56% compared to 1981), mainly as a result of the introduction of catalytic converters. For heavy and light duty trucks specific NO_x emissions also decreased markedly by 29% between 1981 and 1998. Specific NO_x emissions from buses were stable during the same period, mainly because of decreases in occupancy rates. Specific NO_x emissions are projected to continue to decline. Many of the measures in the CIVITAS projects aim either directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction) at reducing the emissions and the level of air pollutants. In such a context, the success or failure of the measures must be assessed by taking into account emission indicators. Yet some of the indicators were excluded either because their determinants are going to be gradually reduced (or substituted) from fuels (e.g. sulphur, benzene) – making it difficult to assess whether the improvements are to be attributed to CIVITAS - or because their impact on health has not been fully demonstrated yet (VOC).
Definition	**NO_x emission** is defined as the annual average NO_x emission per vehicle-km by vehicle and fuel type or by city residents / system users. **Unit**: g/vkm or Tonnes of Nox Vehicles: car, bus, lorry, tram, metro. For road vehicles, vehicle distribution should be based on COPERT categories. Fuels: petrol, diesel, electricity, liquefied petroleum gas (LPG), natural gas, alcohol mixtures, hydrogen and bio-fuels
Measurement	• **Method**: NO_x emissions can be measured through many methods including field trials or modelling. The COPERT software (see http://vergina.eng.auth.gr/mech/lat/copert/copert.htm) can be used to estimate emissions of all regulated air pollutants (CO, NO_x, VOC, PM) produced by different vehicle categories (passenger cars, light duty vehicles, heavy duty vehicles, mopeds and motorcycles) as well as CO_2 emissions on the basis of fuel consumption. This data can be also derived from operational data, or surveys for private transportation. It is required data on trip distances but also the details of vehicles used for motorized trips, including the bus fleet in the city, electric vehicles and the fuel mix, including source and equivalent emissions of electric power. • **Frequency:** Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), or once a year during the project where appropriate. • **Accuracy**: as good as can be obtained within limits of models/resources available • **Target group**: vehicles in demonstration area • **Area of measurement:** city and/or demonstration area
References:	The Directives on emission standards for new passenger cars and trucks should result in significant reductions of specific NO_x emissions from 2000 up to 2010: 66% for cars and 55% for trucks. Kyoto Protocol targets for emissions on a national level (no targets set on a city level). CIVITAS WIKI no.10; DESTINATIONS 13; ECCENTRIC 24; CIVITAS CAPITAL

Key indicator No. 25	**Small particulate emission**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact aspect:	Emissions
Context and relevance	The specific emission of particulate matter (PM) from passenger cars increased up to 1985, but has since been declining, mainly as a result of improved technology and the introduction of limit values for PM emissions from diesel engines by Directive 88/436/EEC. For trucks the specific emission of PM is also decreasing, but at a slower rate as compared with passenger cars. Benefits from the introduction of the 'Clean Lorry Directive' (91/542/EC2), reducing limit values for emissions in two phases, are becoming visible and clearly show the delay in effect. This is due mainly because new trucks replace older models relatively slowly. Again, for buses, occupancy rates seem to be an important factor in emission reduction, since the specific PM emission of buses has not improved in recent decades, while the same emission standards apply to buses and to trucks. Many of the measures included in the CIVITAS projects aim either directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction) at reducing the emission and level of air pollutants. It is obvious that in such a context, the success or the failure of the measures must be assessed by taking into account emission indicators. Yet some of them were excluded either because their determinants are going to be gradually reduced (or substituted) from fuels (e.g. sulphur, benzene) – making it difficult to assess whether the improvements are to be attributed to CIVITAS - or
Definition	**Small particulate emission** is defined as the annual average particulate matter (PM10 and PM2.5) emission, or by city residents / system users. **Unit**: g/vkm or tonnes of PM Vehicles: car, bus, lorry, tram, metro. For road vehicles, vehicle distribution should be based on the COPERT categories. Fuels: petrol, diesel, electricity, liquefied petroleum gas (LPG), natural gas, alcohol mixtures, hydrogen and bio-fuels
Measurement	**Method**: Small particulate emissions can be measured through many methods including field trials or modelling. The COPERT software can be used (see http://vergina.eng.auth.gr/mech/lat/copert/copert.htm) to estimate emissions of all regulated air pollutants (CO, NOx, VOC, PM) produced by different vehicle categories (passenger cars, light duty vehicles, heavy duty vehicles, mopeds and motorcycles) as well as CO_2 emissions on the basis of fuel consumption. This data can be also derived from operational data, or surveys for private transportation. It is required data on trip distances but also the details of vehicles used for motorized trips, including the bus fleet in the city, electric vehicles and the fuel mix, including source and equivalent emissions of electric power. **Frequency:** Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), or once a year during the project where appropriate.
References:	Kyoto Protocol targets for emissions on a national level (no targets set on a city level). CIVITAS WIKI no.11 DESTINATIONS 14 ECCENTRIC 25 CIVITAS CAPITAL

6.2 Air quality

Additional indicator	**CO_2 level**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact aspect:	Air quality
Context and relevance	Directly and indirectly, fossil fuels provide the energy for almost all transport activities. Transport is the fastest growing energy consumer in the EU. Carbon dioxide emissions (CO_2) are also a surrogate for the use of fossil fuels (EEA). Transportation CO_2 emissions account for more than 24% in total 2014 emissions in European Union. (EU) Many of the measures included in the CIVITAS projects aim either directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction measures) at reducing the emission and the level of air pollutants. In such a context, the success or the failure of the measures must be assessed by taking into account air quality indicators. Yet some of the indicators were excluded either because their determinants are going to be gradually reduced (or substituted) from fuels (e.g. sulphur, benzene) – making it difficult to assess whether the improvements are to be attributed to CIVITAS - or because their impact on health has not yet been fully demonstrated.
Definition	**CO_2 level** is defined as the average hourly (or peak/off-peak) CO concentration over a full year. **Unit**: ppm or g/m^3
Methods of measurement	**Method of data collection**: For data collection through monitoring stations, the measurement points should be located where CIVITAS measures should have an impact on the environment. Other approaches such as simulation can also be used. For local models used, a full description of the assumptions would be needed. In addition, the simulation models used should be validated to increase the credibility of the results. **Frequency:** At monitoring stations, average hourly concentration levels need to be collected daily over a year. Calculation of the average concentration levels should be made once a year until the end of the project **Accuracy**: Results from monitoring stations will be affected by many factors such as sites and weather conditions etc. Therefore, care must be taken in planning such measurements. In order to obtain more reliable and accurate data, cities which already use a traffic and dispersion model should apply them. **Target group**: population of city or demonstration area **Area of measurement:** city and/or demonstration area
References:	EEA (2001) p.14 EU Energy in Figures European Commission Statistical Pocketbook 2016 p.164 CIVITAS WIKI no.7 DESTINATIONS 8 (TUC)

Additional indicator	**CO level**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact Aspect :	Air quality
Context and relevance	CO is produced by the incomplete burning of carbon in fuels. High concentrations of CO occur along roadsides in heavy traffic, particularly at major intersections. The health effects of CO vary depending on the length and intensity of exposure and the health of the individual. Effects of CO include dizziness, headache, fatigue, visual impairment, reduced work capacity, reduced manual dexterity, and poor learning ability. Although CO is now not seen as a problem at all in many western European cities, this may not be the case for some eastern European cities. Many of the measures included in the CIVITAS projects aim either directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction measures) at reducing the emission and the level of air pollutants. In such a context, the success or the failure of the measures must be assessed by taking into account air quality indicators. Yet some of the indicators were excluded either because their determinants are going to be gradually reduced (or substituted) from fuels (e.g. sulphur, benzene) – making it difficult to assess whether the improvements are to be attributed to CIVITAS - or because their impact on health has not yet been fully demonstrated.
Definition	**CO level** is defined as the average hourly (or peak/off-peak) CO concentration over a full year. **Unit**: ppm or g/m^3
Methods of measurement	• **Method of data collection**: - For data collection through monitoring stations, the measurement points should be located where CIVITAS measures should have an impact on the environment. - Other approaches such as simulation can also be used. For local models used, a full description of the assumptions would be needed. In addition, the simulation models used should be validated to increase the credibility of the results. • **Frequency:** At monitoring stations, average hourly concentration levels need to be collected daily over a year. Calculation of the average concentration levels should be made once a year until the end of the project • **Accuracy**: Results from monitoring stations will be affected by many factors such as sites and weather conditions etc. Therefore, care must be taken in planning such measurements. In order to obtain more reliable and accurate data, cities which already use a traffic and dispersion model should apply them. • **Target group**: : population of city or demonstration area • **Area of measurement:** city and/or demonstration area
References:	Several air quality limit values for ambient concentrations have been set to protect human health. Current EU legislation (the EC Framework Directive on Ambient Air Quality and Management (CEC, 1996) and related daughter Directives) is based on WHO-recommended threshold values. For CO the objective to be met before 1-1-2005 is 10 mg/m^3 (max daily 8h concentration). WHO guidelines for Europe, 1996 set the target values of 30 mg/m3 (1 hour average) and 10 mg/m^3 (8 hours). CIVITAS WIKI no.5 DESTINATIONS 6

Additional indicator:	**NO_x level**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact aspect:	Air quality
Context and relevance	Exposure to air pollution is associated with adverse health effects, most acute in children, asthmatics, and the elderly (WHO/EEA, 1997), and can damage vegetation (foliar injuries and reductions in yield and seed production) and materials (notably, the cultural heritage). Within the transport sector, road traffic is the most important contributor to urban air pollution. National and EU regulations aimed at automobile emission reductions (such as the introduction of catalytic converters or unleaded petrol) have resulted in considerably lower emissions per vehicle, but the continuous expansion of the vehicle fleet is partly offsetting these improvements. Many of the measures included in the CIVITAS projects aim either directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction measures) at reducing the emissions and the level of air pollutants. In such a context, the success or the failure of the measures must be assessed by taking into account air quality indicators. Yet, some of them were excluded either because their determinants are going to be gradually reduced (or substituted) from fuels (e.g.: sulphur, benzene) – making it difficult to assess whether the improvements are to be attributed to CIVITAS - or because their impact on health has not yet been fully demonstrated. NOx levels are important to assess air quality both for their own toxicity and for their contribution, under certain conditions, to particulate level (which would not be otherwise taken into account).
Definition	**NO_x level** is defined as the average hourly (or peak/off-peak) NOx concentration over a full year. **Unit**: ppm or g/m^3
Methods of measurement	• **Method of data collection**: - For data collection through monitoring stations, the measurement points should be located where CIVITAS measures should have an impact on the environment. - Other approaches such as simulation can also be used. For local models used, a full description of the assumptions would be needed. In addition, the simulation models used should be validated to increase the credibility of the results. • **Frequency:** At monitoring stations, average hourly concentration levels need to be collected daily over a year. Calculation of the average concentration levels should be made once a year until the end of the project • **Accuracy**: Results from monitoring stations will be affected by many factors such as sites and weather conditions etc. Therefore, care must be taken in planning such measurements. In order to obtain more reliable and accurate data, cities which already use a traffic and dispersion model should apply them. • **Target group**: : population of city or demonstration area • **Area of measurement:** city and/or demonstration area
References:	Several air quality limit values for ambient concentrations have been set to protect human health. Current EU legislation (the EC Framework Directive on Ambient Air Quality and Management (CEC, 1996) and related daughter Directives) is based on WHO-recommended threshold values. For NO_2 the objective to be met before 1-1-2005 is 200 $\mu g/m^3$ (8 hour average) and 40 $\mu g/m^3$ (year). WHO guidelines for Europe (1996) set the target values of 200 $\mu g/m^3$ (1 hour average). CIVITAS WIKI no.6; DESTINATIONS 7; CAPITAL no.27

Key indicator No. 26	**Small particulate levels**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact aspect:	Air quality
Context and relevance	Exposure to air pollution is associated with adverse health effects, most acute in children, asthmatics, and the elderly (WHO/EEA, 1997), and can damage vegetation (foliar injuries and reductions in yield and seed production) and materials (notably, the cultural heritage). Within the transport sector, road traffic is the most important contributor to urban air pollution. National and EU regulations aimed at automobile emission reductions (such as the introduction of catalytic converters or unleaded petrol) have resulted in considerably lower emissions per vehicle, but the continuous expansion of the vehicle fleet is partly offsetting these improvements. Particulate matter irritates the membranes of the respiratory system, causing increased respiratory symptoms and disease, decreased lung function, alteration of the body's defence system, and premature mortality. In addition to health problems, airborne particles cause soiling and damage to materials and reduce visibility. Many of the measures included in the CIVITAS projects aim either directly (through incentives to promote the use of cleaner fuels or vehicles or more environmental friendly behaviours) or indirectly (e.g. congestion reduction and access restriction) at reducing emissions and levels of air pollutants. In such a context, the success or the failure of the measures must be assessed taking into account air quality indicators. Particulate matter can be emitted directly by a source or formed by the transformation of gaseous emissions such as SO_x, NO_x, and volatile organic compounds (VOC): this is why a direct measurement (or estimate) is necessary.
Definition	**Particulate level** is defined as the average hourly (or peak/off-peak) PM_{10} and $PM_{2.5}$ (if possible) concentration over a full year. **Unit**: ppm or g/m^3
Methods of measurement	• **Method of data collection**: - For data collection through monitoring stations, the measurement points should be located where CIVITAS measures should have an impact on the environment. - Other approaches such as simulation can also be used. For local models used, a full description of the assumptions would be needed. In addition, the simulation models used should be validated to increase the credibility of the results. • **Frequency:** At monitoring stations, average hourly concentration levels need to be collected daily over a year. Calculation of the average concentration levels should be made once a year until the end of the project • **Accuracy**: Results from monitoring stations will be affected by many factors such as sites and weather conditions etc. Therefore, care must be taken in planning such measurements. In order to obtain more reliable and accurate data, cities which already use a traffic and dispersion model should apply them. • **Target group**: population of city or demonstration area • **Area of measurement:** city and/or demonstration area
References:	Several air quality limit values for ambient concentrations have been set to protect human health. Current EU legislation (the EC Framework Directive on Ambient Air Quality and Management (CEC, 1996) and related Directives) is based on WHO-recommended threshold values. For PM_{10} the target to be met before 1-1-2005 is an annual mean of $40\mu g/m^3$ ($50\mu g/m^3$ on 24h av.). Before 1-1-2010 the target threshold is $20\mu g/m^3$ on an annual mean. CIVITAS WIKI no.7 DESTINATIONS 8

Additional indicator	**Level of Hydrocarbons**
Category:	Environment
Sub-category:	Pollution/Nuisance
Impact aspect:	Air quality
Context and relevance	"The transport sector is a major source of air pollution, and the dominant source in urban areas. Exposure to air pollution can cause adverse health effects, most acute in children, asthmatics, and the elderly, and can damage vegetation and materials (notably, the cultural heritage). Within the transport sector, road traffic is the most important contributor to urban air pollution. While national and EU regulations aimed at automobile emission reductions have resulted in considerably lower emissions per vehicle, the continuous expansion of the vehicle fleet is partly offsetting these improvements." (EEA) Emissions of hydrocarbons occur when there is combustion of carbon compounds. Emissions are the result of incomplete combustion, spillage or evaporative emissions. Hydrocarbons contributes to ozone formation, has direct toxic effects on humans and animals, including carcinogenesis and neurotoxicity, and is harmful to plants. (CIVITAS TELLUS). Level of Hydrocarbons is an optional indicator.
Definition	**Hydrocarbons level** is defined as the average hourly (or peak/off-peak) hydrocarbon concentration over a full year. **Unit**: ppm or g/m^3
Measurement	**Method of data collection**: For data collection through monitoring stations, the measurement points should be located where CIVITAS measures should have an impact on the environment. Other approaches such as simulation can also be used. For local models used, a full description of the assumptions would be needed. In addition, the simulation models used should be validated to increase the credibility of the results. **Frequency:** At monitoring stations, average hourly concentration levels need to be collected daily over a year. Calculation of the average concentration levels should be made once a year until the end of the project **Accuracy**: Results from monitoring stations will be affected by many factors such as sites and weather conditions etc. Therefore, care must be taken in planning such measurements. In order to obtain more reliable and accurate data, cities which already use a traffic and dispersion model should apply them. **Target group**: population of city or demonstration area **Area of measurement:** city and/or demonstration area
References:	EEA (2000), p. 27. Civitas TELLUS Indicator Fact Sheets BERLIN DESTINATIONS 9 (TUC)

6.3 Noise

Key indicator No. 27	**Noise perception**
Category:	Environment
Sub-category:	Nuisance
Impact aspect:	Noise
Context and relevance	Noise affects people physiologically and psychologically: noise levels above 40dB L_{Aeq} can influence well-being, with most people being moderately annoyed at 50dB L_{Aeq} and seriously annoyed at 55dB L_{Aeq}. Levels above 65dB L_{Aeq} are detrimental to health (WHO, 2000). LAeq is equivalent sound pressure level in dB(A). Overall, the external costs of road and rail traffic noise have been estimated at some 0.4% of GDP (ECMT, 1998). About 120 million people in the EU (more than 30% of the total population) are exposed to road traffic noise levels above 55 L_{dn} dB. More than 50 million people are exposed to noise levels above 65 L_{dn} dB. In large urban agglomerations, the effect of noise is further aggravated by high concentrations of people living in close proximity It is estimated that 10% of the EU population are exposed to rail noise above 55 L_{Aeq} dB. The data on noise nuisance by aircraft are the most uncertain, but studies indicate that 10% of the total EU population may be highly annoyed by air transport noise. The measurement of noise level can be made only for very small areas and it is unlikely to be properly modelled. Perception (scales of values, total, day/night) is much more suitable to point out contingent changes in the level of noise. Many of CIVITAS measures would have impacts on noise levels (e.g. access control, road pricing, new concepts for goods distribution). This indicator can be used to measure the impacts of such measures on reducing noise levels.
Definition	**Noise perception** is defined as the percentage of people troubled by transport noise. Environmental noise is unwanted or harmful outdoor sound created by human activities, including noise emitted from road and rail traffic. This indicator is used to measure environmental noise level based on people's perception. **Unit**: %
Measurement	• **Method**: Although actual noise could be measured in some circumstances, it is people's perception that really counts. Therefore, a questionnaire survey is recommended for noise level assessment. Noise levels need to be assessed for both day time and night time conditions. In the questionnaire, the environmental noise can be categorised into levels of satisfaction, such as the following five levels: Very satisfied, Fairly satisfied, Neither satisfied or dissatisfied, Fairly dissatisfied, Very dissatisfied, Don't know • **Frequency:** Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), or once a year during the project where appropriate. • **Accuracy**: The samples chosen for the survey should be sufficient in size and distribution (e.g. age, gender, disabled people) to give a good representation of people's perception of the noise level in the areas investigated. • **Observed group**: inhabitants and visitors (split by age, where possible) • **Area of measurement:** demonstration area and/or city
References:	Noise impact in Prague: http://www.ceroi.net/reports/prague/issues/noise/impact.htm ; Noise state in Prague: http://www.ceroi.net/reports/prague/issues/noise/state.htm ; Noise impact in Moscow: http://www.md.mos.ru/eng/air/shum.htm CIVITAS WIKI no.12; DESTINATIONS 15

Key indicator No. 28	**Noise level**
Category:	Environment
Sub-category:	Nuisance
Impact aspect:	Noise
Context and relevance	Noise affects people physiologically and psychologically: noise levels above 40dB L_{Aeq} can influence well-being, with most people being moderately annoyed at 50dB L_{Aeq} and seriously annoyed at 55dB L_{Aeq}. Levels above 65dB L_{Aeq} are detrimental to health (WHO, 2000). LAeq is equivalent sound pressure level in dB(A). Overall, the external costs of road and rail traffic noise have been estimated at some 0.4% of GDP (ECMT, 1998). About 120 million people in the EU (more than 30% of the total population) are exposed to road traffic noise levels above 55 L_{dn} dB. More than 50 million people are exposed to noise levels above 65 L_{dn} dB. In large urban agglomerations, the effect of noise is further aggregated by high concentrations of people living in close proximity It is estimated that 10% of the EU population are exposed to rail noise above 55 L_{Aeq} dB. The data on noise nuisance by aircraft are the most uncertain, but studies indicate that 10% of the total EU population may be highly annoyed by air transport noise. The measurement of noise level can be made only for very small areas and it is unlikely to be properly modelled. Perception (scales of values, total, day/night) is much more suitable to point out contingent changes in the level of noise. Many of CIVITAS measures would have impacts on noise levels (e.g. access control, road pricing, new concepts for goods distribution). This indicator can be used to measure the impacts of such measures on reducing noise levels.
Definition	**Noise level** measured on-site in the area or corridor under study **Unit**: dB(A)
Measurement	• **Method**: The indicator is evaluated based on field measurement at locations along the corridor. The difficulty to measure traffic noise in a city is that: Ideally a large number of noise measurements is needed, the measurements should cover a sufficiently long period (ideally at least 24 hours), Noise is often a result of many activities but here only the impact of traffic noise should be included. During the measurements, other sources of noise that might be disturbing the measurements are noted (e.g. person mowing the lawn, …). This allows checking and correcting of possible disturbances afterward. As this previous issue requires the permanent presence of a surveyor at the noise measurement location, long-term measurements are not attainable. The minimal duration is determined by the possibility to filter out occasional events from the total measurement period. The measurements should be executed during the daytime period (traffic noise is more important during the daytime, higher risk of other noise sources in night time). The measurements are weighted depending on the density of the measurement points. • **Frequency:** Measurements should be made at least twice, i.e. before the CIVITAS measure is introduced (baseline) and at the end of the project (ex-post), or once a year during the project where appropriate. • **Accuracy**: • **Observed group**: road sections • **Area of measurement:** evaluated corridor/area
References:	Noise impact in Prague: http://www.ceroi.net/reports/prague/issues/noise/impact.htm ; Noise state in Prague: http://www.ceroi.net/reports/prague/issues/noise/state.htm ; Noise impact in Moscow: http://www.md.mos.ru/eng/air/shum.htm WIKI, WBCSD, CAPITAL; ECCENTRIC 27; WBCSD 3

Project CityName				2016				2017										2018												2019												2020								update date	comments
Activities per measure orland Integrated Packages of measures			project months	Sep 1	Oct 2	Nov 3	Dec 4	Jan 5	Feb 6	Mar 7	Apr 8	May 9	Jun 10	Jul 11	Aug 12	Sep 13	Oct 14	Nov 15	Dec 16	Jan 17	Feb 18	Mar 19	Apr 20	May 21	Jun 22	Jul 23	Aug 24	Sep 25	Oct 26	Nov 27	Dec 28	Jan 29	Feb 30	Mar 31	Apr 32	May 33	Jun 34	Jul 35	Aug 36	Sep 37	Oct 38	Nov 39	Dec 40	Jan 41	Feb 42	Mar 43	Apr 44	May 45	Jun 46	Jul 47	Aug 48		
ANT	IP2	Implementing commuter travel plans	stages																																														
			data collection																																															
			reporting																																															
ANT	2.7	Elaborate full commuter plans for (bigger) companies	stages					DE				MS1			IM					OP																								P-V							
			data collection														B			I																			A											
			reporting																M1				M2																		MD				MV			MF				
ANT	1.2	Evaluating the low emission zone in the city centre	stages					IM	MS1-2			MS3-4	OP																																						
			data collection	B																I1												I2							A		P	V										
			reporting									M1											M2												M3										MD	MV		MF				

Activities

	Abbreviation to be used in the scheme	
	M	Mandatory activities: these activities should be indicated (except if not relevant)
	O	optional activities

stages

M	**DE**	start of design, planning phase
M	**IM**	start of implementation, construction phase
M	**OP**	start of operational phase (if relevant)
O	**MS1**	milestone 1: explain in comments
O	**MS2-3-**	milestone 2,3, .. explain in comments

data collection

M	**B**	baseline data
O	**I1**	1st intermediate data
O	**I2-3-**	intermediate data 2-3-
M	**F**	final data: data at the end of the CIVITAS operational period
M	**V**	validation meeting
O	**P1**	intermediate process evaluation meeting nr 1
O	**P2-3-**	intermediate process evaluation meetings nr 2-3-
M	**Pf**	final process evaluation meeting
M	**Pf**	final process evaluation meeting

reporting reporting to your Project Evaluation Manager

M	**M1**	MER - version with evaluation method and baseline
O	**M2-3-**	MER - intermediate versions (version with intermediate results or draft version of the final MER)
M	**Mv**	MER- version with validated conclusions (impact&process)
M	**Mf**	MER - final version

INSTRUCTIONS

This tool is meant to be used by the Local Evaluation Managers (LEMs) to plan all the evaluation activities in their city. Activities are planned on measure level and on the level of an Integrated Package (IP) of measures (if relevant).
In addition, the main stages of the measure/IP are indicated on the timing scheme since the evaluation activities are closely linked to them. In this way, the tool should give a clear overview of all evaluation activities assuring a well-balanced planning to get the right data on the right time, allowing to draw - in time - well motivated conclusions at the end of the project. The scheme will complete the information in the Local Evaluation Plan.

Please take into account the following points:
- each measure/IP has a bundle of 3 lines each containing specific elements: stages of the measure or IP, data collection activities including process evaluation activities and reporting moments towards your Project Evaluation Manager (PEM).
- as shown in the example, the first cells with the information for an Integrated Package are given a grey background colour. If also specific activities for the measures of such an IP must be indicated, this measures are also put in the scheme, below the information of the Integrated Package.
- activities should be indicated either on measure level or on IP level . Use the abbreviations provided (in **bold**). Activities indicated as mandatory elements should be indicated, optional elements can be added to detail the planning or to make it more complete. If needed also additional elements can be added (to be decided by your PEM) and explained in the comments.
- the first line shows the stages of the measure (or IP): the design or planning stage (started with **DE** and coloured in blue), the implementation of construction stage (started with **IM** and coloured in orange) and the operational stage (started with **OP** and coloured in green). If helpful additional milestones can be added and explained in the comments.
- the second line shows all data collection activities including process evaluation activities and meetings. A minimum requirement is the collection of baseline data (**B**), final data (**F**) at the end of the CIVITAS operational period, a final process evaluation meeting (**Pf**) and a validation meeting (**V**). Additional activities can be planned e.g. intermediate data collection (**I1**, **I2**, ..) and intermediate process evaluation meetings (**P1**, **P2**, ...).
- the third line shows the reporting moments to the PEM with additional versions of the MER. The reporting of the MER with the evaluation method and baseline (**M1**), the MER with the validated conclusions (**Mv**) and the final version of the MER (**Mf**) is mandatory. Other MER versions can be added (to be decided by your PEM).
- if there is a month with more than 1 activity, use a '-' to make it clear (e.g. **V-Pf** in 1 cell means both a validation meeting and the final process evaluation meeting in that month)

- you can add comments to the table using 2 different ways: either by cell (the EXCEL function "insert comment") or using the last column of the table
- If you need to add other elements for the measure that are not specified in the manual, or if there is other information, which cannot be put into the scheme, please use the comment box to report about this.

of traffic signs, MS4: installation of ANPR cameras

Project CityName			project months	2016 Sep Oct Nov Dec 1 2 3 4	2017 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 5 6 7 8 9 10 11 12 13 14 15 16	2018 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 17 18 19 20 21 22 23 24 25 26 27 28	2019 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 29 30 31 32 33 34 35 36 37 38 39 40	2020 Jan Feb Mar Apr May Jun Jul Aug 41 42 43 44 45 46 47 48	update date	comments
Activities per measure orland Integrated Packages of measures										
ANT	IP2	Implementing commuter travel plans	stages							
			data collection							
			reporting							
ANT	2.7	Elaborate full commuter plans for (bigger) companies	stages		DE MS1 IM	OP				MS1: approvement by city council
			data collection		B	I	A	P-V		
			reporting			M1 M2	MD	MV MF		
ANT	1.2	Evaluating the low emission zone in the city centre	stages	B	IM MS1-2 MS3-4 OP OP					MS1: start of info campaign, MS2: start of registration of admitted cars, S3: placement
			data collection		M1	I1 M2 M2	I2 A P V M3	MD MV MF		B: reference years 2014-2015
			reporting							

Activities Abbreviation to be used in the scheme

	M	Mandatory activities: these activities should be indicated (except if not relevant)
	O	optional activities

stages

M	**DE**	start of design, planning phase
M	**IM**	start of implementation, construction phase
M	**OP**	start of operational phase (if relevant)
O	**MS1**	milestone 1: explain in comments
O	**MS2-3-**	milestone 2,3,... explain in comments

data collection

M	**B**	baseline data
O	**I1**	1st intermediate data
O	**I2-3-**	intermediate data 2-3-
M	**F**	final data: data at the end of the CIVITAS
M	**V**	validation meeting
O	**P1**	intermediate process evaluation meeting nr 1
O	**P2-3-**	intermediate process evaluation meetings nr 2-3-
M	**Pf**	final process evaluation meeting

reporting reporting to your Project Evaluation Manager

M	**M1**	MER - version with evaluation method and baseline
O	**M2-3-**	MER - intermediate versions (version with intermediate results or draft version of the final MER)
M	**Mv**	MER- version with validated conclusions
M	**Mf**	MER - final version

INSTRUCTIONS

In the next tabs 'monitoring <date>', additional versions of the planning table can be copied and the information can be updated. The LEM can do this regularly or permanently with each change in the planning. Your PEM will indicate for which moments he/she wants to have a new version sent to him/her.

Please take into account the following points:

- If an activity is postponed, put the abbreviation used for this activity in the new cell. The initial position is also kept, but the **bold** font of the abbreviation must be removed.
- you can repeat this action as many times as needed.

- If you need to add other elements for the measure that are not specified in the manual, or if there is other information, which cannot be put into the scheme, please use the comment box to report about this.

of traffic signs, MS4: installation of ANPR cameras

Project				**2016**	
CityName				Sep	Oct
			project months	1	2
Activities per measure or/and Integrated Packages of measures					
			stages		
			data collection		
			reporting		
			stages		
			data collection		
			reporting		
			stages		
			data collection		
			reporting		

		2017												**2018**			
Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

								2019											
May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

2020								**update**
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	**date**
41	42	43	44	45	46	47	48	

comments

Project	City		
XXX			
Measure code	**Measure name**		
Last update	**Responsible**	**e-mail**	**telephone**

ABSTRACT

Measure description and implementation process

Text text ….

Evaluation approach

Text text text ….

Key impact results

- **Key result 1 – Title** – Text text
- **Key result 1 – Title** – Text text

Implementation process

- **Barrier 1 – Type** – Text text …
- **Barrier 1 – Type** – Text text …
- **…**
- **Driver 1 – Type** – Text text …
- **….**

Key lessons learned

- **Lesson 1 – Type** – Text text …

A Introduction

Here the basic information of the measure is presented. Changes in comparison with the start of the project are explained specifically.

A1 Expected results of the measure

The measure objectives are:

(1) City policy level in perspective of CIVITAS goals/ longer term:

- To …

(2) Strategic level:

- To …

(3) Measure level:

- To …
- To …

Objectives with quantifiable targets

Ranking	Objectives	Quantifiable targets
1		
2		
3		
4		

Ranking: Most important objective is described first.

A2 Description

Text text …

Measure outputs

- **Output 1** – Text text …
- **Output 2** – Text text …
- …

Supporting activities

	Type of supporting activity	Activity	Target group	Main objectives
				• .. • …

Interaction with other measures

- **Interaction 1** – Text text …
- **Interaction 2** – Text text …
- …

Interaction with measures / evolutions outside CIVITAS

- **Interaction 1** – Text text …
- **Interaction 2** – Text text …
- …

A3 Target groups and/or affected part of the city or region

Target groups			**Affected area**		
type		**comment**	**type**		**comment**

Additional comments:

- Text text …
- Text text …
- …

A4 Stakeholders: CIVITAS project partners and other important actors

No	CIVITAS Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role - Links

Type: P:CIVITAS partner – S: other stakeholder
Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) – NG: Non-Governmental Organisation – PR: Private company
Level of activity: L: Leading role – P: Principle participant – O: Occasional participant

Comments:

(1) …
(2) …

Additional comments:

- Text text …
- Text text …
- …

A5 Risks

No	Risk category	Description	Action to limit the risk

Additional comments:

- Text text …
- Text text …
- …

B Measure implementation

B1 Situation before CIVITAS

Text text …

B2 Innovative aspects

Ranking	Innovative aspect	Description
1		
2		
3		
4		

Additional comments:

- Text text …
- Text text …
- …

B3 Technology Development

Text text …

B4 Actual implementation of the measure

The measure was implemented in the following stages:

- **Stage 1: Title** *(Date from - Date to)* – Text text …
- **Stage 2: Title** *(Date from - Date to)* – Text text …
- **…**

C Impact Evaluation Findings

C1 Evaluation approach

C1.1 Expected impacts and indicators

Table C1.1.1: Impacts and indicators

	Impact category	Expected impacts	Aspect of this category	Indicators	No.
	Society-people				
	Society-governance				
	Transport system				
	Economy				
	Energy				
	Environment				

Table C1.1.2: Indicators and measurements

No.	Indicator	Data units	Frequency B – I (xx) – A	Method DC-E-S-C	Observed group	Area of measurement
Frequency: B: Before – I: Intermediate - I(x): Intermediate(frequency) – A: at the end of the CIVITAS operation period						
Method: DC: Data collection – E: Estimation – S: Survey						

Comments:
(1) …
(2) …

Additional comments:

- Text text …
- Text text …
- …

….

C1.2 The Baseline

Text text …

C1.3 The Business-as-Usual scenario

Text text …

C2 Measure results

Here the results of the impact evaluation are presented and discussed per impact category.
Only the impact categories on which the measure has a significant impact are explained.

C2.1 Society - people

Text text …

Table C2.1.1: impacts in the category Society - people

Indicator	Unit(s)	Before	Date Before	B-a-U	Data B-a-U	After	Date After	Difference: After – Before	Difference: After – B-a-U

C2.2 Society - governance

Text text …

Table C2.2.1: impacts in the category Society - governance

Indicator	Unit(s)	Before	Date Before	B-a-U	Data B-a-U	After	Date After	Difference: After – Before	Difference: After – B-a-U

C2.3 Transport System

Text text …

Table C2.3.1: impacts in the category Transport System

Indicator	Unit(s)	Before	Date Before	B-a-U	Data B-a-U	After	Date After	Difference: After – Before	Difference: After – B-a-U

C2.4 Economy

Text text …

Table C2.4.1: impacts in the category Economy

Indicator	Unit(s)	Before	Date Before	B-a-U	Data B-a-U	After	Date After	Difference: After – Before	Difference: After – B-a-U

C2.5 Energy

Text text …

Table C2.5.1: impacts in the category Energy

Indicator	Unit(s)	Before	Date Before	B-a-U	Data B-a-U	After	Date After	Difference: After – Before	Difference: After – B-a-U

C2.6 Environment

Text text …

Table C2.1.1: impacts in the category Environment

Indicator	Unit(s)	Before	Date Before	B-a-U	Data B-a-U	After	Date After	Difference: After – Before	Difference: After – B-a-U

C3 Summary: achievement of objectives and quantifiable targets

This table summarizes the results of the impact evaluation focusing on the quantifiable targets of the objectives.

No.	Objective and target	Rating	Comment
1			
2			
3			
4			
NA = Not Assessed O = Not Achieved ★ = Substantially achieved (at least 50%) ★★ = Achieved in full ★★★ = Exceeded			

C4 Up-scaling of results

Text text …

D Process Evaluation Findings

Here the main findings of the process evaluation are summarised. More details are available in the Process Evaluation Report of the Measure.

D1 Deviations from the original plan

The following deviations from the original plan occurred:

- **Deviation 1** – Text text …
- **Deviation 2** – Text text …
- …

D2 Barriers

The following barriers were observed:

- **Barrier 1** – Text text …
- **Barrier 2** – Text text …
- **…**

D3 Drivers

The following barriers were observed:

- **Driver 1** – Text text …
- **Driver 2** – Text text …
- **…**

D4 Supporting activities

The following conclusions concerning the supporting activities are drawn:

- **Observation 1** – Text text …
- **Observation 2** – Text text …
- **…**

D5 Recommendations on the implementation process

The following recommendations can be given:

- **Recommendation 1** – Text text …
- **Recommendation 2** – Text text …
- **…**

E Evaluation Conclusions

E1 Validated direct impact

After validation of the observed impacts of the measure, the following key results can be formulated:

- **Key result 1** – Text text …
- **Key result 2** – Text text …
- …

E2 Relevance of supporting activities *(only if relevant)*

The following conclusions concerning the supporting activities are drawn:

- **Key result 1** – Text text …
- **Key result 2** – Text text …
- …

E3 Interaction with other measures *(only if relevant)*

Concerning the interaction with other measures, the following key conclusions can be drawn:

- **Key conclusion 1** – Text text …
- **Key conclusion 2** – Text text …
- …

E4 Main lessons learned

Implementing this measure, this are the main lesson learnt, important for future sustainable mobility strategies:

- **Key lesson 1** – Text text …

- **Key lesson 2** – Text text …
- …

E5 Long term impact

Based on the conclusions of the evaluation of this measure in the lifetime of the CIVITAS project, we can conclude the following concerning the long term impact of this measure:

- **Key expectation 1** – Text text …
- **Key expectation 2** – Text text …
- …

E6 Potentials for up-scaling in the city

Based on the conclusions of the evaluation of this measure in the lifetime of the CIVITAS project, we can conclude the following concerning possibilities to up-scale this measure in the city:

- **Key conclusion 1** – Text text …
- **Key conclusion 2** – Text text …
- …

E Additional information

E1 Appraisal of evaluation approach

Text text …

E2 Future activities relating to the measure

Text text …

Project	City		
XXX			
Measure code	**Measure name**		
Reporting period	**Responsible**	**e-mail**	**telephone**

A Introduction

Here the basic information of the measure is presented as defined at the start of the project.

A1 Expected results of the measure

The measure objectives are:

(1) City policy level in perspective of CIVITAS goals/ longer term:

- To …

(2) Strategic level:

- To …

(3) Measure level:

- To …
- To …

Objectives with quantifiable targets

Ranking	Objectives	Quantifiable targets
1		
2		
3		
4		
Ranking: Most important objective is described first.		

A2 Description

Text text …

Measure outputs

- **Output 1** – Text text …
- **Output 2** – Text text …
- …

Supporting activities

	Type of supporting activity	Activity	Target group	Main objectives
				• .. • …

Interaction with other measures

- **Interaction 1** – Text text …
- **Interaction 2** – Text text …
- …

Interaction with measures / evolutions outside CIVITAS

- **Interaction 1** – Text text …
- **Interaction 2** – Text text …
- …

A3 Target groups and/or affected part of the city or region

Target groups			Affected area		
type		comment	type		comment

Additional comments:

- Text text …
- Text text …
- …

A4 Stakeholders: CIVITAS project partners and other important actors

No	CIVITAS Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role - Links

Type: P:CIVITAS partner – S: other stakeholder
Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) – NG: Non-Governmental Organisation – PR: Private company
Level of activity: L: Leading role – P: Principle participant – O: Occasional participant

Comments:

(1) …
(2) …

Additional comments:

- Text text …
- Text text …
- …

A5 Risks

No	Risk category	Description	Action to limit the risk

Additional comments:

- Text text …
- Text text …
- …

B General observations for the measure in this reporting period

B1 Implementation phase

What was the phase of the measure during the reporting period?

		Stages	Relevant milestones achieved
	1	Design, planning, preparation	
	2	Implementation	
	3	Operation	

Comments:

(1) ….

Were there any changes to the measure in this period?

- Change 1 - Text text …
- Change 2 - Text text …
- …

Additional comments:

- Text text …
- Text text …
- …

B2 Process evaluation activities

Which activities were undertaken to achieve a good understanding of the implementation process?

- Activity 1 - Text text …
- Activity 2 - Text text …
- …

B3 Barriers

Which barriers have been encountered during the reporting period in trying to reach the objectives of the measure? Which actions have been taken by one or more measure partners to handle the barriers?

No.	Barrier field	Description	Action to overcome the barrier

Additional comments:

- Text text …
- Text text …
- …

B4 Drivers

Which drivers might have been encountered during the reporting period in trying to reach the objectives of the measure?

Which actions have been taken by one or more measure partners to make use of the drivers to reach the measure objectives?

No.	Driver field	Description	Action to make use of the driver

Additional comments:

- Text text …
- Text text …
- …

B5 Influence on risks

How do you estimate the risk in reaching the objectives at this moment?

No.	Risk category	**Description** (including change to previous situation)	**Action to limit the risk**

Additional comments:

- Text text …
- Text text …
- …

C Specific observations on the supporting activities in this reporting period

C1 Quality of the Supporting Activities

Available information and assessment:

	Activity	Target group	Quantitative indicators on level of penetration of target groups	Qualitative score			
				Relevance information	Timing	Relevance of target group	+
			• .. • ..				
Scores: * = Poor ** = Satisfactory *** = Excellent			+ Add extra score if needed				

Comments:
(1) …
(2) ..

Additional comments:

- Text text …
- Text text …
- …

C2 Influence of the Supporting Activities on the implementation process

Available information

- Text text …
- Text text …
- …

Assessment:

	Qualitative indicators	Qualitative score	Motivation
	Useful comments and suggestions made by citizens, leading to changes in design		• .. • ..
	Useful comments and suggestions made by stakeholders, leading to changes in design		
	Influence on decision-making and measure implementation		
	Increased acceptance of the measure		
	Increased awareness and knowledge of citizens on the subject		
	Increased public trust		

	+		
Scores: O = None * = Limited ** = Significant *** = High + add other indicators if relevant			

Additional comments:

- Text text …
- Text text …
- …

C3 Influence of the Supporting Activities on the impact of the measures

Assessment:

Ranking	Impact category	Impact aspect	Quantitative data	Qualitative score	Motivation
1			• .. • ..		•
2					
3					

4					
Scores: O = None * = Limited ** = Significant *** = High					

Additional comments:

- Text text …
- Text text …
- …

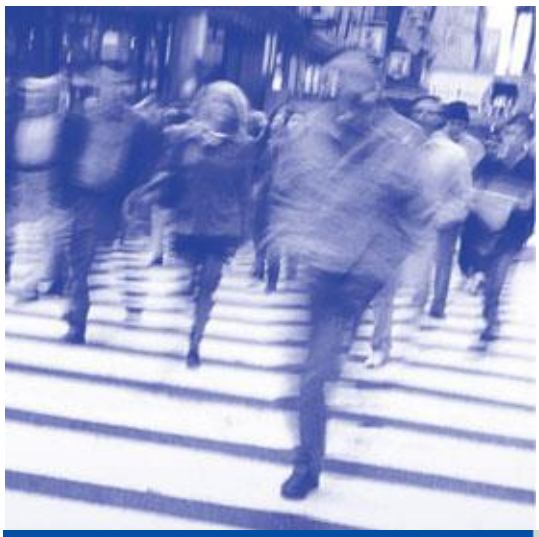
C4 Lessons learnt on the Supporting Activities

Text text …

Specific points are:

- Text text …

- Text text …
- …



2020 CiViTAS
Cleaner and better transport in cities

SATELLITE

Guidelines for the usage of MER and PER

Draft version

Workpackage No.: 2	Evaluation
Responsible Author(s): Dirk Engels	
Responsible Co-Author(s): Gitte Van Den Bergh	
Date: 4.8.2017	
Status:	Draft
Dissemination level:	Confidential

2020 CiViTAS
Cleaner and better transport in cities
SATELLITE

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

Abstract

A solid well-structured evaluation of measures is a crucial element in the success of the CIVITAS program. Clear reporting of the evaluation approach and the findings of the impact and implementation process will contribute strongly in the understanding of the measures and the implemented mobility strategy. Both the 'Measure Evaluation Results' (MER) and the Process Evaluation Report (PER) are the key basic tools to assure a consistent reporting of the Measures and Integrated Packages of Measures. Based on the information in these documents direct conclusions will be drawn on the level of the Measures and Integrated Packages of Measures. This info will be also important for further conclusions on the level of the City, the CIVITAS Innovation Action (IA), the CIVITAS themes and the CIVITAS program. This document includes guidelines to use and complete both reports.

Project Partners

Organisation	Country	Abbreviation
Transport & Mobility Leuven	BE	TML

Document History

Date	Person	Action	Status	Diss. Level
4.1.17	Dirk Engels	Draft version	Draft	PEM IAs
4.8.17	Dirk Engels	Final draft version	Draft	CIVITAS SATELLITE

Status: Draft, Final, Approved, and Submitted (to European Commission).

Dissemination Level: PC = Project Coordinator, SC=Site Coordinator, TC=Technical Coordinator, EM=Evaluation Manager

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

Table of Contents

THE CIVITAS INITIATIVE
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List of abbreviations

CEM: CIVITAS Evaluation Manager

ECG: Evaluation Coordination Group

ELG: Evaluation Liaison Group

IA: Innovation Action

IP: Integrated Package of measures

LEG: Local Evaluation Group

LEM: Local Evaluation Manager

MER: Measure Evaluation Results

ML: Measure Leader

PEM: Project Evaluation Manager

PER: Process Evaluation Report

RIA: Research and Innovation Action

SC: Site Coordinator

1 Introduction

Clear reporting of the evaluation approach and the findings of the impact and implementation process will contribute strongly in the understanding of the measures and the implemented mobility strategy. Both the 'Measure Evaluation Results' (MER) and the Process Evaluation Report (PER) are the key basic tools to assure a consistent reporting of the Measures and Integrated Packages of Measures. Based on the information in these documents direct conclusions will be drawn on the level of the Measures and Integrated Packages of Measures. This info will be also important for further conclusions at the level of the City, the CIVITAS Innovation Action (IA), the CIVITAS themes and the CIVITAS program.

These reports mainly present all the data and information collected on measure level. However, if some conclusions specifically relating to the reported measure are drawn on city or project level, they should be included in the MER. E.g. some projects discuss the implementation process of the measures and the interactions between the measures on city or project level. Then these conclusions should be included in the MER completing the understand of the measure and making the MER a self-standing document presenting all relevant finding for this measure.

For both reports a standard Template is made up (see annex) based on the reporting tools of previous CIVITAS rounds and optimised to fulfil in a better way the evolving needs of good and consistent reporting.

1.1 Concept

The **'Measure Evaluation Results' (MER)** is the main basic report containing all information related to the evaluation of the implemented measures.

It serves multiple purposes including:

- Ensures reporting of all evaluation-relevant information ("completeness");
- Ensures a common reporting style;
- Facilitates analysis of evaluation results for the CIVITAS IA and CIVITAS SATELLITE;
- Enables evaluation conclusions at the level of the City, the CIVITAS Innovation Action (IA), the CIVITAS themes and the CIVITAS program;
- Helps to provide information for dissemination of evaluation results, in particular measure results, in a clear and concise manner.

The main inputs for this report are on one hand the impact measurements and surveys processed by the evaluation team into quantitative and qualitative descriptions of selected

indicators and conclusions on the assessment aspects of the impact categories. On the other hand also the process evaluation findings (see the PER) are crucial inputs to validate and understand the findings and the implementation process.

To keep the report accessible and manageable it is not the idea to include any “raw data” in the sheet, but only the results of the data analysis done by the evaluators.

To make it usable as the basic informative document on the measures e.g. for dissemination purposes, findings should be reported in a comprehensible and well-structured manner. In addition, a summary will be added explaining the key elements of the findings and conclusions in a synthetic way. This summary can be the first view interested persons can get when consulting the measure through the different CIVITAS channels.

To optimise the efforts, it is the idea that individual sections (or building blocks) of the completed Measure Evaluation Results can be used for other project reports, for example final project reports and recommendations. Likewise, elements of such reports that are available early on can be included in the MER.

This report will be build up during the project lifetime, adding new information in each stage.

Complementary to this sheet a ‘**Process Evaluation Report’ (PER)** will be used to report the key findings on the implementation process of the Measure on regular basis. In the last phase of the evaluation work (eventually also in an intermediate phase) these findings will be combined with the findings of the impact evaluation to come to a well-motivated understanding of the measure. The conclusions of the process evaluation will be also included in the MER.

The PER starts with the same general information as presented in the MER but focuses further on the specific aspects of the implementation of the measures, e.g.

- the barriers and the actions to overcome the barriers
- the drivers and the actions to make use of the drivers
- the lessons learned
- risks in the further implementation process
- the specific findings on the supporting activities (if relevant)

The main input for this report are the findings out of the different efforts of the evaluation team to understand the implementation process e.g. discussions with Measure Leaders and Site Coordinators, meetings with experts and stakeholders.

This report will be filled in for each reporting period.

1.2 Reporting versions and timing

The '**Measure Evaluation Result' (MER)** is completed during the project lifetime with the following main versions:

- M1 MER-version with evaluation method and baseline
- M2-3- MER-with intermediate results or draft version of the final MER
- Mv MER - version with validated conclusions (impact & process)
- Mf MER - final version

Each version is a more completed version of the previous one with a possible update of the information that is changed. The timing of these versions depends on the implementation process of the measure(s) and will be indicated in the Local Evaluation Plan of the city. To allow further processing of the information, the final version should be available for the project level according to the planning on that level. In exceptional cases, the validated draft version can be used for this.

Additionally some versions should be provided to CIVITAS SATELLITE to allow quality checks and allow the drawing of conclusions on CIVITAS level. The versions and timing should be agreed between CIVITAS SATELLITE and the IAs. Normally, at least the M1, Mv and MF versions will be provided..

The reporting on the process using the '**Process Evaluation Report' (PER)** will be done according to the agreements in the project.

Additionally a reporting should be done towards the CIVITAS level (reports to be provided to CIVITAS SATELLITE) according to the agreements on this. A typical approach for a 4 years project is the following, linking the evaluation reporting periods to the administrative progress reporting of the project:

- PER1 PER - 1st process evaluation reporting on month 1 to 18 – to the PEM at the end of month 20
- PER2 PER - 2nd process evaluation reporting on month 19 to 36 – to the PEM at the end of month 38
- PER3 PER - 3rd process evaluation reporting on month 37 to 42 – to the PEM at the end of month 38
- PEFf PER - final process evaluation reporting on month 1 to 42 – to the PEM at the end of month 44

The PER3 reporting is only done if relevant activities in the implementation of operational stage did occur. The PEFf can be skipped if this information is clearly summarised and included in the MER.

1.3 Integrated Packages of Measures – Sub-measures

When structuring the evaluation, measures implemented together having (at least partly) the same objectives and target groups can also be evaluated together as part of an Integrated Package of Measures.

In that case the evaluation findings can be reported in 1 MER describing the impact and process findings in an integrated way.

However, we have to take into account the following elements:

- In many cases, some indicators are specifically related to the impacts of one measure. These indicators should also be reported in the related section of the MER, clarifying the significance and meaning for that specific measure. In the other sections the specific findings in relation to that impact of that measure should be mentioned if relevant.
- The evaluation team should also try to understand which measures are most important and which are important to support the other measures to make them more effective. These findings can be reported in the section E of the Sheet.

In some projects the 'Measures' consist of different sub-measures with their specific objectives, characteristics and target group. In that case it can be decided to evaluate a sub-measure as a measure. The reporting can be done on the level of the measure presenting evaluation results for each sub-measure in the different chapters of the reporting document. Or a separate MER is developed for a specific sub-measure.

1.4 Special cases

A standard reporting methods is here described for a typical measure implemented in the real urban environment of the city with the traditional stages of design and planning, implementation and an operational phase. This allows to do a before and after observation and analyse the implementation process.

However some of the CIVITAS measures don't follow this process for different reasons.

Here some guidance is given how the reporting can be done for different 'special cases' using as much as possible the 'standard' reporting tools.

1.4.1 Studies

In some cases the CIVITAS measures in a city include also feasibility studies or design and planning studies being the first stage of the usual measure with a design, implementation and operational stage.

Such ‘measures’ can’t be evaluated with an impact evaluation and a process evaluation as described in the CIVITAS evaluation framework and the evaluation reporting tools explained here.

Here the LEM can use some creativity to use this Template as much as possible to report in the best way on the success of the study, taking into account the following points:

- A higher effort to understand the process of the study (which is the CIVITAS measure) is required. More process evaluation activities should be planned.
- Results of any ex-ante estimation of the impacts of a possible implementation of the studied ‘measure’ should be included in the MER explaining clearly the method how this estimation is build up.

1.4.2 Changed measures

In many cases the measures are changed during the lifetime of the CIVITAS project both on the measure level specific objectives and the way of implementing the measure. For evaluation we start we the version of the measure agreed during the first months of the project

In the MER these changes need to be reported in the relevant chapters mainly in the comments on the explanation of the current (or final situation). Main principle is that the MER presents the measure as this measure was really implemented because all the conclusions on impacts are related to real implementation and the initial planned version of the measure. However it is still important to be aware of the changes because this can have an influence on the results.

In the PER it is the idea that in the first chapter ‘A Introduction’ the information is presented as initially planned. For each period the possible changes will be explained in detail in the next chapter. Especially for ‘changed measures’ the process evaluation is extremely important to understand the why and how of the changing process and the possible influences on the process and impact of the measure.

When changes are very important changing the type of the measure it can be decided to consider the measure to be stopped (see 1.4.3) and starting a ‘new measure’.

1.4.3 Stopped measures

Possibly a measure can be stopped before the operational stage of the measure making it impossible to do a good impact and process evaluation.

In this case the process evaluation is extremely important to understand the why and how of the measure to be stopped.

1.5 In-depth evaluation of measures

In order to avoid a situation in which evaluation resources are spread too thinly across all measures, it is better to decide which key measures should be evaluated in-depth, leaving others with a basic approach of the evaluation.

However the structure of the reporting should be kept the same adding extra information in some parts of the documents.

In this way not all the MERs and PERs will have the same level of detail but the main quality criteria is the clarity of the findings and related conclusions not the length of the reports.

2 Measure Evaluation Results (MER)

The guidelines are set out using the same format as in the Template.

Abstract

This abstract presents the key elements of the findings and conclusions in a synthetic way. Important to take into account is the fact that this summary will be in many cases the first view interested persons can get when consulting the measure through the different CIVITAS channels.

The following items are recommended to be presented:

- The challenge in the city
- A short measure description: what is exactly done.
- The main objectives of the measure
- The main implementation stages
- The impact of the measure
- What did we learn on this measure ?
- Any recommendations for replication.

Informative table

This table contains some basic information of the measure:

- Project: name of the CIVITAS IA (acronym)
- City: name of the city, metropolitan area or urban region
- Measure code: code used to identify the measure or the IP
- Measure name: descriptive name of the measure or IP
- Last update: until which date this version reports
- Responsible: responsible LEM
- E-mail: e-mail of responsible LEM
- Telephone: telephone number of responsible LEM

Example

Project	**City**		
PORTIS	ANTWERP		
Measure code	**Measure name**		
ANT 2.7	**Elaborate full commuter plans for (bigger) companies**		
Last update	**Responsible**	**e-mail**	**telephone**
10.12.2016	Sofie Aelterman	sae@traject.be	+32 475 80 76 08

A Introduction

A1 Expected results of the measure

Explain here the objectives of the measure as implemented. This should be based on the Project's "Description of Work" and the discussion with the Measure Leaders to specify the objectives more clearly to allow a well-focused evaluation.

The different levels of objectives should be indicated on 3 levels:

(1) High level / longer term objective(s)

The City level objective(s) related to the CIVITAS objectives and the CIVITAS Thematic fields.

The CIVITAS objectives 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 eight categories of measures
- To build up critical mass and markets for innovation
- To overcome barriers for implementing innovative and ambitious measures and policies through experimental testing and targeted research
- To change transport behaviour and implement innovative technologies on a wider scale by:
- Exchanging good practices by triggering the ‘how did you do it’ questions) and stimulating good examples to be implemented elsewhere.
- Convincing politicians who pave the way for paradigm shifts in urban transport (triggering the ‘how did you dare’ questions).
- Testing new innovative measures in so-called ‘living laboratories’ to tackle the problems cities are facing.

The CIVITAS Thematic fields are:

- ‘Organisational and infrastructural mobility measures’:
    - Car-Independent Lifestyles – cycling, walking, car-sharing, bike-sharing, car-pooling, co-modality, ride-sharing
    - Collective Passenger Transport – accessibility, intermodality, service improvements, ticketing systems, innovative PT systems, fleet management, procurement schemes
    - Clean Fuels and Vehicles – electric mobility, fuelling infrastructures, hybrid vehicles, use of biodiesel, biogas and compressed natural gas, cleaner fleets
    - Demand Management Strategies – congestion charging, access restrictions, parking management and strategies, low emission zones, car-free zones, priority lanes, mobility credits, financial incentives and disincentives
    - Urban Freight Logistics – urban delivery centres, distribution schemes, fleet management, cycle logistics, freight partnerships, urban freight transport plans
- General aspects of the mobility system
    - Safety and Security – traffic calming, infrastructure design, shared space, cycle highways, secure school paths, anti-vandalism measures

- Technological support of the mobility systems:
  - Transport Telematics – intelligent transport systems, communication, routing, smartphone applications, plate recognition systems

- Measures directly working on the users acceptance and attitude and their travel demand:
  - Integrated Planning – land-use, housing, new developments, sustainable urban mobility plans
  - Mobility Management – marketing and communications, personal and company travel plans, mobility info centres
  - Public Involvement – multi-stakeholder consultations, information campaigns, participatory processes

(2) Strategic level objective(s)

The approach objective(s) contributing to the high-level objective(s)

(3) Measure level specific objective(s)

If possible - mainly for level (3) – also quantifiable targets are mentioned. These measures are summarised in the table with the target specified. List the objectives in order of importance, with the most important one ranked first.

If the measure objectives have been changed over the course of the project, for example in the Inception Report or Local Evaluation Plan, please only give the final objectives of what was actually implemented.

Example

(1) High level / longer term:

- To reduce congestion and pollution in the city centre

(2) Strategic level:

- To reduce the level of private car use in the city centre

(3) Measure level:

- To design and implement a bike-sharing scheme to transfer 3% of car trips to bikes.
- To encourage the use of cycling for home-school and home-work trips through promotional activities at all senior schools and 5 main work locations.

Ranking	Objectives	Quantifiable targets
1	To design and implement a bike-sharing scheme to transfer car trips to bike trips.	3% of car trips shifted to bike trips
2	To encourage the use of cycling for home-school and home-work trips	Increase of 15% cyclists in the target schools and work locations
3		
4		

A2 Description

Non-technical description of the measure as implemented. Describe what the measure is about in a non-technical way, and provide a comprehensive, easy-to-understand measure description (i.e. understandable by a member of the public). This needs to describe what was actually implemented, so will need to change if the measure changes. Try to keep this fairly short (i.e. half to one page).

In the additional paragraphs, please specify additional information:

- Measure outputs: indicate here the direct practical result of a measures with figures e.g. 4 renting stations for bikes, 20 new buses, …
- Supporting activities: if significant the supporting activities like specific communication for the measure, citizens engagement, stakeholder involvement are listed here more in detail:
    - Type of supporting activity: measure communication, citizens engagement, stakeholder involvement or any other (please specify)
    - Activity: e.g. event, public discussions, workshop, presentation, info-material, leaflets, ….
    - Target group: the target group of the activity with a quantification of the size e.g. the 1000 children of a primary school, 500 employees of the Technological Park, …
    - Main objectives: what do we want to achieve with this supporting activity e.g.
        - To establish and further extend links with strong partners in the sustainable transport field
        - To effectively disseminate achievements of the project to international, national and local levels
        - To support the branding, visibility and familiarity with the CIVITAS project

- To cooperate with strong national networks and stakeholders
- To raise citizens interest
- To inform citizens on measure content
- To include major stakeholders into problem defining
- To include major stakeholders into solution
- To include major stakeholders into measure implementation
- To improve trust between different stakeholders
- To increase public awareness on sustainable mobility
- To enhance the use of the measure
- To establish and further extend links with strong partners in the sustainable transport field

- Interactions with other measures: Interrelationships with other CIVITAS measures in terms of geography, target group etc. are not only important to understand the background to the measure but also how these inter-relationships could have an effect on the observed evaluation results. For this reason, if other CIVITAS measures have an influence on the process of implementation and/or the impacts expected from this measure, they should be mentioned here to take this into account during the interpretation of the findings. If the measure is part of an Integrated Package of measures, this can be indicated here explained what is the way they are integrated.
- Interaction with measures / evolutions outside CIVITAS: if significant also interferences with other measures or evolutions should be mentioned here to take this into account when during the interpretation of the findings.

A3 Target groups and/or effected part of the city or region

Indicate here the target group(s) of the measure:

- Type: the type of target group according to the following list:
  - 0 All
  - 1 Residents
  - 2 Car drivers / motorists
  - 3 Public transport users
  - 4 Cycle / walking groups

5 Mobility impaired people
6 Commuters
7 Visitors (shops / leisure)
8 Local businesses
9 General public
10 Other, please describe

- Comment: give more details on the target group:
  - Name of the school, workplace place, location, department with a quantification of the size
  - Mention any changes during the life time of the CIVITAS project

If relevant additional comments can be added. Also here possible changes during the life time of the CIVITAS project can be mentioned.

A4 Stakeholders: CIVITAS project partners and other important actors

Indicate here the important partners for the different stages of the measure:

- CIVITAS Partner / other actors: name of the partner including an abbreviation of relevant
- Type:
  - P CIVITAS partner
  - S other stakeholder
- Type of organisation: use these types or add an additional one:
  - C City
  - PT Public transport company
  - KI Knowledge institution (e.g. university)
  - NG Non-Governmental Organisation (e.g. consumer organisation)
  - PR Private company
  - other Other, please describe
- Level of activity: use these types
  - L Leading role
  - P Principle participant

- O Occasional participant

- Role – Links:
  - role of the partner in the different stages of the measure
  - possible link of this partner with other partners

Elements of the table can be explained further in detail by adding comments linked with (1), (2) , …. to the table.

If relevant additional general comments can be added. Possible changes during the life time of the CIVITAS project can be mentioned here.

A5 Risks

Here the findings of a limited risk analysis at the start of the project are listed:

- Risk category: use these types or add an additional one:

  1 Political / strategic: e.g. Opposition of key actors based on political and/or strategic motives, lack of sustainable development agenda or vision, impacts of a local election, conflict between key (policy) stakeholders due to diverging believes in directions of solution

  2 Institutional: e.g. Impeding administrative structures, procedures and routines, impeding laws, rules, regulations and their application, hierarchical structure of organizations and programs

  3 Cultural: e.g. Impeding cultural circumstances and life style patterns

  4 Problem related: e.g. Complexity of the problem(s) to be solved, lack of shared sense of urgency among key stakeholders to sustainable mobility

  5 Involvement, communication: e.g. Insufficient involvement or awareness of (policy) key stakeholders, insufficient consultation, involvement or awareness of citizens or users

  6 Positional: e.g. Relative isolation of the measure, lack of exchange with other measures or cities

  7 Planning: e.g. Insufficient technical planning and analysis to determine requirements of measure implementation, insufficient economic planning and market analysis to determine requirements for measure implementation, lack of user needs analysis: limited understanding of user requirements

8 Organizational: e.g. Failed or insufficient partnership arrangements, lack of leadership, lack of individual motivation or know-how of key measure persons

9 Financial: e.g. Too much dependency on public funds (including CIVITAS funding) and subsidies, unwillingness of the business community to contribute financially

- Description: short explanation of the risk, see examples above
- Action to limit the risk: which actions are planned to limit the risk

If relevant additional comments can be added. Possible changes during the life time of the CIVITAS project can be mentioned here.

B Measure implementation

B1 Situation before CIVITAS

Describe the situation before CIVITAS with an emphasis on the elements that were expected to be changed with the implementation of the measure (see part A).

B2 Innovative aspects

This is to understand what distinguishes the measure from what was common before (even up to the international level). Report aspects that relate to what was actually implemented. Changes can be mentioned under 'additional comments'.

To allow Projects to describe the innovative aspects of the measures in a consistent and more readily identifiable way, a list of possible ways in which a measure can be innovative is given below. A measure can be innovative in a number of different ways that can be difficult to separate in a general description, so the list provides the means to separately identify those aspects. Also the geographical extent to which the measure is innovative (e.g. internationally/within EU/nationally/regionally) can be added.

Complete the table:

- Put het innovative aspects in order of importance (the most important one first)
- Use the following categories of innovation, or add other aspects not covered by any of the categories (describe this category specifically under 'Description'):
  - New conceptual approach – refers to a new general solution or method that has been developed to solve a previously known issue or an issue which has perhaps not been looked at before.
  - Use of new technology/ITS – where technology has been used in new circumstances or is an improvement on the existing technology.
  - New mode of transport exploited – self-explanatory. More likely to be relevant at a regional or local scale.
  - Targeting specific user groups – through technology and information developments more specific parts of the general travelling population can be targeted. This could be people living adjacent to a bus route or travelling to a particular location, or drivers of certain types of vehicles.
  - New economic instrument – a new approach of using financial benefits or penalties to encourage a particular behaviour

- New policy instrument – this would relate to Measures where a new direction has been taken in policy in order to bring about desired changes.
- New organisational arrangements or relationships – would describe situations where new, more effective or efficient institutional structures were put in place or new agreements between stakeholders developed, all with the aim of bringing about desired impacts.
- New physical infrastructure solutions – relates to Measures which include innovative approaches to the physical transport infrastructure that encourages or requires the desired behaviour.

- Description: explain the innovative aspect

B3 Research and Technology Development

For some measures it may be helpful to describe the research and technological development that has led to the implementation of the measure, the method of implementation or some other specific aspect of the measure. Use non-technical terms as much as possible, but include references to relevant literature as appropriate.

B4 Actual implementation of the measure

Describe what was done to implement the measure. This should be divided into stages, with a timing associated with each stage reported, to aid understanding of the sequence of implementation. You can start from the 3 main stages used in the reporting on the measure:

- Design, planning
- Implementation
- Operation

Each stage should have a short descriptor name followed by a few sentences covering what the stage involved.

For each stage more details should be given e.g. main milestones, timing, specific activities. For the timing the monitoring tool (part showing the stages) can be used.

Measure changes should be reported also here, identifying the reasons and decision making process for this changes.

Example

Stage 1: Design - Develop tender document (March 2009 to April 2009) – Building from the original description of work a detailed tender document was written. After consultation of

the stakeholders (public transport company, cycling association, green department) this was approved.

Stage 2: Design - Select and negotiate plan of work with contractor (July 2009) – Following submission of tender document from all interested contractors …..

Where possible include *diagrams, maps and pictures* to aid understanding. The *use of maps* to help describe the geographical context of the measure is especially desirable. Maps help to visualise the scale and proximity of the measure to other measures.

C Impact Evaluation Findings

C1 Evaluation approach

Here we describe the impact evaluation approach. All information should be taken from the Local Evaluation Plan, if possible just by copying the information in this plan.

C1.1 Expected impacts and indicators

Here we give an overview of all expected impacts and the indicators used to understand this impact.

Filling in both tables will give a structured view on the indicators and the data collection activities to get the values (or qualitative description) before the implementation and after (at the end of the CIVITAS operation period). The link between the two tables are the number of the indicators.

The expected impacts are structured according to the Impact categories agreed in the CIVITAS evaluation framework. Only if relevant a category is discussed in the table.

If available you can also use your own tables if they contain at least the same information.

Table 1 contains the following information:

- Impact category (pre-filled in): if not used, a category can be removed, but keep the order!
- Expected impact: describe in words the impacts expected under this category, use as much lines as impacts you want to discuss
- Impact aspects: indicate the ‘impact aspects’ as listed in the indicators table in the CIVITAS evaluation framework. If an additional aspect is evaluated, please add and explain in a comparable way as in the CIVITAS evaluation framework.
- Indicators: list all indicators used to describe the Impact aspects.
    - Also ‘Intermediate indicators’ can be listed. This allows to refer to them in the description of other indicators.
    - Both key indicators and additional indicators need to be listed.
- No.: number of the indicator linking the info of table 2 to this table.

Table 2 contains the following information:

- No.: number of the indicator linking the info of table 1 to this table.
- Indicator
- Data unit(s) used for this indicator
- Frequency: indication of the moments of measurement:
    - B before the implementation
    - I during the operational phase
    - I(xx) during the operational phase, e.g. I(each month)
    - A at the end of the CIVITAS operation period
- Method:
    - DC data collection
    - E estimation
    - S survey
    - C calculation using some intermediate indicators (mention them)
- Observed Group: which users are taken into account in the survey or measurement
- Area of measurement: in which area the data are collected or survey is done

Elements of the table can be explained further in detail by adding comments linked with (1), (2) , …. to the table. Especially for the Method this is useful to clarify the approach.

For the methods it is recommended to give some comments explaining the approach e.g. the control group, or any other technique used to isolate effects and external interference.

Finally also additional general comments to the evaluation approach should be added to explain any specific aspect of the evaluation of this measure, e.g. a possible risk, barrier, data inconsistency, lack of data, ….

C1.2 The baseline

A description of the baseline position should be given. This should describe the approach/philosophy used, data obtained, surveys undertaken etc. Give details of the base year and any differences in the indicators (including data sources) used. The choice of the baseline date, area included, conditions, etc. may require some assumptions to be made.

C1.3 The business-as-usual

A description of the business-as-usual approach for the measure should be given. This should describe the approach/philosophy used (e.g. modelled, extrapolated, measured at a control site / measured at same site) and how it will be used within the whole evaluation. Give details of any differences in the indicators (including data sources) used. The development of the business-as-usual scenario will require assumptions to be made about the estimation methods and factors used.

C2 Measure results

This is the core section of the Measure Evaluation Results Template and is therefore expected to be the longest. It should:

- Report, discuss and interpret the evaluation results;
- Provide facts and explain them;
- Elaborate on the actual contributions to measure objectives;
- Describe whether there is a need for supplementary measures (not only within CIVITAS) to make the measure (more) successful;
- Offer visual presentations, for example graphs, maps, tables, etc.

The results of the impact evaluation are presented and discussed per impact category. Only the impact categories on which the measure has a significant impact are explained.

For each impact category a textual explanation of the achievements is given illustrated with the quantitative information of the indicators used to understand the impact of the measure in the impact category. This information can be presented in tables as included in the template.

The actual ‘After’ results should be clearly compared to those obtained from the baseline ‘Before’ and ‘Business-as-Usual’ (where appropriate). This may best be done using simple tables for one or more indicators with columns for ‘Before’, ‘Business-as-Usual’ (B-a-U) and ‘After’ as well as for the differences between them, as indicated below. In addition bar charts

and other graphical presentations are helpful in understanding the results. Indicate where any observed differences are statistically significant.

C3 Summary: achievement of quantifiable targets and objectives

In the table we make up an overview of the extent to which the measure has achieved its objectives using a star rating scheme. Where the targets/objectives were or were not achieved describe how they differed. Where quantifiable targets have been changed over the course of the project, please indicate these changes and explain why.

C4 Up-scaling

To understand the impacts of the measure if it were applied to a larger area or number of services etc. the observed results need to be up-scaled. This will be based upon a number of assumptions that will need to be made and clearly explained. For instance, if the results from a rapid bus scheme in one corridor of a city are to be up-scaled to three other corridors in the city, information about the scale of the corridors, flows of public transport passengers and other vehicles etc., and likely levels of replication need to be estimated. The assumptions underlying these estimates should be explained.

The up-scaled results should be described in a similar way to the main evaluation results above (see C2 and C3) but also need to be clear about the limitations and assumptions made regarding the up-scaling methodology.

Up-scaling can also be done for a range of measures as part of a city level evaluation. If relevant the results of this can also be reported for the composing measures to make the understanding of the measure itself more complete. I

D Process Evaluation Findings

Here the main findings of the process evaluation are summarised. More details are available in the Process Evaluation Report of the Measure.

D1 Deviations from the original plan

Report on any deviations to the planning, installation or execution of the measure. From an evaluation perspective, it will be important to explain such changes from the original plan, for example, if only a part of the measure was implemented. If a conflict between the dissemination and the evaluation purpose of the template is perceived, indicate any "sensitive" information that should not be made public.

Deviations should be reported in a brief manner. A short heading describing what changed between the original plan and what was implemented, and a few sentences explaining when, where and why things changed.

Example

- **Deviation 1: Biodiesel (B30)** – As long as the B30 is not an approved fuel in Belgium, the discussions on sustainability of bio diesel are still ongoing. Also manufactures of De Lijn buses and fuel suppliers keep reserved to stimulate the use of bio diesel. As the bus manufactures don't give any guarantee and any certificate on the sustainability of bio diesel, the management board of De Lijn decided not to implement bio diesel in their fleet.

D2 Barriers

Here we summarize the findings concerning the barriers for the implementation of the measures and the actions to overcome these barriers.

Example

- **Barrier 1 - Financial –** due to financial crisis, any invests in research and development of hydrogen buses need to be stopped.
- **Barrier 2 - Political –** due to financial crisis, the Flemish minister of mobility, Hilde Crevits, decided to stop any invests in research and development within new technologies (of hydrogen buses).

D3 Drivers

Here we summarize the findings concerning the barriers for the implementation of the measures and the actions to overcome these barriers.

Example

- **Driver 1**: **Planning** - before CIVITAS project started, all buses (except the very old ones which will be replaced in the very near future) received closed soot-filters, financed by Flemish Government
- **Driver 2: Involvement/communication** - Many interest of this project from the major tram constructors and of other PT companies within Europe

D4 Supporting activities

Here we summarize the observations concerning the supporting activities.

Example

Observation 1: citizens participation - the activities to involve the citizens of the corridor in the planning process were crucial to raise the acceptance for the reorganization of the urban space and reducing the parking places

Observation 2: involvement of employees - 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.

D5 Recommendations on the implementation process

Here we summarize the lessons learnt and recommendations concerning the implementation process.

Example

- **Recommendation 1: Financial audit -** See the financial crisis as a stimulation it is better to start with an energy audit to reduce energy costs of the new vehicles
- **Recommendation 2: Juridical aspects –** Implementation of new technologies to collect data needs also a clear agreement on the privacy aspects of using these data. Therefor it is important to start in parallel with the technological development, with a negociation with the relevant services on the privacy issues.

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E Evaluation Conclusions

As suggested in the CIVITAS evaluation framework, it is important to validate the observed impacts of the measure, having well-structured discussions with Measure Leaders, Site Coordinators, external experts, stakeholders, etc. Based on this, the evaluation conclusions can be formulated.

Here we suggest to report these conclusions in different complementary sub-chapter in a bullet point way. This will make the key elements in the conclusions clear.

E1 Validated direct impact

Here we report the key results concerning the impact of the measure, taking into account the observed impacts and the interpretation and comments added to this during the validation phase.

Example

- **Key result 1** – description text description text description text description text description text description text description text description text
- **Key result 2** – description

E2 Relevance of supporting activities

Here we assess the importance of the supporting activities.

Example

- **Key result 1** – description text description text description text description text description text description text description text description text
- **Key result 2** – description

E3 Interaction with other measures

Here we draw key conclusions concerning the interaction with other measures.

Especially when measures are implemented in a strongly integrated way to achieve the objectives, it important to reflect on the complementarity of the measures and the importance of each measure in the final impacts observed. In that case, during the validation meeting and process evaluation meetings, an expert judgement should be done ranking the different

measures of an Integrated Package of measures according to their importance in the observed impacts. The result of this, can be presented here.

Example

- **Key conclusion 1** – description text description text description text description text description text description text description text description text
- **Key conclusion 2** – description

E4 Main lessons learned

This subchapter presents the main conclusions on the measure integrating impact and process evaluation findings. In this way it is the key subchapter of this document.

Example

- **Key conclusion 1** – description text description text description text description text description text description text description text description text
- **Key conclusion 2** – description

E5 Long term impact

Based on the conclusions of the evaluation of this measure in the lifetime of the CIVITAS project, we can draw here conclusions concerning the (expected) long term impact of this measure.

Example

- **Key expectation 1** – description text description text description text description text description text description text description text description text
- **Key expectation 2** – description
- …

E6 Potentials for up-scaling in the city

Based on the conclusions of the evaluation of this measure in the lifetime of the CIVITAS project, we draw her conclusions concerning possibilities to up-scale this measure in the city.

Example

- **Key conclusion 1** – description text description text description text description text description text description text description text description text
- **Key conclusion 2** – description

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E Additional information

E1 Appraisal of evaluation approach

Here we give a critical reflexion on the evaluation approach for this measure indicating weak and strong points and giving recommendations for similar evaluation work in the future.

E2 Future activities relating to the measure

Here we add all available information on the future of the measure after the project lifetime. Also reasons why and why not should be added.

3 Process Evaluation Report (PER)

The guidelines are set out using the same format as in the Template.

Informative table

This table contains some basic information of the measure:

- Project: name of the CIVITAS project (acronym)
- City: name of the city, metropolitan area or urban region
- Measure code: code used to identify the measure or the IP in all CIVITAS reporting
- Measure name: descriptive name of the measure or IP
- Reporting period: the period for which this Process Evaluation report is reporting:
    - PR1: process evaluation reporting on month 1 to 12
    - PR2: process evaluation reporting on month 13 to 24
    - PR3: process evaluation reporting on month 25 to 36
    - PF: final process evaluation reporting on month 1 to 42
- Responsible: responsible LEM
- E-mail: e-mail of responsible LEM
- Telephone: telephone number of responsible LEM

Example

Project	**City**		
PORTIS	ANTWERP		
Measure code	**Measure name**		
ANT 2.7	**Elaborate full commuter plans for (bigger) companies**		
Last update	**Responsible**	**e-mail**	**telephone**
10.12.2016	Sofie Aelterman	sae@traject.be	+32 475 80 76 08

A Introduction

Here the basic information of the measure is presented as it was defined at the start of the project.

Guidelines are given under chapter 2.

This chapter is identical to the first version of the MER allowing to copy this part from the **first** version of the MER.

B General observations for the measure in this reporting period

Here the main findings of the process evaluation are summarised. More details are available in the Process Evaluation Report of the Measure.

B1 Implementation process

In which stages was the measure during the reporting period?

We have 3 main stages for a measure:

- Design, planning, preparation stage: the measure is developed in detail and design work for the measure is conducted. At the end of this phase all planning details are fixed, including all decisions and permissions that are a pre-condition for starting the implementation phase.
- Implementation stage: the measure will be implemented in real life. At the end of this phase the measure starts operation.
- Operation stage: the measure is opened to the public, i.e. users are able to increase their utility. The first phase of operation lies within the time frame of the CIVITAS project and can be analysed and evaluated. The long-term running is the outstanding time (beyond the CIVITAS).

Only keep the stages which were active during the reporting period and add relevant milestones achieved during this period.

Elements of the table can be explained further in detail by adding comments linked with (1), (2) , …. to the table.

More details should be given e.g. main milestones, timing, specific activities. For the timing the monitoring tool (part showing the stages) can be used.

Where there any changes in the measure in this period?

Explain any changes during the reporting period, identifying the reasons and decision making process for this changes.

Additional comments

If relevant additional general comments can be added. Possible changes during the life time of the CIVITAS project can be mentioned here.

B2 Process evaluation activities

Which activities were done to have a good understanding of the implementation process ?

Here we report the activities done to have a good understanding of the implementation process ?

B3 Barriers

Which barriers have been encountered during the reporting period in trying to reach the objectives of the measure ? Which actions taken by one or more measure partners to handle the barriers ?

Process barriers are events or overlapping conditions that hampers the process to obtain measure objectives/goals.

Here we report on these barriers and the actions to overcome these barriers:

- Barrier field: use these fields or add an additional one:

  1 Political / strategic: e.g. Opposition of key actors based on political and/or strategic motives, lack of sustainable development agenda or vision, impacts of a local election, conflict between key (policy) stakeholders due to diverging believes in directions of solution

  2 Institutional: e.g. Impeding administrative structures, procedures and routines, impeding laws, rules, regulations and their application, hierarchical structure of organizations and programs

  3 Cultural: e.g. Impeding cultural circumstances and life style patterns

  4 Problem related: e.g. Complexity of the problem(s) to be solved, lack of shared sense of urgency among key stakeholders to sustainable mobility

  5 Involvement, communication: e.g. Insufficient involvement or awareness of (policy) key stakeholders, insufficient consultation, involvement or awareness of citizens or users

6 Positional: e.g. Relative isolation of the measure, lack of exchange with other measures or cities

7 Planning: e.g. Insufficient technical planning and analysis to determine requirements of measure implementation, insufficient economic planning and market analysis to determine requirements for measure implementation, lack of user needs analysis: limited understanding of user requirements

8 Organizational: e.g. Failed or insufficient partnership arrangements, lack of leadership, lack of individual motivation or know-how of key measure persons

9 Financial: e.g. Too much dependency on public funds (including CIVITAS funding) and subsidies, unwillingness of the business community to contribute financially

- Description: description of the barrier with more detail in a way understandable for people outside the city - without detailed knowledge of the measure. Questions to be answered are: Which impact did the barrier have on the process of the measure and How did it occur? What exactly happened?

  Example: If a (institutional) barrier is described just with “Impeding administrative structures, procedures and routines” it is not clear what happened in the city and what negative impact this factor had on the measure. It would be better to additionally write in one sentence a more specific explanation such as “The new complex legislation of procurement for the purchasing of goods and services has caused delays in the process of the public tender necessary for purchasing the automatic control system”.

- Action to overcome the barrier: what was/is done to solve the problem caused by the barrier. Examples of this are:
  - Political / strategic: (Co-)development of vision on sustainable development or sustainable mobility, (Co-)development of a program towards sustainable development or sustainable mobility, discours with key stakeholders (politicians etc) about the sustainability problems to be solved
  - Institutional: Analysis of and/or proposals to change impeding rules, structures, legislation, organisational structures etc.
  - Cultural: Facilitating cultural circumstances and life style patterns
  - Problem related: Thoroughly analyzing problems towards sustainable mobility to be solved, activities to explain the pressure of the problem, all activities towards sharing the sense of urgency among key stakeholders to sustainable mobility
  - Involvement, communication: Consultation of target groups by workshop, conference, focus group, expert meeting, face-to-face interviews or questionnaires, telephone interviews or questionnaires or web based questionnaires, public awareness campaign about the sustainability problems to be solved, bringing together key stakeholders to discuss the sustainability problems to be solved (sharing different viewpoints), public awareness campaign

about the measure through media activities, involvement of key stakeholders (politicians etc) in the measure

- Positional: Put the measure concerned into a running sustainability program (combined with the strategic actions), activities to exchange experiences with other measures / cities (workshop, conference, focus group etc)
- Planning: Raising or attempting to raise additional 'time budget' for the measure , (re)conduct the economic and technical planning as well as analysis to determine requirements of measure implementation, (re)conduct market analysis to determine requirements for measure implementation, thoroughly analyzing user needs analysis to better understand the user requirements
- Organizational: Activities to raise the competences of the measure partners (for example special courses etc), activities to raise the motivation of the measure partners (for example extra measure meetings)
- Financial: Raising or attempting to raise additional financial budget for the measure, developing a context which is attractive to the business community to contribute financially
- Technological: Raising or attempting to raise additional technical resources for the measure (all kind of equipment), all kind of actions to solve technological problems
- Spatial : (Attempts) Adjusting the construction permissions, creating experimental and /or investment zones / city parts / corridors

Additional comments:

If relevant additional general comments can be added.

B4 Drivers

Which drivers might have been encountered during the reporting period in trying to reach the objectives of the measure ?

Which actions taken by one or more measure partners to make use of the drivers to reach the measure objectives?

Process drivers are events or overlapping conditions that stimulates the process to obtain measure objectives/goals.

Here we report on these drivers and the actions to make use of the driver to stimulates the process to obtain measure objectives/goals:

- Driver field: use these fields or add an additional one:

1 Political / strategic Commitment of key actors based on political and/or strategic motives, presence of sustainable development agenda or vision, positive impacts of a local election, coalition between key (policy) stakeholders due to converging (shared) believes in directions of solution

2 Institutional Facilitating administrative structures, procedures and routines, facilitating laws, rules, regulations and their application, facilitating structure of organizations and programs

3 Cultural Facilitating cultural circumstances and life style patterns

4 Problem related Pressure of the problem(s) causes great priority, shared sense of urgency among key stakeholders to sustainable mobility

5 Involvement, communication Constructive and open involvement of policy key stakeholders, constructive and open consultation and involvement or citizens or users

6 Positional The measure concerned is part of a (city) program and/or a consequence of the implementation of a sustainable vision , exchange of experiences and lessons learned with other measures or cities

7 Planning Accurate technical planning and analysis to determine requirements of measure implementation, accurate economic planning and market analysis to determine requirements for measure implementation, thorough user needs analysis and good understanding of user requirements

8 Organizational Constructive partnership arrangements, strong and clear leadership, highly motivated key measure persons, key measure persons as 'local champions'

9 Financial Availability of public funds (including CIVITAS funding) and subsidies, willingness of the business community to contribute financially

10 Technological New potentials offered by technology, new technology available

11 Spatial Space for physical projects, experimentation zones

- Description: description of the driver with more detail in a way understandable for people outside the city - without detailed knowledge of the measure. Questions to be answered are: Which impact did the driver have on the process of the measure and How did it occur? What exactly happened?

  Example: If a (political) driver is described only with "strong commitment of local authorities", it is not clear to the outside reader which impact on the measure process this driver is causing. It is necessary to write in one sentence which local authority or person is concerned and what has changed concerning the process of the measure due to this commitment. An example is: "The alderman for city development has promoted the

measure in such a way that also business became interested in the measure and this now company XXX is an principal partner"

- Action to make use of the driver: what was/is done to make use of the driver to support the implementation of the measure in an optimal way and to increase the envisaged impacts. Examples of these type of actions are given already under 'Action to overcome the barrier' (see above).

Additional comments:

If relevant additional general comments can be added.

B5 Influence on risks

How do you estimate the risk in reaching the objectives at this moment?

This is an update of the table under A5. There the initial version at the start of the project is presented and we keep this in this way.

Here we indicate the influence of the current process on these risks with the possible occurring of new additional risks. Only the risks of the coming period must be listed:

- Risk category: use these types or add an additional one:

  1 Political / strategic: e.g. Opposition of key actors based on political and/or strategic motives, lack of sustainable development agenda or vision, impacts of a local election, conflict between key (policy) stakeholders due to diverging believes in directions of solution

  2 Institutional: e.g. Impeding administrative structures, procedures and routines, impeding laws, rules, regulations and their application, hierarchical structure of organizations and programs

  3 Cultural: e.g. Impeding cultural circumstances and life style patterns

  4 Problem related: e.g. Complexity of the problem(s) to be solved, lack of shared sense of urgency among key stakeholders to sustainable mobility

  5 Involvement, communication: e.g. Insufficient involvement or awareness of (policy) key stakeholders, insufficient consultation, involvement or awareness of citizens or users

  6 Positional: e.g. Relative isolation of the measure, lack of exchange with other measures or cities

7 Planning: e.g. Insufficient technical planning and analysis to determine requirements of measure implementation, insufficient economic planning and market analysis to determine requirements for measure implementation, lack of user needs analysis: limited understanding of user requirements

8 Organizational: e.g. Failed or insufficient partnership arrangements, lack of leadership, lack of individual motivation or know-how of key measure persons

9 Financial: e.g. Too much dependency on public funds (including CIVITAS funding) and subsidies, unwillingness of the business community to contribute financially

- Description: short explanation of the risk, see examples above, and indicate the influence of what happened in this reporting period on this risk.
- Action to limit the risk: which actions are planned to limit the risk

If relevant additional comments can be added.

C Specific observations on the supporting activities in this reporting period

If supporting activities are significant for these measure, it is important to evaluate them specifically. The items in this chapter can be used to do this in a structured way.

If this is not the case, this chapter can be left out of the report.

C1 Quality of the Supporting Activities

Here we assess in a qualitative way each supporting activity. First we give any relevant data on the size and penetration level of the activity towards the target group. Then we assess the activity with a qualitative score.

The table should be filled in with the following information:

- Activity: e.g. event, public discussions, workshop, hearing, presentation, info-material, leaflets, ….
- Target group: the target group of the activity with a quantification of the size e.g. the 1000 children of a primary school, 500 employees of the Technological Park, …
- Quantitative indicators on level of penetration of target groups: data on the size of the activity and the response of the target group e.g. number of hearings, participants, number of reactions on a survey,

- Qualitative score: ….* = Poor ** = Satisfactory ***= Excellent for the following aspects:
    - Relevance information: is the information or discussion relevant in relation to an effective and efficient implementation of the measure
    - Timing: was it the right moment to do this activity ?
    - Relevance of target group: was this the right target group to approach to have an influence on the implementation process and the impact of the measure
    - Any other aspect you define yourself (or agreed in your project)

Elements of the table can be explained further in detail by adding comments linked with (1), (2) , …. to the table. Especially for the qualitative score this can be useful.

If relevant, additional general comments can be added.

C2 Influence of the Supporting Activities on the implementation process

Here we assess the influence of the supporting activities on the implementation process of the measure.

Available information

If available any data showing the influence of the supporting activities on the implementation process of the measure can be added here.

Assessment

Here we assess in a qualitative way each supporting activity:

- Quantitative indicators: some pre-formulated indicators are already added in the table, others can be added
- Qualitative score: O = None * = Poor ** = Satisfactory ***= Excellent
- Motivation: explain in bullet points the qualitative score.

If relevant additional general comments can be added.

C3 Influence of the Supporting Activities on the impact of the measures

Here we assess the influence of the supporting activities on the impact of the measure. The difference between this aspect and the previous aspect (see C2) can be illustrated by the following example:

Meetings with citizens living in a heavy road corridor in which parking places are replaced by a good cycling lane can help to make it acceptable to construct the cycling lane and avoid negative reactions on the building permit (= influence on the implementation of the measure) but can also motivate people to start cycling more using the measure (with a positive influence on the impact of the measure).

Assessment

Here we assess the influence of the supporting activities on the impact of the measure:

- Ranking: put the influences in order of importance
- Impact category: the impact category (see MER C1.1)
- Impact aspect: the impact aspect (see MER C1.1)
- Qualitative data: If available any data showing the influence of the supporting activities on the impact of the measure can be added here in bullet points.
- Qualitative score: O = None * = Poor ** = Satisfactory ***= Excellent
- Motivation: explain in bullet points the qualitative score.

If relevant additional general comments can be added.

C4 Lessons learnt on the Supporting Activities

Here we draw some conclusions on the importance of supporting measures to have a positive influence on the implementation process and the impact of the measure.

We can synthesis the finding and highlight some specific elements.

Annex 5 - Framework for Cost Benefit Analysis

This annex presents the CIVITAS GUARD Framework for Cost Benefit Analysis (Part 1) and the CBA tool developed in CIVITAS DYN@MO (Part 2).

Part 1 CIVITAS GUARD Framework

This short note is based on the CIVITAS GUARD Framework for Cost Benefit Analysis developed by John Preston of TRG, University of Southampton. From the outcomes of CIVITAS I it was clear that the European Commission wanted evaluation that provided quantified conclusions and added value to project/city reports. Within CIVITAS II this was felt to be best provided through the use of Cost Benefit Analysis (CBA), although this approach could be supplemented by other economic assessment approaches such as multi-criteria analysis (MCA) where appropriate.

Within CIVITAS PLUS II, the use of Cost Benefit Analysis has been firmly endorsed by the European Commission with the expectation that this will be used for economic assessment of at least about one third of all measures.

This short Note aims to scope the form of CBA that could be adopted.

1. Scope of Cost Benefit Analysis

CBA would focus on a sub-set of the quantitative indicators. These are listed in Table 1. The expected impacts are indicated by ✓. Some other indicators include parking costs (could be incorporated into operating revenue) and access/egress time (typically walk time) for public transport.

It should be noted that in most cases the measures are assumed to affect either the passenger sector (WP1, 2, 4, 5, 6, 8) or the freight sector (WP7). Only one set of measures is assumed to affect both sectors (WP3). WP1 assumes no impact on demand, whilst WP3, 4, 5 and 8 assume no changes in public transport frequencies (in other words any modal shift can be accommodated by existing spare capacity).

With respect to the environment, it is assumed that the emphasis will be placed on emissions except for WP3 where air quality should also be considered.

The key indicators include measures of:

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

- Changes in vehicle emissions.
- Changes in transport related accidents.

Table 1: CBA Indicators

	WP 1 Alternative Fuels & Clean Vehicles	WP2 Collective Passenger Transport	WP3 Demand Management Strategies	WP4 Mobility Management, Marketing, Communication & Education	WP5 Safety & Security	WP6 Energy-efficient Vehicle Use	WP7 Energy-efficient Freight Distribution	WP8 Innovative Transport Telematics Systems
Operating revenues		✓		✓ (profitability)		✓ (profitability)	✓ (profitability)	
Operating Costs	✓	✓	✓	✓	✓	✓	✓	
Maintenance Costs	✓	✓	✓	✓	✓	✓	✓	✓
Investment Costs	✓	✓	✓	✓	✓	✓	✓	✓
Fuel Consumption	✓	✓	✓	✓		✓	✓	
Emissions	✓	✓	✓	✓		✓	✓	✓
Air Quality			✓					
Noise			✓	✓		✓	✓	
Transport safety		✓	✓	✓	✓	✓	✓	✓
Passenger movements		✓	✓	✓	✓			✓
Freight movements			✓		✓	✓	✓	
Modal split		✓	✓	✓	✓	✓	✓	✓

Traffic levels		✓		✓	✓	✓	✓	✓ (Congestion)
Journey times		✓	✓		✓			✓
Waiting times				✓	✓			
Service frequency		✓			✓			
Service reliability					✓(Waiting time)	✓(Waiting time)	✓(Waiting time)	✓
Vehicle occupancy		✓						
Vehicle Speed			✓	✓ (Congestion)	✓	✓ (Congestion)	✓ (Congestion)	✓ (Congestion)
Parking demand		✓	✓					

2. Form of Analysis

This would be based on a standard social cost benefit analysis of the following form.

$$NPV_s = \sum_a \sum_{i=0} \frac{(R_{ia} + UB_{ia} + NUB_{ia} + E_{ia} - OC_{ia} - K_{ia})}{(1 + r)^i}$$

where

NPV_s = Net present value summed over all agents
R_{ia} = Revenue in year i to agent a,
UB_{ia} = User transport benefits in year i accruing to agents a,
NUB_{ia} = Non user transport benefits in year i accruing to agents a,
E_{ia} = External benefits in year i accruing to agents a,
OC_{ia} = Operating (and maintenance) costs in year i to agent a and
K_{ia} = Capital costs accruing to agent a in year i (with the usual assumption being that capital costs begin to be incurred in year 0).

It is suggested that five agent groups are considered: transport operators, authorities, users of the measure, other transport users and households. This would require impacts to be disaggregated by these groups. Particular attention should be paid to tax streams, particularly where there are transfers from highly taxed car to low taxed (and subsidised) public transport and vice versa. Information will be required on transport tax rates in each partner city.

The project life would vary from measure to measure (based on either the technical, market or economic life of the technologies being introduced – although this could be standardised e.g. to 10 years). The interest rate would be determined by the European Commission (currently 4%).

Table 2: Example of CBA (stimulation of public transport)

Agents	Costs	Benefits
Public Transport Operator	Construction Costs Operating Costs	Additional Revenue (Grants) (Subsidy)
Public Transport Users		Reduced time of travel Reduced costs of travel net of tax savings (Tax savings) Reduced accidents
Car Users		Reduced time of travel Reduced cost of travel net of tax savings (Tax savings) Reduced accidents
Local Authorities	(Grants) (Increased subsidy) (Tax savings	
Householders	Environmental Costs	Environmental Benefits

The NPV calculations would be undertaken by Projects/Cities using the information obtained by cities in Table 1, modified to form a cost-benefit impact matrix of the form shown by Table 2, which shows an example of the stimulation of public transport which also leads to reduced road congestion.

The measurement of user benefits would be based on the concept of generalised cost. Generalised cost would be calculated as:

$$GC = OPC + T + v_1 IVT + v_2 OVT + v_3 DT$$

where

OPC = Out of Pocket Cost Net of Tax

T = Tax

IVT = Expected In-vehicle time

OVT = Out of Vehicle Time (based on walk and wait time. For frequent services wait time

can be assumed to be half the service headway).

DT = Delay Time (based on reliability measure).

v_1 = the value of in-vehicle time,

v_2 = the value of out-of-vehicle time (often assumed to be twice v_1),

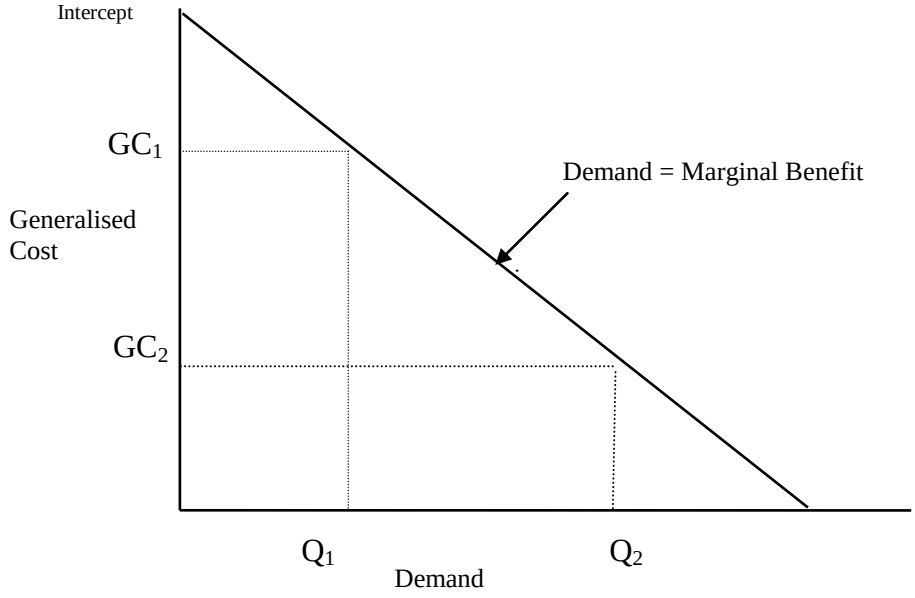
v_3 = the value of delay time (sometimes assumed to be three times v_1).

Meta-analyses will be needed to establish European wide values of time, as well as values of accidents and values of air and noise pollution. With respect to air pollution, emphasis would be on both global impacts (carbon) and local impacts (NOx, PM_{10}). Noise could only be included where it is quantified (e.g. in terms of DbA)

The generalised cost measures will be used to determine user and non user benefits using variants of the rule of half. For example, from Figure 1 below user benefits (UB) could be computed as:

$$UB = Q_1 (GC_1 – GC_2) + ½ (Q_2 - Q_1) (GC_1 – GC_2)$$

Figure 1: Illustration of the Rule of Half.



Where there are changes in the generalised cost and usage of existing modes, user benefits may be estimated by direct measurement, assuming a linear demand curve. Where a new mode is introduced, this will require knowledge of the (inverse) demand curve (and in particular the intercept that determines the maximum willingness to pay). However, given knowledge about price and/or generalised cost elasticities, this can be inferred. Knowledge of the entire demand curve will also be required when there are shifts in the demand curve (for example due to changes in external factors) rather than movements along the demand curve.

Where there is knowledge of modal diversion, estimates of non-user benefits can be made through the use of indicators such as the value of congestion relief, safety benefits and environmental benefits per passenger kilometre abstracted from car to other modes.

Evaluation could be undertaken by developing a **spreadsheet model** in which sensitivity analysis could be undertaken with respect to key parameters.

An important issue that will need to be considered is the level of spatial resolution as some measures will be localised to a particular corridor or neighbourhood, whilst others will have a city wide impact. This may be exacerbated by the variation in the number of measures being considered by cities.

An important priority is for partner cities to each identify measures (or groups of measures) that they believe will be amenable to such quantitative analysis.

An Example

The proposed methodology has been applied to a Winchester case study examined by TRG as part of the CIVITAS I MIRACLES project. An example is given by Table 3, which examines the impacts of a quality bus partnership.

Table 3: An Illustrative Cost-Benefit Analysis applied to a CIVITAS I Project

	Change in revenue	Change in capital costs	Change in operating costs	Change in user benefits	Change in non-user benefits[1]	NPV	Overall total
1	116484	1395594	16663	145606	5500	-1144667	-1144667
2	135375	0	4993	169219	8204	307805	-836863
3	130797	0	4824	163497	7926	297396	-539467
4	126374	0	4661	157968	7658	287339	-252127
5	122101	0	4504	152626	7399	277622	25495

[1] Benefits from congestion relief and reduced noise and air pollution.

Table 3 shows that this scheme breaks even in social terms after five years. This scheme involves the provision of new vehicles and a project life of 15 years could be assumed. Given the then UK test discount rate of 3.5%, the social Net Present Value of the scheme is over £2.3 million and the benefit:cost ratio is 2.59. Indeed this scheme appears to be a success in commercial terms, with a financial Net Present Value of £0.178 million and a benefit:cost ratio of 1.12. This is reassuring given that the bulk of the investments were made by a commercial bus operator.

Part 2 CIVITAS DYN@MO cost-benefit analysis tool for cities to evaluate measures

Within the CIVITAS DYN@MO project, Tim Larsson of Lund University developed a cost-benefit analysis tool. This tool (an excel spreadsheet) allows the user to input relatively little data about a sustainable urban transport measure and to obtain a benefit-cost ratio and net present value for the measure based on the monetised value of its costs and benefits.

It takes into account many different benefits including time, operating cost and accident savings, changes in air quality and noise. It uses monetized values of these benefits taken from Swedish and UK sources but adapted to take into account differences in purchasing power in different DYN@MO countries. However, if users have local values, they can include these in the spreadsheet if they wish but this is only recommended for expert users who are very familiar with how CBA works.

The tool can be downloaded via following link:
www.civitas.eu/content/civitas-dynmo-launches-easy-use-cost-benefit-analysis-tool-0.

In addition to the tool, a note can be downloaded from this site (www.civitas.eu/content/civitas-dynmo-develops-user-friendly-cost-benefit-tool-cities-evaluate-measures) which provides the source data for a hypothetical CIVITAS measure typical of those for which you might wish to carry out a CBA. You can test the tool by using the data on pages 1 and 2. Then, after you obtain a result, you can check the right answer on pages 3, 4 and 5 that will hopefully highlight and explain problems that you experienced – if any – in using the spreadsheet.

ANNEX 7 - Reflective evaluation by the learning histories method

1 Introduction

How do we organize the preparation, implementation and operation of the CIVITAS measures, and how can we improve the way we learn from our experiences? These are important questions. Looking back can be very helpful in finding some answers; to build new perspectives and find ways for new strategies to improve the process of the measures and to learn about transferability.
Making a learning history together with involved project partners is a process of creating collective memory and of sense making. It stimulates reflection in a natural way: by story telling, and looking for emerging patterns in the stories.

"If people want to share meaning, then they need to talk about their shared experience in close proximity to its occurrence and hammer out a common way to encode it and talk about it. They need to see their joint saying about the experience to learn what they jointly think happened" (Karl Weick).

The aim of the Learning History method within CIVITAS is getting insight to the:

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

1.1 Background Learning History

The concept learning history is developed by researchers at the American research institute MIT (Kleiner & Roth, 1997). A learning history is a way for organizations to learn from experience and consequences of their own learning and change. It is a way of recording learning experiences. Characteristic of a learning history is not only the lesson drawn from the experience being told, 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.

In fact a learning history is a process that results in a jointly told tale in multiple narratives, with illustrations and reflections on strategies, noticeable results, what happened and why. It gives insight to organizational dynamics, the internal logics on dealing with change. Workshops and training can be part of this process. A learning history is also a product: a document, or any other form of (multimedia) presentation, to be spread and discussed on a large scale. A learning history can have the form of an ongoing story, continuously renewed, in the form of a collective journal or learning log, or as a website. The history is performed by people who were/are involved in the central issue of the history, preferably also external people, like trainers, partners, stakeholders. So, a learning history is not only a product, but primarily a process of making sense of (learning) experiences. (www.learninghistories.net).

1.2 What does a Learning History looks-like?

A learning history is one story about a process with 3 layers:

1. The first layer describes the main actual measure events that occurred during the reporting period, in a chronological way.
2. The second layer shows the perception of internal/external project partners why they believe these main actual events happened as they happened and what the role/impact was of barriers and drivers. These perceptions are shown as statements of different (anonym) project partners.
3. The third layer contains critical reflection, concerning issues like: what could we learn from the process so far; how did we handle barriers and make use of drivers and was that the right way? Or should we have done it in another way? How can we make use of these learning experiences for transferability?

The figure below shows an example of a Learning History structure.

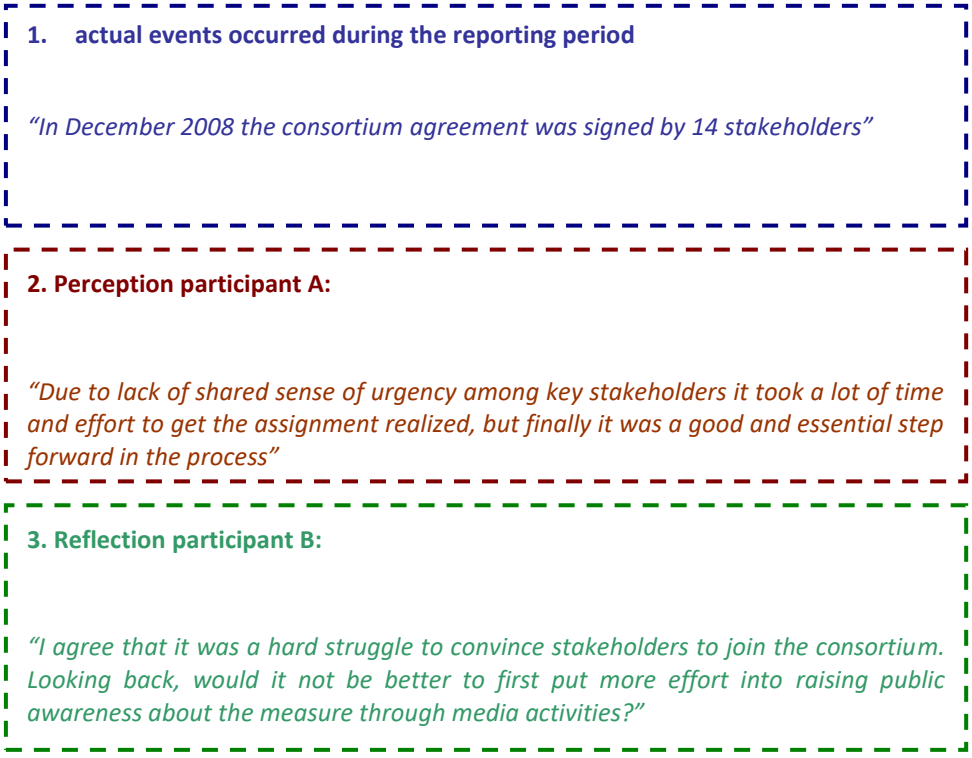


Figure 1: Learning History structure

1.3 Why use the Learning History method?

Because of the 3 layered structure, the Learning History offers an added value on the evaluation process on several aspects:

- It clearly states the various (learning) experiences and opinions of different stakeholders and reports these inputs in a structured manner in the context of the project. This makes it easier to discuss them with colleagues or outsiders who were not involved in the specific process; the last point is of importance for the transferability of learning experiences.
- The open-minded joint reflection process should create a safe space to have a critical reflection on a participant's own role and the group's role as a whole. In this way, the Learning History approach contributes to the process of building common confidence, understanding and trust; which are terms for change and innovation.
- This method facilitates a process to speak up about things that went well in the process, but also to share and to discuss hot issues. This could 'clear the air' and gives new energy and insights to continue the measure process.

2 How to set up a Learning History in CIVITAS?

2.1 General overview of steps

For setting up a Learning History within the CIVITAS measures, the following approach (see figure 2 below). Starting with the practical organization of a Learning History workshop, followed by the performance of the workshop aiming to gather process information on barriers, drivers and learning experiences, and finally reporting the results in Section II of this part of the Focused Measure Process Evaluation Form. The sub paragraphs 4.1 to 4.4 in this text will explain the following steps more in detail.

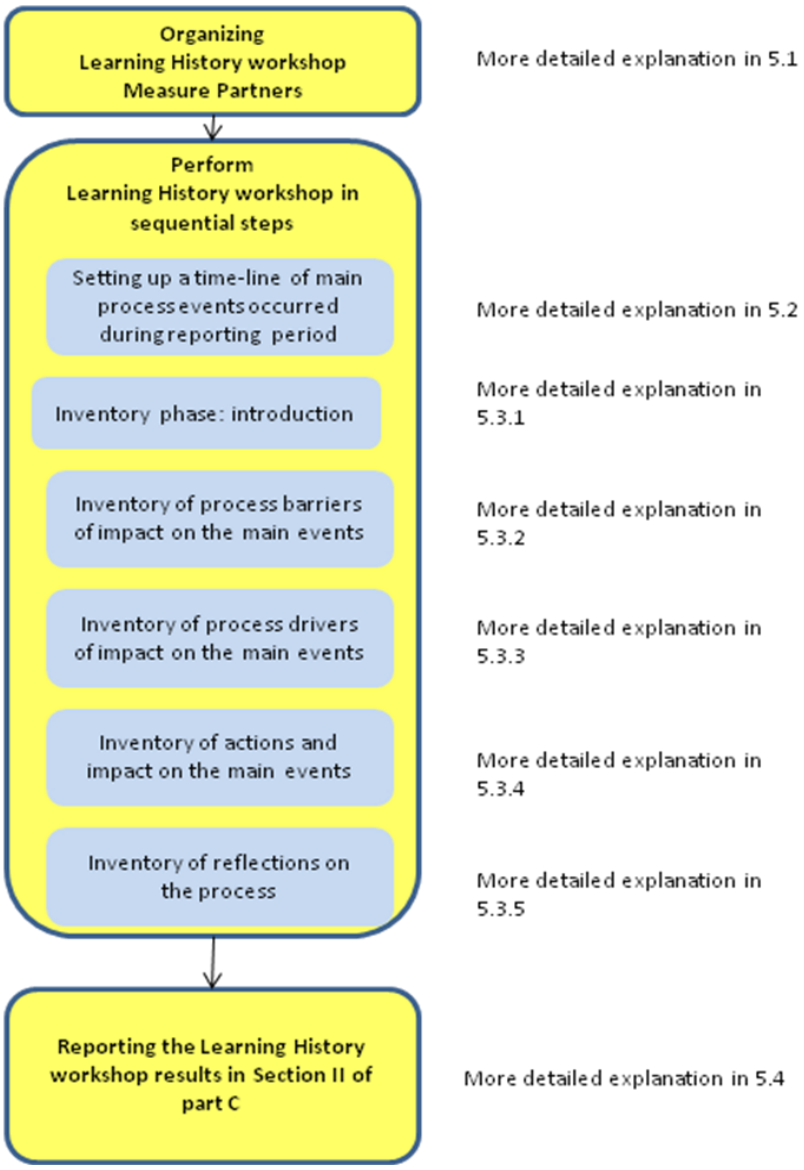


Figure 2: Setting up a Learning History for a CIVITAS measure

Box 1

As there are many countries and cities involved in CIVITAS Plus it is obvious that there is a great variety in the context in which the measures are to be carried out. To a large extent this is due to cultural aspects, differences in daily routines etc. Therefore, the Learning Histories approach is to be regarded not as a blueprint, but as a framework. This framework provides a basis to collect the information on barriers, drivers etc which is necessary to complete Part C. The way one uses this framework depends on the context of the measure. In this clarification on how to set up a Learning History attention will be paid to different ways of using the framework. However it is necessary to bear in mind that:

- It is impossible to pay attention to all the different circumstances of the various measures. This implies that the here mentioned remarks, 'tips and tricks' etc. are based on the outcome of the workshops on Learning Histories in Porto and Delft.
- In addition to the aforementioned point the Measure Leaders (ML's) and Local Evaluation Managers (LEM's) have to rely also on their own inventiveness and creativity. Of course it is always possible to contact TNO for advise how to deal with special circumstances: Martin van de Lindt (E: martin.vandelindt@tno.nl, T: + 31 15 2695487), Sophie Emmert (E: sophie.emmert@tno.nl, T: + 31 15 2695483).
- Regardless of the way that the Learning Histories concept is used, the retrieved information must be qualitative and quantitative sufficient to fill in Part C.

2.2 Organizing a Workshop

Box 2

The goal of the Learning History (LH) workshop is to get as much relevant information as possible about the measure process by combining facts, perspectives and reflections on barriers, drivers, actions etc., and to use this information to complete part C in an efficient way. A workshop like this requires that the attendees speak frankly and bring forward not only positive matters, but also process related problems. Sometimes this can be a very serious barrier to organize the workshop.

The alternative is to do structured interviews with the relevant persons, based on the questions to be answered in the parts of the Focussed Measure Process Evaluation Form. The results of the interviews are used anonymously to complete the Focussed Measure Process Evaluation Form.

This seems an attractive alternative to the workshop, but it is necessary to bear in mind that there are some great disadvantages. The first is that the information is one dimensional (no reflection at all on the facts and perspectives) and therefore qualitative not as rich as information from the workshop. Secondly, structured interviewing and converting the results into (in this case) Part C of the form is a very time consuming process. It is expected that it is far more time consuming then a well organized Learning History process as suggested in this clarification. Above this, the Learning History process as suggested in this clarification has the advantage for the Measure Leader that he gathers the required information in a very structured way, that he is not doing everything by his own and gives him the opportunity to bind persons / organizations around the measure.

- *Inviting Measure Partners*

In view of the fact that communication is an important matter, it is suggested that clear contact is made with the partners and they are invited in good time for the workshop. It is also important to be clear what will be expected from the project partners during the workshop. For that reason we would recommend the Measure Leaders to compose an invitation letter or email on a personal level for the project partners, including:

- ✓ why and for which purpose the measure process is evaluated;
- ✓ the frequency of evaluating, which is once a year;
- ✓ when and where the LH workshop will take place;
- ✓ expectations of the LH workshop participants in terms of contributing to the open-minded reflection on the measure process and the collection of learning experiences;
- ✓ the program of the workshop and the questions to prepare themselves for the workshop by reading in advance the draft 'time-line actual events' of the measure.

Box 3

Sometimes the problem arises that the Measure Leader is not in a position to invite the possible attendees of the LH workshop. Often this is caused by his or her position within the organization in relation to hierarchical structures. One way to handle this problem is to speak to the right person, explain the problem, make clear agreements with him or her and prepare the invitation procedure. Then send the invitation on behalf of the right person or let him or her send the invitation.

Normally it should be not a big problem, but sometimes it will be difficult to motivate possible attendees to come to the workshop. There is really not a blueprint solution for this. Sometimes it is suggested to give people who are attending the workshop a (financial) incentive, but this is rather unusual because the attendees in fact have a stake in the measure. Moreover it is very doubtful if one gets the best motivated people for the LH workshop. A better way of motivating people is, beside putting together an attractive workshop program, for example putting forward that:

- ✓ They get a chance to put forward their own perspectives, stakes, opinion about barriers, drivers etc and make these clear to the other attendees
- ✓ The input of all the attendees will be used anonymous in the report and will not be lost
- ✓ The aim of the LH workshop is not to judge each other but to learn from each other
- ✓ Team spirit and working together are essential conditions for the success of the measure. The workshop will contribute to these conditions.

Since the character of Learning History workshops is very much an interactive process, we would recommend not involving too many participants just to be able to facilitate an open dynamic group process. A number of participants between 7 and 9 seems to be ideal. Not only is the number of participants of influence on the quality of the workshop process and the results, but also the persons who are invited. It is best to invite the specific persons of the measure partners who have a clear view on the measure process from their perspective.

Box 4

It is often a question who to invite for the workshop. In this case it is useful to make a distinction between core measure partners and others. The core measure partners are those organizations that signed the measure contract. Normally representatives of these organizations are always invited to the workshop. However it is important that these representatives are really involved with the measure so they can bring forward relevant information. The questions who else to invite is not unambiguous to answer. It depends to a large extend on the phase and / or ultimate objective of the measure. If the measure is, for example, in the preparation phase it can be a good reason for inviting only the core measure partners. However, when one of the main goals of the measure is scaling up, transferring it to other parts of a city or even to other cities, it might be very useful to invite representatives of other city departments and/or organizations. Sometimes it is useful to invite someone who is relatively an outsider because he or she can reflect in a very open way and might bring forward some new perspectives, ideas etc. This might be useful when there are circumstances that are hampering the process in a way that a lock-in situation has been occurred (or are likely to occur).

Although there is no one single answer who should be invited for the workshop there are some general tips to work with:

- ✓ Think very carefully about who is to be invited. Relate this not only to the purpose of the workshop to be organized, but also to the phase and objective of the measure. Think strategically!!
- ✓ Although the people who are invited are part of organizations, it is important to realize that ' people are making the workshop and are defining the results'. Therefore it is very helpful to make a profile of the people who are to be invited. For example the type of organization they work, the position within the organization, the relation to the measure, the power and willingness to influence the measure process, relations with other measures or (city) programs, the willingness and capability to listen and learn etc.
- ✓ To be sure that all organizations are represented sufficiently it is recommended to have two persons of an organization on the invitation list. One that seems the best, and one that is a good replacement. If the first one will not be present, the second one can be invited. You may also invite both, assuming that one of them will not attend the workshop.

- *Example Workshop program*

Time	Activity
8.30 – 8.45	Walk in and coffee
8.45 – 9.00	Opening, introduction intention of the session
9.00 – 9.15	Presentation time-line actual events (Measure Leader)
9.15 – 9.30	Discussion and completion time-line actual events
9.30 – 10.00	Inventory barriers and reflections
10.00 – 10.15	Coffee break
10.15 – 10.45	Inventory drivers and reflections
10.45 – 11.15	Inventory actions and reflections
11.15 – 12.00	Reflections and learning experiences
12.00 – 12.30	Lunches
12.30 – 12.50	Learning experiences and transferability
12.50 – 13.00	Closing

- *Moderating the workshop*

The moderation of the workshop could be done by the Measure Leader, together for instance with the Local Evaluation Manager, since the Measure Leader is asked to fill in the Evaluation form part-C based on the outcomes of this workshop. However, the moderator should keep in mind at least the following aspects:

- ✓ Time slots and aimed results
- ✓ Balanced contribution from participants (not only of those with the loudest voice)
- ✓ Doing a first rough analysis (clustering) of results during the workshop to steer the discussion

Box 5

Although it is the most easy way to let the workshop be moderated by the ML and/or LEM it is preferable to use / hire an external moderator, if possible. There are some good reasons for this:

- ✓ Generally speaking the ML and LEM do not have a lot of experience with moderating workshops. This is rather normal because moderating workshops is a profession.
- ✓ Mostly it is an advantage to let the workshop be moderated by an outsider: he can ask questions and lead the process with a fresh view.
- ✓ A good moderator is able to create an atmosphere of trust, in which the attendees feel free, respected and speak openly. In this case it is an advantage that the moderator has no interest in the measure
- ✓ It is very important that the ML and LEM provide the right information to the moderator on subjects like the measure itself, the attendees of the workshop, the objective and expected results of the workshop, possible delicate aspects / questions / problems / stakeholders etc.
- ✓ If there are really delicate matters it is advised that the moderator contact the attendees concerned to get information on these matters. He can bring forward the information unanimously during the workshop in several ways.

- *Practicalities*

Based on our own experience with organizing (Learning History) workshops, we have the following issues on our checklist of practicalities:

- ✓ Determine and communicate 'Rules of the game' (see Box 6)
- ✓ Well aired room with enough space
- ✓ Suitable line up of participants
- ✓ Beamer + laptop
- ✓ Flip-overs
- ✓ A1 (or A0) forms (see section 4.4)
- ✓ Sticky notes, tape, markers (writing different colors) etc.
- ✓ Catering

Box 6

A very important practicality is to start the workshop with a number of rules: 'rules of the game'. Sometimes they are already mentioned in the information about the workshop communicated to the attendees, but in that case it is necessary to repeat 'the rules of the game'. An example of such rules is:

- ✓ Be relaxed: there's no right or wrong, it's your perspective
- ✓ Be active: don't sit back, but speak for yourself
- ✓ Be positive: try to understand and be cooperative
- ✓ Be respectful: listen to each other carefully

It is also very important to stress the fact that the results of the workshop(s) are NOT reported to the City or the EU. The results of all the workshops will be anonymously reported to the EU on a higher aggregation level. It is preferable to give this message not only at the beginning of the workshop, but also during the invitation phase of the workshop.

2.3 Time-line actual events

The first step in creating a Learning History is to conduct a chronological time-line of main actual events that occurred during the reporting period. The results of this step are used in C2 of the Focussed Measure Process Evaluation Form
We would like to suggest that the Measure Leader makes this draft event time-line in advance and sends it in advance to the workshop participants. Ask them to read through the document and let them review whether this time-line of events is complete from their perspective or not; and of course if not, what is missing or incorrect from their point of view.
During the workshop the Measure Leader could first present the draft event time-line, after that discuss and complete the event time-line with input from the participants. This will result in a shared perception of what actual happened in the reporting period
The time-line of the process could be presented in an illustration, e.g. see figure 3, however this is not essential. The construction of the draft time-line should take the Measure Leader not more than two hours.

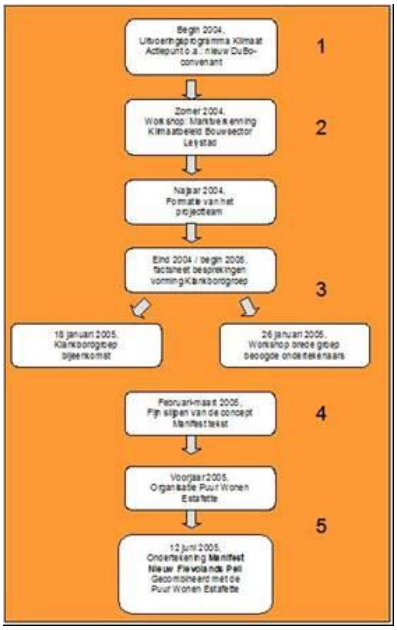


Figure 3: Illustration of a Dutch project on Sustainable Construction; time-line of main actual events that occurred in the reporting period between 2004 and 2005 (Emmert en Roelofs, 2008)

Box 7

Remember that only the real important events have to be taken in account. So it necessary to limit the timeline to these: don't come up with too much events. In most cases four or five will do.

2.4 The inventory phase of the workshop

2.4.1 Introduction

After the defining the time line, the inventory part of the workshop starts. In this phase an inventory of barriers, drivers, actions and lessons learned is to be made. In general everyone can do this on his own way as long as the questions of C3 to C6 of Part C of the Focussed Measure Process Evaluation Form can be completed

However, based on the experiences with this kind of inventories it is highly recommended to make print outs of the C3, C4, C5 and C6 items on A1 size papers and follow the next steps during the inventory:

- ✓ Stick the A1 form on the wall
- ✓ The attendees of the workshop are sticking their notes on the form
- ✓ The moderator clusters the notes, gives the clusters a name and starts the discussion.

An illustration of A1 print outs with clustered sticky notes is seen below.

Figure 4: The A1 size form with clustered sticky notes on barriers (Learning History Workshop Delft, 7th and 8th of July 2009)

The next paragraphs will focus on the various topics of the inventory part of the workshop in more detail.

2.4.2 Inventory of barriers

The second step, after the agreement on the main events that happened, is a plenary inventory of barriers encountered in reaching the objectives as described in B1 that occurred during the reporting period. The results of this step are used in C3 of the Focussed Measure Process Evaluation Form.

Box 8

Process barriers are events or overlapping conditions that hampers the process to obtain measure objectives/goals

The moderator could first explain and inspire the participants about what is meant by 'process barriers' by showing the table below (see figure 5).

After that, the participants are asked to write down barriers they experienced during the reporting period on sticky notes. These written down barriers could be straight from the table (see figure 5), or would be formulated by the participants themselves after consideration of the possible areas in which barriers may be have occurred. The moderators collect all the notes and put them on one board or large paper.

This will result in a collection of anonymous sticky notes, with all kinds of process barriers faced by different project partners.

The moderator(s) roughly clusters the sticky notes and starts facilitating the discussion; central questions are:

- ✓ Why were these (clusters of) process barriers experienced as barriers to reach the objectives?
- ✓ What was the impact of these barriers on events that occurred in the way they occurred?

Political / strategic barriers, for example: opposition of key actors based on political and/or strategic motives, lack of sustainable development agenda or vision, impacts of a local election, conflict between key (policy) stakeholders due to diverging believes in directions of solution
Institutional barriers, for example: impeding administrative structures, procedures and routines, impeding laws, rules, regulations and their application, hierarchical structure of organizations and programs
Cultural barriers, for example: impeding cultural circumstances and life style patterns
Problem related barriers, for example: complexity of the problem(s) to be solved, lack of shared sense of urgency among key stakeholders to sustainable mobility
Involvement / communication barriers, for example: insufficient involvement or awareness of (policy) key stakeholders, insufficient consultation, involvement or awareness of citizens or users
Positional barriers, for example: relative isolation of the measure, lack of exchange with other measures or cities
Planning barriers, for example: insufficient technical planning and analysis to determine requirements of measure implementation, insufficient economic planning and market analysis to determine requirements for measure implementation, lack of user needs analysis: limited understanding of user requirements
Organizational barriers, for example: failed or insufficient partnership arrangements, lack of leadership, lack of individual motivation or know-how of key measure persons
Financial barriers, for example too much dependency on public funds (including CIVITAS funding) and subsidies, unwillingness of the business community to contribute financially
Technological barriers, for example: additional technological requirements, technology not available yet, technological problems
Spatial barriers, for example no permission of construction, insufficient space

Figure 5: Examples of possible areas and barriers

This discussion will probably result in a pallet of different beliefs why these (clusters of) process barriers were barriers and what the impact was on the process and the objectives. The moderator will rank the most important barriers.

Box 9

To structure this pallet of barriers and initiate the discussion the moderator together with the attendees may rank the three barriers with the highest impact and determine for example which barriers are within or without control of the measure partners.

Note that it is not necessary that all participants of the workshop agree upon the barriers. As long as the overview is recognizable to the participants

The moderator will rank the most important barriers.

2.4.3 Inventory of drivers

The third step is a plenary inventory of drivers to reach the objectives as described in B1 that occurred during reporting period. The results of this step are used in C4 of the Focussed Measure Process Evaluation Form.

Box 10

Process drivers are events or overlapping conditions that stimulates the process to obtain measure objectives/goals

The moderator could first explain and inspire to the participants about what is meant by 'process drivers' by showing the table below (see figure 6) or would be formulated by the participants themselves after consideration of the possible areas in which drivers may be have occurred.

After that, the participants are asked to write down drivers they experienced during the reporting period on sticky notes. These drivers could be from the table (see figure 6),

The moderators will collect them on one board or large paper.

This will result in a collection of anonymous sticky notes, with all kinds of process drivers faced by different project partners.

The moderator(s) roughly clusters the sticky notes and starts facilitating the discussion; central questions are:

- ✓ Why were these (clusters of) process drivers experienced as drivers to reach the objectives described in B1?
- ✓ What was the impact of these drivers on events that occurred in the way they occurred?

Political / strategic drivers, for example: commitment of key actors based on political and/or strategic motives, presence of sustainable development agenda or vision, positive impacts of a local election, coalition between key (policy) stakeholders due to converging (shared) believes in directions of solution
Institutional drivers, for example: facilitating administrative structures, procedures and routines, facilitating laws, rules, regulations and their application, facilitating structure of organizations and programs
Cultural drivers, for example: facilitating cultural circumstances and life style patterns
Problem related drivers, for example: pressure of the problem(s) causes great priority, shared sense of urgency among key stakeholders to sustainable mobility
Involvement / communication drivers, for example: constructive and open involvement of policy key stakeholders, constructive and open consultation and involvement or citizens or users
Positional drivers, for example: the measure concerned is part of a (city) program and/or a consequence of the implementation of a sustainable vision , exchange of experiences and lessons learned with other measures or cities
Planning drivers, for example: accurate technical planning and analysis to determine requirements of measure implementation, accurate economic planning and market analysis to determine requirements for measure implementation, thorough user needs analysis and good understanding of user requirements
Organizational drivers, for example: constructive partnership arrangements, strong and clear leadership, highly motivated key measure persons, key measure persons as 'local champions'
Financial drivers, for example: availability of public funds (including CIVITAS funding) and subsidies, willingness of the business community to contribute financially
Technological drivers, for example: new potentials offered by technology, new technology available
Spatial drivers, for example: space for physical projects, experimentation zones

Figure 6:Examples of possible areas and drivers

This discussion will probably result in a pallet of different beliefs why these (clusters of) process drivers were drivers and what the impact was on the process. The moderator will rank the most important ones.

Box 11

To structure this pallet of barriers and initiate the discussion the moderator together with the attendees may rank the three drivers with the highest impact and link the with the barriers.

Note that it is not necessary that all participants of the workshop agree upon the drivers. As long as the overview is recognizable to the participants

2.4.4 Inventory of actions taken

The fourth step is a plenary inventory of actions taken to handle the barriers and to make use of the drivers to reach the goals as described in B1 during the reporting period. The results of this step are used in C5 of the Focussed Measure Process Evaluation Form.

Box 12

Actions are activities undertaken by one or more measure partners to handle the barriers and / or to make use of the drivers to reach the measure objectives

The moderator(s) could first explain to the participants about what is meant by 'actions taken' by showing the table below (see figure 7).

After that, the participants are asked to write down the actions taken during the reporting period on sticky notes. These actions could be from the table (see figure 7), or would be formulated by the participants themselves after consideration of the possible areas in which actions may be have taken.

The moderator(s) will collect them on one board or large paper.

This will result in a collection of sticky notes, with all kinds of taken actions.

The moderator(s) roughly clusters the sticky notes and start facilitating the discussion; central questions are:

- ✓ What actions were taken?
- ✓ Why were these actions taken regarding the objectives to reach as described in B1 and regarding the drivers and barriers?
- ✓ What was the impact of these actions on the objectives to reach as described in B1 and on the process?

Political / strategic actions, for example: (Co-)development of vision on sustainable development or sustainable mobility, (Co-)development of a program towards sustainable development or sustainable mobility, discours with key stakeholders (politicians etc) about the sustainability problems to be solved
Institutional actions, for example: analysis of and/or proposals to change impeding rules, structures, legislation, organisational structures etc.
Cultural actions, for example: facilitating cultural circumstances and life style patterns
Problem related actions, for example: thoroughly analyzing problems towards sustainable mobility to be solved, activities to explain the pressure of the problem, all activities towards sharing the sense of urgency among key stakeholders to sustainable mobility
Involvement / communication actions, for example: consultation of target groups by workshop, conference, focus group, expert meeting, face-to-face interviews or questionnaires, telephone interviews or questionnaires or web based questionnaires, public awareness campaign about the sustainability problems to be solved, bringing together key stakeholders to discuss the sustainability problems to be solved (sharing different viewpoints), public awareness campaign about the measure through media activities, involvement of key stakeholders (politicians etc) in the measure
Positional actions, for example: put the measure concerned into a running sustainability program (combined with the strategic actions), activities to exchange experiences with other measures / cities (workshop, conference, focus group etc)
Planning actions, for example: raising or attempting to raise additional 'time budget' for the measure , (re)conduct the economic and technical planning as well as analysis to determine requirements of measure implementation, (re)conduct market analysis to determine requirements for measure implementation, thoroughly analyzing user needs analysis to better understand the user requirements
Organizational actions, for example: activities to raise the competences of the measure partners (for example special courses etc), activities to raise the motivation of the measure partners (for example extra measure meetings)
Financial actions, for example: raising or attempting to raise additional financial budget for the measure, developing a context which is attractive to the business community to contribute financially
Technological actions, for example: Raising or attempting to raise additional technical resources for the measure (all kind of equipment), all kind of actions to solve technological problems
Spatial actions, for example: (attempts) adjusting the construction permissions, creating experimental and /of

investment zones / city parts / corridors

Figure 7: Examples of possible areas and activities

This discussion will probably result in a pallet of different beliefs why these actions were taken and what the impact was on the process and the goals to reach (B1). The moderator will rank the most important ones.

Box 13

To structure this pallet of barriers and initiate the discussion the moderator together with the attendees may rank the three actions with the highest impact and link the with the drivers and/or barriers. It might also be interesting to look at actions that are not taken, but that that have should have been taken.

Note that it is not necessary that all participants of the workshop agree upon the actions. As long as the overview is recognizable to the participants

2.4.5 Reflections and learning experiences

At this stage we have an overview of events, barriers, drivers and actions taken as well an insight to 'why things happened as they happened' during the reporting period. The last step is a reflective discussion on learning experiences; looking back at the time-line of events that occurred, the barriers and drivers that were faced and actions that were taken. The results of this step are used in C6 of the Focussed Measure Process Evaluation Form

To illustrate this overview and give it central place in the discussion the moderator may for example tape the used flip-over sheets side by side on the wall (figure 8). This will support the moderator(s) in his (their) facilitation of the discussion. Central questions to structure the discussion are:

- ✓ Which of the actions can be regarded as a success and which as a failure and why?
- ✓ What have we learned? What are the do's and don'ts in terms of the process and actions?
- ✓ What actions do we want to undertake?

Figure 8: The A1 size forms with clustered sticky notes on barriers, drivers and actions (Learning History Workshop Delft, 7th and 8th of July 2009)

Box 14

It is highly recommended to collect the A1 wall papers after the workshop and use them as as basis to report the results in the evaluation form. To secure that the sticky notes remain on the right place while taken them away for reporting it is advised to stick them on the form with strips of adhesive tape.

2.4.6 Reporting

Based on the outcomes of this Learning History workshop, the Measure Leader is asked to complete section C of the Focused Measure Process Evaluation Form. Since this part of the form is complementary to this suggested workshop program, it should take the Measure Leader not longer than 2 hours to complete this section of the Focused Measure Process Evaluation Form.

Box 15

After the workshop and after filling in the C-part of the form it is recommended to send the report (at least the C-part) to the attendees for a final feedback on the results. There are at least five reasons for this:

- ✓ It gives people a last chance to bring forward delicate matters anonymously
- ✓ It stimulates a sphere of trust for the measure partners / attendees
- ✓ It demonstrates that the opinion of the measure partners is taken seriously
- ✓ It shows that there is accurate way of working on the measure and its process evaluation
- ✓ It contributes to the comprehensiveness of the form

ANNEX 8: Survey methodologies

1 General considerations

The planning and conduct of all the surveys and data collection are the responsibility of the cities and projects. Whilst CIVITAS WIKI will try to provide as much advice and support as required, it is completely reliant on the cities and projects to provide the high quality and consistent data required for the evaluation. So a number of general points concerning surveys and data collection should be helpful.

Before embarking on any survey, whether by direct measurement or questionnaire, it is always useful to consider a number of basic points (Cochran, 1963):

- **Objectives of the survey**. A clear statement is always helpful, as it easy to get caught up in the details and make decisions that do not align with the overall objectives.
- **Population to be sampled**. The population is the aggregate group of people or objects of interest. For a questionnaire survey on the opinion of a city's residents about transport and related issues, the population is the number of people in the city. Alternatively, the population could be a specific group in society, such as people who use a specific bus service or tourists that visit a specific site.
- **Relevance of data.** All data that is collected should be relevant and no essential data omitted. With questionnaires there is often a tendency to ask too many questions, some of which are subsequently never analysed. An overlong questionnaire lowers the quality of the answers to the important questions as well as the less important ones and can increase refusal rates.
- **Precision required.** Results of sample surveys are always subject to some uncertainty, because only a part of the population is being included and because of errors in measurement. This uncertainty can be reduced by taking larger samples and by using better means of measurement, but both can be costly. Hence it is important to specify the degree of precision desired in the results; this is further considered later in this section.
- **Method of measurement.** This may include a choice of measurement equipment or approaches to the population, e.g. interview, self-administered questionnaire; use of mail, telephone, email, text message, personal visit, etc.
- **Sampling units**. These are the separate, non-overlapping parts of the population that are to be sampled. This is often obvious, for instance a bus from a fleet of buses. But in sampling people in a city, the unit may be an individual, a family or perhaps drivers, aged 17-20, living in a specific area.
- **Sample selection.** Usually a simple random sample of the population of concern is required (i.e. so that one group within the population has not responded disproportionably compared to another). A plan is required as to how such a random sample is to be selected and the survey administered. A number of different

plans may be possible so for each a rough estimate of the sample size (based on the degree of precision required) will help to provide comparative costs.

- **Pilot test.** A pilot test of the questionnaire and approach is always useful to identify problems of understanding/interpretation of the questions and of the method of conducting the survey.
- **Fieldwork organisation.** Staff will need special training for administering the survey. Adequate supervision is required and early checking of the quality of the collected information is invaluable.

2 Sample Size

It is important to give proper consideration to the size of the sample required. Too large a sample can be a waste of resources while too small a sample may diminish the usefulness of the results. However it should be remembered that within CIVITAS although an individual sample for a particular measure may seem insufficient, such survey information can be used in conjunction with comparable survey results from other similar measures to provide a useful and statistically valid outcome.

The main steps involved in deciding a sample size, *n*, are as follows:

(1) The desired precision of the result needs to be determined. This is likely to be in terms of the accepted confidence interval (or margin of error) around the sampled result and the level of chance that the true result is outside this range. For instance, it may be required that the result lies within +/-3% of the true result and that there is a 95% level of confidence that this is correct. However, the desired precision will also depend on the size of the result expected. For example for modal split, if you are trying to measure the percentage of commuters using a bicycle where the current mode share is only about 2%, a higher precision level (and therefore higher sample of all commuters) may be needed than if you are principally determining the percentage of car users or public transport users.

(2) An appropriate formula for linking *n* with the desired precision is required.

(3) If results are required for subsets of the population, then separate calculations need to be made for each subset and the total *n* found by addition.

(4) Usually more than one item or characteristic is measured in a sample survey and each may require a different degree of precision. The required sample values then need to be reconciled.

(5) Finally, the chosen value of n must be appraised to see whether such a sample size is feasible within the resources available. If not, the desired precision may need to be reviewed or greater reliance given to combination with results from similar measures in other cities to give the required precision.

In designing a questionnaire survey, it is easy to become overburdened by trying to generate a perfect random sample whereas in reality a perfect random sample will never be achieved. Whilst measures can be taken to improve the random nature of the sample there will always be some people who will be more inclined to respond to a questionnaire than others. For example, retired people will have more spare time with which to ‘get around’ to filling in the questionnaire, or because it is quite an emotive issue those more concerned about transport issues will be more inclined to fill it in. It is therefore important to

choose sample sizes large enough to have enough respondents within certain sub-samples of interest (e.g. young people compared to old people).
It should be noted that the sample sizes are the numbers required to be returned, and this can differ quite drastically depending on the subject of the questionnaire, incentives for reply and the target group. Local information on response rates from previous questionnaire surveys can be very informative. This response rate will depend on your survey method (e.g. postal, email, face to face, handed out). Of course, there is also the financial limitation on how many questionnaires you can produce/undertake.
Another consideration in determining the number of questionnaires to be distributed is the use of an initial, relatively general questionnaire to recruit people for more detailed questionnaires. This approach was followed for large-scale travel questionnaires and diaries in Winchester for the MIRACLES project in CIVITAS I. The process that was used for determining the sample size is shown in Figure B.1.

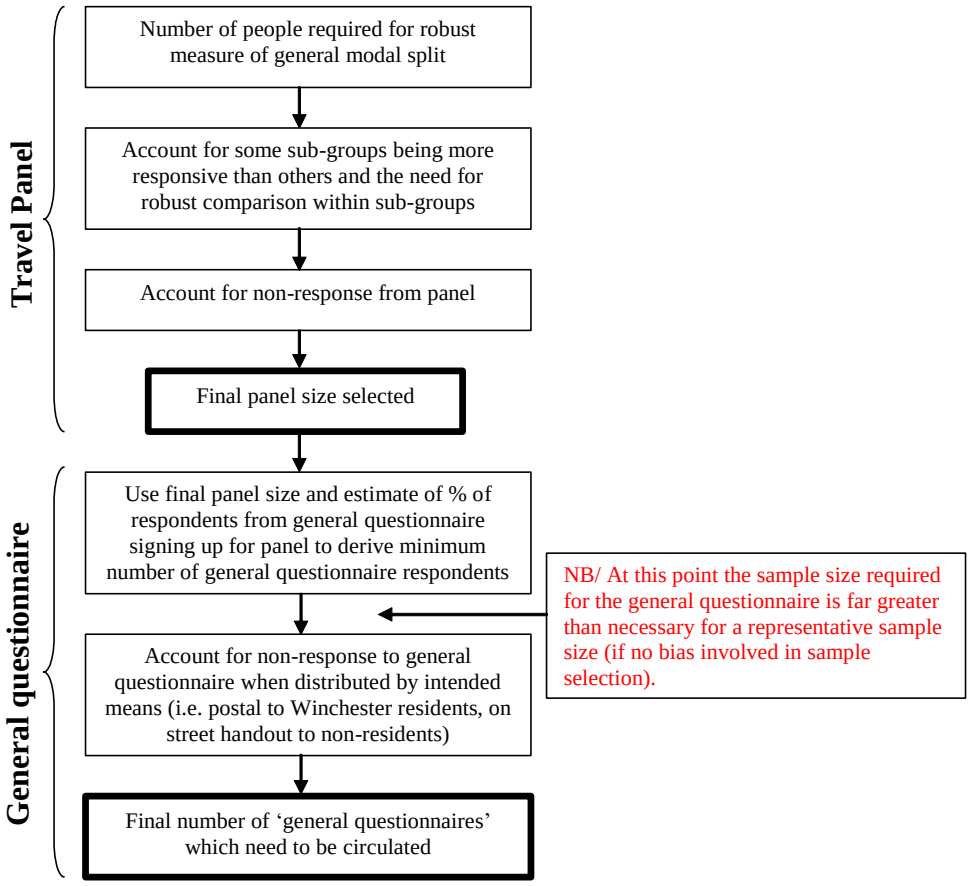


Figure 2.1: Flow diagram showing how sample sizes for large scale questionnaires in Winchester were developed

3 Data collection methodology

For questionnaire surveys, the main methods of collecting information include face-to-face interviewing, telephone, mail, and internet. Each method of the data collection has inherent advantages and disadvantages.

In-person data collection typically yields the most complete coverage, achieves the highest response rate, and produces the best quality data. Not surprisingly, in-person interviews are also the most expensive of the four methods. For this reason, telephone and mail methods are more commonly used despite well-recognised trade-off in data quality. Apart from high cost, other obstacles to personal interview include personal security and access, such as to gated communities, etc.

In a **telephone questionnaire**, respondents are called by survey teams to answer a series of questions which are recorded during the survey. Depending on the scale of the survey, it can be costly to set up the appropriate systems to conduct telephone surveys, though professional agencies may provide a suitable solution. Compare to postal questionnaires, telephone surveys can get higher response rates, so can be more representative of the population, provided possible bias in the telephone number sampling frame is addressed (e.g. young people using mobile phones). It may also be difficult to obtain a sample within a defined geographical area.

The main advantage of **postal questionnaires** is that they are relatively inexpensive, and they can have a wide geographical distribution. However, postal questionnaires take a long time to send out and get back. Low response rates and incomplete forms are common problems with such methods.

For data collection through the **internet**, respondents are asked to complete a questionnaire on-line, and the results are sent directly into a database allowing the survey team to access the response immediately. They are also relatively cheap to conduct. The problem with such methods is that unless the population being surveyed all have access to the internet, a random sample is difficult to achieve and so the results may be biased to higher socio-economic groups and younger people who do have access to the internet and miss out other groups.

Recently also a more innovative internet concept is possible using an app on a mobile phone combining location data with additional information introduced by the user. Of course, similar concerns on bias effects remain valid.

Selection of an appropriate method requires careful consideration of many factors, not the least of which is coverage of the target population. While the method of data collection might be largely dictated by the population coverage and sample frame, other common determinants include survey costs, response rates, and data quality issues. Method selection can also be influenced by the complexity and length of the survey and timeliness needs. Table B.1 provides a summary of four methods of data collection along with associated features of each, though the response rates and data quality can be very dependent on the group being sampled, the procedures adopted and country of operation.

Table 2.1: Comparison of data collection methodologies (Sharp, 2004)

	In-person	Telephone	Mail	Internet
Description	Interviewer travels to respondent's home or office and administers questions in face-to-face interview	Interviewer contacts respondent and administers questions over the telephone	Questionnaire mailed to respondent and is returned by mail or data retrieved by telephone	Respondent completes survey on web
Coverage	Most complete	Omits non-telephone households	Similar to in-person depending on how the addresses were obtained	Only households with Internet connection or access to Internet
Response Rate	Highest of all modes	Intermediate	Among the lowest	Among the lowest
Data Quality	Highest of all modes	Intermediate	Lowest of all modes	Intermediate; mixed results
Cost	Most expensive (this often leads to geographically clustered sample cases, leading to a reduction in the effective sample size.)	Intermediate	Among least expensive	Among least expensive (though high start-up cost compared to data collection cost)

2.3 Measurement conditions

The conditions surrounding (and influencing) the data collection should as far as possible be controlled and homogeneous. Thus the time of day, traffic and weather conditions etc. must be chosen so that a group of measurements or simulations take place under more or less the same conditions (blocking).

Special considerations to bear in mind include:

- the measure may perform differently from the reference case for particular conditions of measurement; for example, an enhanced UTC measure may perform much better than the reference case when traffic flows are at or near the capacity, so monitoring conditions of measurement is important.
- specification and calibration of a simulation model may vary in adequacy over the range of conditions being simulated.
- measured indicators may be strongly correlated with parameters which describe the measurement conditions; a good example is the relationship between travel time through a road network and the level of traffic on that network. So, if average travel time through a validation site is being measured as an indicator for a number of peak periods, it is necessary to allow for any variations in traffic flow from one peak period to the next in comparing the performance of a measure with a reference case (here traffic flow would be called a "confounding variable", which may mask or counteract the main variable of interest).

The usual response to such considerations is to measure or simulate indicators for conditions which are as well-defined as possible (that is, as homogeneous as possible) but this approach may still leave the problem of confounding variables and it has obvious resource implications for validation.