2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

D.8.5.
Final Evaluation Report

Project-level Evaluation

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Abstract

This is the fifth and last report for CIVITAS ECCENTRIC evaluation activities, delivering the analysis component of the evaluation in ECCENTRIC. The document contains the comparative assessment, the evaluation of the laboratory areas, and the evaluation of the thematic Work Packages.

Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS

Partner nº	Organization	Country	Abbrev.
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club "Sustainable Development of Civil Society"	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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Disclaimer:

The views expressed in this publication are the sole responsibility of the ECCENTRIC consortium and do not necessarily reflect the views of the European Commission

Abbreviations

BaU: Business as Usual

B/C: benefit/cost ratio

CO2: Carbon dioxide

CAR: Center Automotive Research

CBA: Cost-Benefit Analysis

EMT: Empresa Municipal de Transportes de Madrid

ENPV: Economic Net Present Value

EV: Electric Vehicles

FDR: Financial Discount Rate

GA: Grant Agreement

IA: Innovative Actions

ICE: internal combustion engine

ICT: Information and Communication Tecnologies

KPI: Key Performance Indicators

LEM: Local Evaluation Managers

LEV: Light Electric Vehicles

LEZ: Low-Emission Zone

MaaS: Mobility as a Service

MAIS3+: Maximum Abbreviated Injury Scale

MAL: Turku land use, housing and transport agreement

MER: Measure Evaluation Reports

ML: Measure Leaders

NOx: Nitrous oxides

O&M: Operate and Maintain

PEM: Project Evaluation Manager

PER: Process Evaluation Report

PM: particulate matter

PT: Public Transport

SCBA: Social Cost-Benefit Analysis

SECAP: Turku Climate Plan

SUMP: Sustainable Urban Mobility Plan

TTP: Turku Technology Properties

VKT: Vehicle Kilometre Travelled

WP: Work Package

WPL: Work Package Leaders

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A. Introduction

This is the fifth and last report for WP8, delivering the analysis component of the evaluation in ECCENTRIC. The document contains the comparative assessment, the evaluation of the laboratory areas, and the evaluation of the thematic Work Packages (WP).

The comparative assessment implements a Cost-Benefit Analysis approach, based mostly in the Measure Evaluation Reports (MER) produced independently by the Local Evaluation Managers (LEM). Complementary information contributed to monetize the impacts measured and fill some gaps in the data gathered for ECCENTRIC.

The Integrated Site Evaluation looks into the laboratory areas addressed by ECCENTRIC, reporting the joint impacts of the measures implemented within its boundaries. It is mostly based on its impacts in Key Performance Indicators (KPI), but also includes some impacts in the local policies, politics and local decision-making processes.

The cross-site evaluation provides an analysis of the WP, from a systemic perspective. That is achieved by looking into the complete “landscape” of elements playing a relevant role of the measures in the WP. In concludes with the analysis of the feedback loops governing the implementation and impact of measures in the corresponding policy field. This section includes as well the barriers and drivers identified for each topic.

The document contains in the annexes the Process Evaluation Reports (PER) for those measures undergoing a detailed process evaluation. For about one third of the measures in ECCENTRIC a second and more in-depth evaluation phase of the process was rolled out, delivering further and more detailed lessons for replication and upscaling efforts.

The evaluation in ECCENTRIC has produced the following documents:

- For thirty-two (32) measures, impact evaluations and standard process evaluation. (Included in D.8.3 and D.8.4).
- For eleven (11) measures, impact evaluations (D.8.4) plus detailed process evaluation due to its particular implementation approach.
- For eight (8) measures, detailed process evaluations instead of impact evaluations, where due to delays or blocked implementations there are no impacts measurable, and lessons learned from the process became more relevant.

This report provides the basis for the policy recommendations provided in the final reports of the thematic WP, and other deliverables dealing with final conclusions of the ECCENTRIC project such as the Replication Packages.

B. Evaluation Methodology

Within ECCENTRIC, project-level evaluation comprises all the information streams from the local activities partnering in the project. Its recommendations transcend the boundaries of ECCENTRIC and are bound to dissemination at European level and beyond.

It builds upon process and impact evaluation at measure level, as well as on direct inputs from LEM and Work Package Leaders (WPL).

The Grant Agreement (GA) defines the objective of project evaluation as follows:

> *An overall evaluation at the project level, based on the impact evaluation and process evaluation at the measure level will provide added value for the understanding of underlying system effects. The comparison across cities will help to provide solid inputs on the effectiveness and efficiency of different measures and packages of measures, on the analysis of synergies and conflicts in the living laboratory, and on the estimation of upscaling potential in each of the cities making it possible to identify good practices and the possibilities for transferability.*

By this approach, the evaluation strongly contributes to generate thematic conclusions (WP 2-7), to facilitate cross-fertilization among the partners (WP 9), and to replication actions in other cities (WP 10).

Several components of the evaluation support this objective. Firstly, the understanding of the underlying system effects implies the understanding of the reaction and feedback mechanisms within the system where actions and decisions are made, during the planning, implementation, and operation of measures. Secondly, impact and process evaluation performed at local level are the main inputs to develop a system model, the tool of choice to provide this understanding.

The latter does not provide absolute comparisons, but rather a qualitative understanding of the system dynamics surrounding each WP; this level contributes as well to the thematic conclusions of each WP.

The elements outlined above define the structure of the evaluation at the project level displayed in the figure below. In the subtitles below the reader can find an overview of the impact and process evaluation, on which project evaluation builds upon.

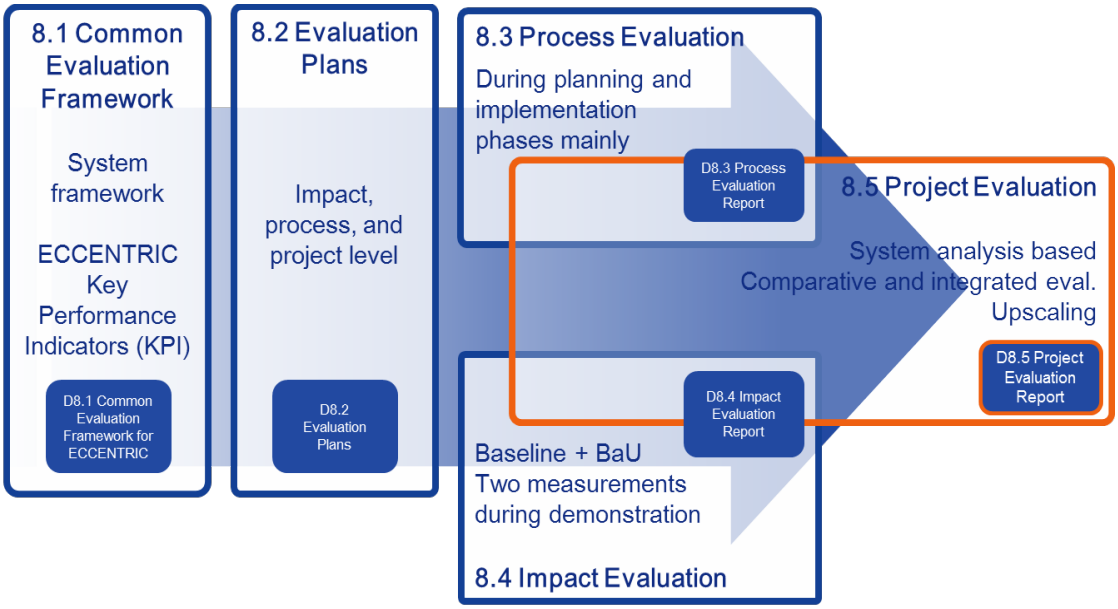


Figure 1. Structure of the evaluation in ECCENTRIC

B.1 Impact Evaluation

Key Performance Indicators (KPI) are the backbone of impact evaluation. These indicators summarize the efforts to measure quantitatively the outputs of the implemented measures, enabling fair and objective evaluations and comparisons.

The selected indicators were the result of careful selection and harmonization across CIVITAS ECCENTRIC, in a process that involved Local Evaluation Managers, (LEM), Project Evaluation Manager (PEM), Measure Leaders (ML), and Work Package Leaders (WPL), ensuring that evaluation results were comparable to certain extent, and results could be disseminated under the same framework.

The indicators are framed within the CIVITAS Evaluation Framework developed by SATELLITE and applicable to all CIVITAS Innovative Actions (IA) projects initiated in 2016 and to be finalized in 2020. This framework evolved simultaneously with the IAs, and its content is as well the result of the contributions of these projects. The indicators are as well framed within the CIVITAS ECCENTRIC Evaluation on Measure and Project Level work package (WP8), particularly by the definitions in Task 8.4 – Impact Evaluation.

In Task 8.5 – Project-level Evaluation, KPIs are an important part of the comparative assessments, as they provide measurable inputs to the analysis of the effectiveness of the actions taken and its contribution to the expected goals, whilst enabling the cost-benefit-analysis.

KPIs facilitate as well a common understanding of the impact of measures within the laboratory areas. The section Integrated Site Evaluation comes back to these indicators and reports the performance of the study area in the terms embodied by these KPIs

CIVITAS ECCENTRIC KPIs are aligned throughout the project, from its general objectives, the objectives of each WP, and the objectives of each measure. The categories of impact follow the CIVITAS Evaluation Framework and each relevant aspect was tracked by at least

by one indicator. In total, 29 indicators cover 7 impact categories. The following table presents the structure of impacts and indicators relevant for the project.

Impact Category	Impact sub-Category	Key Impact Aspects	ID	Indicator
SOCIETY - PEOPLE	Acceptance	Awareness level	01	Awareness
		Acceptance level	02	Acceptance
		Fulfilment of expectations	03	Satisfaction
	Accessibility	Physical accessibility to transport services	04	Access to mobility services
			05	Physical barriers
			06	Car ownership
		Usage and operation capabilities	07	Operational barriers
		Economic accessibility	08	Relative travel cost
SOCIETY-GOVERNANCE	Planning	Planning process	09	Contributions to policy, plans and programs
TRANSPORT SYSTEM	General	Modal split	10	Mode shift
			11	Modal split
		Total travel	12	Vehicle-kilometre travelled
		Transport system utilization	13	System usage
	Car	Parking	14	Parking turnover
	Public transport	Quality of service	15	Commercial speed
		Congestion levels	16	Peak/off-peak travel time difference
		Service reliability	17	Accuracy of time keeping
	Safety	Transport safety	18	Number of fatalities and seriously injured
			19	Number of incidents
ECONOMY	Costs	Investment costs	20	Investment cost
		Operating cost	21	Operating cost
	Benefits	Economic development	22	Job/sales impact
ENVIROMENT	Pollution and nuisance	Emissions	23	CO^2 emissions
			24	NO^x emissions
			25	PM emissions
		Noise	26	Noise level
ENERGY	Energy consumption	Energy consumption	27	Vehicle energy efficiency
LAND USE	Urban space	Use of space	28	Use of space for parking
		Attractiveness of space	29	Quality of public space

Table 1. ECCENTRIC impact categories and Key Performance Indicators (KPI).

B.2 Process Evaluation

LEMs have conducted process evaluations at measure level in accordance with the evaluation plans (D.8.2). Results for this evaluation have been delivered in 2019 in the Process Evaluation Report (D.8.3), and outcomes of these results are summarized in the MERs to provide a complete overview of the measure impact.

This is not the end of process evaluation though. Even after the delivery of D.8.3. some measures are undergoing a detailed process evaluation to gain further insight into the planning, implementation and operation of the measure. Initially, this evaluation strategy was implemented to avoid thin-spreading efforts and resources, allowing to focus in those measures with interesting processes. The results of this detailed process evaluation are included in D.8.5 as part of the cross-site evaluation.

Local conditions external to CIVITAS ECCENTRIC, detailed in the last chapter of this deliverable, made in some cases impossible to perform the impact evaluation in timely fashion. Delays in approvals, political decisions and other reasons, shaped good study cases for process evaluations, and the consortium decided to fall back to detail process evaluations for these measures as well. This way, these measures will be able to deliver useful lessons for future implementations, albeit impact figures have to be subject of further research.

The table in the following pages summarizes the evaluation process underwent by each one of the ECCENTRIC measures.

Code	Measure	Impact Evaluation	Process Evaluation
TUR 2.1	Citizen and stakeholder involvement in mobility planning and production of new mobility services	Yes	Standard
TUR 2.2	City District / Urban Corridor Cases as Pilots for Sustainable Urban Mobility	Yes	Standard
MAD 2.3	Adaptive parking management based on energy efficiency and occupancy	Yes	Standard
STO 2.4	Dynamic occupancy-based parking fees		Detailed
STO 2.5	Green parking standards in Åstra city development		Detailed
RUS 2.6	Park & Ride in the peripheral district	Yes	Standard
MUC 2.7	Community information and participation portal	Yes	Standard
MAD 2.8	Mobility management strategies for vulnerable groups	Yes	Detailed
MUC 2.9	Neighbourhood oriented marketing of sustainable multimodal mobility services	Yes	Standard
MUC 2.10	Transfer – Exchanging communication and information technology for everyday mobility between generations	Yes	Standard
RUS 2.11	Information, training and awareness raising	Yes	Detailed

Code	Measure	Impact Evaluation	Process Evaluation
TUR 3.1	Smart Multimodal Mobility Services: applying Mobility as a Service concept	Yes	Detailed
TUR 3.2	Integrated Ticketing and Information System for Mobility	Yes	Standard
MAD 3.3	Open platform for multimodal mobility information and services	Yes	Standard
MUC 3.4	Beacon based indoor routing as a mobility service app		Detailed
STO 3.5	Develop smart choice of mobility services	Yes	Standard
RUS 3.6	Mobile app and internet portal for Public Transport (PT)		Detailed
MUC 3.7	The App for the City lab	Yes	Standard
MAD 4.1	Innovative and participative approach to traffic safety on a neighbourhood level	Yes	Standard
MUC 4.2	Software-controlled safety management in the road network	Yes	Standard
RUS 4.3	Providing Secure Pedestrian Crosswalks	Yes	Detailed
RUS 4.4	Safe Sidewalks with cycling facilities in the peripheral district	Yes	Detailed
STO 4.5	Policy for rerouting cyclists during construction work	Yes	Standard
MAD 4.6	Pedestrian friendly public space outside the city center	Yes	Standard
MAD 4.7	Enabling cycling outside the city center	Yes	Standard
TUR 4.8	Easy, Safe and Comfortable Cycling and Walking Round the Year	Yes	Detailed
STO 4.9	Offering test fleets of e-bikes and e-freight bikes	Yes	Standard
MAD 5.1	High-level PT service corridors in peripheral districts	Yes	Standard
STO 5.2	Speed up core bus routes	Yes	Standard
RUS 5.3	Analysis of PT demand and reorganization of PT network in Druzhba (data collection)		Detailed
RUS 5.4	Introduction of a night line to Druzhba (after 21h) with GNC buses	Yes	Standard
TUR 5.5	Bike-sharing and Car-sharing schemes	Yes	Detailed
MUC 5.6	Conception and development of an integrated e-bike sharing scheme		Detailed

Code	Measure	Impact Evaluation	Process Evaluation
TUR 5.7	Introduction of Electric Public Transport	Yes	Standard
MAD 5.8	Electric and hybrid buses for public transport	Yes	Standard
MUC 5.9	Intermodal (E-) Mobility stations	Yes	Detailed
MUC 5.10	Sustainable mobility via E-scooter sharing	Yes	Standard
STO 6.1	Offering Electric Vehicles (EV)-rest fleets to selected target groups	Yes	Standard
MAD 6.2	Test fleets, policy incentives, and campaigns for the uptake of electric vehicles	Yes	Detailed
MUC 6.3	"Electric light-weight vehicles – one for all"		Detailed
TUR 6.4	Electrification of Municipal Fleet & Promotion of Electro-mobility	Yes	Standard
STO 6.5	Developing the Clean Vehicle Web Portal (Miljofordon)	Yes	Standard
STO 6.6	Master plan for developing EV-charging in STO	Yes	Standard
STO 6.7	Promote installation of EV-charging facilities in multifamily houses	Yes	Detailed
MAD 7.1	Consolidation center with EVs and local regulations for clean urban freight logistics	Yes	Detailed
STO 7.2	Consolidating STO municipal freights	Yes	Standard
MUC 7.3	Sustainable city logistics by combining cargo-bike-delivery-services with a flexible storage system	Yes	Standard
STO 7.4	Night delivery with clean and silent vehicles	Yes	Detailed
MUC 7.5	Neighbourhood oriented concierge system at the development area Domagkpark		Detailed
MAD 7.6	Prototype for an ultra-low emissions cargo vehicle	Yes	Standard
TUR 7.7	Introducing biogas for urban freight logistics	Yes	Standard

Table 2. List of CIVITAS ECCENTRIC measures and their process evaluation approach.

B.3 Project level evaluation

Each one of the sections below correspond to one of the components of the project level evaluation. The exact methodology for each component is presented at the beginning of the section.

C. Comparative Assessment of Measures

C.1 Social Cost-Benefit Analysis

Following the ECCENTRIC evaluation framework, a Social Cost-Benefit Analysis (SCBA) is carried out to assess the possible impacts of the projects on society over time. The comparative assessment considered only suitable measures for an SCBA. These measures are reported in Table 1.

Work Package	Measure
WP2	RUS 2.6: Park and Ride in the peripheral district
	MUC 2.7: Community information and participation portal
	MUC 2.9a: Neighbourhood oriented marketing of sustainable multimodal mobility services: Direct and dialogue marketing
WP5	STO 5.2: Speed up core bus routes
	TUR 5.7: Introduction of electric public transport
	MAD 5.8: Electric and hybrid busses for public transport
	MUC 5.9: Intermodal (E-) mobility stations
WP6	STO 6.1: Offering Electric Vehicles (EV) test fleets to selected target groups
	MAD 6.2: Test fleets, policy incentives, and campaigns for the uptake of electric vehicles
	TUR 6.4: Electrification of the city's fleet and promotion of electro-mobility
WP7	MAD 7.1: Consolidation centre with EVs and local regulations for clean urban freight logistics
	TUR 7.7: Introducing biogas for urban freight logistics

Table 3. Measures selected for SCBA

A Cost-Benefit Analysis (CBA) is an analytical tool for judging the economic advantages or disadvantages of a project's investment by assessing its costs and benefits to assess the welfare change attributable to it. When the analysis is carried out with a social perspective, namely as an SCBA, the return calculated is a proper measurement of the project's contribution to social welfare. Thus, in an SCBA both financial aspects such as investment costs, operating costs, direct benefits, etc., as well as social effects such as pollution, security, noise, travel time, indirect market, etc. are equally considered[1]. To assess the trade-offs between different effects, the SCBA locates all impacts to the same nominator and expresses them in monetary terms. Some impacts are not easily quantified and/or monetized and hence not included in the SCBA.

[1] Sartori, D., Catalano, G., Genco, M., Pancotti, C., Sirtori, E., Vignetti, S., & Del Bo, C. (2014). Guide to cost-benefit analysis of investment projects. Economic appraisal tool for Cohesion Policy, 2020.

C.1.1 Methodology

According to the SATELITE CBA guidelines, the SCBA compares a scenario with-the-project with a counterfactual scenario without-the-project. An incremental approach is considered; this means that only the additional costs and income that would not happen without the project are contemplated. The incremental approach requires a counterfactual scenario to be defined as what would happen in the absence of the project. Likewise, a baseline scenario that defines the conditions before the project needs to be specified. In cases where a project consists of a completely new asset, e.g. there is no pre-existing service or infrastructure, then the without-the-project scenario is one with no operations. In cases of investments aimed at improving an already existing facility, the counterfactual scenario should include the costs and the revenues/benefits to operate and maintain the service at a level that it is still operable (Business As Usual (BaU)) or even small adaptation investments that were programmed to take place anyway (do-minimum).

Accordingly, the SCBA of the selected measures considered three different scenarios:

- Before scenario which considered the baseline (or reference) aspects
- BaU scenario, referring to the without-the-project scenario, considered what would have happened without the measure implementation
- After scenario, referring to the with-the-project scenario, considered the aftermath of the measure implementation

Following is a summary of the calculation steps considered for the SCBA of the selected measures, these are based on the SATELITE CBA guidelines

C.1.1.1 Determination of the total investment and operational costs

The initial investment includes the additional capital costs of all the fixed and non-fixed assets such as equipment, machinery, technical costs, design/planning costs, etc. The operating costs include all the additional costs to Operate and Maintain (O&M) the project, typical O&M costs include: labor costs for the employer, materials needed for maintenance and repair of assets, consumption of raw materials, fuel, energy, rent of buildings, rental of machinery, general management and administration, etc.

The cost breakdown over the years should be consistent with the physical realisations foreseen and the time-plan for implementation. The cash-flow forecasts should cover a period appropriate to the project's economically useful life (considering the and residual value) and its likely long-term impacts. The number of years for which forecasts are provided should correspond to the project's time horizon or reference period and depends on the sector of intervention (e.g. railways- 30 years, research, and innovation- 15 to 25 years, apps/internet- 5 years, among others).

C.1.1.2 Determination and valuation of direct and external effects

Given the scale of the projects and the risk of double counting when including indirect effects- effects of the reactivation on the wider economy- the SCBA only contemplates direct and external effects linked to the use of the project.

Since this SCBA deals only with transportation projects, the direct effects are derived from the different inflows and costs (time and monetary) of transport in the reference and the

project alternative. For most projects, the following direct effects are relevant: changes in monetary transport costs, changes in travel time, and changes in travel time reliability.

The external effects describe the impact of the project on the human environment and nature. They are called external as they are not compensated for. Three types of external effects can be distinguished: the external effects of the infrastructure itself (use of space, visual intrusion, etc.), the effects linked to the use of the infrastructure, and changes in transport flows (air pollution, noise, traffic safety, etc.) and the impact on the environment caused by possible changes in the location of economic activity. More specifically, the appraisal of the measures considered changes in air pollutants and greenhouse gasses (Carbon dioxide (CO2), nitrous oxides (NOx), and particulate matter (PM), changes in energy consumption, changes in noise levels, and changes in the number of accidents.

Different approaches can be taken to calculate direct and external costs depending on the information available. The valuation is obtained by multiplying the differential (change) of external effects by the respective valuation factor. The valuation depends on various factors such as the type of input (units), country, road conditions, type of vehicle, etc. Valuation factors were obtained from sources such as:

- DG Regio (2014) Guide to Cost-Benefit Analysis of Investment Projects. Economic appraisal tool for Cohesion Policy 2014-2020
- CPB (2013), Algemene leidraad voor maatschappelijke kosten-batenanalyses
- OECD (2011), Improving the Practice of Transport Project Appraisal, ITF Round Tables, No 149, OECD Publishing
- Ricardo-AEA (2014) Update of the Handbook on External Costs of Handbook
- CE Delft (2008) Handbook on estimation of external costs in the transport sector
- HEATCO- FP6: Harmonised European Approach for Transport Costing and Project Assessment

The precise reference values and calculation details used for each measure are available in the Annex A of this document.

C.1.1.3 Economic performance indicators

To have an overview of the possible effects over time the effects are discounted into their present value today. In this way, different effects occurring at different times can be summed and the net benefit for society can be calculated using the Economic Net Present Value (ENPV). A project has an economic benefit if ENPV>0.

It is important to highlight that an appropriate Financial Discount Rate (FDR) needs to be utilized to calculate the present value of future cash flows. The financial discount rate reflects the opportunity cost of capital. Thus, it is considered the European Commission's reference parameter (in real terms) suggestion of 4%.

The benefit/cost ratio (B/C) is another important indicator that attempts to summarize the overall value for money of a project. This is the ratio between the discounted value of the project's benefits divided by the discounted value of the project's costs. A ratio can be either positive or negative. If it is positive (ratio greater than 1), the project is considered worth the

money invested, on the other hand, if it is negative (ratio less than 1), the project is considered to lose money. If the relationship is one, the relationship is considered even or neutral.

C.1.2 SCBA calculation

To certainly assess the cost and benefits of the measures an SCBA tool in Excel was programmed. The calculation was based on the methodology previously mentioned (according to SATELITE CBA guidelines). In Figure 2 the calculation process to obtain the SCBA results of each selected measure is presented.

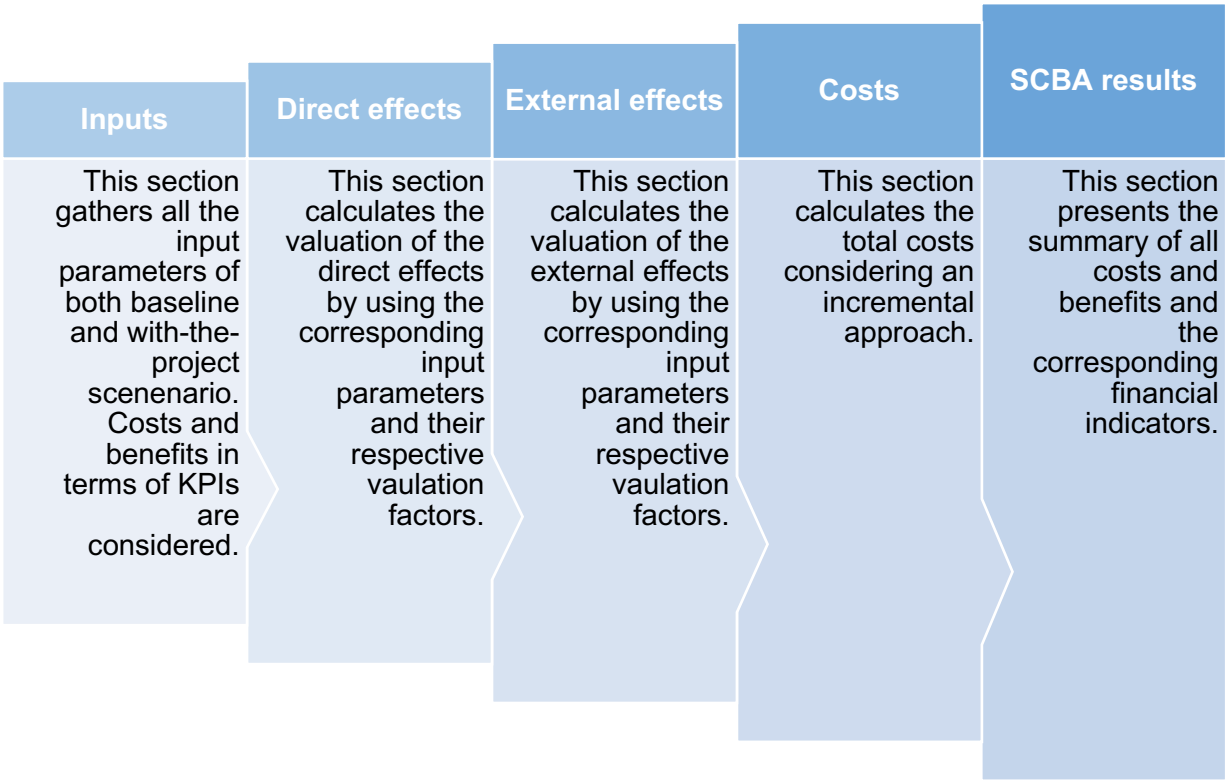


Figure 2. SCBA calculation process

Table 4 shows the list of Key Performance Indicators (KPI) considered and their corresponding units. Each KPI is classified in the calculation according to their effects. As mentioned before, these effects are translated into monetized values to conduct the SCBA. Table 4 presents the KPIs considered for the SCBA in the function of its flexibility and data availability in the literature, and chances for monetization. Those KPIs not suitable for SCBA are marked as “Not quantified”.

ID	Indicator	KPI Units	SCBA effects	SCBA data
1	Awareness	Percentage	-	Not quantified
2	Acceptance	Percentage	-	Not quantified
3	Satisfaction	Score (0-5)	-	Not quantified
4	Access to mobility services	Percentage	-	Not quantified
5	Physical barriers	Score (0-5)	-	Not quantified
6	Car ownership	Cars to inhabitant's ratio	-	Not quantified
7	Operational barriers	Score (0-5)	-	Not quantified
8	Relative travel cost	Aver. income&%	Direct	Changes in prices
9	Contributions to policy, plans, and programs	Score (0-5)	-	Not quantified
10	Mode shift	Percentage	-	Not quantified
11	Modal split	Percentage	-	Not quantified
12	Vehicle-kilometre travelled (VKT)	Kilometers	Direct	Average operation savings, emissions, noise and congestion
13	System usage	Users/unit time	Direct	Revenues from demand
14	Parking turnover	Ratio (0-1)	Direct	Revenues from demand
15	Commercial speed	Km/h	Direct	Proxy of travel time (difficult to estimate without further data).
16	Peak/off-peak travel time difference	Percentage	Direct	Proxy of travel time
17	Accuracy of time keeping	Percentage	Direct	Proxy of travel time
18	Number of fatalities and seriously injured	Quantity	External	Cost associated to fatalities and serious injuries
19	Number of incidents	Quantity	External	Cost associated to incidents
20	Investment cost	Euro	Project Cost	Investment cost
21	Operating cost	Euro	Project Cost	Operating cost

ID	Indicator	KPI Units	SCBA effects	SCBA data
22	Job/sales impact	Euros and employees	Indirect effect	Not quantified- risk of double counting.
23	CO_2 emissions	Tons of CO_2	External	Climate change and health valuation
24	NO_x emissions	Tons of NOx	External	Climate change and health valuation
25	PM emissions	Tons of PM	External	Climate change and health valuation
26	Noise level	dB(A)	External	Health valuation
27	Vehicle energy efficiency	MJ/km	External	Monetized savings in energy and proxy of emissions
28	Use of space for parking	Percentage of area	-	Not quantified
29	Quality of public space	Score (0-5)	Indirect	Qualitative value

Table 4. ECCENTRIC KPIs and categorization for the SCBA.

C.1.3 Assumptions for the SCBA calculations

Below are the different assumptions, estimates, and methods used to calculate the forecast values for each measure. The values presented in each Measurement Evaluation Report were used. The values correspond to the three different scenarios that were considered and evaluated in each measure, these scenarios are Before (baseline), BaU (without-the-project), and After (with-the-project).

In addition, any uncertainties in the prediction of the values for SCBA are also noted below.

RUS 2.6: Park and Ride in the peripheral district

- It was considered a project lifetime of 25 years
- It was considered a once time investment cost in year 1 (2019)
- It was assumed that the operational cost will remain constant throughout the project's lifetime
- For KPI System Usage it was assumed a value of 9.600 users/year for the total project's lifetime
- For KPI CO2 emissions it was considered the reduction of CO2 emissions resulting from the built-in buffer car park. For year 1 it was considered the reported value of 25,344 ton/year and for the next years, it was assumed a 5% increase in the savings per year.

MUC 2.7: Community information and participation portal

- The recommended project lifetime is of 5 years. Nevertheless, it was assigned a lifetime of 6 years to adjust the start of the project to 2016 and the end to 2021.
- No significant investment costs were assigned to the BaU scenario. For the After scenario, it was stated that the operational costs for the years 2016 and 2017 were included in the investment costs including 08/2017. Thus, to work with yearly data the investment costs were assigned to the year 2017 and the operational costs were assigned to start from the year 2017 considering 4 months in 2017 (ongoing operation) and yearly data for the next years.
- For the BaU scenario, it was considered the same operational costs reported for the After scenario. This is because, in the evaluation report, 2020 was taken as a reference year to build the BaU scenario.
- It was assumed constant operational costs throughout the project's lifetime. The extra personnel costs that will be incurred after the end of EU funding for the BaU scenario were not calculated.
- The valuation of the KPI System Usage was not considered for the SCBA calculations since there is no price reported for the offered service.
- For the BaU scenario calculations, the values for the KPIs VKT, CO2 emissions, NOx emissions, and PM emissions considered the reported values of the Before scenario from 2017 to 2019. For the next years, it was considered the reported values for the BaU scenario assuming constant values throughout the project lifetime.
- For the After scenario calculations, the values for the KPIs VKT, CO2 emissions, NOx emissions, and PM emissions considered the reported values for the Before scenario from 2017 to 2018, for the next years it was considered the reported values for the After scenario assuming constant values throughout the project lifetime.

MUC 2.9a: Neighbourhood oriented marketing of sustainable multimodal mobility services: Direct and dialogue marketing

- The recommended project lifetime for this type of project is of 5 years. Nevertheless, it was stated that the planning phase ended by the year 2018 thus, it was assigned a lifetime of 8 years to adjust the end of the project to 2023.
- It is stated that the reported investment cost corresponds to both, baseline and after scenario since the acquired data was evaluated and used for calculations of both scenarios. Thus, for the calculations of the SCBA, these investment costs were assigned only to the After scenario and it was assumed no investment costs for the BaU scenario.
- No operational costs for the BaU scenario were assigned.
- It was considered no operational costs from 2016 to 2018 for the After scenario. For the years 2019 and 2020, the reported operational costs were assigned. It is important to highlight that it was stated that the operational costs are indicated in relation (per month, per order, etc.) where the variable is the number of orders. There

is not a reported forecast for the number of orders but it was stated that there will be a lower population consequently the costs are expected to be lower as well, thus, it was assumed a 2% decrease in the operational costs from 2021 to 2023.

- The valuation of the KPI System Usage was not considered for the SCBA calculations since there is no price for the offered service.
- It was used the given data calculated with a special expansion factor to extrapolate the yearly values of the KPIs VKT, CO2 emissions, NOx emissions, and PM emissions for the BaU and the After scenario.
- The BaU scenario calculations considered the reported values for the Before scenario from 2017 to 2019, for the next years it was considered the reported values for the BaU scenario assuming a constant value throughout the project's lifetime.
- The After-scenario calculations considered the reported values for the Before scenario from 2017 to 2018, for the next years it was considered the reported values for the After scenario assuming a constant value throughout the project's lifetime.

STO 5.2: Speed up core bus routes

- No operational costs were assigned since it is stated that there were no measurable operating costs associated with the geometric modification measures that were implemented.
- Since it is stated that the KPI Accuracy of Time Keeping was dropped for one of the two bus lines and no data regarding waiting time or reliability was presented for the second bus line, this KPI was could not be considered for the SCBA.
- KPIs such as Congestion and Reliability, Fuel Savings, and Emissions (CO2, NOx, PM) could not be assessed as the necessary data was not measured.
- To calculate the KPI Commercial Speed it is necessary to monetize it in terms of saving time per passenger. The factor used for the valuation takes into account the country (Stockholm), suburban area, and a type of traffic close to capacity. However, no data was provided on the number of passengers in different scenarios. Consequently, for the valuation of time savings per passenger, it was assumed that 100 net passengers could benefit from this measure. The data provided by the project manager was:
    - Bus 178: On a weekday peak-hour basis, there is a reduction of commercial driving time from 17.1 (BaU) to 16.6 (After) hours. This only includes hours 7-9 and 15-18. Taking 250 normal workdays per year= 125 hours per year
    - Bus 179: On a weekday peak-hour basis, there is a reduction of commercial driving time from 43.45 (BaU) to 42.87 (After) hours. This only includes hours 7-9 and 15-18 Taking 250 normal workdays per year= 45.8 hours per year.

  Thus, the value used for the calculations was the sum of the estimated hours per year saved - a total of 270 hours.

- It is stated that the performance will evolve based on a mixture of changes in overall vehicular traffic and passenger demand, therefore is not possible to properly estimate if the reported values of the KPI will remain constant the following years nor their change. For the SCBA it was assumed that they will remain constant throughout the project lifetime to estimate the benefits of the measure.

TUR 5.7: Introduction of electric public transport

- A project lifetime of 14 years was considered according to the estimated renewal time of the conventional buses
- It is stated that the electrification of fleet line 1 started with the eFöli project, meaning that the measure implications would have taken place regardless ECCENTRIC. Nevertheless, the SCBA calculations considered only the scope of ECCENTRIC which embraces only two buses from the total fleet of line 1. Therefore, it was not included the implications of the eFöli project as a whole.
- To have representative results from the SCBA concerning exclusively the two buses, it was considered for the BaU scenario values of two 2-axis EURO 6 diesel buses. For the After scenario, the reported values were used.
- For the KPI VKT, it was considered the reported value of 10.311,3 km from the year 2017 to 2019 per each e-bus for both scenarios (BaU and After).
- Since it is specified that a more reliable operation is expected and according to the driving output presented by Aho in the eFöli publication, it was considered that the VKT of e-buses will grow 10% yearly. Therefore, this growth was considered for the year 2020 onwards.
- The investment costs of the BaU scenario correspond to the purchased of two 2-axis EURO 6 diesel buses. The investment costs of the After scenario correspond to the purchased of two Linkker Ltd e-buses.
- The values of the operational cost in the different scenarios (Before and After) were multiplied by the VKT value of each year, respectively.
- The KPIs CO2, NOx, and PM emission data for the BaU scenario was obtained multiplying the VKT mentioned before with the factors provided for EURO VI (50% payload). The emissions increase accordingly with the increase of VKT throughout the project lifetime.
- The KPI CO2 value for the After scenario was calculated using the factors presented in the eFöli publication (pg. 61). Data from the optimistic scenario was utilized. The factor 209 g CO2/km was multiplied by the corresponding VKT each year.
- The KPIs NOx and PM emission values for the After scenario have a cero value since it is stated in the eFöli publication that these components are mostly eliminated (disregarding the auxiliary heater) and neglecting the electricity emissions.
- The KPI Energy Consumption reported values were multiplied by the corresponding VKT each year to have megajoules/year data.

- The valuation of the KPI Noise was not included as an external benefit, since monetization using decibels requires data of the number of people exposed and this was not calculated nor estimated.

MAD 5.8: Electric and hybrid busses for public transport

- The suggested lifetime of 12 years for the buses was considered to adjust the project lifetime. Since the start year for every measure is 2016, to adjust the period accordingly it was considered a lifetime of 14 years from 2016 to 2029.
- The investment costs were assigned to the year 2019 for both scenarios, BaU and After, considering the updated values that were reported. The calculated investment cost reflects an incremental approach.
- To compare both scenarios, it was considered the replacement (for BaU scenario) and the purchased (for After scenario) of 9 buses in total. Thus, the reported investment values were multiplied by 9.
- It was considered in both scenarios a constant VKT value of 476.440 km throughout the project's lifetime. This value was used to calculate the total operation costs, considering the reported values in €/100 km units. As well the constant VKT value was used to calculate the values of the KPI Energy Consumption to have megajoules/year values and calculate the valuation.
- It was assumed that the emissions data (CO2) for the BaU and After scenario will remain constant over time.
- For the valuation of revenue by a shift in demand, it was considered the measured value of 2.486.942 users/year for the BaU scenario throughout the project's lifetime. To reflect a possible shift in demand due to the increased awareness, it was considered 2.600.00 users/year for the After scenario throughout the project's lifetime. It was assigned 1,1712 €/passenger for both scenarios.

MUC 5.9: Intermodal (E-) mobility stations

- It was assigned a project lifetime of 20 years.
- The investment costs were assigned only to the After scenario and it was assumed no investment costs for the BaU scenario. The costs were assigned only to the year 2018 since in this year the first two stations were installed and there is no specific data of the further investment costs breakdown regarding the installations of the other mobility stations.
- No operational costs for the BaU scenario were assigned.
- It was considered no operational costs from 2016 to 2017 for the After scenario. From 2018 to 2021 the reported operational costs were assigned. For the next years, it was subtracted the leasing operation cost and a reduction of 15% applied since it is

expected a decrease over the years as there will be less promotion and communication costs.

- The valuation of the KPIs System Usage and Relative Travel Cost (% of average income per year) was not considered for the SCBA calculations since it cannot be estimated the specific amount of users per provider and no growth could be assessed.
- It was used the given data calculated with a special expansion factor to extrapolate the yearly values of the KPIs VKT, CO2, NOx, and PM emissions. This data was calculated for the BaU and the After scenarios.
- The BaU scenario calculations considered the reported values for the Before (baseline) scenario from 2017 to 2019, for the next years it was considered the reported values for the BaU scenario assuming a constant value throughout the project's lifetime.
- The After scenario calculations considered the reported values for the Before scenario from 2017 to 2018, for the next years it was considered the reported values for the After scenario assuming a constant value throughout the project's lifetime.
- The KPI Energy Consumption calculation for both scenarios take into consideration the VKT of the After scenario.

STO 6.1: Offering EV-test fleets to selected target groups

- It was considered a project lifetime of 4 years. Considering the start in 2016 (planning phase) and end in 2019 (ending of the EV-vans try after the period of two years)
- All the reported cost was converted to euros with the factor 1 SEK= 0,0957366 EUR[2]
- It was assigned 20% of the reported operating costs to the year 2018 while the remaining 80% was assigned to the year 2019.
- The CO2 and NOX KPIs emissions values for the BaU scenario correspond to the standard emissions rates specified and not on a sample of measured emissions. Specifically, 0,833 tons/year CO2 and 0,0000845 tons/year NOx were considered.
- The reported emissions values of the CO2 and NOX KPIs emissions values for the After scenario were considered only for the year 2018 and 2019
- The KPI VKT was not considered since it was not reported for the BaU scenario due to limitations.

[2] Data retrieved January 2020, from https://www1.oanda.com/lang/de/currency/converter/

MAD 6.2: Test fleets, policy incentives and campaigns for the uptake of electric vehicles

- It was considered a project lifetime of 20 years, starting in 2019 and ending in 2035. Year 1 was adjusted to 2019 since the reported results were adjusted for this year.
- Since it was indicated that there are no investment costs, because of the leasing contract, it was considered only the annual operational costs of the fleet as economic costs.
- It was assumed that operational costs for the BaU and After scenario will remain constant yearly.
- It was assumed that the reported values of the emissions (KPIs CO2, NOx, and PM) for the BaU and After scenario will remain constant throughout the project lifetime.

TUR 6.4: Electrification of city's fleet and promotion of electro-mobility

- Since the measure embraces a pilot project it was considered a project lifetime of 4 years.
- The investment costs were attributed to the year 2018. The operation costs were attributed to the year 2019.
- In order to obtain representative results that focus on the impact of the use of Light Electric Vehicles (LEVs), the calculation of direct and external benefits considered the values that corresponded to the substitution of car use for LEVs.
- For the valuation of the KPI VKT the After scenario considers the reduction of VKT attributed to the use of LEVs. Therefore, the BaU scenario considers the estimated value of 1.988.773 km, and the After scenario considers 1.988.308 km since it is stated that the LEVs replaced 465 km of car use.
- For the valuation of the KPI CO2 emissions the After scenario considers the reduction of CO2 attributed to the use of LEVs. Therefore, the BaU scenario considered the estimated 309 tons of CO2 emissions generated by work-related travel. The After scenario considered 308,93 tons of CO2 emissions since it is stated that the LEVs replaced 465 km of car use which represents 0,07 tons of CO2 emissions.
- The valuation of the KPI Energy Consumption considered the reduction of VKT only, thus the reported reference value of 3,0 megajoule/km was multiplied by the VKT to have yearly data. The energy consumption of the LEVs was not considered since the energy consumption values reported in the After scenario considered all the LEVs energy consumption (megajoule/km) but there is no VKT data per type of LEVs.

MAD 7.1: Consolidation centre with EVs and local regulations for clean urban freight logistics

- It was considered a project lifetime of 14 years, starting in 2018 and ending in 2029. Year 1 was set up to 2018 since the reported results were quantified from this year.
- It was considered that the investment cost for the BaU scenario is €99.000,00 corresponding to the investment of a Fuso hybrid truck and a Euro V diesel truck.
- Although it was stated that the consolidation centre has the capacity to increase the number of shipments, it was not stated that there would be a growing demand for the services. Thus, it was assumed that the reported operational cost, VKT value, and the emissions data (KPIs CO2, NOx emissions, and PM) for the Bau and After scenario will remain constant throughout the project's lifetime.

TUR 7.7: Introducing biogas for urban freight logistics

- A project's lifetime of 14 years was considered.
- The investment cost considered only the reported values, namely for the BaU scenario it was considered only one 2-axis diesel truck. For the After scenario it was considered the investment costs of two biogas trucks.
- The operation costs considered the total mileage driven. And it was assumed no change in operating costs throughout the project lifetime since the mileage is estimated to remain approximately the same.
- In the After scenario, according to the given data, it was considered for the KPI VKT for years 2017 and 2018 a value of 70.600 km. For the BaU scenario, it was considered the reported mileage of 137.100 km for all years.
- It was assumed that there is no difference in the KPI VKT from 2019 between scenarios (BaU and After), thus, no monetary benefits for this KPI are be attributed.
- The operation costs considered the total mileage driven. And it was assumed no change in operating costs throughout the project lifetime since the mileage is estimated to remain approximately the same.
- According to the provided data (for Iveco and Scania bus), in the After scenario, it was assigned a value of 5-ton CO2/year to the KPI CO2 for years 2017 and 2018. For the consecutive years, it was assigned the reported values.
- The following factors were used to calculate the KPIs NOx and PM values in the BaU scenario. These were multiplied to the correspondent VKT to have ton/year data
    - Full load NOx: 0,5 g/km
    - PM: 0,0072g/km
- To calculate the emission data of KPIs NOx and PM in the After scenario, the following values were converted to megajoules and multiply by the correspondent energy efficiency factor and the yearly VKT to have ton/year data
    - Gas truck, NOx: 0,28g/kWh

  - Gas truck, PM: 3,2g/kWh
- It was assumed that the calculated values of the KPIs CO2, NOx, and PM emission data will remain constant throughout the project lifetime.
- It was assumed that the reported value of the KPI Energy Consumption will remain constant throughout the project lifetime. The reported values in each scenario were multiplied by the VKT to have yearly data.

C.2 Evaluation results

		Investment and operational costs				Direct benefits					External benefits						Financial indicators	
	Measure	Project investment cost	Operation and Maintenance cost	Residual value	Total economic costs	Revenues from demand increase	Travel time savings	Congestion and reliability	Fuel savings	Operation cost savings	Energy savings	Noise	CO2 emissions savings	NOX emissions savings	PM emissions savings	Total Economic benefit	ENPV/ Net benefits	B/C Ratio
WP2	RUS 2.6	-€ 48.099	-€ 3.207	€ 0	-€ 51.306	€ 166.744	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 49.417	€ 0	€ 0	€ 216.161	**€ 164.855**	4.2
WP2	MUC 2.7	-€ 18.276	€ 0	€ 3.801	-€ 18.276	€ P.M	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 49.399	€ 62.596	€ 9.030	€ 121,025	**€ 102.749**	6.6
WP2	MUC 2.9a	-€ 41.580	-€ 330.791	€ 0	-€ 372.371	€ P.M	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 1.143.486	€ 534.661	€ 75.057	€ 1.753.204	**€ 1.380.833**	4.7
WP5	STO 5.2	-€ 699.260	€ 0	€ 0	-€ 699.260	€ 0	€ 450.145	P.M	P.M	€ 0	P.M	€ 0	P.M	P.M	P.M	€ 450.145	-€ 249.114	-0.36
WP5	TUR 5.7	-€ 600.000	€ 6.190	€ 0	-€ 600.000	€ 0	€ 0	€ 0	€ 0	€ 0	€ 57.894	P.M	€ 21.502	€ 724	€ 800	€ 87.110	**-€ 512.890**	0.15

		Investment and operational costs				Direct benefits				External benefits							Financial indicators	
	Measure	Project investment cost	Operation and Maintenance cost	Residual value	Total economic costs	Revenues from demand increase	Travel time savings	Congestion and reliability	Fuel savings	Operation cost savings	Energy savings	Noise	CO2 emissions savings	NOX emissions savings	PM emissions savings	Total Economic benefit	ENPV/ Net benefits	B/C Ratio
	MAD 5.8	-€ 566.252	€ 0	€ 0	-€ 566.252	€ 1.072.490	€ 0	€ 0	€ 0	€ 1.323.620	€ 436.741	€ 0	€ 106.720	€ 0	€ 0	€ 2,939,571	**€ 2.939.571**	5.2
	MUC 5.9	-€ 266.294	-€ 169.894	€ 0	-€ 436.188	P.M	P.M	P.M	P.M	€ 0	€ 0	€ 0	-€ 583.012	€ 279.186	€ 23.973	-€ 279.853	**-€ 716.041**	-0.64
	STO 6.1	-€ 13.013	€ 0	€ 0	-€ 13.013	€ 0	P.M	P.M	P.M	€ 895	€ 234	€ 0	€ 55	€ 1	€ 0	€ 1.184	**-€ 11.828**	0.09
WP6	**MAD 6.2**	€ 0	-€ 123.209	€ 0	-€ 123.209	€ 0	€ 0	€ 0	€ 0	€ 0	€ 189.038	€ 0	€ 44.231	€ 1.251	€ 15.373	€ 179.947	**€ 91.225**	2.03
	TUR 6.4	-€ 26.184	-€ 50.549	€ 0	-€ 76.734	€ 0	€ 0	€ 0	€ 21	€ 0	€ 21	€ 0	€ 6	€ 0	€ 0	€ 47	**-€ 76.687**	0
WP7	**MAD 7.1**	-€ 51.775	-€ 282.492	€ 0	-€ 334.267	€ 0	€ 0	€ 0	€ 0	€ 0	€ 15,216	€ 0	€ 3.639	€ 197	€ 2.643	€ 21.694	**-€ 312.573**	0.06

	Investment and operational costs				Direct benefits				External benefits							Financial indicators	
Measure	Project investment cost	Operation and Maintenance cost	Residual value	Total economic costs	Revenues from demand increase	Travel time savings	Congestion and reliability	Fuel savings	Operation cost savings	Energy savings	Noise	CO2 emissions savings	NOX emissions savings	PM emissions savings	Total Economic benefit	ENPV/ Net benefits	B/C Ratio
TUR 7.7	-€ 118.681	€ 0	€ 0	-€ 118.681	€ 0	€ 0	€ 0	€ 0	€ 108.644	€ 40.757	P.M	€ 70.982	€ 2.101	€ 1.885	€ 224.369	**€ 105.688**	1.89

Table 5. Summary of the Social Cost Benefit Analysis.

C.2.1 Interpretation of the results

The impact of social cost-benefit analysis can be positive or negative. The positive impact is called a social benefit and the negative impact is termed as a social cost. Results shown in Table 5 can be analysed with these criteria. Nevertheless, is important to empathize that the results depended strictly on the data collected and reported. The quality of the data varied for each measure, besides, external factors were not fully included or highlighted in the evaluation findings of each measure. Thus, the results of this SCBA are not representative of the long-term impact of the projects. However, the results obtained in the SCBA can help to identify the components of the measure that caused positive or negative impacts. As well as the data obtained can be utilized to investigate further the strong and weak points of the measures.

The description of the measures and the underlying context differs significantly. However, there are major benefits in common that fall into the same category: emission reduction. The emission reduction was caused by changes in the type of fuels, reductions in energy consumption due to new technologies, and/or the reduction of VKT. Nevertheless, it is important to highlight that the reduction of emissions promoted by all measures comprehends a wider scope, where the combination of new mobility measures during and after the measures' implementation phase influenced the results. Furthermore, external factors such as socioeconomic issues of the different countries play a role in the weight of the results. Likewise, all projects incorporated a wider perspective since they deal with environmental issues related to emissions with effects on climate change, which are intrinsically non-local. Thus, due to the difficulty of isolating impacts, the stated environmental benefits should be taken as potential benefits related to the implementation of measures, not exclusively due to those implementations.

As can be observed in Table 5 the ENPV/ Net benefit results are positive for the three measures analysed from WP2, as well as a B/C ratio greater than 1, which is an indicator that the social benefits exceed the costs of implementation. In particular, the B/C ratio is higher for MUC 2.7 and MUC 2.9a, this could be attributed to the fact that the costs of the measure are significantly lower compared to the benefits obtained. It is important to note that both measures promoted sustainable mobility options via direct dialogue or marketing hence why the costs are lower than other measures. The nature of these measures is exclusively aimed at guiding and assisting residents to shift their mobility behaviour towards a less car-dependent lifestyle. There was a direct dialogue, however, the measures do not include direct actions in the transportation system of the living lab. In addition, it should be noted that other measures, external and personal factors could have also contributed to the change in the residents' behaviour. Therefore, the benefits obtained reflect indirectly the impact of the measures.

Regarding RUS 2.6, the direct benefit obtained from the revenues from demand is a determining factor for the results. RUS 2.6 describes the introduction of the P&R concept for the first time in the city of Ruse. Likewise, for this reason, the calculations did not consider an incremental approach, since no direct or indirect benefits were attributed to the counterfactual baseline scenario. Furthermore, the investment and operation costs of this measure are considerably low since the P&R station created was of small scale. Altogether, increased the economic benefits obtained.

The results obtained for the measures from WP5 differ. Only MAD 5.8 obtained positive ENPV/ Net benefit results, and a B/C ratio greater than 1. For this measure, the determining point is the benefits obtained from operating costs. The operational cost was reduced significantly, therefore instead of a cost, it is considered as a benefit. Moreover, the operational benefits are almost double the investment cost of the project, this is mainly due to the characteristics of the measure where hybrid buses provide an effective alternative for the replacement of diesel buses. The hybrid buses implemented in the city of Madrid proved to be economically efficient, both in terms of savings in maintenance costs and fuel savings. Consequently, also potential savings in terms of external factors such as the reduction of CO2, NOx, and PM emissions.

Opposite to MAD 5.8, the financial indicators obtained for TUR 5.7 were negative, even though both measures comprehend the replacement of diesel buses. TUR 5.7 introduced electric buses that represented challenges during winter conditions causing various interruptions in the service. As a result, the e-buses introduced as part of this measure had to be constantly supplemented by diesel buses. Furthermore, the SCBA calculations considered only the impacts of the two buses that were funded by CIVITAS ECCENTRIC, hence the calculations did not consider the joint benefits of the total hybrid buses fleet established during the project. These factors combined, affected significantly the benefits calculated and estimated.

MUC 5.9 presented a notable scenario, as can be seen in Table 5, there are no positive benefits assigned to CO2 emissions. Instead, since there was an increase in CO2 emissions these are considered costs. The reasons for this are directly attributed to the data collected, which had a limited scope. The assessment of MUC 5.9 considered only the users using mobility stations, which is a small percentage of the total population of the targeted study area (living lab). Those few people rarely own a car or produce emissions, so the difference between scenarios is exceptionally low. The data provided for the SCBA of this measure is based on a projection that considered the entire living lab. Therefore, when comparing BaU and After scenarios, the value of CO2 emissions is higher for the After scenario. The measure promoted exclusively the use of different mobility offers, and even though it displayed a low but positive response from the users, the results obtained reflect that the measure alone cannot accomplish a positive mode shift towards more sustainable transport options within the short project lifetime. Likewise, it is important to underline that external factors such as changes in the type of car contributed to this calculated increase.

The data available to perform the STO 5.2 SCBA was scarce and the results reflect this by having an exceptionally low and negative B/C ratio. As benefits, only the change in commercial speed could be assessed. The measure was evaluated based on the operational characteristics of two bus lines, the reported investment cost embraces changes in both bus lines. Nevertheless, speeds improved on one line but not the other, therefore significantly affecting results. It is important to highlight that the calculation of this benefit was made under heavy assumptions, affecting the truthfulness of the results obtained. Also, KPIs like dwell times and reliability improved, but not to the extent of the established objectives. Furthermore, it was not possible to include these two KPIs in the SCBA, as the essential data to assess them was not measured. Likewise, not having data related to these KPIs disabled the calculation of related KPIs, such as the KPIs for CO2, NOx, and PM emissions. The valuation of all these KPIs could have increased the calculated net benefits.

The results obtained for the measures assess in WP6 are mixed. MAD 6.2 attained positive ENPV/ Net benefit results and a B/C ratio greater than 1. MAD 6.2 embraced the integration of EVs in public and private fleets along with incrementing the amount of EVs charging stations in the city of Madrid. Given that a financial lease was used, the measure had no investment costs. This distributed and significantly reduced annual operating costs throughout the project lifetime. The general approach taken by this measure succeeded in providing substantial benefits in the energy-saving category. In turn, the reduction in fuel consumption contributed to a reduction in emissions, providing large indirect economic benefits to the measure. In addition, it should be noted that the data collected and reported for each scenario was substantially complete, this contributed to the valuation of benefits.

For STO 6.1 and TUR 6.4, the lack of data measured before and during the implementation phase of the project was one of the main reasons that led to the negative results. As can be seen in Table 5, the benefits calculated for these measures are very low or in some cases could not be estimated. It was reported that both measures had financial and management barriers during the measure implementation phases. These barriers not only led to implementation delays but were also detrimental to the data collection. Furthermore, both measures have a short project lifetime since they only cover the test of electric vehicles. Having a short-term project and having data collected only for the useful life of the pilot project obstructs the accurate estimation of the long-term impacts that may occur. Last, for both measures, the investment cost was higher compared to vehicles with combustion engines. This in combination with the lack of emphasis on reducing operating and maintenance costs, and the influence of external factors such as reduced usage, parking problems, loading times, etc., played a decisive role in the imbalance of the benefits obtained.

The WP 7 SCBA only comprises two measures. MAD 7.1 obtained unfavorable results and, on the contrary, TUR 7.7 managed to obtain positive net benefits and a B/C ratio above 1. The lack of stakeholders involved in measure MAD 7.1 highly influenced the results obtained. The aim of MAD 7.1 intended to form a Local Freight Partnership with multiple stakeholders however, only one client was interested in making use of the planned services of the measure. Consequently, the volume of operations was exceptionally low compared to the capacity of the hub. This is reflected by the high maintenance costs and the lower benefits obtained. Although the measure managed to VKT and therefore managed to have less fuel consumption and lower emissions levels, the reduction was not high enough to offset investment and operating costs.

Regarding TUR 7.7, the results of this measure demonstrated that biogas vehicles have proven to be a viable and emission-reducing alternative to diesel/gasoline vehicles in heavy traffic and among city fleets. Even though it is considered that the investment costs of a biogas truck are slightly higher than those of a similar model diesel truck, the net benefits compensate for the investment. As can be seen in Table 5, economic benefits from operation cost savings, energy savings, and CO2 emission reduction were significantly higher than investment costs; hence the positive net benefits. The main difference comes out from the energy price as no major costs are incurred from different engine technology. Additionally, as a vehicle fuel, biogas produces approximately 85% less carbon dioxide emissions than gasoline. An additional benefit not envisaged in the analysis was the long-term impact of the measure promoting the expansion of the gas filling network in the city of Turku.

D. Integrated Site Evaluation

This section discusses the overall impacts of the laboratory areas in terms of KPIs and other observed effects. The content of this section is partly presented in Annex B: Site evaluation reference information.

For each city, the general characteristics of the laboratory area are briefly discussed in the annex. If external actions occurred simultaneously during the demonstration phase, and these interfered somehow with the measurements of the ECCENTRIC evaluation, these are disclosed as well. Baseline and BaU scenarios are discussed using the ECCENTRIC KPIs

In the main document a summary of the actual ECCENTRIC implementations in the laboratory area, followed by the estimation of the net impact of the implementations, which is the result of the final measurements, minus the impact of the external actions.

The table below presents a summary of the laboratory areas intervened by ECCENTRIC:

City	Laboratory area
Madrid	Districts of *Puente de Vallecas* and *Villa de Vallecas*
Munich	Areas of *Domagkpark* and *Parkstadt Schwabing*
Stockholm	Årsta District[3]
Ruse	Druzhba area
Turku	Kupittaa area

Table 6. ECCENTRIC Laboratory areas.

In addition, some cities discuss also impacts in stakeholders and local decision-making processes. The city of Munich also devotes a section to extend the analysis to other areas of the city where equivalent pilots were implemented, following a demonstration rationale similar to the one supported by ECCENTRIC[4].

D.1 Madrid

D.1.1 ECCENTRIC Measures related to the laboratory area

In the framework of ECCENTRIC, eleven measures were implemented and evaluated in Madrid. They cover all the project's technical work packages (WP.2 "Inclusive urban planning, new parking policies and mobility management", WP.3 "Mobility as a service for and by all", WP.4 "Enabling safe walking and cycling", WP.5 "Efficient and clean public transport solutions", WP.6 "Promoting the uptake of cleaner vehicles", and WP.7 "Towards better and cleaner urban freight logistics").

[3] Actual implementations took place mostly in other locations scattered around Stockholm.
[4] This activity was additional to the content initially described in the Grant Agreement. Changes in scope and budget to accomplish this additional material were reported by ECCENTRIC during the last reporting period.

Work Package	Measure ID	Measure name
WP2	MAD 2.3	Adaptive parking management based on energy efficiency and occupancy
	MAD 2.8	**Mobility management strategies for vulnerable groups**
WP3	MAD 3.3	Open platform for multimodal mobility information and services
WP4	**MAD 4.1**	**Innovative and participative approach to traffic safety on a neighbourhood level**
	MAD 4.6	**Pedestrian friendly public space outside the city centre**
	MAD 4.7	**Enabling cycling outside the city centre**
WP5	MAD 5.1	High-level PT service corridors in peripheral districts
WP5	MAD 5.8	Electric and hybrid buses for public transport
WP6	MAD 6.2	Electrification of Municipal Fleet & Promotion of Electro-mobility
WP7	MAD 7.1	Consolidation centre with EVs and local regulations for clean urban freight logistics
	MAD 7.6	Prototype for an ultra-low emissions cargo vehicle

Table 7. Summary of Madrid measures

Four of the measures have taken place in different parts of the two districts of the city lab. They are indicated in bold fonts in the table. Measure MAD 2.3 (Adaptive parking management based on energy efficiency and occupancy) was implemented at the Empresa Municipal de Transportes de Madrid (EMT) headquarters, also located in *Puente de Vallecas* district, but was focusing on technical feasibility and employees' acceptance, and was not intended to have any significant impacts on its urban surroundings.

In the course of the project, two other measures that were initially intended to be implemented within the living laboratory area had to be relocated. In the case of measure MAD 5.1 (High-level PT service corridors in peripheral districts), the location of the pilot section was located mostly in the neighbouring district of Moratalaz; furthermore, the municipality did not provide the necessary budgetary resources to implement the pilot section (see measure report for details), and the measure team decided to dedicate the available project resources to undertake a detailed analysis of the corridor, including the users' and residents' practices and priorities, which was completed in December 2019.

The second measure being relocated outside the city lab was MAD 5.8 (Electric and hybrid buses for public transport), due to technical and operational reasons. The depot serving the

area was not prepared to operate hybrid buses, and the buses had to be assigned to a depot not covering Puente and Villa de Vallecas. The measure team selected an alternative bus route close to the living lab and providing tangential accessibility (i.e. inter connecting neighbourhoods in the periphery), so that results could be comparable to those that would have been obtained in the Living Lab, with similar results in terms of promoting cleaner mobility in peripheral districts of the city.

Finally, measures MAD 3.3, MAD 6.2, MAD 7.1 and MAD 7.6 operated at the city level. The following table summarizes the selected indicators to evaluate the performance of each of the nine measures that take place within the Madrid Living Lab.

Impact area	Impact sub-area	Indicator	Unit	2.8	4.1	4.6	4.7	5.8
Transport system	General	Modal shift	Trips / %	x		x	x	
Transport system	General	Systems usage	Users			x	x	
Transport system	General	Bus service	Km/year					x
Society	Acceptance	Awareness	%	x				
Society	Acceptance	Acceptance	%	x				
Society	Acceptance	Satisfaction	Score	x	x	x	x	x
Environment	Pollution and nuisance	CO2 emissions	Ton/year	x		x	x	x
Environment	Pollution and nuisance	NOx emissions	Ton/year	x		x	x	x
Environment	Pollution and nuisance	PM emissions	Ton/year	x		x	x	x
Environment	Pollution and nuisance	Average energy savings	MJ/km					x
Transport	Safety	Subjective safety perception	Score	x				
Transport	Safety	Fatalities and seriously injured	Quantity		x	x	x	

Transport	Safety	Traffic incidents reported by citizens	Quantity	x	
Economy	Costs	Investment costs	EUR		x
Economy	Costs	Operational costs	EUR		x
Governance	Governance	Number of safety actions in the Living Lab	Quantity	x	

Table 8. Key Performance Indicators for the measures implemented in the Living Lab

D.1.2 ECCENTRIC net impact

The net impact of ECCENTRIC can be discussed from the perspective of the main KPIs. As we are talking about the impact of the project as a whole, it is important to mention measure MAD 2.3, which although not located within the Living Lab area, provides important elements for this reflection.

Awareness, Acceptance and Satisfaction

Each measure has produced a survey to measure the level of Awareness, Acceptance and Satisfaction of the citizens and main stakeholders. The two first indicators (Awareness and Acceptance) were employed in only three measures: MAD 2.3, MAD 2.8 and MAD 7.1.

MAD 2.3 was the only measure that has achieved better results in terms of Awareness (72% of the persons interviewed declared to have a medium-to-detailed knowledge of the ECCENTRIC measure) than Acceptance and Satisfaction (2.3 and 2.6 over 5, respectively). However, this was expected, since the measure operates with a constraint logic (the convenience of traveling by private car and parking in the workplace). This resistance tends to decrease over time, since new travel habits are assimilated.

The measure MAD 2.8 focused on two distinct groups (children and elderly), and has presented different degrees of awareness. All the children in the participating schools were aware about the measure, as it was a part of the school activities. As for the elderly population of Vallecas, their awareness about the measure was rather low (1.9 over 5), probably due to the high number of elderly residents in the living lab, and the limitations of the project's awareness raising activities to reach out to all of them.

In terms of acceptance, all the persons interviewed in the survey expressed their full support to the actions undertaken (5 over 5), and complete satisfaction (4.9 over 5 among elderly and 4.8 over 5 among children). Even those that had not directly participated in the measure and were not aware of them considered that it was highly positive to undertake these actions in the neighbourhood.

Departing from a low level of awareness and acceptance, the MAD 7.1 measure has reached above-average values of awareness, acceptance and satisfaction (3.9, 3.6 and 3.7 over 5, respectively). Furthermore, compared to other delivery services available in the city, the

satisfaction level of the sustainable logistics model promoted by the measure got an average of 4.6.

In MAD 3.3, the quality of the information provided by the Open Data Mobility Platform has been positively assessed by public transport users, with an average score of 3.8 over 5, and by a small sample of app developers, with an average score of 3.9 over 5. Compared to the previous situation, in which the platform "*Mi transporte*" and "*Portal Datos Abiertos*" were the main sources of information, the satisfaction of users with public transport information has increased by 0.8 points.

The MAD 5.8 measure has also achieved a significant score in customers' satisfaction. Passengers riding bus line 140 expressed a high level of satisfaction with the new hybrid buses, with a 4.2 score over 5, compared to a 3 score to the old buses. 69% of the interviewers considered highly adequate to dedicate municipal funding to this action (a score of 4.5 over 5).

In summary, the surveys indicated high levels of satisfaction with the measures undertaken during the ECCENTRIC project in the living lab. In general, the citizens and stakeholders who responded the surveys were in agreement with the public investment committed and supported these actions. The workshops and public events held by the project counted with the engagement of the participants, expressing satisfaction and interest in contributing with the different measures.

Modal shift

The project has had a satisfactory result in terms of modal shift, with emphasis on measures related to non-motorised modes. Two measures (MAD 2.8 and MAD 4.6) have even exceeded the initial estimate.

In the laboratory area, there was an 8.5% increase on walking trips among the elderly, replacing public transport journeys. As expected, modal change was not so high among children, with a 3.4% increase in sustainable trips among children (walking, cycling and public transport) replacing car travel. This was probably due to the fact that whereas the project targeted only children, in many cases any modal shift decision is subordinated to the convenience of the parents. In one particular school (Loyola de Palacio), it became obvious that the car-friendly conditions of its urban environment is strongly discouraging walking and cycling. It is also worth noticing that most of the modal shift among children from car use was shifting to public transport rather than walking.

The number of walking trips in the vicinity of the streets included in the measure MAD 4.6 has increased substantially (more than 9,000), far beyond the 1,000 target. 13% of the affected population that live within a 400-m band along the streets included in the measure declared to have changed to walking; and 30% of the people who answered the survey were influenced by the street improvements on their choice for walking.

The lack of cycling infrastructure and a car-oriented urban design acted as a barrier to the choice of the bicycle as a transport option. Despite this, the project achieved 849 new cycling trips per day coming from other modes of transport (almost 2% of modal share). 16% of the residents who answered the survey were influenced by the street improvements on their choice for cycling.

The project also demonstrated the limited potential of parking management initiatives in companies to induce modal shift inductor: 4.1% of the Empresa Municipal de Transportes de Madrid (EMT) staff members changed their transport mode between 2018 and 2019, resulting in an increase in the modal share of public transport and car-pooling as a result of parking management based on energy efficiency and occupancy introduced by MAD 2.3 measure; 45% of the employers changing mode mentioned the ECCENTRIC measure (changes in the assignment of parking places) as the reason to it.

CO_2, NO_X, PM emissions / Average energy savings

Due to the modal shift and the replacement of conventional vehicles by electric vehicles, the project obtained a very positive joint impact regarding the emissions reduction and energy savings. This economy varies according to the actions carried out:

The measures related to the promotion of non-motorised modes have achieved around 40% reduction of CO2 and other emissions thanks to the modal shift.

The actions dedicated to the electrification of the public fleet obtained an 83% reduction in energy consumption and CO2 annual emission. The replacement of the combustion engine has provided a 100% reduction in NOx and PM emissions.

From the public transport users' perspective, the reduction of noise pollution should also be highlighted: 33.8% of the passengers considered that the new hybrid buses provided by ECCENTRIC were less noisy than the previous ones.

A significant reduction was also achieved by the sustainable logistics concept promoted by ECCENTRIC (a consolidation centre served with small low-emission trucks), resulting in NOx (94%), PM (63%) and CO2 (54%) annual emission reductions; and also, a 54% reduction in energy consumption in the operations handled by the MAD 7.1.

In the case of MAD 2.3, the modal shift achieved did not result in significant reductions in emissions or energy consumption. EMT workers changing to a more sustainable mode were mostly making short-distance trips, and their saving were neutralised by modal changes towards individual car use made by some employees travelling long-distance commuting trips.

Road Safety

Road safety was highlighted in a significant number of measures and was pointed out by many citizens who answered the surveys, as the main reason for a modal shift towards more sustainable modes (walking and cycling).

In the Living Lab, the elderly's perception on road safety, as measured by the survey carried out by Mad 2.8, showed a 30% increase between 2017 and 2019.

The number of fatalities and seriously injured decreased by 16.9% in the two districts between 2017 and 2018, whereas at the city level it decreased by 6.5%. However, it is uncertain that

this decrease can be attributed to ECCENTRIC, as the implementation of most of the measures was not completed until the end of 2018[5].

The perception of the street conditions (which include safety as a key trait) has notably improved: 30% of the people who answered the MAD 4.6 survey were influenced by the street improvements on their choice for walking; and 16% of the respondents to the MAD 4.7 survey were influenced by the street improvements on their choice for cycling.

The number of traffic accidents involving cyclists has slightly decreased (by 3.5%).

As an Eccentric contribution, the municipality staff responsible for safety actions were also empowered with more accurate information, including the citizens' and residents' perspectives.

Economy (costs)

This indicator is mainly related to the actions that required the acquisition of hybrid and electric vehicles. These vehicles ae more expensive than conventional ones, but their higher investment costs were expected to be amortized over 5 years due to their lower energy consumption and maintenance costs.

The leasing of the MAD 6.2 new electric cars supposed an 11% increase in operating cost. Investment costs were 39% higher for the MAD 5.8 hybrid buses compared to the prior Euro IV diesel buses they have replaced.

Hybrid buses were considered economically efficient, as the additional costs could be recovered in less than 5 years, due to fuel and maintenance savings. Operating costs have been cut by more than half (51.4% reduction), from €66.67(100 km to €34.30/100 km.

The small low-emission (hybrid) trucks operating from the MAD 7.1 Consolidation Centre provided annual savings estimated at €10,000 compared to the BaU scenario.

Finally, e-cars provided substantial reductions in CO2 and others pollutant emissions, as well as in energy use (83% to 100%), without any drawbacks in terms of reliability and performance of the fleet. In spite of energy cost savings, abatement costs remain high, but are expected to decrease as new e-car models enter the market and leasing costs come down.

By measuring the positive and negative aspects of electric mobility, mainly in terms of costs, Eccentric provided guidelines for future purchases of electric vehicles and operating models.

D.2 Munich

D.2.1 ECCENTRIC Measures related to the laboratory area

In the framework of ECCENTRIC, eleven measures are implemented and tested in Munich. They belong to different work packages and address different challenges of urban mobility.

[5] It would be necessary to have access to 2019 data becomes available to assess this impact. Regrettably, the municipality changed its data collection procedures, and no data was available for 2019 at the time of preparing this report.

Some measures consist of comprehensive sub measures. A summary of all Munich ECCENTRIC Measures (dependent and independent from the actual Living Lab) is presented in Table 9.

Work Package	Measure ID	Measure name
WP2	MUC 2.7	Community Information and Participation Portal
	MUC 2.9	Neighbourhood oriented marketing of sustainable multimodal mobility services.
	MUC 2.10	Transfer – Exchanging communication and information technology for everyday mobility between generations
WP3	MUC 3.4	Beacon based indoor routing as a mobility service app
	MUC 3.7	The app for the city lab
WP4	MUC 4.2	Software-controlled safety management in the road network
WP5	MUC 5.6	Conception and development of an integrated e-bike sharing scheme
	MUC 5.9	Intermodal (E-) Mobility Stations
WP6	MUC 6.3	Electric light-weight vehicles – one for all
WP7	MUC 7.3	Sustainable city logistics by combining cargo-bike-delivery-services with a flexible storage system
	MUC 7.5	Neighbourhood oriented concierge system

Table 9. Summary of Munich measures

Most of the above-mentioned measures are implemented in the Living Lab. Some measures are not taking place in the laboratory area but in other parts of the City of Munich (highlighted in grey). Those independent measures do not have an influence on changes which occurred in the Living Lab during the project lifetime and are therefore not included in the KPI measurements.

The following Table 10 presents summarized, the expected impacts, its correspondence with the ECCENTRIC objectives, and the selected indicators to track the performance of each of the nine measures that take place within the Living Lab:

Impact area	Impact sub-area	Indicator	Unit	Addressed measures								
				2.7	2.9	3.7	4.2	5.6	5.9	5.10	6.3	7.5
SOCIETY-PEOPLE	Acceptance	Awareness	%	X	X	X	X	X	X	X	X	X
SOCIETY-PEOPLE	Acceptance	Acceptance	%	X	X	X	X	X	X		X	X
SOCIETY-PEOPLE	Acceptance	Satisfaction	Score (0-5)	X	X	X	X	X	X	X	X	X
SOCIETY-PEOPLE	Accessibility	Car ownership	Cars to inhabitants ratio	X	X	X	X		X			
SOCIETY-PEOPLE	Accessibility	Operational Barriers	Score (0-5)					X			X	
SOCIETY-PEOPLE	Accessibility	Access to mobility services	Percentage						X			
SOCIETY-PEOPLE	Accessibility	Relative travel cost	Ratio						X			
SOCIETY-GOVERNANCE	Planning	Contribution to Policies Plans and Programs	Score (0-5)		X		X	X		X		
TRANSPORT SYSTEM	General	Mode shift	%	X	X	X	X	X	X	X	X	X
TRANSPORT SYSTEM	General	VKT	km	X	X	X		X		X	X	X

Impact	Impact	Indicator	Unit	Addressed measures								
TRANSPORT SYSTEM	General	System usage	# unique users per time period	X	X	X			X	X		X
TRANSPORT SYSTEM	Safety	# of accidents with fatalities/ seriously injured	#				X					
ENVIRON-MENT	Pollution and nuisance	CO2 Emissions	Tons	X	X	X			X	X		X
ENVIRON-MENT	Pollution and nuisance	NOx Emissions	Tons	X	X	X			X	X		X
ENVIRON-MENT	Pollution and nuisance	PM Emissions	Tons	X	X	X			X	X		X
ENERGY	Energy consumption	Vehicle energy efficiency (potential)	Energy/VKT								X	
ECONOMY	Costs	Investment costs	Euro	X	X	X	X	X	X	X	X	X
ECONOMY	Costs	Operational costs	Euro	X	X	X	X	X	X	X	X	X

Table 10. Impact areas of the Munich measures

D.2.2 ECCENTRIC net impact

The following assessment of the impact refers to the values measured in the course of ECCENTRIC before and after the implementation of the measures which took place in the Living Lab.

Addressing Indicators "Awareness", "Acceptance", and "Satisfaction"

Regarding the KPIs awareness, acceptance and satisfaction the net impact is difficult to sum up. Almost every measure looked at those three very relevant indicators to see if the Living Lab residents are aware of the implemented measures, if they are actually accepting and using the new options and if they are satisfied with the usage and the function of the measure's output. Data for these indicators was obtained very individually for each measure. User online or paper-based surveys, qualitative interviews, user experience workshops and both household surveys sum up the following conclusions regarding the Munich measures:

The **Awareness** of the residents in the Living Lab became increasingly distinctive as the project progressed. By implementing more and more measures, it became visible that there is actually something done in the field of transport, mobility and measures related to these topics. Measures are known better due to plenty of events and actions which advertised the measures to a gratifying extent. Especially the measures visible in the streets of the Living Lab, e.g. MUC 5.9 Mobility stations, MUC 5.10 E-scooter sharing, MUC 7.5 Concierge shop and of course MUC 2.9 with its comprehensive mobility marketing campaign and mobility management actions for schools being located in the Living Lab.

The **Acceptance** of new mobility options increased due to the project, which can be seen by the increasing number of loan processes of the new mobility offers (MUC 5.9) and the increasing number of users, having several apps for different mobility offers at the same time. Residents of the Living Lab are making use of the services, apps, mobility options and other mobility related options which are available in the research area. The local community information and participation portal (MUC 2.7) is used on a very regular basis to look for news and what's going on in the neighbourhood. The Concierge shop (MUC 7.5) is used but could be even more frequently used. Therefore, it is currently being transformed into a café which can become a place to meet and hang out with other residents of the Living Lab. This might increase the acceptance of this measure. Same goes for the Luftlotse app (MUC 3.7). It is not very much used yet but this is due to the fact of different unfavourable circumstances like technological aspects and other outer conditions like weather or the affinity to use such technical solutions.

Multiple surveys, interviews and workshops together with users of the different ECCENTRIC offers showed a mostly high **Satisfaction** with the ECCENTRIC measures.

Addressing indicators "Mode Shift", "Car Ownership", and "VKT"

In the following the **mode shift** from the first household survey (05/2018, n=572 households in the Living Lab: Domagkpark and Parkstadt Schwabing) to the second household survey (10/2019, n=328 households in the Living Lab), is described in numbers. Whereas the survey in 2018 had a similar distribution of households in the Living Lab walking (-0,4%) and using sharing offers as car sharing and bike sharing, there is a noticeable shift in 2019 in modes like cycling (-2,5%) and PT (+2,8%). The use of cars as driver decreased by 1,5% while the use as passenger slightly increased about 0,3%. Other options, which were not queried in detail also increased (+1,1%), the legalization of e-scooters in Munich in 06/2019 are probably the reason.

A reduction in **car ownership** within the Living Lab could not be observed, in Parkstadt Schwabing there was even a slight increase, from 1,03 cars/household to 1,09 cars/household. Looking at the car ownership ratio for the entire Living Lab, there is a slight increase in the number of cars per household from 0,93 (in 05/2018) to 0,96 (in 10/2019). Looking at the exact distribution of cars in a household it shows that there are 1,3% less of all 328 questioned

households in 2019 who do not own at least one car. The number of households owning at least one car decreased from 59,4% to 58,2%. On the contrary, the percentage of household owning two cars increased from 14,9% to 17,1%. Same goes for the households owning three or more cars, 0,5% of the Living Lab households own three or more cars after implementing the ECCENTRIC measures in the Living Lab. This result fits a recently published study (12/2019) by the Center Automotive Research (CAR) of the University of Duisburg-Essen. The study suggests that the number of cars in Germany is steadily increasing, which contradicts the, for this evaluation consulted study “Mobilität in Deutschland”.

The **VKT** by household in the Living Lab in 2019 slightly increased to 10.030 km per year regarding the number in 2018 (9.121 km/year). That means, households drive slightly more kilometers per year but looking at the type of car (Gasoline or Diesel) this doesn’t have a bigger negative influence regarding the emissions.

Addressing indicators "CO2 Emissions", "NOx Emissions", and "PM Emissions"

Based on the emission factors already used for the BaU scenario for 2020, emissions could be calculated analogue for the ex-ante scenario, based on the VKT and car ownership numbers for the Living Lab.

The annual emissions for all 2.100 households in the Living Lab sum up the following totals:

Pollutant	Emissions ex-ante (2018)	% change to Baseline (2017)
CO_2	3.693 t	-4%
NO_x	8,28 t	-19%
PM	87,581 kg	-28%

Table 11. Living Lab emission comparison

Table 11 shows the comparison of the emissions based on three different scenarios for the Living Lab. Data for VKT and the number of cars in the Living Lab for the ex-ante scenario was conducted in the household survey 10/2019 (asking for the VKT in 2018). **CO2**, **NOx** and **PM Emissions** could be reduced in the Living Lab. Looking at the total VKT, there are slightly more kilometres driven from household survey 1 until household survey 2. To explain the decrease regarding all emission factors, with a car ownership ratio being constant and an increasing VKT, it’s worth to look at the type of car and the Diesel-Gasoline ratio for the first and second car in the households. Since a switch from diesel to gasoline vehicles was observed, the, for diesel vehicle typical emissions of NOx and PM were reduced more significantly. The overall reduction results from the transition to newer vehicles, fulfilling higher emission standards.

Addressing indicator “System usage” and “Contribution to Policies Plans and Programs”

Not only new **systems** are **used** after their implementation during ECCENTRIC, but also already existing services are used more frequently. An example therefore is measure MUC 5.9, the implementation of mobility stations in the Living Lab, leading to an increased usage of nearly all sharing providers of car sharing, bike sharing and scooter sharing. Measure MUC

2.9a fostered the system usage of the different available transport modes in the Living Lab. Residents successfully made use of the material spread by the direct and dialogue marketing campaign.

ECCENTRIC **contributed** to **policies plans and programs** of the city of Munich, improving the transport system by fostering more sustainable mobility. An example of the synergies arising from the project is the promotion of bicycle usage. Measures for improving bike safety and bike sharing were tested and implemented in the course of ECCENTRIC (measure MUC 2.9b and MUC 5.9). With the installation of mobility stations in the Living Lab, visible platforms were given to all kinds of sharing offers and at the same time the approach of the city of Munich, which was already tested at Münchner Freiheit, was continued. Furthermore, the involvement of companies in the strategy of sustainable transport was continued by transferring the concept of the corporate mobility management to companies in Parkstadt Schwabing (2.9c). Overall the awareness of the citizens increased by implementing visible measures and reports about the project on local media. Also MUC 4.2 is **contributing** in several ways to **policy, plans and programs** within the City of Munich. The 'Vision Zero' strategy for the City of Munich was developed in 2018 and further approved by several further city council resolutions. The whole strategy is based on a strong knowledge generation & political support out of MUC 4.2 achievements. Due to a parallel expert support for MUC 4.2 and the city strategy, the ECCENTRIC living lab was furthermore used as a very productive test area for a baseline inventory on road safety and subsequent measure implementation with a clear focus on a city-wide upscaling process.

Addressing Indicators "Investment costs" and "Operational costs".

Analyzing the **Investment** and **Operational costs** of the ECCENTRIC measures, it can be seen, that the investment costs are always higher than the operational ones. This is naturally given as there is always comprehensive research, development/ production and bigger investments necessary to do in the initial phase of a measure. Besides the measures related to transport (means) (see measures MUC 6.3 and MUC 5.6), which have priority according to the topic, marketing costs accounted for the highest share (e.g. see measures MUC 2.9a and MUC 5.9). Another high share comes from costs related to people and their time, especially from the commissioning of subcontractors (e.g. measure MUC 4.2) and technicians (e.g. measures MUC 3.7 and MUC 2.7). Additional costs occurred due to unexpected events, as the change of the shop owner of the concierge (measure MUC 7.5), the non-functioning technology of the beacons (measure MUC 3.4) and defects in the first prototype of the e-Trike (measure MUC 5.6).

Following is an in-depth study regarding Munich's Living Lab of Domagkpark and Parkstadt Schwabing.

D.2.3 Validation of impacts: a look into the case of measure MUC 5.9

Background and objectives

Measure MUC 5.9 Intermodal (E-)Mobility Stations has obviously raised awareness and is well accepted within Munich's Living Lab of Domagkpark and Parkstadt Schwabing (see MER MUC 5.9). Due to successful stakeholder cooperation and transparent processes regarding the mobility station development, implementation and maintenance, the City of Munich showed big interest in upscaling and replicate the measure output. In addition to the development within

CIVITAS ECCENTRIC, there were two other projects in Munich, namely Smarter Together (H2020) and City2Share, which implemented a different form of mobility stations in two other districts of Munich. As there is now so much more knowledge about the usage, awareness, acceptance and satisfaction of mobility stations in general, the City of Munich aims to develop a city-wide concept of mobility stations in the future.

This detailed analysis of MUC 5.9 helps to provide reliable information which supports the decisions making process for Munich's City Council. For that reason, additional multivariate analysis was carried out to look deeper into the user requirements, especially how to reach the non-users and develop the mobility station concept to make it more attractive for different user types.

Conclusion

This analysis shows findings on the evaluation of the mobility stations in the living lab of the CIVITAS ECCENTRIC project. As it can be seen the awareness is quite high. All in all, more than three quarters (78.1 %) of the residents know at least one mobility station in their living environment. Considering the different services of the station, it is remarkable that the majority knows the car sharing offers and that the information pillars are almost not known.

By the evaluation of the acceptance, it can be seen that the residential opinion about the mobility stations in the Domagkpark is very good. More than 70 % indicated a very positive feedback.

About 1/4 of those surveyed currently use the mobility stations. In the next step, user profiles are examined in more detail. Thus, not only the user but also the non-user could be characterized. For this purpose, only car sharing and bike sharing behavior was investigated. When defining the non-users, they are likely to be high aged, female rather than male and have a tendency to high household size.

Out of this results, a calculation was constructed which was intended to check if there is a connection between not using the mobility station and car ownership, bicycle ownership, age and full time job.

The findings show directions and strengths of the variables' influence. Especially remarkable is the strong influence of car ownership.

Further developments regarding MUC 5.9

The results of this more detailed evaluation of the intermodal (e-)mobility stations of measure MUC 5.9 directly support the decision-making process at city-level. As mentioned in the beginning, a city-wide concept of mobility stations is intended to develop for the city of Munich. The results of this analysis are to be discussed as a major decision support during future city council meetings. Thus, this detailed study is considered as a direct preparation of a possible city council decision regarding the upscaling of mobility stations in Munich, which is expected to be made in the upcoming year.

Further details are available in Annex C: "Validation of impacts: a look into the case of measure MUC 5.9".

D.3 Stockholm

D.3.1 ECCENTRIC Measures related to the laboratory area

Stockholm measures are somewhat dispersed, with only four measures focused specifically on the original Living Laboratory of Årsta and neighbouring districts. Table 12 lists the measures and their locations. Because of the rather dispersed locations of the measures both within and outside Årsta, and because of the difficulty of obtaining data that is specific to a particular district, here we mainly focus on the City of Stockholm as the unit of analysis. The anticipated impacts of the 12 measures in Stockholm are summarised in Table 13.

Work Package	Measure ID	Measure Name	Study Area
WP2	STO 2.4	Smart and flexible parking by emerging technology	Årsta
	STO 2.5	Transforming parking areas to new green uses	Various, including Årsta's main square
WP3	STO 3.5	Develop smart choice of mobility services	Metropolitan Stockholm
WP4	STO 4.5	Policy for re-routing cyclist during construction works	Gjörwellsgatan
	STO 4.9	Offering Test-Fleet with E-Bikes and E-Freight Bikes	Årsta
WP 5	STO 5.2	Speed up core bus routes	Bus lines 178 and 179
WP6	STO 6.1	Offering EV-test fleets to selected target groups	Årsta, Liljeholmen, and Hammarby Sjöstad
	STO 6.5	Developing the Clean Vehicle Web Portal	Metropolitan Stockholm and beyond
	STO 6.6	Master plan for developing EV-charging in Stockholm	City of Stockholm
	STO 6.7	Promote installation of EV-charging facilities in multifamily houses	City of Stockholm
WP7	STO 7.2	Consolidating Stockholm Municipal Freights	Blasieholmen

Work Package	Measure ID	Measure Name	Study Area
	STO 7.4	Night delivery with clean and silent vehicles	Folkungagatan

Table 12. Summary of Stockholm measures

Below the areas of impacts for each one of the measures in Stockholm.

Impact area	Impact sub-area	Indicator	Unit	Addressed measures											
				2.4	2.5	3.5	4.5	4.9	5.2	6.1	6.5	6.6	6.7	7.2	7.4
Society-People	Acceptance	Awareness Level	# Users			X	X				X	X	X		
Society-People	Acceptance	Awareness Level	%			X	X								
Society-People	Acceptance	Acceptance Level	# Users		X						X				
Society-People	Acceptance	Acceptance Level	%	X			X	X		X		X	X	X	X
Society-People	Acceptance	Fulfilment of Expectations	Score (0-5)		X	X	X			X		X	X		
Society-People	Acceptance	Satisfaction Level	%					X							
Transport System	Car	Parking Turnover	Range 0-1	X											
Transport System	Public Transport	Quality of Service	km/h						X						
Transport System	Public Transport	Service Reliability	Inter-quantile range						X						
Transport System	Safety	Transport Safety	% Incidents				X								
Transport System	General	Transport System Utilization	# Users			X	X								
Transport System	General	Transport System Utilization	Annual Growth %			X									

Impact area	Impact sub-area	Indicator	Unit	Addressed measures											
				2.4	2.5	3.5	4.5	4.9	5.2	6.1	6.5	6.6	6.7	7.2	7.4
Transport System	General	Total Travel	VKT					X			X				
Transport System	Quality of Service	Time Traveled	Minutes												X
Transport System	Quality of Service	Service Reliability	%												X
Environment	Pollution & Nuisance	Energy Efficiency	kWh/100km							X					
Environment	Pollution & Nuisance	CO2 Emissions	Tons	X						X		X	X	X	X
Environment	Pollution & Nuisance	NOx Emissions	Tons							X					X
Environment	Pollution & Nuisance	PM10 Emissions	Tons												X
Environment	Pollution and Nuisance	Noise Emissions	dBA											X	X
Economy	Costs	Investment Costs	Euro				X	X	X	X		X	X		
Economy	Costs	Operating Costs	Euro	X	X		X	X		X		X	X	X	
Economy	Benefits	Operating Revenues	Euro	X											
Economy	Transport System	Freight Movements	Tons/km											X	

Table 13. Impact Areas of the Stockholm Measures

D.3.2 ECCENTRIC net impact

The most noticeable net impacts of ECCENTRIC are likely to be in the Awareness-related indicators and to be produced by the measures that affected larger geographic areas.

On the **awareness** indicators, most measures that exposed a broad range of the population to a new sustainable mobility concept produced a measurable increase in awareness, acceptance or satisfaction, for example the pop-up recycling exchanges in STO 2.5, the peer-to-peer car sharing platforms in STO 3.5, and the installation of EV charges in multi-family homes in STO 6.7.

Transport system characteristics saw some measurable differences due to Eccentric. The measures to speed up bus routes in STO 5.2 led to measurable improvements in moving

speeds, dwell times at stops, and variability in overall travel times. All of the mobility services tested in STO 3.5 saw dramatic growth during the project period, which would not have happened had they not prioritised Stockholm, which we attribute at least in part to the consortium formed in Eccentric. Some of the transport system impacts were only measurable in the context of the specific target group of the measure: for STO 4.9, this showed a clear improvement as the target group purchased e-bikes at a higher rate than the general population, and for STO 6.1, test users of EVs reported a high average level of satisfaction both during and after their respective trial periods. However, for these localised measures, any measurable effects were not significant at the scale of the City of Stockholm as a whole.

The **Environmental** effects of the measures were also mostly specific to test groups and therefore limited in scope. However, measure STO 6.6, which implemented a plan to systematically deploy EV charging stations across the City of Stockholm, was estimated to have significantly diminished the estimated increase in CO_2 emissions that would be expected based on prevailing trends. Similarly, due to the widespread installation of EV chargers in multi-family homes in measure 6.7, the possibility to use EVs across Stockholm is also estimated to have significantly reduced CO_2 emissions.

The **Cost** considerations of the Stockholm-based measures varied widely depending on the measure, with some comprising mostly investment costs (e.g. STO 4.5, STO 5.2) while others comprised mostly operating costs (e.g STO 2.5, STO 4.9, STO 6.1, STO 6.7, STO 7.2). For some, the costs were found to be disproportional to the perceived benefits: for 4.9, for example, the maintenance of e-bikes exceeded the capacity of the small company leading the measure. However, these cost escalations would likely have been mitigated with more prior experience with EU-funded projects and more continuity in staff responsible for the measure, so that more efficient maintenance arrangements could have been put in place early on and carried through the duration of the project. Measure STO 2.4 was quite costly for both investment and operating costs for the parking enforcement technology, although in this case an increase in revenue is also expected.

D.4 Ruse

D.4.1 ECCENTRIC Measures related to the laboratory area

The Ruse team implemented the following measures in the Ruse Living Lab:

Work Package	Measure ID	Measure Name
WP2	RUS 2.6	Park & Ride System in Druzhba District
	RUS 2.11	Information, training and awareness raising
WP3	RUS 3.6	Mobile Application and Internet Portal
WP4	RUS 4.3	Providing Secure Pedestrian Crosswalks
	RUS 4.4.	Safe Sidewalks with cycling facilities towards the City Center

WP5	RUS 5.3	Analysis of PT Demand and Reorganization of PT Lines in Druzhba
	RUS 5.4	Introduction of “Good Night” Line to Druzhba

Table 22. Summary of Ruse measures.

D.4.2 ECCENTRIC net impact

The data for the net impact of ECCENTRIC measures (collected in Dec.2019 - Jan.2020) contains the following:

Modal split - The results show that already 76% of the local population use for their every-day trips PT, walking or cycling. It means that there is a shift to more sustainable way of moving. The initial percent of 73.5% increased with 2.5% and now the sustainable commuters are already 76%. The picture obtained was as follows:

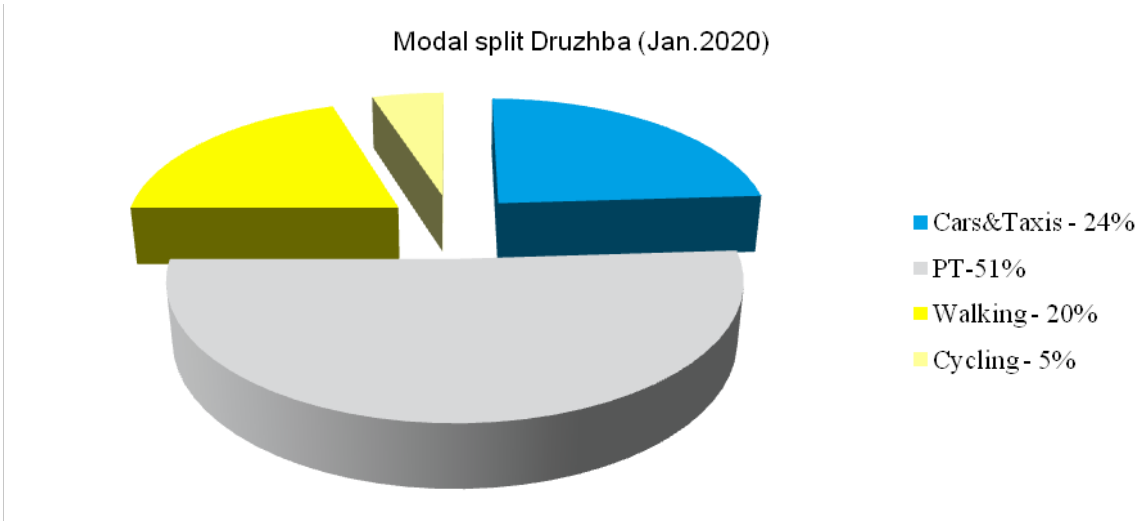


Figure 3. Druzhba modal split in January 2020

The PT use increased also with 2% - from 49% to 51%. The walking – with 1% from 19% to 20%. There is a small decrease with 0.5% of the cycling but we estimate it is due to the cold weather when people were interviewed. In general the trend is positive, although due to the late implementation of the technical measures in Ruse, they were in use only for several months and couldn’t influence much the travel behaviour of the citizens although they were well informed about them and persuaded in the benefits of the sustainable mobility for their health and wellbeing.

For evaluating the **Awareness, Acceptance, and Satisfaction,** data was obtained from the 215 respondents from the panel and the results of the direct oral interviews. The **awareness** about the mobility measures implemented under ECCENTRIC and in particular about the new pedestrian infrastructure increased from 14% to 100%. The awareness about the P&R facility rose from 0 to 76%.

The **system usage** was estimated to be 100% according to the observation of the usage of the pilot measures.

The acceptance was 95%, because 5% didn't like the small scope of the measures. The same results for the level of **satisfaction** were not obtained**.**

Physical barriers: the group of disabled people estimated that with the new infrastructure the physical barriers for them decreased from 95% to only 30% and it would be easier for them to move outside and to reach the PT stops in the district.

Road safety – The number of the road accidents in Druzhba for the last 2 years is: 2018 – 25 accidents, 1 dead; 2019 – 20 accidents, 0 dead. The number of road accidents decreased with 23%. New 2.5 % of the local population adopted sustainable mode of transportation (increase by 3.4% from the original value).

It is visible, that the trend is positive and it is due partly to the information and educational activities of CSDCS in the frames of ECCENTRIC and partly to the implementation of the new mobility measures for pedestrians (RUS 4.3 and RUS 4.4) in the district. Below the positive trend is shown on a chart:

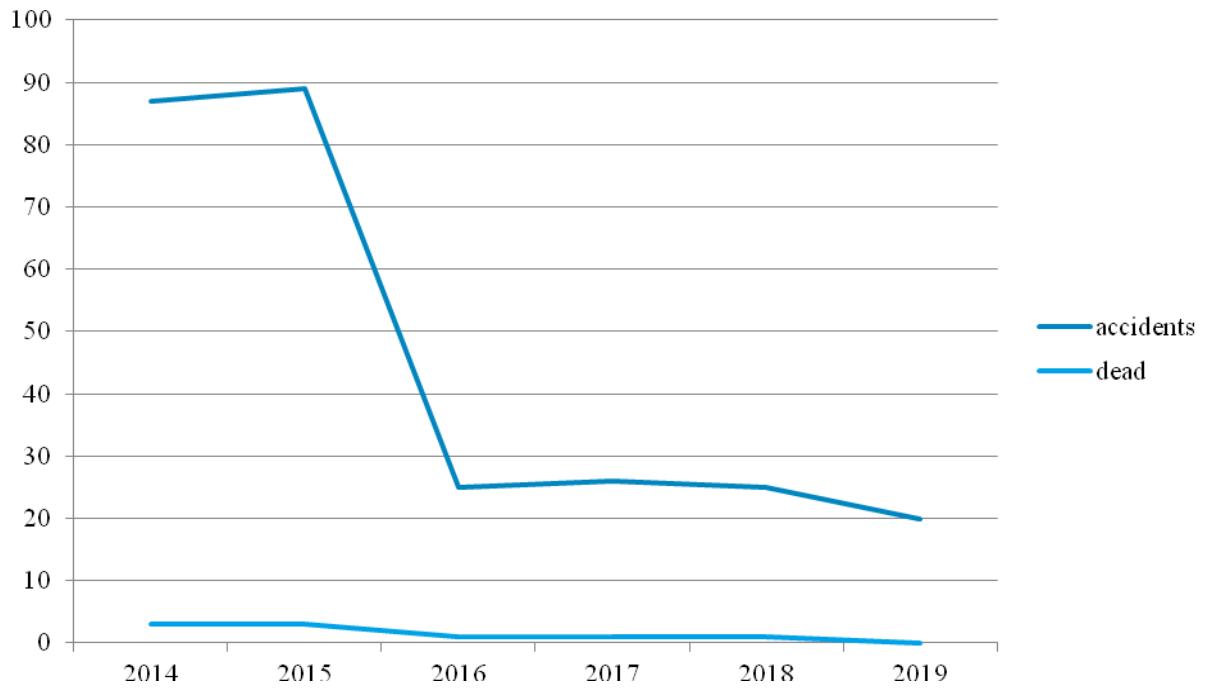
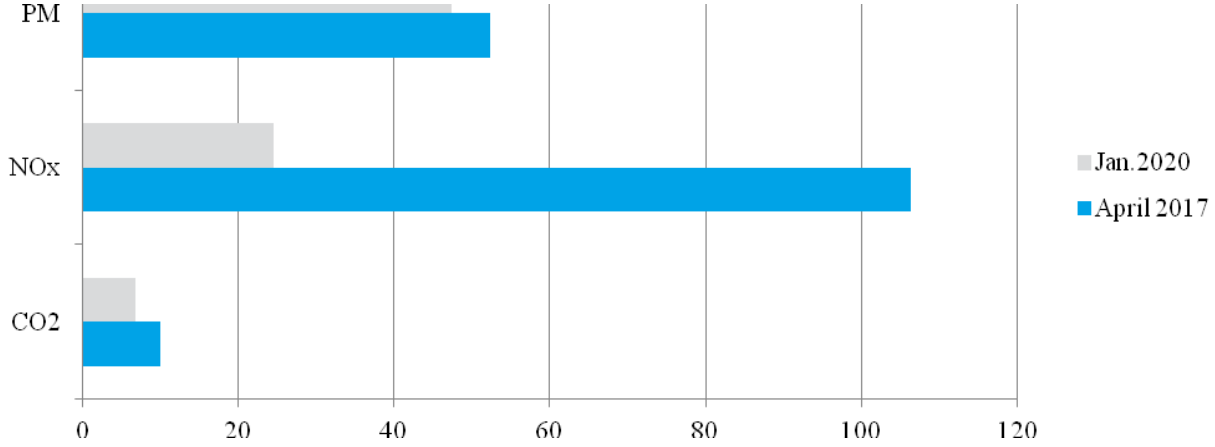


Figure 4. Accidents and dead graphs

Air pollution - For January 2020 the data are:

- CO2 – 6.7 mg/m3
- NOx – 24.5 µg/m3
- PM – 47.3 µg/m3

There is a slight improvement of the air quality partly due to the new measures. It is shown on the graph below:



(Data from https://www.riosv-ruse.org/danni-punktove/)

Figure 5. Air quality in April 2017 and January 2020

The quality of the air was improved that is partly due to the combination of new mobility measures. CO2 emissions decreased with 33%. It was registered 2.5 % less car usage thus providing a decrease by 10.4% comparing to the initial value. It was also registered 2 % more use of public transport thus providing an increase by 4% comparing to the initial value.

The ECCENTRIC measures also contributed to the social inclusion and livability in Druzhba. 80% of the citizens accept it and estimate that it will improve their living conditions. 64% are satisfied with the P&R because it will lead to the more intensive usage of public transport thus decreasing the social inequality and contributing to the social inclusion.

D.5 Turku

D.5.1 ECCENTRIC Measures related to the laboratory area

In the framework of ECCENTRIC, altogether nine measures were implemented in Turku. There were measures in all the project work packages. Out of the nine Turku measures, one (TUR2.2.) was solely focused on the laboratory area development and five others partially. Measures TUR 5.7 and TUR 7.7 were operated at the city level and TUR 2.1 at city/regional level. The table below presents a list of all the Turku measures, with the ones addressing the laboratory area at least partially in grey.

Work Package	Measure ID	Measure name
WP2	TUR 2.1.	Citizen and Stakeholder involvement in Mobility Planning and New Mobility Services
	TUR 2.2.	City District / Urban Corridor Cases as Pilots for Sustainable Urban Mobility
WP3	TUR 3.1.	Smart Multimodal Mobility Services: Applying Mobility as a Service Concept
	TUR 3.2.	Integrated Ticketing and Information System for Mobility
WP4	TUR 4.8.	Easy, Safe and Comfortable Cycling and Walking Round the Year
WP5	TUR 5.5.	Bike-Sharing and Car-Sharing Schemes
	TUR 5.7.	Introduction of Electric Public Transport
WP6	TUR 6.4.	Electrification of Municipal Fleet & Promotion of Electro-Mobility
WP7	TUR 7.7.	Introducing Biogas for Urban Freight Logistics

Table 14. List of Turku measures

The MaaS ecosystem and data interface, developed within the scope of TUR 3.1. and TUR 3.2, were promoted in the laboratory area to citizens and companies. Part of the 12km winter maintenance pilot route implemented within the scope of TUR 4.8. partially ran in the laboratory area. Ten bike sharing stations were placed in the Kupittaa lab area, and the most popular start and end stations were also located there. Car-sharing was also promoted, and at a later stage of measure TUR 6.4. a shared e-car provided for Turku city staff in the lab area.

The following table presents the indicators reflecting the impact of each of the six measures that took place at least partially in the laboratory area.

Impact area	Impact sub-area	Indicator	Unit	Addressed measures					
				2.2.	**3.1.**	**3.2.**	**4.8.**	**5.5.**	**6.4.**
SOCIETY-PEOPLE	Acceptance	Awareness	%	X	X	X	X	X	X
SOCIETY-	Acceptance	Acceptance	%	X	X	X	X	X	X

Impact area	Impact sub-area	Indicator	Unit	Addressed measures					
PEOPLE									
SOCIETY-PEOPLE	Acceptance	Satisfaction	Score (0-5)	X	X	X	X	X	X
SOCIETY-PEOPLE	Accessibility	Car ownership	Cars to inhabitants ratio	X	X	X			X
SOCIETY-GOVERNANCE	Planning	Contribution to Policies Plans and Programs	Score (0-5)	x	X		X	X	
TRANSPORT SYSTEM	General	Mode shift	%	X			X	X	X
TRANSPORT SYSTEM	General	VKT	km	X				X	
TRANSPORT SYSTEM	Safety	# of accidents with fatalities/ seriously injured	#				X		
TRANSPORT SYSTEM	Safety	# of injured	#				X		
ENVIRONMENT	Pollution and nuisance	CO2 Emissions	Tons	X					X
ENVIRONMENT	Pollution and nuisance	NOx Emissions	Tons	X					
ENVIRONMENT	Pollution and nuisance	PM Emissions	Tons	X					

Table 15. Indicators reflecting the impact of each of the six measures

D.5.2 ECCENTRIC net impact

An assessment of the impact of ECCENTRIC measures in the living laboratory area is presented here.

Awareness, acceptance and satisfaction

Awareness, acceptance and satisfaction were surveyed among both companies and housing cooperatives in the laboratory area. When in 2016 none of the housing companies had informed the inhabitants about sustainable mobility, in 2019 two out of 37 housing companies (5.41%) stated that they had informed their residents about sustainable mobility. There was a

slight increase in awareness which can, however, possibly be attributed within the margin of error for a survey with such a small sample (n=37).

According to the private company survey, 14.3 % of the companies promoted sustainable mobility among their employees in 2016. In 2019, the share had risen to 45.7% (n=164). This increase could at least partly be attributed to project efforts on promoting sustainable mobility actively to the laboratory area companies.

When in 2016 64 % of the respondents were willing to take part in sustainable mobility pilots in the Kupittaa area according to the housing company survey, in 2019 57% of the respondents expressed their interest in sustainable mobility pilots. Acceptance of sustainable mobility pilots had thereby somewhat decreased – however, due to the small size of the sample (n=37), it is likely that the difference was not statistically significant.

When inquired about the willingness to take part in sustainable mobility pilots in the Kupittaa area, 39% of the private companies expressed a positive willingness (n=164). This marked a clear downturn in interest as in 2016 the respective amount was 54%.

Satisfaction in this measure refers to the satisfaction in various types of mobility service offered in the laboratory area – MaaS services, city bikes, winter cycling route, biogas, and ECCENTRIC events. No comparison to baseline could be made unfortunately due to lack of baseline data. Awareness of mobility services was overall rather low among the companies, with only 27 companies stating their awareness of various mobility service offered in the area. The respondents of the private companies who were familiar with these services (n=27) rated the services they had used with an average score of 2.3 on a scale of 1-5. Due to the low number of respondents, however, no far-reaching conclusions could be made from this data.

Looking at the housing companies surveyed, the satisfaction in mobility services used was a bit higher as the respondents of the housing companies who were familiar with mobility services (n=10) rated the services they had used with an average score of 3.0 on a scale of 1-5. Again, the sample is so small that making any conclusions was somewhat impossible. In order to gain any insight into the satisfaction in mobility services, the samples should have been significantly higher and the employees/households should have been addressed directly.

Changes in mobility behavior as manifested by **mode shift** were difficult to prove based on the data available in the laboratory area. In Finland, the National Travel Survey is conducted every 8-10 years. As the latest survey dates back to 2016, no similar survey was to be made after measure implementation. Also as data was not collected on modal share in the housing cooperative / company surveys that were sent in the laboratory area, it is difficult to make any valid conclusions on potential mode shift. Based on the information derived from measure 4.8., winter cycling levels did increase on the pilot route. At the continuous automated measurement point on the bridge by the Turku Cathedral in central Turku, situated within the laboratory area boundaries, winter cycling numbers increased 39% during the pilot. This indicates that the pilot route was attractive cyclists. At this point it is inconclusive whether cyclists just diverted their daily routes to the pilot route or whether there has been a permanent change in modes due to improved road conditions – however the results are encouraging also based on user satisfaction surveys. Overall, the envisaged potential mode shift in the laboratory area was connected to the development of the mobility node and without it, making it challenging to assess mode shift from the activities of other measures which targeted larger areas instead of

the laboratory area alone. The same applies to **Vehicle-km travelled** – without the node the impact of the measures in the laboratory area specifically is difficult to estimate.

Car ownership

Car ownership in the city of Turku and the laboratory area has increased during the project lifetime. In Turku, there were approximately 414 passenger cars per 1000 residents in 2019. This marked a 1.5% rise from 2017, a slight increase from the baseline year when the same number was 408 cars per 1000 residents. This development was in line with the current overall trend in car ownership in Finland. In the laboratory area specifically, an even more rapidly growing trend could be observed: in 2019, there were 309 passenger cars per 1000 residents compared to the 280 in 2017. This marked a 10.4% increase in car ownership.

Contribution to Policies, Plans and Programs

When looking at the Contribution to Policies, Plans and Programs, the impact brought about by the project was evident. Measure TUR 2.2. which specifically addressed the laboratory area particularly contributed to the development of the city spearhead projects “Turku Science Park” and “Smart & Wise”. The Turku Science Park spearhead project is one of the city’s three spearhead projects and an important component in developing the appeal and competitiveness of Turku. The objective is to use new networked operating models to create an internationally attractive and boldly experimental cluster of expertise with versatile functions and logistic appeal. The Science Park covers the laboratory area, reaching from the university campus to the Kupittaa business cluster and further to Itäharju. Its aim is to be seamlessly connected to the city center. The goal of the spearhead project is to combine the projects of land use, building, and transport with innovation activities. Smart & Wise Turku is another city spearhead project developed during ECCENTRIC, combining the strategic goal of regional carbon neutrality in 2029 with the Smart City concept. Traffic and Mobility is one of the focal points in Smart & Wise, including the development of a mobility node. The development of this spearhead project can be attributed to ECCENTRIC impact to a large extent.

In the Turku land use, housing and transport agreement (MAL) for 2016-2019, the Kupittaa area was already mentioned as one of the focal areas of development. In the MAL agreement draft for 2020-2023, it is stated that “the city of Turku and the state will promote public transport connection and city development project realization that connects the Kupittaa-Itäharju region”. In addition, smart mobility pilots will be promoted in the area, including the Smart&Wise spearhead project and an autonomous vehicle pilot in Kupittaa. It should however be noted that the 2020-2023 version of the MAL agreement used here was still a draft.

The share of walking, cycling and public transport will be increased through active measures in accordance with objectives of Turku master plan 2029. The objective for the share of sustainable means of transport according to the Turku master plan and the Structural Model 2035 for the Turku Urban Region is over 66% in 2030. It is stated in the plan that “Walkers and cyclists will be provided with uninterrupted main connections of high quality, safe routes and convenient city center arrangements.”

In the Turku Climate Plan (SECAP) from 2018, sustainable mobility is promoted via several measures and actions although the mobility node is not directly mentioned. It is perhaps fair to say that the integration of the node on policy level either in the SECAP or the MAL agreement

would have created the needed momentum for its realization. Otherwise, it could be estimated that the measures' policy level influence has been significant in the laboratory area.

Making any valid conclusions on the impact of the measure on **traffic-related deaths, serious injuries or incidents** was very challenging. In Finland overall, traffic safety has been on a steady rise since the 1990s'. According to data from Statistics Finland, there were 189 pedestrians or cyclists injured (not including seriously injured) in Turku between 2017 and 2019. The map below shows the locations of these incidents in 2017-2018 (2019 data was not available in this format yet) in the city center (pedestrian incidents in orange, cyclist incidents in lilac). Data on the cause of the incident was available for each accident – however it was not specified in this data whether the incidents were road maintenance related. 15 of these incidents occurred within the laboratory area – however due to the fact that the cause of these incidents is not specified with enough detail, it is impossible to say whether they were related to winter maintenance. Overall, like mentioned above, there is significant fluctuation in numbers of incidents each year.

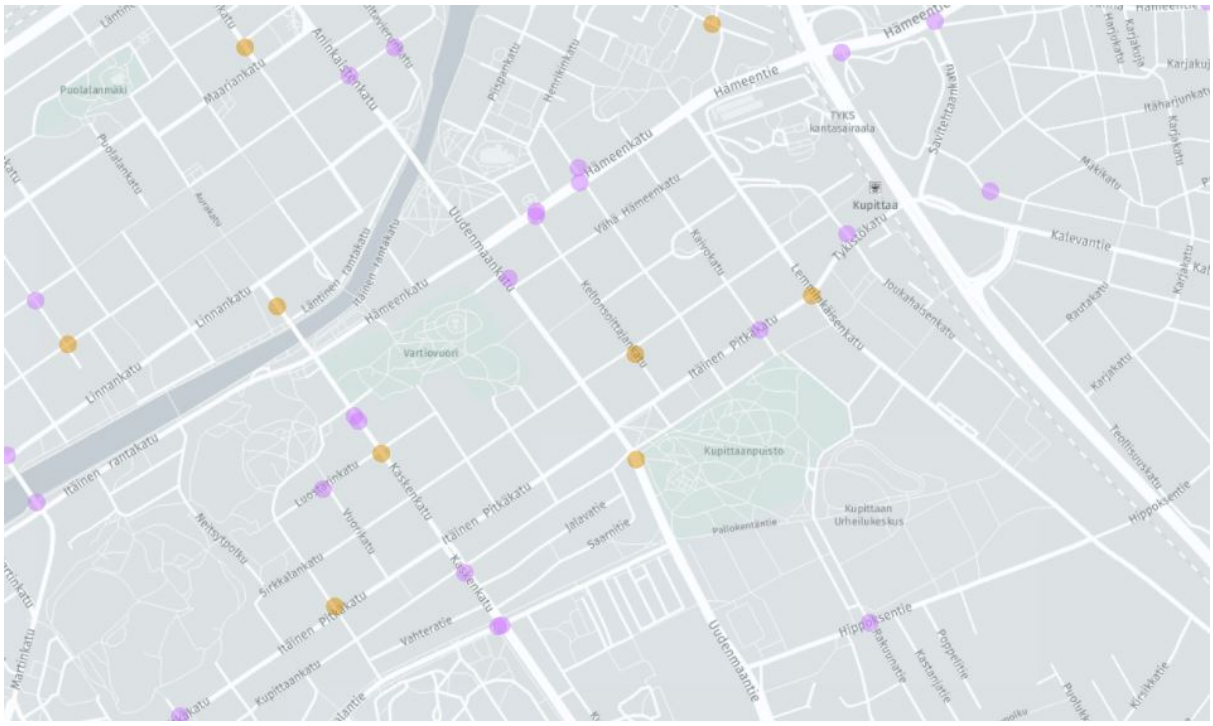


Figure 6. Pedestrian and cyclist incidents within Turku city centre 2017-2018[6].

The number of fatalities among cyclists and pedestrians was higher during the project (2016-2019) than prior to it, with 7 fatalities incurred in total or on average 2.3 per year. On the other hand the number of **seriously injured** among cyclists and pedestrians had decreased, with a total of 7 serious injuries in the three years, 2.3 on average per year.

[6] Source www.mobilityanalytics.ramboll.com.

Road user group	Fatalities			Seriously injured		
	2014	2015	2016	2014	2015	2016
Pedestrian	1	-	-	3	5	3
Cyclist	1	-	-	3	7	1

Table 16. Number of fatalities and seriously injured / follow-up

Data was available only on the causes of the five fatalities in 2017 and 2018. None of the fatalities were linked to poor maintenance of road infrastructure and none of the fatalities or seriously injured occurred in the laboratory area.

Measure TUR 6.4. addressed the laboratory area only nearing the end of the project when a shared-use electric car was offered for testing in the laboratory area. It should be noted that due to the lateness of this part of the measure it was not included in the impact evaluation report of the measure.

The shared-use electric car was situated in the Kupittaa laboratory area in a parking garage below the ICT-City building, which is owned by the Turku Technology Properties (TTP). ICT-City offers companies various and modern business premises. TTP is a company partly owned by the city of Turku and was thus a natural choice to act as a partner in the pilot. TTP offered the parking space to be used free of charge. TTP had also only recently installed a charging station in the garage. The parking garage was optimal as the car was inside yet the garage doors were open 24/7 and hence the users did not need any keys or other means to get access to the car.

In the beginning of the pilot the user amounts stayed quite low since the COVID-19 pandemic had an effect both on the marketing campaign and also the amount of people working in Kupittaa. The laboratory area is known for the IT and knowledge workers, who quickly shifted to remote working instead of going to their offices. Thus the amount of potential users dropped drastically. In May 2020, a massive marketing campaign was launched to reach all the Turku city employees and especially the companies and citizens situated in Kupittaa. This proved to be efficient and the user amounts rose considerably. The booking calendar was originally open only for the city employees and the staff of the three partners of the pilot (Turku University of Applied Sciences, TTP and Turku Science Park) during office hours, but due to COVID-19 and summer holidays the calendar was opened for everyone, so basically anyone could book the car also for private use during all times. The personal data of the users was not available so it is not clear whether the users were from Kupittaa or not, but it is very likely that at least most of the users were, since the marketing campaign was executed in the Kupittaa postal district and the car itself is situated at the heart of the Kupittaa. In July, the car was booked 25 times which stands for a very high booking rate. By 5.8. the car had been booked for 67 times. The exceptional conditions in the spring obviously decreased the booking rates but the interest towards the car has been rising all through the pilot. Due to the fact that the shared-use electric

car was only taken to use by the end of the project, it was not included in the TUR 6.4. impact evaluation.

Due to the unsuccessful efforts on **implementing the mobility node in TUR 2.2.,** another course of action was taken in the lab area, focusing on improving traffic safety. A part of the measure MAD 4.6. “Pedestrian friendly public space outside the city center” was replicated when the first-ever experimentation on blocking access to a thoroughfare was realized in the laboratory area in mid-August 2019. This idea was concretized through a study carried out on what kind of experiments could be done in the Kupittaa area. The Tahkonkuja street runs past the Kupittaa sports hall. Passage has been forbidden on the street (apart for service and maintenance) for 20 years but only few adhere to this prohibition, despite speed bumps and traffic signs prohibiting access to the street. Traffic on the street has been heavy as its location serves well for dropping kids off to hobbies, and thereby poses a safety hazard to the people walking and cycling past to the numerous sports facilities and fields in the area. In order to improve traffic safety, it was decided that a pilot would be realized for a year, blocking access to the street with different types of traffic obstacles. The pilot was to be monitored every three months and feedback gathered from the citizens via the city’s feedback portal. So far, feedback on the pilot has been mainly positive, despite the initial outrage on part of some citizens. Due to the lateness of this action it was not included in the measure evaluation approach. An analysis of the pilot experiences is however being made and after the pilot in the autumn 2020, a decision will be made on whether the experiment will become a permanent arrangement in the area.

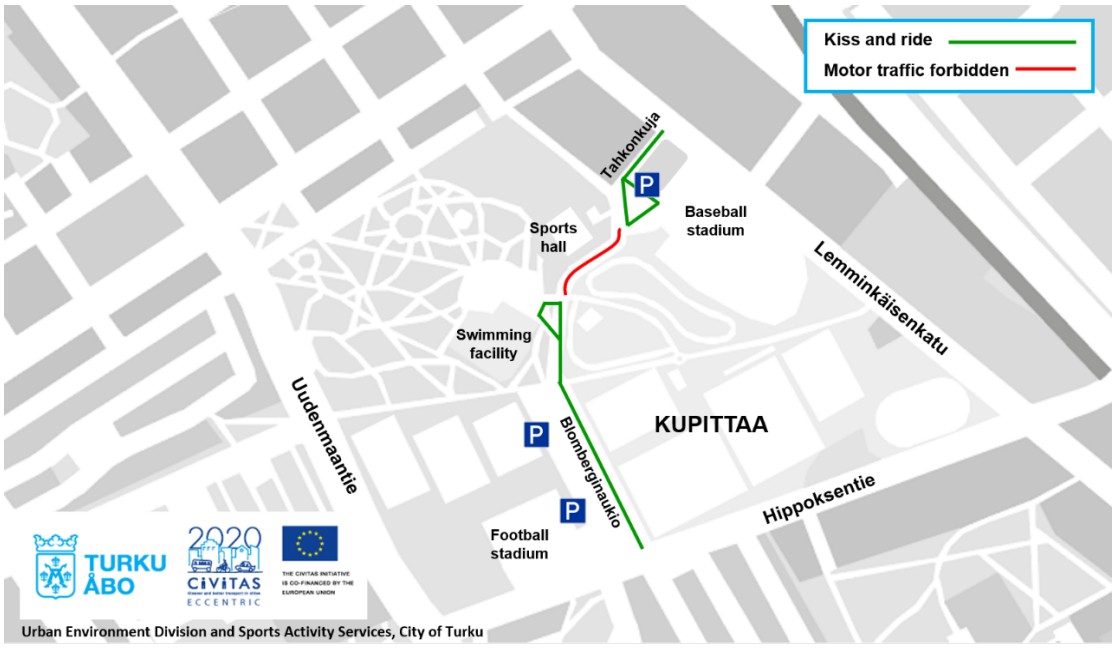


Figure 7.The Tahkonkuja thoroughfare pilot.

Due to the failure to implement the mobility node the potential project impact in terms of CO2/NOx/PM emissions cannot really be demonstrated. There were of course various other activities that contributed to emissions in the laboratory area – however, due to lack of data this impact cannot be directly assessed.

To conclude, it can be said that the project had impact on increasing awareness and acceptance of various sustainable mobility issues in the laboratory area. On average, 66% of the companies surveyed in the laboratory area were aware ECCENTRIC measures (e.g. the bike share system, winter cycling pilot route, electric city buses, biogas as a traffic fuel). In principle, acceptance of sustainable mobility pilots in the laboratory area was high in principle (private companies: 57%, housing cooperatives: 39%). However, the sample was small, and the companies were not addressed with a specific question accepting the mobility change. The project significantly contributed to policy level development in the city, making smart mobility ingrained more deeply into the city planning processes and, in the spearhead, projects addressing laboratory area development. Although the purpose of the report at hand was to assess impact, it should yet be noted here that the process learnings of the measures that addressed the lab area were significant, particularly measure TUR 2.2. The learnings from the measure would have been significantly lower without its failure to implement the mobility node.

E.Cross-Site Evaluation

The cross-site evaluation have a holistic view of the measures within the ECCENTRIC Work Packages. The analysed topics are reported in the table below:

Work Package Number	Title
WP2	Inclusive Urban Planning, New Parking Policies and Mobility Management
WP3	Mobility as a Service for and by All
WP4	Enable Safe Walking and Cycling
WP5	Efficient and Clean Public Transport Solutions
WP6	Promoting the Uptake of Clean Vehicles
WP7	Towards better and cleaner urban freight logistics

Table 17. Work packages evaluated in ECCENTRIC

From the WP mentioned above, only WP7 followed a more traditional approach by taking up the impacts and lessons learned directly from directly from the reports and discussions with the WPL, since the topic turned oud to be incompatible with the joint analysis applied to another WP. WP7 had a more punctual analysis focused in the particular measures, and provided lessons applicable only to the context where these were implemented.

E.1 Methodology

The systemic approach followed for the cross-site evaluation overcomes the limitations of traditional comparative analysis: limited transferability within different contexts due to varying local conditions. Europe-wide policy recommendations are expected form CIVITAS projects, and CBA or the laboratory area approach are not enough to achieve this objective.

First the definition of a system. A good and “simple” example of a system is a chess game. Such a simple system has 4’897.256 possible outcomes after only five moves. To deterministically estimate the outcome of such a system requires effort and resources hardly available in most cases. Trying to do the same for an urban system is nowadays infeasible, even with the leapfrog progress in data analysis.

In the chess example, if each piece had its own will, each piece would be a stakeholder, whose actions affects those of others. The system can be explained by variables: linear variables such as *number of moves (time)*, input variables such as *aggressiveness*, and output variables (indicators) such as *number of remaining pieces*, or *exposure of the king.* The interrelationship between those variables is sometimes easy to explain and demonstrate

(e.g. between *number of remaining pieces* and *number of available squares*). In many cases though, the relationship is not even apparent or hardly demonstrable.

The system analysis aims to raise the level of qualitative understanding of the system where decisions are made, and actions take place, not to determine quantitatively the outcome of the system: in chess, who wins the game, after how many moves, etc. The system analysis can help to identify trends and patterns, enabling the development of actions and strategies that support the achievement of given objectives; in chess, this might be to neutralize the opponent's king.

The systemic approach attempts to:

- Identify the set of variables and its interdependencies, and the mechanisms acting within the system.
- Merge impact and process evaluation in a synthesis.
- It aims to raise the level of understanding of the system, not its outcome
- It helps to identify patterns on the system's behavior, helping decision makers to pull the right levers.
- It helps to avoid unintended consequences and symptomatic treatment.

The methodology differentiates two stages: the system analysis, and the exploitation of the model, in this case for each WP.

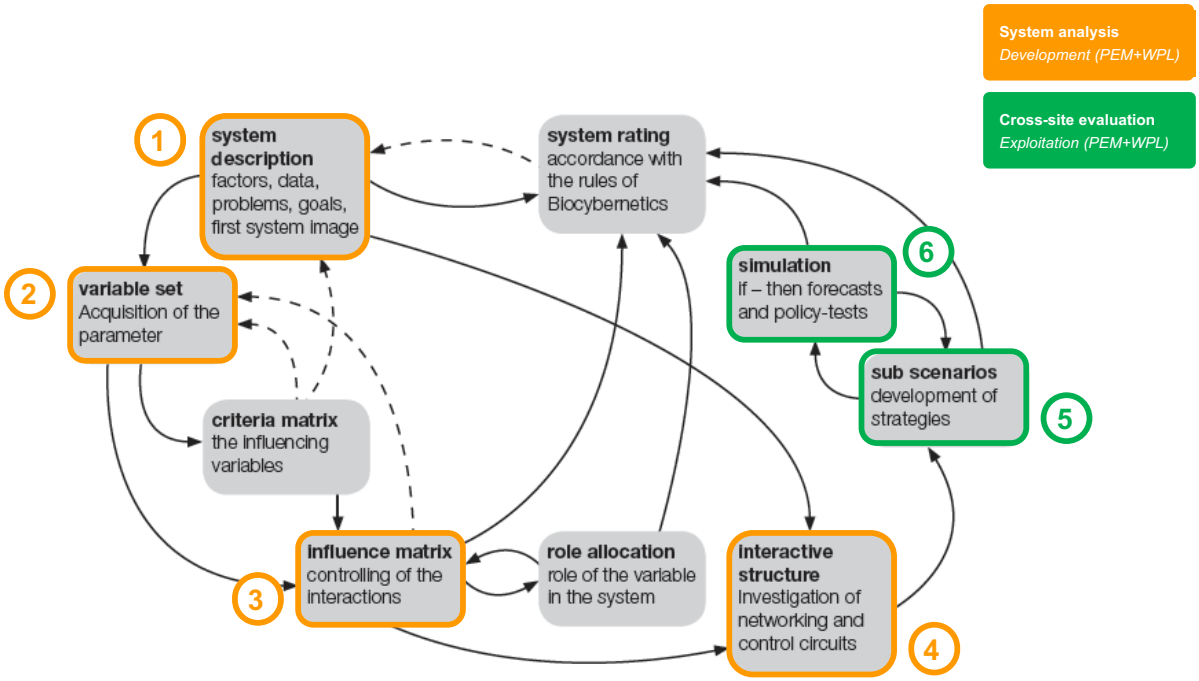


Figure 8.The "sensitivity analysis" methodology.

Each step is better illustrated in the sections below. The following figure though provides a first image of how the process looks like.

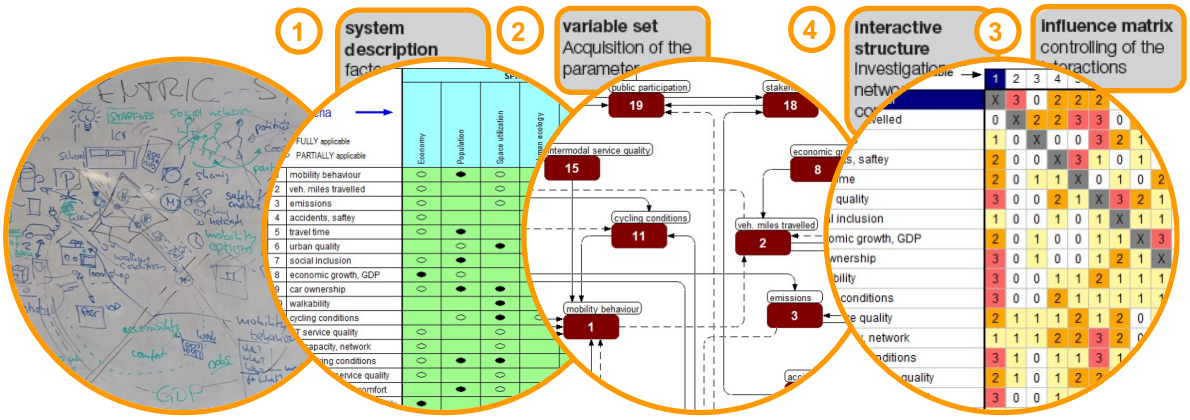


Figure 9. Visualization of the system analysis methodology.

First drafts allow to have a first understanding of the system, identify the set of relevant variables, and provide first definitions. This is followed by the assessment of the impact and sensitivity of each variable in relationship to the rest of the system.

In parallel, the actual interrelationships among variables are identified, to have as a result the set of governing feedback loops that determine the functioning of the system.

The methodology is recursive. That means, it is always possible to go back in the process and redefine anything in previous steps. The discussive nature of the methodology makes the recursive approach not only needed, but also desirable. The methodology only works in joint work with other stakeholders, it is not the result of a personal and individual analysis.

Following the system analysis, particular scenarios can be developed. Focusing in specific topics (e.g. the thematic Work Packages) sub-models can be generated, to produce a clearer picture under given conditions or assumptions. Finally, trends can be identified by simulating what-if scenarios, modelling the effect of changes in one variable in the system overall.

E.2 ECCENTRIC system analysis

The following variables were the initial set of variables used in the system analysis for ECCENTRIC. Further on, the analysis of the WP demanded the rename or merge of some variables for the sake of clarity. Those situations will be properly explained when discussing each WP.

This set was built considering inputs form academic sources, the ECCENTRIC KPIs, and several interactions among ECCENTRIC partners and experts, including a workshop with the participation of all members of the project.

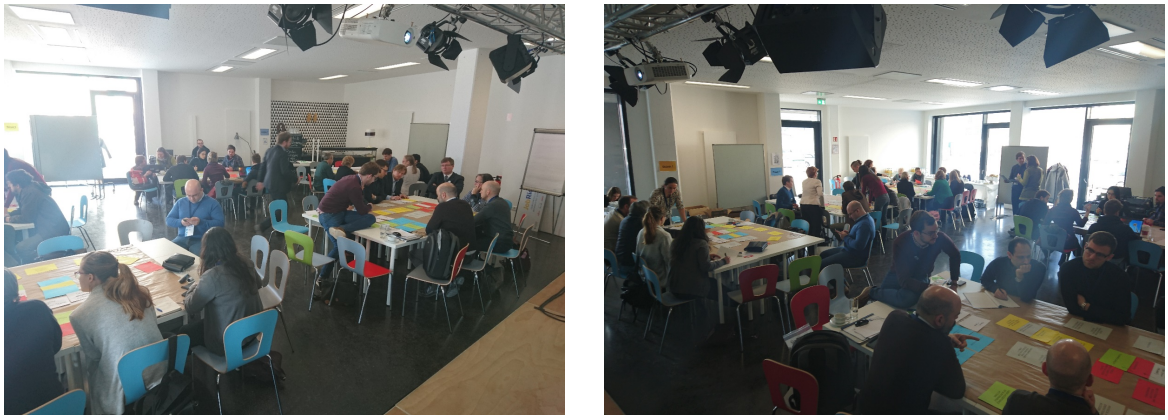


Figure 10. System analysis workshop in Munich

Following the consolidation of the variable set, these were analysed, and related to each other to come up with its reactivity and passivity figures, and find its role on the mobility system landscape.

E.2.1 Variable description

Economy and resources

1. **Economic Performance and Competiveness:** Citywide economic performance measured as total investments in the form of capital (public or private), and assets. The variable relates closely to the attractiveness and competitiveness of the city, as a measure of success in comparison with other cities that compete for capital, investments, resources, knowledge, etc. The variable includes the concept of the productiveness of the workforce, particularly tied to the impact of the mobility systems on it.
2. **Investor Interest:** It represents the attractiveness for the private sector to get involved as a shareholder in a distinct sustainable mobility schema, either on the side of the infrastructure (investor/owner), rolling stock, or operation. It not only represents the level of expected returns but also uncertainty and risk exposure (legal, financial, etc.)
3. **User Cost of Individual Driving:** Direct user cost of individual motorized mobility. Examples of direct costs include the cost of the vehicle, fuel/electricity, parking, road/mobility/congestion charges. Closely related to indirect costs such as the value of time, comfort, etc. can be included if highly relevant for a given mode. Also, it considers direct and indirect subsidies that affect user costs.
4. **Cost-Pax in Public Transport:** Direct cost per passenger considering the costs of public transport. The costs include capital investment, operations, and maintenance

of infrastructure, rolling stock, and systems related. The variable is related to user costs in the form of subscriptions/fares but not directly linked since direct and indirect subsidies affect final pricing.

5. **Cost-Pax in Shared Mobility:** Direct cost per passenger of shared mobility emerging schemas. Examples of direct costs include subscription/fare/usage costs. Closely related to indirect costs such as the value of time, comfort, etc. can be included if highly relevant for a given mode. Also, it considers direct and indirect subsidies that affect final pricing.
6. **Attractiveness/Value:** Attractiveness and value of unimproved land. It disregards the value of buildings, personal property and other improvements to real estate. The value of a certain location is created by communities, services, public works, usage permits, quality of surrounding space, etc. Highly relevant value generators for ECCENTRIC, are mobility services, accessibility levels, urban structure (density), and quality of public space.

Social

7. **Data, Information, Knowledge, and Outreach:** This variable covers different forms of information and transmission. From hard data processed in real time for operational purposes, or post-processed for planning purposes at different time horizons, to knowledge and wisdom communicated to the community through regular education programs or tailored campaigns. The analysis of each WP shaped this variable differently, For instance it was internalized as back, and front-ends for MaaS schemas, while it was interpreted as communication campaigns for inclusive urban planning. A further discussion of its interpretation is available in the following sections.
8. **Planning Capacity:** Cognition, cooperation and coordination capabilities in different scenarios. At the politic/institutional level it is the capacity to layout policies, investments, and plans that benefit the community, favouring citizens and economic interest. At the community level it reflexes the capacity to coordinate efforts on the short/medium term, maximizing efficiencies and individual outputs. At institutional/entrepreneurial, level it stands for the capacity of optimizing the use of resources to maximize the output of the service (not the financial output).

   The variable does not deal with output levels, but rather the capacity to work together and make improvements possible. Non-cooperative societies/communities rarely achieve more than single elements can provide. Cooperation enables greater outputs that the initial input (1+1=3). Non-cooperative societies/communities behave reactively, spending resources to solve problems or fulfilling aspirational needs. Cooperative ones plan investments/expenditures wisely, with a long-term perspective.
12. **Car Ownership:** Number of vehicles per household.

Mobility behaviour

9. **Vehicle-Kilometre Travelled:** Sum of travelled kilometres by all vehicles in a given route, region or user group. Accounts only for motorized (combustion or electric) vehicles. It doesn't account for active mobility vehicles, even if these are powered.
10. **Acceptance of sustainable mobility solutions:** Acceptance of the measures by the general public, not only by the users. Non-users can accept or not a given measure and determine as well its success. Users are not necessarily in favour of a measure; by definition, captive users have no option and may not accept the measure but still make use of it. Acceptance does not imply a change in behaviour or willingness to

change.
Particularly for ECCENTRIC, sustainable mobility solutions refers to the measures tested within a given WP or the project.

11. **Car Dependency:** Representation of the objective (only suitable option) and subjective (blind to other available alternatives) preference for private, motorized, individual vehicles, as known today. The definition excludes vehicles like scooters, e-bikes, pods, etc. even if these are powered. The variable represents the user preference for owning, renting or leasing a powered vehicle, which the user drives by him or herself. The preference described by the variable is not limited to owning and driving the vehicle. It includes:
    a. Trip preparation and finalization (parking, charging/tank)
    b. Feelings associated to the driving experience (weather isolation, traffic, "freedom" perception, etc.)
    c. The experience out of the vehicle ("Freedom" perception, living style, location/housing preferences, aspirational/image values, etc.)
    d. Inertial/conditional behaviour.
13. **Multimodality:** The variable accounts for multimodal mobility behaviour. It means not to rely on a single transportation mode for all travel motives, provided that multiple alternatives are available. It implies that mobility decisions are taken (more) rationally, taking into consideration full transportation costs and user intrinsic values (travel time, comfort, environmental footprint, etc.).
14. **Public Transport Ridership:** The variable accounts for traditional public transportation usage in terms of total passengers in a given amount of time. It might differ from the actual demand.
15. **Ridesharing:** The variable accounts for the actual sharing of mobility means and resources. Mobility means can be provided by private individuals or organizations such as service/mobility providers, logistic companies, etc. Ridesharing implies the use of empty capacity on an existing trip to mobilize additional passengers (users) The actual action of sharing and utilizing these resources relies on a rational decision involving (economic) benefits for both providers and users. Busses might be the best example of ridesharing, although for the analysis this variable is used in a more contemporary manner, covering only the emerging schemas associated to this term.
16. **Active Mobility:** The variable accounts for active mobility behaviour, covering walking and cycling, including e-bikes and shared bicycle schemas.

Governance and administration

17. **Governance in Support of Sustainable Mobility:** It is defined as the dialog between the different actors involved or affected by any given action. It implies a balanced representation in the discussion, as well as transparency and cooperation efforts. It requires the willingness to make compromises with the objective of achieving common and individual objectives.

    Governance is connected to the horizontalization of power relationships, and the dialog across different aspects of urban management. Necessarily needs the implementation of mechanisms of participation and involvement for those parties without direct access to the decision-making process.
18. **Transparency:** The variable stands for transparency and legal certainty. The variable represents the level of certainty regarding the legal foundations of agreements within privates or with public institutions. Legal certainty requires a clear definition of responsibilities and risks, and balanced allocation of resources and risks (including insurance requirements). The variable extends to procurement and contract awarding

as well. The variable involves the stability of the legal framework, which provides clear and durable rules for doing businesses in the city (although legal frameworks normally fall within the jurisdiction of states/countries).

19. **Financial Support of Sustainable Mobility:** Public financial support for sustainable mobility in different shapes. From market regulation to subsidies in operations or directly to users. The variable defines the level of involvement of government and public administration in the transportation market, particularly on the transportation supply when they have an active role. Passive roles of the public sector can range from facilitator to the regulator of the transportation market. More active roles include the provision of funding through procurement or the provision of subsidies. The highest possible level of involvement is in the provision itself of the transportation services and total independence for setting user fares.

System interfaces

The following variables are classified as interfaces because from a systemic point of view they allow the translation of the actions in the limited scope of transportation to a broader scenario with impacts in the built and natural environment.

20. **Local pollution:** The variable covers contaminants produced locally in cities by the transportation fleets. The definition covers all transportation sub-products with local impacts, this includes nitrogen oxides (NOx), particle matter (PM), noise, etc. This definition excludes CO2, which is not necessarily produced locally, and have impacts beyond the local context.
21. **Energy Consumption:** Defined as the energy consumption for transportation activities measured in Joules or Kilowatts per hour. All sources of power can be translated into an energetic equivalent, by using source-specific factors. Fossil fuels use volume-fuel equivalents which are specific to the characteristics of the product availability on each country, for instance: 33,41 kWh/gallon is the standard gasoline-gallon equivalent, but specific E10 available in the EU is typically 32,78 kWh/gallon. Local conditions are to be observed. Neutral-energy fuels (e.g. solar or biogas) can be considered as neutral-energy fuels for ECCENTRIC.

    The variable is closely linked to CO2 emissions, even if vehicles are powered electrically. The country energy mix can be used to estimate CO2 emissions in those cases. Since ECCENTRIC has no impact on the energy mix, this is an external factor and is not considered for the analysis.
22. **Amount of Urban Space for People:** Land available for not-transportation purposes. It excludes the space used for streets/tracks/lanes/rails, stations, depots, etc., as well as space for parking, charging, fuelling, unloading and all transportation/mobility associated activities. It refers mainly to the usage of urban land and street sections for meeting, walking and non-motorized mobility. This refers as well to the space allocated for social or productive activities in public areas.

Urban physical environment

23. **Urban Structure:** Urban configuration at the city level described in terms of the distribution of centres (monocentric/polycentric), segregation of activities (or mix-use), and urban density.
24. **Quality of the Street:** Configuration at street level describing the physical infrastructure, built environment and activity on and on both sides of the street. It does not cover the actual usage given by the citizens. The concept implies quality for all road users and balanced space allocation for all users of the street.

Infrastructure/networks/services

25. **Electric mobility:** The variable describes the availability, penetration and refinement levels of electric mobility infrastructure, vehicles, and services. It is described by the progress in terms of implementation/availability of supporting infrastructure (charging points), availability and diversity of options of e-vehicles, as well as the progress mainly related to battery/charging technology/performance
26. **Motorized Individual Transportation (MIT):** Supply-side of private motorized individual transportation. It includes the vehicle itself ("the private car"), and the required infrastructure: roads, highways, lanes, parking facilities, fuelling, charging, etc. As well, the variable covers the quality of the infrastructure and rolling stock.
27. **Sharing services:** Supply-side of shared motorized individual transportation. It excludes all pooling options on the market, focusing exclusively on mobility schemas providing vehicles for individual use, but without implicit ownership. Under this category fall car-sharing schemas, taxis, car rentals, P2P solutions, and any other option that enables temporary individual usage of a vehicle. The variable includes the vehicle/provider/service itself (Zipcar, Uber, Lift, etc.), and the required service-specific infrastructure: stations, parking facilities, fuelling, charging, etc. The variable covers the quality of the service as well and rolling stock. Concepts of coverage/density of service, frequency, and availability can be descriptors of quality.
28. **Public Transport** (shared right-of-way)**:** Classic public transportation systems. Supply-side of public motorized collective transportation. It includes the vehicles/fleet/service itself (bus, train, tramway, Bus Rapid Transit, etc.), and the required infrastructure: roads, rails, lanes, stations, depots, fuelling, charging, etc. The variable includes all mobility solutions enabling the share of a vehicle, such as ride hailing, on-demand buses, and similar schemas that imply sharing a vehicle. The variable covers the quality of the infrastructure as well as rolling stock, and service provided. Concepts of coverage/density of service, usability, frequency, and availability can be descriptors of quality.
29. **Walking and cycling:** Supply-side of active transportation. It includes the vehicles/fleet/service itself (bicycles, cargo bikes, sharing systems, etc.), and the required infrastructure: sidewalks, bike lanes/highways, parking facilities, weather protection, etc. E-bikes are covered by this variable if pedalling is required. When discussing walking, the variable is described by the quality and attractiveness of public space, including facilities and amenities for pedestrians and users of the street (not necessarily for mobility purposes). When discussing cycling, the variable covers the quality of the infrastructure, rolling stock, and service provided. Concepts of coverage/density of service, usability, frequency, and availability can be descriptors of quality. Safety of infrastructure for pedestrians and cyclists is also included in this variable, as well as, continuity and prioritization over motorized transportation.
30. **Information and Communication Technologies (ICT) for Mobility:** The variable describes the physical and software infrastructure involved in the capture, processing, analysis/optimization, and output of information supporting user utilization of transportations systems, and backend/provider operations. Different scales and concepts are covered by the variable: Traffic management (centres), mobile devices and applications, data sharing, open data, big data, crowdsourcing, platform integration, detection technologies, and many others.

    Modelling and forecasting, dynamic management and optimization of the transportation system, and digital (smart) contracts are also concepts relevant for some WP.

Externalities

31. **Injuries and deaths:** Safety related to all road users, making emphasis in pedestrians and cyclists as the most vulnerable actors in urban environments. Safety most recognized unit measurement is the number of seriously injured and deaths in roads, per 1000 inhabitants. Different countries have different definitions of seriously injured, but in the EU, injuries rated equal to or above 3 on the medical Maximum Abbreviated Injury Scale (MAIS3+) is becoming the standard.
32. **Congestion and other capacity constrains:** Saturation of the transportation elements with affectation on usability beyond minimums accepted by the user. The variable covers a wider definition of congestion, standing not only for the resistance to free traffic follow, but also resistance in other parts of the trip, such as during parking manoeuvres. This is particularly relevant for ECCENTRIC since its measures can affect capacity for vehicle traffic in different parts of the trip.
33. **Accessibility:** Accessibility is defined in two ways: Physical and operational. Physical accessibility translates to being able to reach the transportation system. Accessibility can be restricted on the system side by long access distances or boarding and alighting conditions (supply side), or disabilities (demand side). Operational accessibility translates to being able to use the system, even if it is physically reachable. On the supply side, it is affected by the intelligibility of the system (topology, maps, user-end interfaces, etc.). On the demand side, it can be affected by the required skills to operate the vehicle, navigate/operate the system, familiarity with the network/system/vehicle, deal with inconveniences, etc.

Auxiliary bundles

These variables are only used as simplifications for the analysis of some WP. These are not considered in the analysis of the systemic roles or the effect system.

34. **Financing for Sustainable Mobility:** Accommodates financing elements in sustainable mobility in its public and private versions, encompassing and replacing the variables: 2, 7, 8, 17, 18 and 19. This system is represented by the analysis of the cluster Inclusive Urban Planning in WP2.
35. **"Sustainable" Mobility Behaviour:** Accommodates different representations of the more "sustainable" modes, encompassing and replacing the variables: 14, 15 and 16. Essentially, it means more Public Transport, active and share mobility and reduced Motorized Individual Transport.

E.2.2 Impact matrix

To understand the relationships among variables, an impact matrix was built by giving values to each possible pair of variables. The valuation is given in terms of "a given variation in variable A, produces an *X* change in variable B". The output *X* can take the following values:

*0: Variable A has **no** effect on variable B*

*1: Variable A has a **weak** effect on variable B*

*2: Variable A has an **equivalent** effect on variable B*

*3: Variable A has a **strong** effect on variable B*

This process is time consuming and is not suitable for discussing in large groups. The lead of WP8 performed this exercise internally, consulting experts in and outside of the institution. The resulting matrixes were compared and disagreements were discussed individually. This

process helped to sharpen the definition of variables, and come up with a consensus matrix, presented below.

Influence by variable ↓ on variable →		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	AS	P
1	Economic performance and comp.	X	2	1	1	0	2	0	1	2	1	1	2	0	1	1	1	0	0	1	2	2	2	1	0	0	2	2	2	2	2	1	0	0	1	1	37	1369
2	Investor interest in SM	2	X	0	0	1	1	0	0	0	1	0	1	0	0	0	0	1	1	1	0	1	0	0	0	2	1	2	1	1	2	0	0	1	1	1	22	1056
3	User cost of PrT	1	2	X	0	0	0	0	0	2	1	2	1	2	1	2	1	1	0	0	1	1	1	2	0	0	2	1	2	0	0	0	0	0	1	1	28	532
4	Cost/Pax of PuT	0	2	0	X	1	1	0	0	2	2	1	1	2	2	1	2	0	0	1	0	0	0	1	1	0	0	1	0	1	0	0	0	0	1	1	24	504
5	Cost/pax of shared mobility	0	2	0	1	X	0	0	0	1	2	1	1	2	1	2	2	0	0	1	0	0	0	0	0	0	1	2	1	0	1	0	0	0	1	1	23	529
6	Location attractiveness/value	0	1	1	0	0	X	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	2	2	0	1	0	0	1	0	0	0	1	1	1	14	392
7	Data, inform, knowledge, outr.	1	1	0	0	0	0	X	2	1	2	2	1	2	1	2	1	2	0	1	0	0	1	1	1	0	1	1	1	1	1	1	0	1	1	1	31	372
8	Planning capacity	2	2	0	1	1	1	2	X	0	2	2	0	1	0	2	0	3	1	2	1	1	2	1	2	1	1	2	2	2	1	1	1	2	1	1	44	616
9	Vehicle-Kilometer Travelled	1	1	0	0	0	0	0	0	X	0	1	0	1	0	0	0	0	0	0	2	2	1	0	1	1	2	0	0	0	0	2	3	1	1	1	21	630
10	Acceptance of sustainable mob.	1	2	0	1	1	0	1	1	1	X	1	1	2	2	2	2	1	0	0	0	0	1	1	1	1	1	1	1	2	1	1	0	0	1	1	32	1376
11	Car dependency	0	1	1	1	1	0	2	0	2	2	X	2	2	2	2	2	2	0	0	0	0	2	1	3	1	1	1	1	1	1	2	2	1	1	1	41	1763
12	Car ownership	1	0	2	0	1	1	0	0	0	2	2	X	2	2	2	2	1	0	0	2	0	2	1	2	1	2	0	0	0	0	0	0	0	1	1	30	750
13	Multimodal behaviour	2	2	0	1	1	1	0	0	2	1	2	1	X	1	2	1	0	0	0	2	2	1	1	0	0	1	2	1	1	1	0	1	0	1	1	32	1248
14	PuT Ridership	0	1	0	1	0	1	0	0	2	0	1	0	1	X	1	2	0	0	0	2	2	1	1	0	1	0	1	2	0	1	1	1	0	1	1	25	825
15	Sharing of mob/log resources	1	2	1	0	1	0	0	0	1	1	1	1	2	1	X	1	0	0	0	2	2	2	1	1	0	0	2	1	0	1	1	1	0	1	1	29	1073
16	Active mobility	1	1	0	0	0	2	0	0	1	2	2	1	2	1	1	X	0	0	0	2	2	0	0	2	0	0	0	1	2	0	2	1	1	1	1	29	1044
17	Governance in support of SM	2	2	1	1	1	1	2	2	0	2	1	1	0	0	0	0	X	1	2	1	1	1	1	2	1	1	1	1	1	2	1	0	1	1	1	36	1008
18	Transparency	2	3	1	1	1	1	0	1	0	1	0	0	1	1	2	1	1	X	1	0	0	0	0	0	1	0	1	1	0	1	0	0	0	1	1	24	240
19	Financial support of SM	2	2	0	2	1	1	1	1	0	2	1	1	0	1	1	0	2	2	X	1	0	1	1	1	1	2	1	2	2	1	0	0	1	1	1	36	720
20	Local contaminants	1	1	0	0	0	1	0	1	0	1	1	0	1	1	1	1	2	0	1	X	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	17	527
21	Energy consumption	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	X	0	0	0	0	0	0	0	0	0	0	0	0	1	1	12	348
22	Urban space for people	1	0	1	0	0	1	0	1	0	1	1	0	0	0	1	1	1	0	1	0	0	X	1	2	0	0	0	0	0	0	1	2	2	1	1	20	680
23	Urban structure	1	2	1	2	2	3	0	0	2	1	2	2	1	2	1	2	1	1	0	1	2	1	X	2	0	2	0	2	2	0	0	0	2	1	1	42	1134
24	Quality of the street	0	1	0	0	0	2	0	0	1	1	1	0	1	1	1	3	0	0	0	0	0	1	1	X	0	1	1	0	1	0	2	1	2	1	1	24	912
25	EV technology/veh/infrastr.	0	1	1	1	1	0	0	0	1	1	2	1	0	1	0	0	0	0	0	2	1	0	0	1	X	1	0	0	0	1	0	0	0	1	1	18	288
26	MIT services/infrastructure	2	1	2	0	0	1	0	0	2	1	2	2	1	1	1	1	0	0	0	1	1	2	2	2	1	X	1	1	1	0	2	2	1	1	1	36	1116
27	Shared motorised mob. services	1	1	0	0	2	0	0	0	1	1	2	0	2	1	1	0	1	0	0	1	1	1	1	1	1	1	X	1	0	1	0	1	1	1	1	26	858
28	PuT networks/services/infr.	2	1	0	2	0	2	0	0	1	1	2	1	1	2	0	1	0	0	0	1	1	2	2	2	0	1	1	X	1	0	1	1	1	1	1	32	992
29	Active mobility networks/serv.	1	1	0	0	0	1	0	0	1	2	2	0	1	1	0	2	1	0	0	1	2	2	1	2	0	1	1	1	X	0	3	1	2	1	1	32	960
30	ICT for mobility and logistics	1	2	0	0	2	0	2	2	1	1	1	0	2	1	3	1	1	1	1	1	1	1	0	0	0	0	3	1	1	X	0	1	2	1	1	35	735
31	Transportation safety	1	1	0	0	0	0	0	0	0	1	1	0	1	0	0	2	1	0	1	0	0	0	0	1	0	1	1	0	2	0	X	0	0	1	1	16	432
32	Congestion	3	2	2	1	1	1	0	0	0	2	2	1	1	1	1	1	2	0	2	2	2	2	1	2	0	1	1	2	1	1	1	X	1	1	1	42	924
33	Physical and operational acc.	1	2	1	1	1	1	0	0	1	2	1	1	2	2	2	1	1	0	1	0	0	0	0	1	0	1	1	1	2	0	2	1	X	1	1	32	832
34	Financing for SM	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X	1	34	1156
35	"Sustainable" modes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X	34	1156
		37	48	19	21	23	28	12	14	30	43	43	25	39	33	37	36	28	10	20	31	29	34	27	38	16	31	33	31	30	21	27	22	26	34	34	PS	
		100	46	147	114	100	50	258	314	70	74	95	120	82	76	78	81	129	240	180	55	41	59	156	63	112	116	79	103	107	167	59	191	123	100	100	Qx100	

Figure 11. Consensus impact matrix

This matrix is not the result of an arithmetic operation of the different inputs. It is the result of discussions and agreements.

E.2.3 Systemic roles

The sum of each variable "activity" over other variables, and its "reactivity" to the action of the other variables, are called correspondingly active and passive sums (Those are designated as AS and PS in Figure 11). When plotted on a scatter diagram, the relative location of each variable is revealed, allowing the identification of the role of each variable, and a first understanding of the system as well.

The figure below presents the plot for the ECCENTRIC variables.

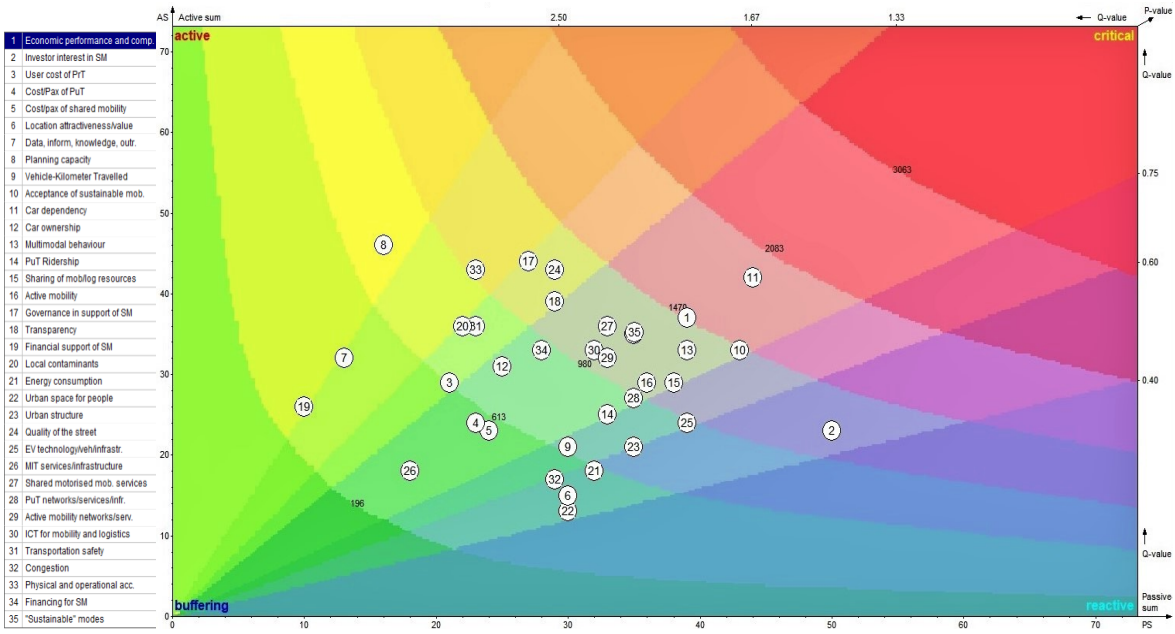


Figure 12. Scatter plot of the Impact Matrix for ECCENTRIC relevant variables

The variable system lays slightly on the buffering side, meaning a relative larger capacity of the urban mobility system to absorb changes and remain relatively stable. In practice, that translates in a relative difficulty to induce changes and move from the status quo.

On the other hand, the system tends to regulate itself. For good or bad, this ensures he long lasting effect of actions if aimed in the right direction.

Most variables lay on the central area, meaning the system has no clear visible “levers” for steering the functioning of the system, other than information and planning related variables. These are likely the most important targets for policy making over other more contentious aspects such as infrastructure, congestion, etc.

Another notable exception is the interest of the private sector in sustainable, which is more volatile than critical. Relying in this variable for steering the system could be effective, but it comes at high risk. It should be not the keystone of any strategy for this system.

Right at the border of a critical role lays car dependency. It is the most reactive variable in the system, followed closely by the competitiveness and economic performance of the region. Both react only on the long term though, as discussed later in this report. Acceptance is also a relatively critical element in the system, which reveals as well in its central role in the analysis of all WP in section E.3.

To understand the individual role of each variable, the diagram in Figure 13 provides an approximate reference. A more detailed analysis is provided in Table 18.

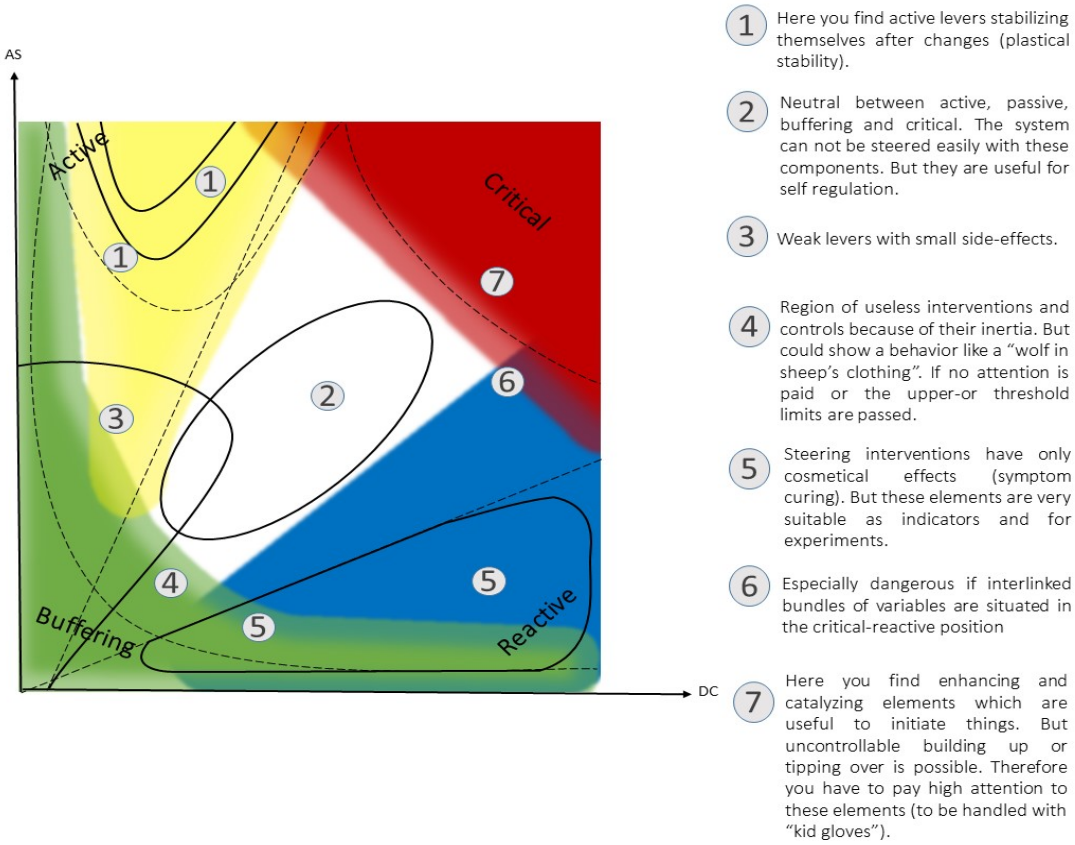


Figure 13. Reference for assessing systemic roles in the scattered plot of the impact matrix

Systemic role	Variable
Neutral section between active, reactive, buffering and critical. There are little means to steer the system via the components in this area, which are on the other hand, well fitted for self-regulation if integrated in feed-back cycles. Here is obvious the stiff character of the urban mobility system.	• Economic performance and comp • Acceptance of sustainable mobility solutions • Active mobility • Multimodality • Ridesharing • Motorized individual transportation • Public transport (shared ROW) • Walking and cycling • Financing for sustainable mobility • "Sustainable" mobility behaviour

Rather mobile reactive components where interventions can easily be undertaken leading “obviously” to the desired result. However, the result may soon be neutralized by repercussions from the system.	• Investor interest
Components where interventions cause fast self-cushioning oscillations. This can be mistaken for manoeuvrability, while in reality there is not much change of the systems situation or trend. Integrated in feedback cycles, this variable can absorb disturbances. Also usable as a gentle correction lever.	• Car ownership • Public transport ridership • Sharing services • Accessibility
Weak switch lever which first may have little effect on the system because of its inertia. However, when activated repeatedly or on a specific target variable it can initiate a new development. Recommendable if drastic effects are to be avoided.	• User cost of individual driving
Typical buffering components with little action or reaction. It may help to stabilize the system (elastic stability) via self-regulation (if it is not a hidden activator while influencing a critical variable).	• Cost/Pax in public transport • Cost/Pax in shared mobility • Electric mobility
Reactive variables with lots of buffering. Variations in this variables are not of great influence except if these have a specific influence on active or critical components. Of some help as an indicators.	• Attractiveness/value • Local pollution • Energy consumption • Injuries and deaths
Can be used as switch lever which is able to stabilize the system anew (plastic stability). They may be aimed at other variables to get the desired effect indirectly.	• Data, inform, knowledge, outreach • Transparency
Slightly reactive and weakly buffering components which are contributing to	• Vehicle-Kilometre Travelled

the self-regulation of the system. Most likely unsuitable as an indicators.	• Quality of the street • Amount of urban space for people
Interventions in components of this section often cause pendulum movements, which may be compensated rather soon through corrections in the system. A control of this self-dynamics (which may stop a wanted development) will be better carried out from outside the system.	• Car dependency
Slightly active components, suitable for small corrections and slight constellation changes without creating disturbing repercussions.	• Governance in support of sustainable mobility • Urban structure
Active variable whose modification may get things going. However, to obtain a lasting influence it should be protected against the imminent compensation of the system, or strengthened by concerted action with components acting in the same direction. Making use of these variables, can produce unintended changes. Therefore, side effects have to be analysed thoroughly.	• Congestion • Planning capacity
Weakly active and slightly buffering component serving as a soft lever to start changes in the system. It must probably be used several times to achieve the desired effect.	• ICT for mobility • Financial support of sustainable mobility

Table 18. Systemic roles of the ECCENTRIC relevant variables.

Main elements of the effect system

The difference of impact and causality stands in the middle of the scientific analysis. While the impact matrix of the section before provides a good overview of the impacts among variables, it does not represent the actual connections among them. The effect system addresses this question relating variables in a causality basis. The result are pairs of connections symbolizing a “variation in variable *A*, which causes a change in variable *B*”. In comparison with the impact matrix, the “effect matrix” has way more “ceros”, denoting a very reduced number of causality relationships between a given pair of variables *A* and *B*.

The relationships were determined in workshops and an extensive literature review. Causality is very often difficult to prove, rarely found in scientific publications, frequently confused with impact, or simply overlooked. The discussion among ECCENTRIC partners confirmed this problem, but also helped to identify the critical connections that actually structure the landscape or urban mobility.

The relationships are defined considering two aspects: the direction of the impact (direct or inverse), and the relative timeframe of the manifestation of the effects. Below there is a summary of the most important causal interactions among variables.

Interactions of Acceptance of Sustainable Mobility Solutions

Acceptance denotes a positive intentional attitude towards the sustainable mobility measure, without acceptance adoption is highly improbable; however, adoption also depends on the degree of freedom of users to make choices[7] . It has been identified that price and affordability (including perceptions of lifetime costs of products), product-service specifics (i.e. perceived quality, availability, convenience, safety/hygiene, etc.), consumer characteristics (i.e. personal habits and mind-set, risk aversion, environmental attitudes and lifestyle choices) and relationship with service provider are the main barriers for a product or service's acceptance[8].

In general, sustainable mobility transport could be identified as those strategies where there is as little use of non-renewable resources as possible, and low harmful emissions released to the environment. In this regard, these strategies could include increasing as much as possible the opportunities for walking and cycling (active mobility), when this is not realistic, increase transit/public transportation (PT Ridership) while improving its environmental performance (i.e. cleaner/efficient engines, shorter journey distances, etc.) when this is also not a feasible and improving the environmental performance of cars (share of mobility resources)[9]. If the sustainable mobility measure is the only choice, then adoption could happen even without acceptance.

Interactions of Amount of Urban Space for people

Referring to the land consumption in terms of the usage of urban land and street sections for all transportation/mobility associated activities. Assuming the area of interest has a reasonable economic development and polycentric planning is facilitated, the more land is allocated for transportation in that area, the more it will stimulate urban activities. However, larger consumption of land for transport does not always mean larger densities or more polycentric areas, to the point that land can become a scarce resource. This depends on the type of transport (i.e. car infrastructure is not as efficient regarding land consumption, as it is public transport).

Interactions of Car Dependency

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[7] Kilian-Yasin, K., Wöhr, M., Tangour, C., & Fournier, G. (20.16). Social acceptance of alternative mobility systems in Tunis. *Transportation research procedia*, *19*, 138.
[8] Roy, R., Shehab, E., Tiwari, A., Rexfelt, O., & af Ornäs, V. H. (2009). Consumer acceptance of product-service systems. *Journal of Manufacturing Technology Management*.
[9] Bertolini, L., & Le Clercq, F. (2003). Urban development without more mobility by car? Lessons from Amsterdam, a multimodal urban region. *Environment and planning A*, *35*(4), 576.

As the demographics in a population change so the decisions towards driving and car culture behaviour. There is a strong positive relation between car dependency with car ownership and VKT. On the other hand, the strongest interactions that can influence car dependency in relation to the built environment are spatial density and spatial diversity (a jobs/housing ratio); both of them show a negative relation[10].

Interactions of Congestion

Congestion can be seen as the saturation of transportation networks, when congestion increases so does the demand for road space and motorized vehicle services such as parking space, fuel, toll roads (road space), etc.

Interactions of Multimodality

The concept of multimodality implies the availability of different modes of transportation to make a given trip. Each mode has distinct characteristics. Some research mentions the positive effect of sustainable regulations and policies in multimodal behaviour (i.e. restriction parking policies, sustainable urban planning, public transport incentives, etc.)[11]. Other important factors that influence multimodality are related to the characteristics of the built environment and socio-demographic conditions of the area of study. These include factors such as population/urban density of the area (positive), household size (negative), income (negative), age group, trip purpose, car ownership (negative), transport safety (positive), travel duration (positive), availability and accessibility to public or other means of transport stop/station based (positive). In these last two variables, availability in peak hours and distance between each mode are particularly important[12][13].

Interactions of Public Transport

The higher availability of public transport networks in the area, the more polycentric and higher densely populated the area will be. As well, the supply of enough and high-quality public transport and shared vehicles systems such as carpooling is associated positively with a higher public transport ridership and also has a positive relation with multimodal behaviour. Especially the availability in peak hours and distance between each mode are particularly important in areas with high population density, since the transition from one transport mode to another can be facilitated.

Interactions of Vehicle Kilometre Travelled

The more densely populated and more polycentric a city is the less VKT there will be. Studies have shown that the degree of urbanization and its density within urban areas are key factors on regulating vehicle kilometre travelled; lower average urban densities stimulate

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[10] Martin, E., Shaheen, S. A., & Lidicker, J. (2010). Impact of carsharing on household vehicle holdings: Results from North American shared-use vehicle survey. *Transportation Research Record*, *2143*(1), 157-158.

[11] Bertolini, L., & Le Clercq, F. (2003). Urban development without more mobility by car? Lessons from Amsterdam, a multimodal urban region. *Environment and planning A*, *35*(4), 588.

[12] Olafsson, A. S., Nielsen, T. S., & Carstensen, T. A. (2016). Cycling in multimodal transport behaviours: Exploring modality styles in the Danish population. *Journal of transport geography*, *52*, 125-128.

[13] Krygsman, S. (2004). *Activity and travel choice (s) in multimodal public transport systems*. Utrecht University.

greater car use. Built environment plays a key role in shaping people's transportation choices, a high quality built environment is related to low car dependency and therefore low VKT [14]. As well, the more polycentric configuration a city has, the shorter travelled distances there will be[15] .

Interactions of Electric Mobility

Electric Mobility can be negatively influenced by low economic performance and lack of current governance frameworks in support of electric mobility. Contrarily, the high demand of electric mobility, low market price for such services, vehicles and infrastructure as well as supportive policies and incentives positively influence the rate of implementing electric mobility.

The relationship with other variables highly depends on the source of power of the grid (coal, natural gas, renewable energies, etc.) as well as the boundaries to which this relationship is analysed on its life cycle. Electric mobility can positively influence greenhouse emissions if the source of energy comes from non-renewable energies, and can influence negatively the investment interest in other alternatives for sustainable mobility.

Interactions of Quality of the Street

Quality of street refers to the configuration of the physical infrastructure/built environment and activities at a street level, while active mobility refers to the share of trips conducted by non-motorized modes such as walking and cycling. In general, low quality of street is associated with a lack of physical activities and therefore a bigger need of motorized mobility oriented to reach places of interest. High quality of the street includes a balanced allocation of spaces and activities for all users of the street, therefore, the better the quality of street the more availability of high quality-safe infrastructure for active mobility networks and services there will be.

Interactions of Urban Structure

The creation of new roads or expansion of existing ones increases the attractiveness of the land they pass through, promoting new urban facilities and making it more polycentric. Urban structure is highly affected by economic growth and urban planning. If a city is experiencing an accelerated economic growth, demand for land use accelerates and development of transportation facilities may be unable to keep up[16]. When it comes to the configuration of a city, commuting cost tends to increase as the distance increases, which means the farer the point of interest (central business districts), the higher the user cost of public transport will be[17]. Also, there is a large negative relationship between car dependency and both transit provision and land use diversity.

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[14] Ecola, L., Rohr, C., Zmud, J., Kuhnimhof, T., & Phleps, P. (2014). *The future of driving in developing countries*. Rand Corporation.14,73.

[15] Duarte, C. M., & Fernández, M. T. (2017). The influence of urban structure on commuting: An analysis for the main metropolitan systems in Spain. *Procedia engineering*, *198*, 52-68.

[16] Sakamoto, S., Morimoto, A., & Daimon, H. (2015). A Study on Influence of LRT on Population Shift in European Various Cities. *Journal of the City Planning Institute of Japan*, *50*(3). 22-23

[17] Duranton, G., & Puga, D. (2015). Urban land use. In *Handbook of regional and urban economics* (Vol. 5, pp. 514). Elsevier.

Interactions of Planning Capacity

Planning capacity is described by the cognition, cooperation and coordination capabilities of the society at different levels, including the ability to produce policies, investments and plans that benefit the community as whole. An increment in the planning capacity favours citizens and economic interest, and simultaneously is related to the production of better products and services. At a community level it denotes the capacity to coordinate efforts on the short/medium term, maximizing efficiencies and individual outputs.

Interactions of Governance Support of Sustainable Mobility

Governance is the dialogue between the different actors involved/affected by a given action where transparency and cooperation are always present. Governance will have a positive effect on sustainable frameworks; the higher the levels of governance the higher the probability to develop sustainable mobility frameworks that support social, economic and environmental development. Governance embraces the capabilities/strength of institutions to provide sustainable mobility favouring balanced/neutral frameworks, and facilitate its enforcement. The definition involves the robustness of regulations and policies as well in place, meaning its completeness and interoperability across the different aspects of urban management. The more governance support of sustainable mobility in an area, the higher the support towards social, economic and environmental development there will be; therefore, the more attractive it will be for the private sector to get involved as a shareholder in the sustainable mobility business.

Interactions of Data, Information, Knowledge, Outreach

Data information and knowledge refer to the general education levels and mobility specific knowledge and image of a product or service. It includes providing critical information for the planning processes, and to optimize the use of the mobility/logistics systems available. It involves the communication, education and training of users and stakeholders to help to raise information, knowledge and image levels, having an impact on several aspects of the system. The larger the availability of data, information, knowledge, training and education on sustainable mobility the more positive image its created and therefore is more likely that the users will accept the suggested measures.

E.3 WP2 evaluation: Inclusive urban planning, New parking policies and mobility management

WP2 had very differentiated topics. On one hand the planning process itself, and on the other hand implementation, in this case particularly addressing parking policies and mobility management in particular.

The evaluation of this WP is divided in two components, first dealing with the acquisition of rights and resources to implement a measure, and then with the effects of the measures.

Because it is agnostic to a specific topic or measure, the first part of the analysis can be applicable to any of the thematic WP within ECCENTRIC and beyond. An appropriate reinterpretation of the Governance Structure, Data, Information, Knowledge and Outreach variables is needed though.

The figure below displays the color code and line conventions for the diagrams discussed in this section. It is applicable as well to the analysis of all the other WP.

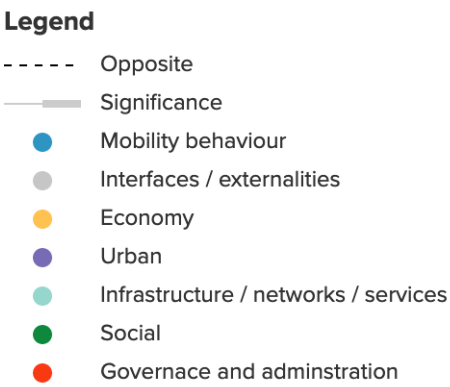
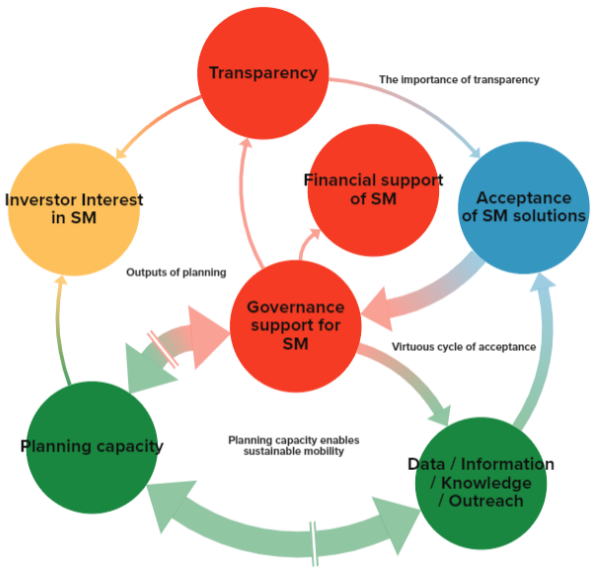


Figure 14. Conventions and color code for the system diagrams

Inclusive urban planning.

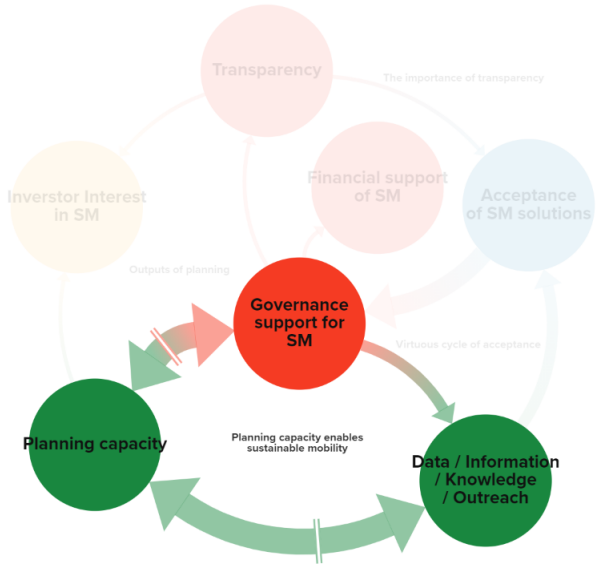


Inclusive urban planning system general overview. An interactive map is available at:

https://kumu.io/helbertlopez/ecc-wp21-financing-for-sustainable-mobility.

The walkthrough through the most important feedback cycles is available at:

https://helbertlopez.kumu.io/civitas-eccentric-wp2-inclusive-urban-planning.



Planning capacity is the key to secure resources for more sustainable transportation measures and policies. Whenever this concept is already available, the tools and strategies to mobilize public and private actors can be implemented right away. If this is still to be strengthened, there are two main elements to increase planning capacity.

First, data, information and knowledge in different forms are preconditions to increase the planning capacity of a society or an organization. Without a proper understanding of the current situation, planning is not feasible. Second, governance also unlocks the possibility of planning, while simultaneously engaging stakeholders and disseminating information and knowledge.

The relationships among these aspects are bidirectional and have many internal implications. The overall impact of sustainable mobility solutions on planning, deployment, and operation is overreaching and exponential. Deficiencies in either of these aspects have a strong negative impact on policies and measures attempting to change urban mobility.

The difficulties in the implementation of Civitas ECCENTRIC measure TUR 2.2. highlight the intricacies of the relationship between information and planning capacity. Failure to identify land-ownership rights (which was taken for granted) hindered the planning process and made it impossible to move forward into the financing and procurement stages of the project. Because of ECCENTRIC the communication efforts have been improved and will extend even beyond ECCENTRIC.

Planning capacity includes cognition, cooperation and coordination capabilities in different scenarios. At a political/institutional level it is the capacity to layout policies, investments, and plans that benefit the community, favor citizens and economic interests. At the community level it reflects the capacity to coordinate efforts in the short/medium term, maximizing efficiencies and individual outputs. At an entrepreneurial level it stands for the capacity to optimize the use of resources to maximize the output of the service (not the financial output).

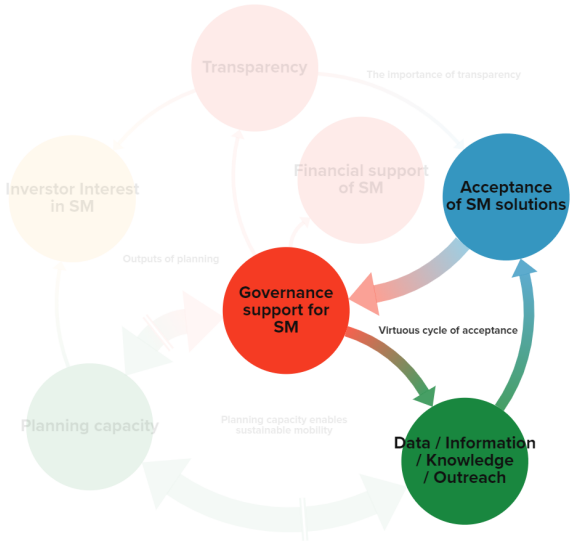
This variable does not deal with output levels, but rather the ability to work together and make improvements possible. Cooperation enables a greater output than the initial input (1+1=3). Non-cooperative societies/communities behave reactively, spending resources to solve problems or fulfilling aspirational needs. Societies/communities that cooperate plan investments and expenditures ahead, with a long-term perspective in mind.

Acceptance of sustainable mobility encourages public and private sectors to support actions in the same direction. Governance structures can facilitate the dissemination of information and knowledge. Simple, clear and straightforward communication increases acceptance therefore creating a virtuous cycle.

No amount of effort is enough to keep this cycle alive. A failure of nurturing the governance-information-acceptance cycle leads to the stagnation and neutralization of other parallel efforts.

The experience of Civitas ECCENTRIC in measure TUR 2.1 and MUC 2.9 demonstrates the positive effect of dissemination of information and inclusion of citizens on the acceptance of measures in the field of sustainable mobility.

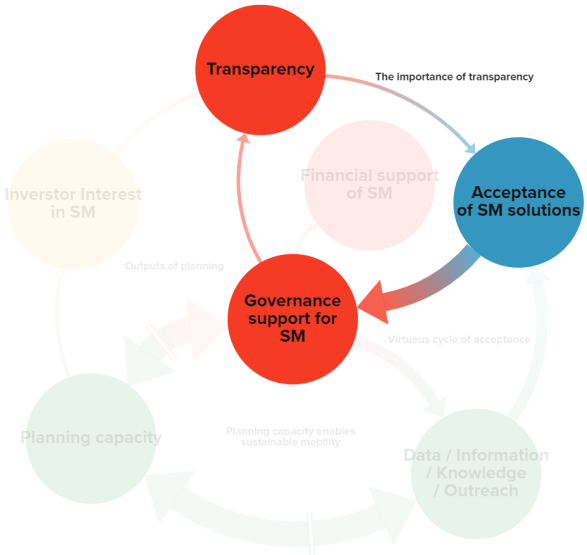
Measures in Civitas ECCENTRIC highlighted the importance of



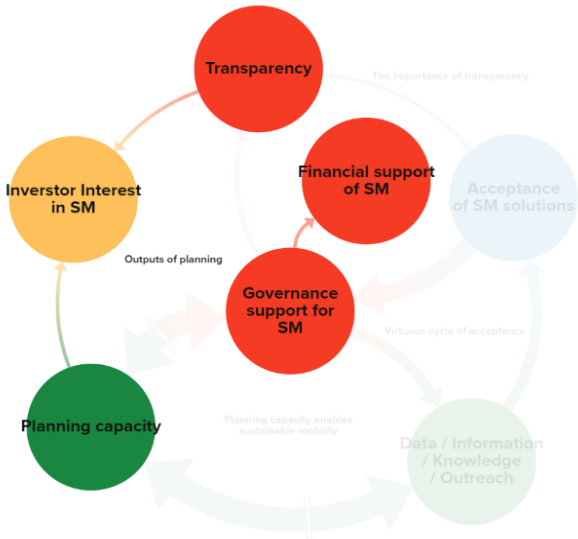
choosing the right channels and clarity of communication to reach specific target groups. All measures in WP2 implemented different communication strategies. Those tailored to very specific groups were particularly successful. TUR 2.1 for instance, tackled a particular information and communication deficiency and successfully contributed to achieving governance support for sustainable mobility projects and helping the project move forward in the planning process.

The measures should not only be accepted by the users, but also by the general public. Non-users can either accept or not accept given measure and therefore also determine its success. Users are not necessarily in favor of a measure; by definition, captive users have no option and may not accept the measure but still make use of it. Acceptance does not imply a change in behavior or willingness to change.

Particularly for ECCENTRIC, sustainable mobility solutions refers to the measures tested within a given WP or the project.



Although transparency did not have as strong of an importance as other variables in this WP, it should not be ignored. It secures acceptance and enables long-term prospects for sustainable mobility. The short time span of ECCENTRIC is not enough to measure the impact of transparency in sustainable mobility, however it is certainly a precondition for a sustainable future.



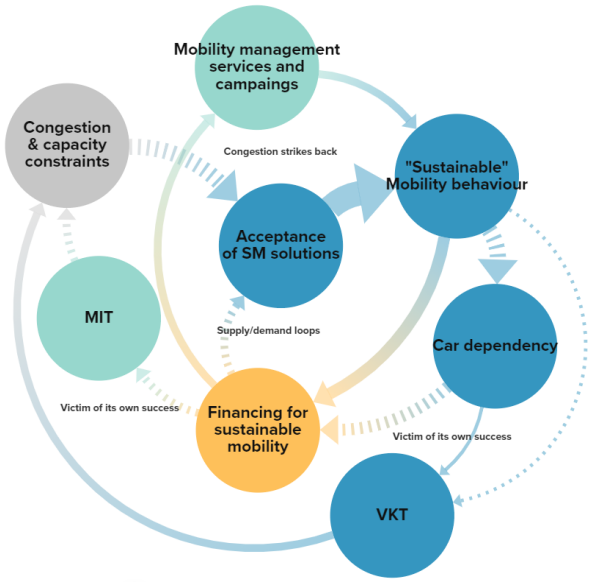
The results of these cycles are the resources to implement policies and measures in favor of sustainable mobility. As discussed before, measures TUR 2.1 and TUR 2.2 of Civitas ECCENTRIC have demonstrated different possible outcomes under different approaches.

For mobilizing resources from the public sector, the governance system is of course the decisive element. For motivating the private sector, planning capacity and transparency are crucial.

This (sub)system has no counteracting forces within. This means, if there is progress in any of the aspects, no internal forces work against the system. In this sense, the system is very strong.

However, counteracting forces from the outside are possible and can affect almost all the variables. Acceptance, information, and knowledge are aspects that react very sensitively to external conditions and in many cases are not even directly or exclusively related to urban mobility itself. Therefore, there is a strong need to establish a link with the overarching urban strategy in order to avoid contradictions and negative feedback from the outside.

New parking policies and mobility management.

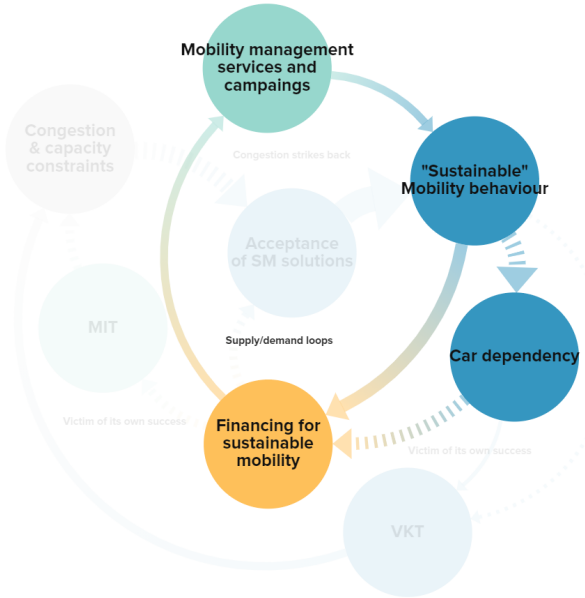


New parking policies and mobility management system general overview. An interactive map is available at:

https://kumu.io/helbertlopez/ecc-wp22-parkingmobility-management

The walkthrough through the most important feedback cycles is available at:

https://helbertlopez.kumu.io/civitas-eccentric-wp2-new-parking-policies-and-mobility-management



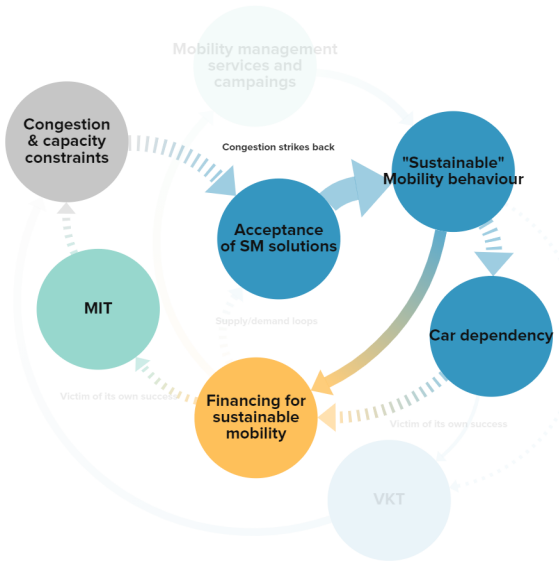
If resources are secured (by the means described in the analysis of WP2 - Inclusive Urban Planning), and services are deployed on the streets, a change in behaviour can be expected. Whether demand follows the supply or supply follows the demand is a matter of timing and irrelevant from a systemic perspective.

Civitas ECCENTRIC has widely explored the impact of mobility management measures targeting specific and diverse groups. MUC 2.7, 2.9, 2.10 and MAD 2.8 have proven a high user acceptance and satisfaction.

The impact of mobility management in ECCENTRIC has also been shown to be positive, although limited. There is always a limit to the effectiveness of curbing the mobility behaviour of such initiatives, however, changes in behaviour can often only be measured in the long term. Without exception, the underlying need for proper infrastructure has been identified as a key element for a shift towards sustainable mobility, always accompanied by mobility management initiatives. Both have to be planned hand in hand.

All ECCENTRIC measures under this topic have demonstrated that a long term prospect on such programs is not only desired but needed. The implementation has proven to be difficult and shows many flaws due to the complexity of the target groups and the planning processes. Long-term effects depend on a permanent operation of the implemented measures. Only then can they be taken for granted by the users and incorporated into their daily lives.

It is important to be precise about these measures. If demand and needs of the users do not match, financing could be endangered due to poor financial returns, or low (social) benefit ratios. There are also other forces antagonizing change in mobility behaviour, as discussed in the analysis of another WP.

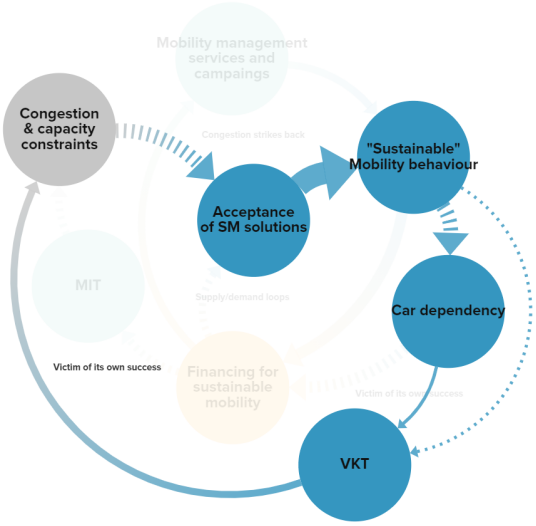


The success of parking and mobility management measures a shift in the allocation of resources and space for transport and mobility projects. In the short term, this leads to a disruption of doing business-as-usual and is likely to increase congestion and affect a comfortable, and smooth driving experience *.

Several measures in Civitas ECCENTRIC explored novel ways to change the status quo. MAD 2.3 and RUS 2.6, demonstrated that it is possible to achieve acceptance and promote a change in mobility behaviour even if the advantages of Motorized Individual Transport (MIT) are reduced. Wrongly managed though, acceptance and public opinion can stop this trend, and shift resources back to outdated policies for providing more space for MIT. A strategic approach to avoid this rebound effect is a priority.

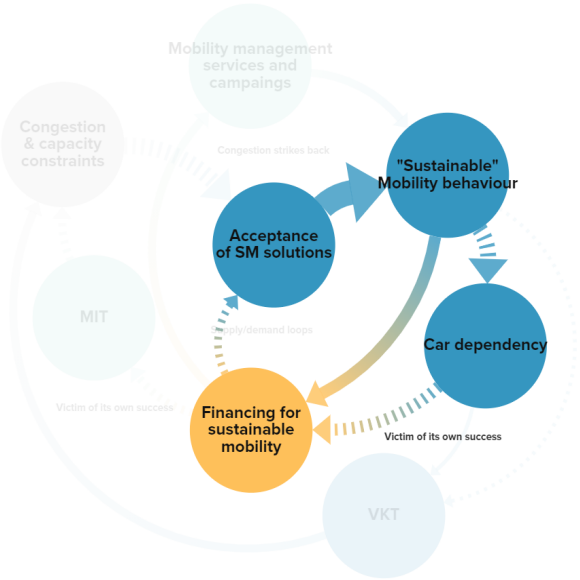
Congestion (and other forms of impedance for MIT) has to be managed strategically. Congestion is always present, regardless of the success of more sustainable modes of transport. Targeting congestion (or even worse, treating it symptomatically) leads nowhere. This is the conclusion of ECCENTRIC and years of failed policies.

*The concept of congestion in this analysis goes beyond the traditional road congestion. It involves other forms of capacity constraints to the unrestricted and smooth flow of MIT. Some examples are the limited availability of parking, repurposing to managed lanes (provided that there are no additions to capacity), prioritization of sustainable modes of transport, etc.



The acceptance and success of parking and mobility management measures could be negatively affected if they lead to a reduction of VKT, and in consequence the improvement of conditions for car usage (less congestion, higher availability of parking spaces, etc.). With an improvement of the conditions for the private vehicle, preference for MIT bounces back, neutralizing efforts in favor of more sustainable mobility.

This is further evidence that congestion and other forms of resistance act as buffers that absorb external influence over the system, rather than as elements that are suitable as targets of transport or mobility policy.



Another likely rebound effect to take place following the success of sustainable mobility measures, is to be observed in the availability of public financing. The perception of these investments may change as sustainable mobility behaviour increases and dependence on the car decreases. They may start to be perceived as unnecessary or be redirected to more urgent matters.

The relatively low reactivity of the urban mobility system requires repeated and continuous efforts to achieve a change from the current situation. Failing to do so would mean that the self-regulating capabilities would bring back the system to its status quo. Not only would resources be wasted, but the willingness to implement measures to promote sustainable mobility would be lost as well.

Barriers and drivers

It has been shown that tailor-made offers combined with a digital or appealing approach (social media, gamification, incentives), have an enormous impact because they encourage participation. A key success factor is the formation of working and steering groups and the assignment of clear responsibilities. Special attention was paid to vulnerable groups that are often neglected in planning processes, such as children, the elderly or people with disabilities. In all cities, meetings were held with these groups to include their points of view and discuss their requirements for a functioning mobility system. For instance, joint city walks, debates, participative workshops, and training sessions were organized with overwhelming success.

It should be noted that a target-group-specific approach, a continuous support of the actions and an adapted continuation are required. In all participating cities, the active exchange with users has led to an enormous increase in awareness and acceptance of the sustainable mobility solutions. Changing mobility behaviour remains a long-term and complex process, but good results have been achieved in the short term.

For infrastructure-based projects, innovative project design is very important alongside the active participation of the target groups. Since the mobility system is increasingly linked to digital services, these can be used on a larger scale to facilitate use and create new incentives.

Bellow there are more points raised during the analysis of the process.

Barriers

1) Problem related: specific measure-related concerns on the implementation, such as right time for implementation, acceptance, lack of reach of certain groups, participation on the measure, logistics, human resource capacity, etc. Other problem-related barriers included issues with land ownership and allocation, lack of compliance with land use plans and disconnection of public transport

2) Organisational: most barriers referred to potential lack of support or capacity of the organisations or stakeholders involved in the implementation of the measure. Difficult collaboration between private actors due to secrecy/competitive concerns.
3) Planning: situations derived from lack of anticipation of potential problems while planning, which was also related to a lack of involvement of stakeholders in such stage.
4) Involvement and communication: lack of interest, and therefore poor involvement and communication of decision makers and other stakeholder groups in the measure and also support to advertise/communicate such measures.

In parking related measures, car culture/land use ownership and space were two repeated barriers; although cultural barriers were not among the most popular problems, these two elements were mentioned in most measures of this nature. Other barrier identified was on changing behaviour /understanding the problem or concerns. Financial barriers to promote sustainable mobility were also mentioned repeatedly. Some measures that were using relatively new technology included technological to implement, accept the technology and scale up as well as its integration with the Laws and regulations, and human resources capacity.

Drivers

Top four drivers included: Financial, Planning, Organizational, and Political/strategic.

1) Financial: Most measures acknowledged the availability of funding as main driver and agreed that was enough funding for the projects.
2) Planning: Strong planning was also acknowledged, which enabled participants to be aware of other organizations and partners and make use of those.
3) Institutional / Political and Strategic: Alignment with strategic objectives. A favourable attitude towards the measure was perceived when measures were aligned with some policies or strategies that were implemented nearby the city lab, as well as favourable legal and institutional framework. There was also an existing momentum for the measure, which allowed them an easier advertisement of the measures and in some cases piggy bag on other related projects.
4) Organizational: Pre-existing networks and infrastructure. People described it as the easy access to use existing resources, such as materials, knowhow, and a network of experts, which allowed an easy integration of the measure within other similar initiatives or political agendas.

Other drivers included, cultural, technological drivers, as well as high visibility through communication, and having a positive impact on image of the area. In order to take advantage of such drivers, it was important to identify key supporting policies and stakeholders and maintain a good communication between them, act quickly and formalize agreements. Also teaming up with related projects increased visibility.

E.4 WP3 evaluation: Mobility as a Service for and by all

The analysis of Mobility as a Service (MaaS) in Civitas ECCENTRIC differentiates between short and long term. It is fair to assume that, in the short term, satisfied MaaS customers will not necessarily behave more sustainably in terms of mobility.

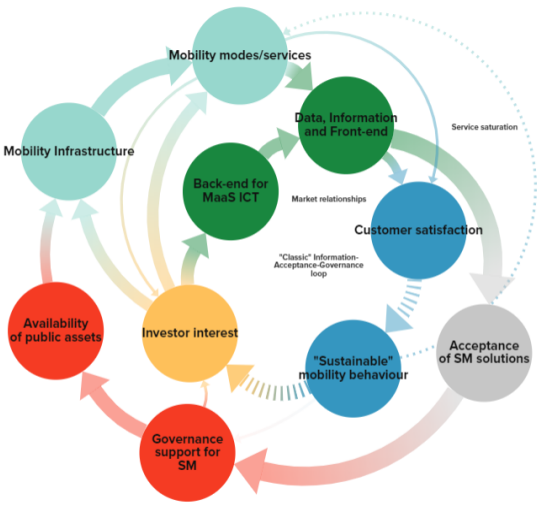
Nowadays there are countless “sustainable” mobility solutions launched under the flag of MaaS with very little proof of their positive impact on travel behaviour or the environment. Nevertheless, the market is delivering solutions that, at least for now, are not contributing to a decrease in the number of VKT, an increase in the share of public transport or active mobility, or an improvement of any other figures commonly linked to sustainable mobility.

Low market penetration and numerous barriers are reasons for this. Civitas ECCENTRIC is exploring various options to reverse this and make MaaS a solution that delivers on its sustainability promise.

In the long term it can be assumed that MaaS will develop into an option which actually offers better mobility services for all citizens while at the same time reducing car dependency, VKT, and overall emissions.

For the conventions and color code used in the figures below, please refer to **Figure 14**.

Short term analysis.

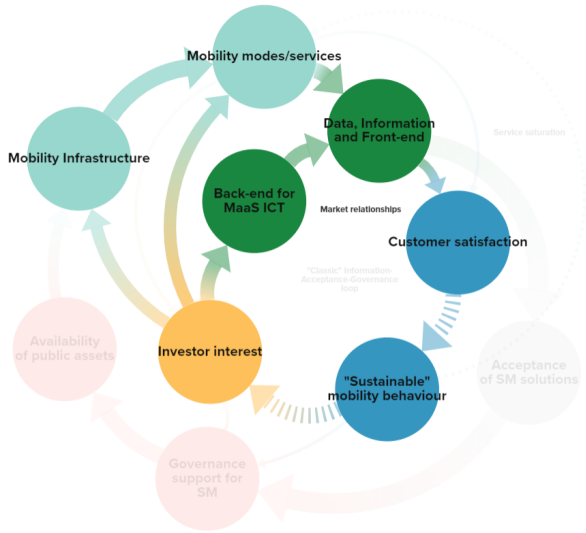


Mobility as a Service for and by all – short term analysis system general overview. An interactive map is available at:

https://kumu.io/helbertlopez/ecc-wp3-mobility-as-a-service-short-term

The walkthrough through the most important feedback cycles is available at:

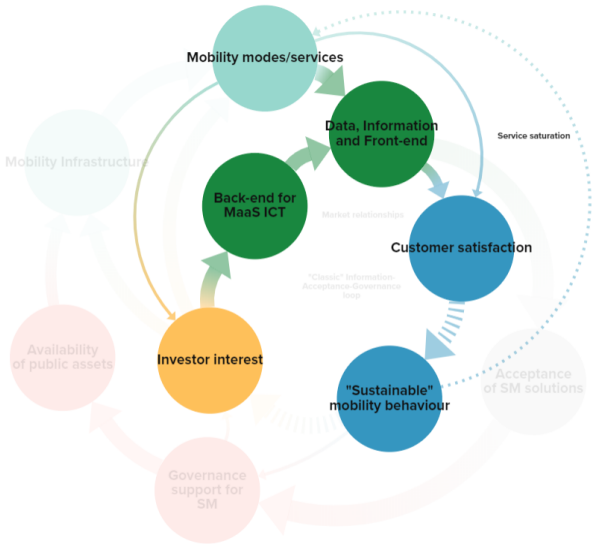
https://helbertlopez.kumu.io/civitas-eccentric-wp3-mobility-as-a-service-for-and-by-all-short-term-analysis



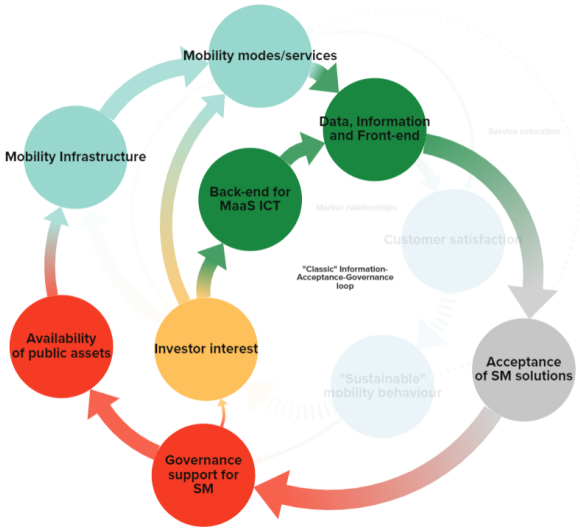
Investors and companies deliver mobility solutions because nowadays customers appreciate increased options for mobility. The customer's decision has nothing to do with the sustainable aspect of it, and in many cases, trips are created or shifted from cycling and walking.

The expanding nature of the market has created an opportunity for these new alternatives to pop-up, and deliver infrastructure, services and platforms frequently marketed as MaaS.

Although still following a niche strategy, some of these MaaS concepts want to become a solution for the mass market. Moving up from the niche strategy seems to be a requirement to having a relevant impact on the figures of sustainable mobility.



Quality and capacity of MaaS are limited by the capacity of the mobility services themselves, and by the number of services integrated into the MaaS platforms. The larger the availability and the integration, the more attractive it becomes for customers and mobility providers. The companies therefore see this as a sign of a promising market in which the risks and investments are worthwhile.



With TUR 3.1 and TUR 3.2, Civitas ECCENTRIC has demonstrated the impact and importance of the relationship between the information available to the user, its acceptance and the positive impact on the governance processes required to deploy the services, infrastructures and ICT solutions needed to consolidate a MaaS.

While there is still a long way to go before all the components are available and in place, it is important to identify the threads that mobilize the governance system to secure the assets and resources required for MaaS.

MaaS is not only the user front-end or the services that are part of it. It implies securing public space to operate, securing permissions, transparency, contracts that are good and beneficial to all parties. More importantly, MaaS requires a healthy dialogue between a large number of parties that must agree to move forward with the implementation. Civitas ECCENTRIC has taken important steps in this direction.

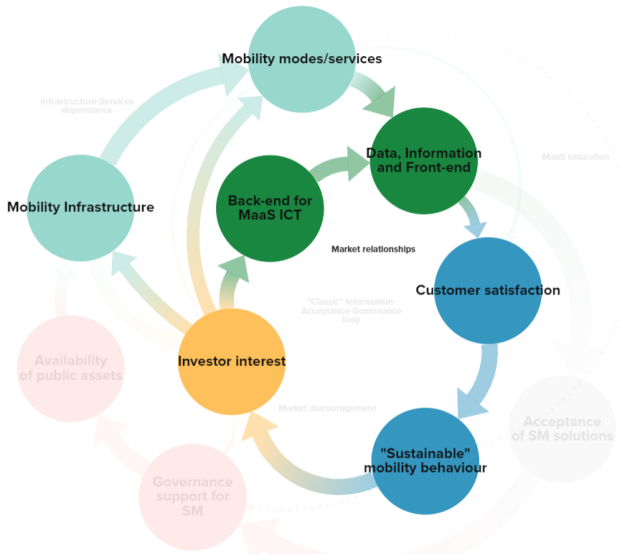
Long term analysis.

Mobility as a Service for and by all – long term prospects system general overview. An interactive map is available at:

https://kumu.io/helbertlopez/ecc-wp3-mobility-as-a-service-long-term

The walkthrough through the most important feedback cycles is available at:

https://helbertlopez.kumu.io/civitas-eccentric-wp3-mobility-as-a-service-for-and-by-all-long-term-prospects

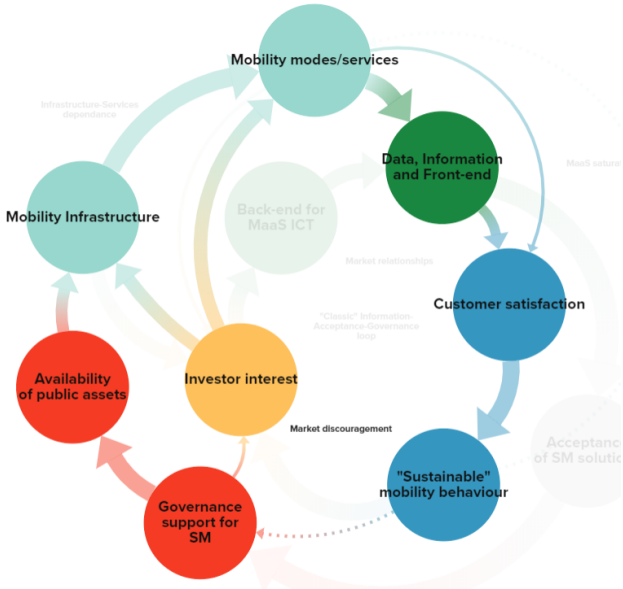


The long-term part of the analysis has not been backed with empirical information from Civitas ECCENTRIC measures due to its long-term nature. However, it is the result of a systemic analysis involving experts in the field and the professionals participating in the project.

Market relationships of Mobility as a Service (MaaS) will evolve from its current form (based on the assumption of an expanding mobility demand), to an actual preference for sustainable mobility solutions over Motorized Individual Transport (MIT).

Bundling infrastructure, services and information with the user at the heart of the ecosystem will result in satisfied customers who view MaaS as their first mobility option.

This will secure the investments needed to deploy the infrastructure, services and ICT platforms to deliver a high quality MaaS that binds users to the system. In the long term, there is an opportunity for users, investors and the environment to benefit from MaaS schemes.

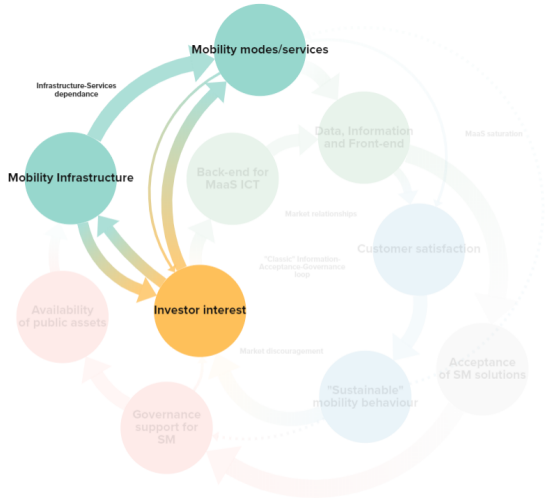


Public support currently stands behind MaaS (regardless of its sustainability), but as the market matures, support for MaaS will decrease. The support of MaaS schemes, through projects like ECCENTRIC, is a bet on the future, supporting the transformation of the mobility market in urban areas.

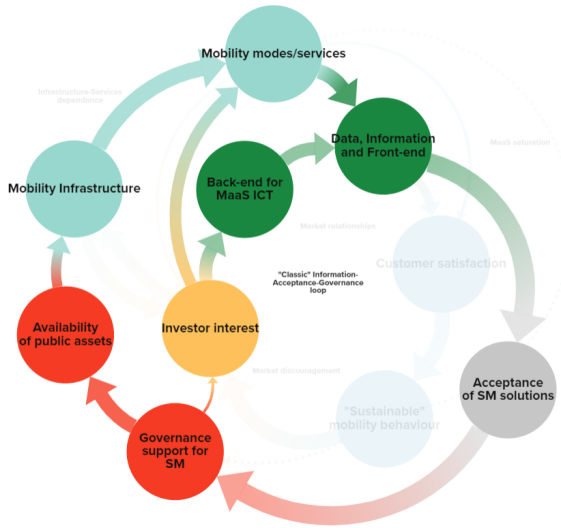
From a market perspective, this support will expire if the bet is successful, as it is the role of the administration to promote healthy markets, but not to interfere, operate or actively participate in them.

The public sector is likely to turn to its traditional role, which is to maintain an overview and define the rules for proper competition that benefit citizens and provide a stable framework for the functioning of the market. Only a few assets will remain entirely in its hands, namely the public space and other public goods needed to operate MaaS (e.g. radio frequencies and the like).

The bulk of the investment for infrastructure and services is expected to come from the private sector, which will slow down the expansion of MaaS, or at least limit implementations to what the market is actually demanding.



Nevertheless, the availability of proper infrastructure and mobility options are preconditions to securing resources from the private sector. The timing of phasing out public funding must be chosen carefully to ensure that there is a good basis for the private sector to continue investing in infrastructure and improving services.



In any case, governance systems created during the introduction of MaaS should remain in place to a certain extent. The main task in the future will no longer be securing resources and expanding the system, but ensuring MaaS retains its customer focus and delivers on its sustainability promise.

Barriers and drivers

For MaaS to flourish, user needs and knowledge of how to enable the creation of interconnected, sustainable and seamless services to meet those needs should be at the heart of the work. An emphasis should be placed on how to facilitate behavioural change, while allowing for strong stakeholder involvement.

For the successful implementation of MaaS measures the involvement of and communication with stakeholders is crucial. This requires that cities focus on adequate resources and the skills needed to involve stakeholders at multiple levels. To date, MaaS as a concept is often not well understood by the various key institutions. The lack of expertise in dealing with technology and new market entrants affects the support provided. It is important to clarify the legal framework and to involve the institutions in the development of MaaS.

Complexity, perceived uncertainty and the rapidly changing market are influencing the way new services can position themselves and create the necessary partnerships. Also, the high competition between partners affects the way they participate in platforms that are not run by

themselves. MaaS actions are naturally aligned with environmental goals, regulatory frameworks, and a Sustainable Urban Mobility Plan (SUMP). In some cases, these are translated into favorable regulatory frameworks, strong support from regional policy makers and key stakeholders, as well as interest and commitment towards cooperation.

The success of MaaS actions requires solid planning for design, leadership and flexibility/adaptability. A strong business culture in the ICT sector that supports these actions (e.g. IT infrastructure, high level of interest, high smartphone penetration) is enabling the process.

Below there are more points raised during the analysis of the process.

Barriers

1) Involvement and communication: Repeated issues highlight a weak communication between stakeholders in some measures, especially when they are not located in the same city, and since MaaS involve more than one institution communication is key. LEMs also reported difficult governance of the projects, frequently facing the one-man-show issues; it was stated that in such cases, a special set of skills is required to steer governance in the right direction. Another issue faced by some measures was the repeated change of the ML, which significantly affected its performance.
2) Institutional/Organizational: According to the experiences shared in this WP, MaaS is not yet sufficiently well established and fully understood in key institutions; cities frequently lacked knowledge to deal with technology. As a result, issues such as unfavourable or unclear regulatory framework, lack of financial funds and support from policy makers, were reported under this category. This seems to contribute to a high perception of uncertainty on the topic. In particular, LEMs experienced difficulties on setting clear Terms of Reference.
3) Problem-related: Most barriers are connected to the complexity and lack of understanding MaaS and the perceived uncertainty, as well as the rapidly changing landscape of mobility services/options/supply. Often, new options on the market would also mean new technologic barriers to solve. All of these reasons create highly volatile and unstable markets for MaaS, which affected some measures on their ability to position themselves and create the required partnerships to operate (MaaS, with PT, or private share-mobility initiatives, or dissolved partnerships). Another particular problem was the very high competition between partners for running the platforms, and to maintaining interest within partners to keep participating in the schema when they were not running the platforms.
4) Technological: This category included technical problems to physically implement the measures' installation or unexpected performance of the technology, which compromise the safety of the users and lack of technical capacity of the public administration to implement this measure. It was also highlighted that technology was not an issue, but rather the availability of human resources for development, since that is scarce.

Key actions identified to overcome such barriers include improving communication between all stakeholders and encourage cities to clarify legal framework and engage in developing MaaS. Promote a more robust planning to identify potential problems in advance.

Drivers

1) Planning: Most measures recognized strong planning as a driver, in particular its design, leadership and flexibility/adaptability within the measures, which in some cases, such planning was replicated in other countries.
2) Cultural: Participant cities have a strong business culture in the ICT sector that supports these measures (i.e. IT infrastructure, high interest, high smartphone penetration etc.). It was also recognized that there is a growing interest of the public to make things fast and easier by online services (integrated booking, payment, routing, etc.)
3) Involvement and Communication: Good leadership (MAD 3.3), cohesion between teams and high interest from the target population (MUC 3.4) were mentioned. ECCENTRIC's involvement and having more of its measures in the living lab had a positive effect (MUC 3.7).
4) Political/strategic: Measures are naturally aligned with environmental goals, regulatory frameworks, and SUMP. In some cases, this translated in favourable regulatory frameworks, strong support from regional policy makers and keys stakeholders, as well as interest and commitment towards the WP. In general, there was a perception of a growing political will to set proper conditions for the success of MaaS (Restrictions on MIT, shared mobility, etc.).
5) Positional: In general, previous drivers also allow some measures to get more visibility and to position themselves.

Other drivers include institutional support, funds allocations provided by ECCENTRIC and technological maturity. Actions recommended making use of the drivers included maintaining those favourable conditions through effective communication with stakeholders.

E.5 WP4 evaluation: Enable safe walking and cycling

For the conventions and color code used in the figures below, please refer to **Figure 14**.

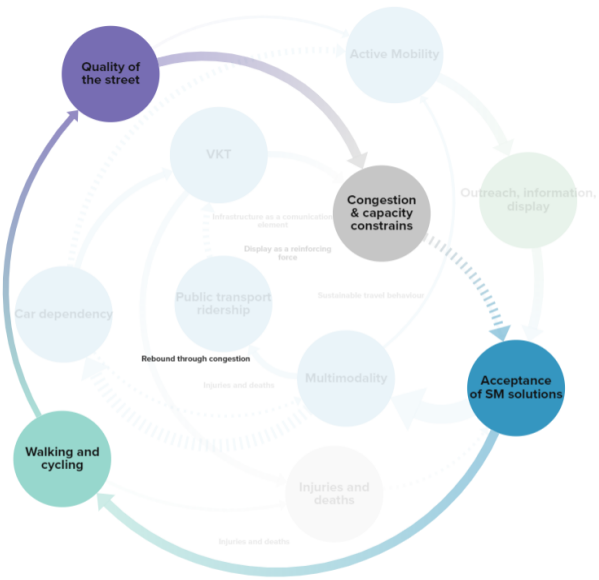
Relevant variables and effects, reinforcing and counteracting feedbacks

Enable safe walking and cycling system general overview. An interactive map is available at:

https://kumu.io/helbertlopez/ecc-wp4-walking-and-cycling

The walkthrough through the most important feedback cycles is available at:

https://helbertlopez.kumu.io/civitas-eccentric-wp4-enabling-safe-walking-and-cycling



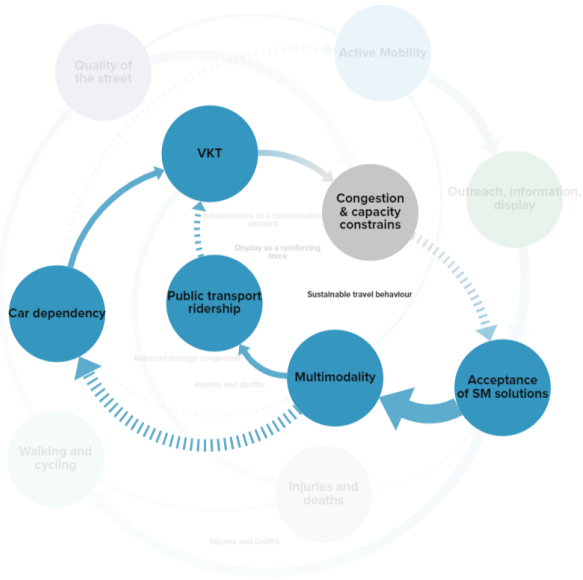
When space is limited, the investments to support walking and cycling can reduce the space for Motorized Individual Transport (MIT). This can negatively affect the acceptance of these measures, as well as public opinion and political will to support further actions in that direction.

Managing the impact of congestion* and other capacity constraints in acceptance with the public opinion is critical to ensuring increased active mobility.

Residents of different cities react differently to capacity constraints. For instance, in Madrid and Stockholm, when congestion increases, a negative impact on the acceptance of active mobility is observed, whereas in Munich the opposite seems to happen.

In both cases, however, this behaviour can be reversed, due to forces that have little or no relation to the actual impact on pedestrian and bicycle infrastructure. Acceptance must be managed strategically and no direct relationship between mobility actions and acceptance should be expected.

*The concept of congestion in this analysis goes beyond the traditional road congestion. It involves other forms of capacity constraints to the unrestricted and smooth flow of MIT. Some examples are the limited availability of parking, repurposing to managed lanes (provided that there are not additions to capacity), prioritization of sustainable modes of transport, etc.

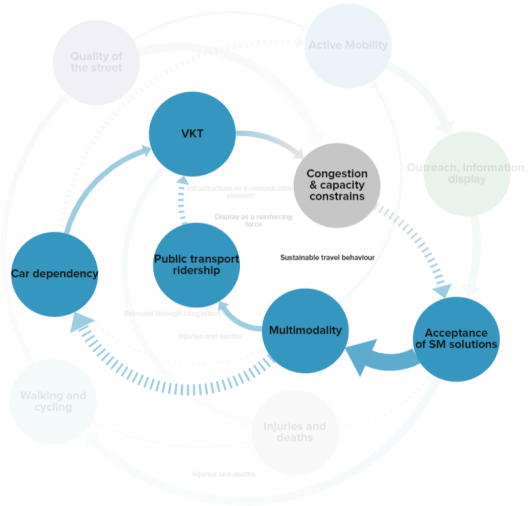


A successful increase in acceptance of walking and cycling leads to a more multimodal behaviour and to the replacement of motorized individual travel with an increased use of public transport and a reduction of car dependency.

The overall long-term effect is a potential reduction of congestion and a positive perception of these actions. However, it is important to note that public acceptance will not automatically be given only because congestion is tackled successfully. Despite of this positive effect on congestion, cycling and walking actions did not have a prominent position in the political agenda of the partner cities of Civitas ECCENTRIC. After some ups and downs, measures finally got approved but in some cases their continuity after ECCENTRIC is uncertain. In general, projects promoting active mobility seem to lack instruments and support for project implementation. From funding issues to a lack of guidelines for planning and approval, Civitas ECCENTRIC has identified the need to improve governance and robust risk management around these types of measures.

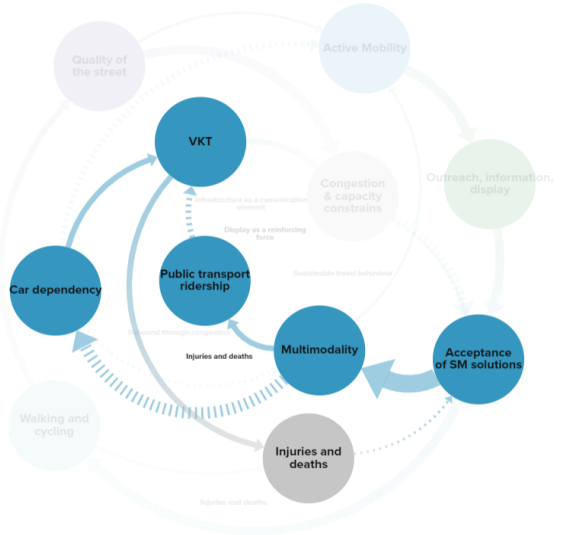
Sustainable urban mobility plans (SUMPs) are one of the tools to increase the significance of cycling and walking projects and support their implementation. SUMPs were identified in Civitas ECCENTRIC as a positive driving force, but they have yet to find their way into a more permanent form in the formal planning procedures of each city. This is true particularly for non-central locations where the benefits of active mobility almost always yield to car-centric planning philosophies.

Civitas ECCENTRIC itself was found to be a driving force for the acceptance and delivery of cycling and walking related projects.



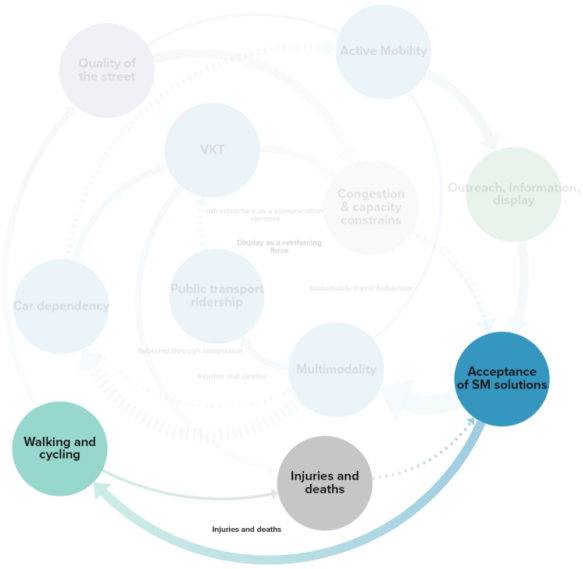
Few cities might behave differently, though. Munich, for instance, is observing a trend of citizens reacting in favor of more space for active mobility, as a solution for the increasing congestion. This has shaped a politic agenda that supports the delivery of cycling and walking projects. While this is very positive for increasing the acceptance of these actions, it also raises the importance of managing congestion strategically. If congestion is reduced, it could happen that investments in walking and cycling are then perceived as disproportional and superfluous.

Reducing congestion and other forms of capacity constraints should not be the final objective of investments in cycling and walking, but rather a tool to regulate the use of space in cities.



Reducing Vehicle Kilometers Traveled (VKT) by shifting motorized trips away from MIT reduces the risk of accidents, which has the potential of raising acceptance for walking and cycling measures. A similar effect takes place when shifting trips to public transport: The reduction of VKT also reduces the risk of accidents.

However, the impact of measures to improve cycling and walking is different for public transport and MIT users. The experience of Civitas ECCENTRIC shows that active mobility seems to be less attractive for users of MIT than for users of public transport (MAD 4.6, MAD 4.7). This suggests that multimodality is increasing and that the benefits are sensitive for those citizens who have so far relied exclusively on public transport, but changes in car dependency cannot be expected without the support of complementary (most likely car-restrictive) measures.

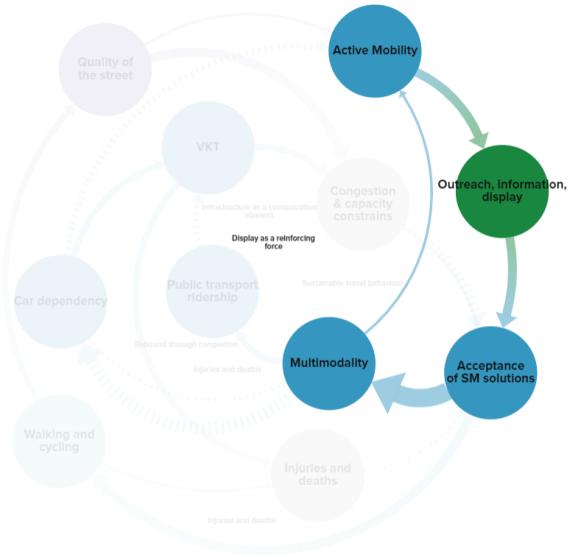


As far as road safety is concerned, this issue has gained importance in recent years and is shaping public opinion in favor of further measures to protect the safety of pedestrians and cyclists.

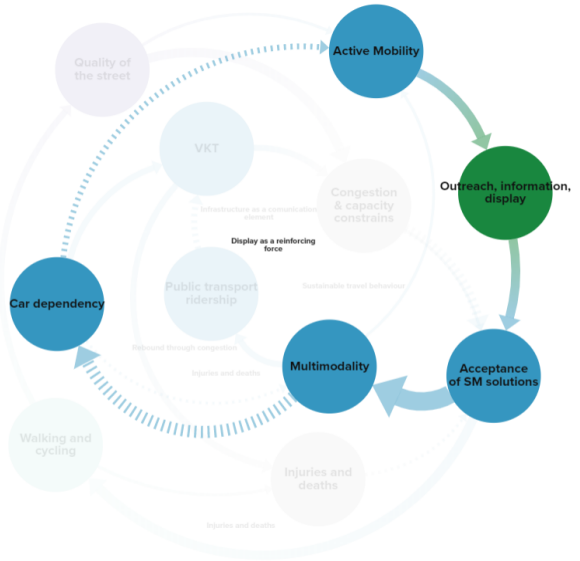
More pedestrians and cyclists on the streets increase the risk of conflict with other users. It is therefore important to maintain security as a central element. Here, too, failure to do so has a negative impact on the acceptance of such measures, triggering a chain of reactions that can neutralize any effort to increase the share of active mobility.

Civitas ECCENTRIC seems to have already identified this in the proposal stage, dedicating a complete cluster of measures to tackling the issue of safety for pedestrians and cyclists. Although the time frame was too short to observe a significant impact on actual accident figures or the number of pedestrians and cyclists, the observed acceptance was always high (RUS 4.3, RUS 4.4, STO 4.5, TUR 4.8 and STO 4.9). Besides, Civitas ECCENTRIC has taken action to increase safety in critical locations. GIS based analyses and user group surveys seem to have worked very well to identify “dark spots” (MAD 4.1 and MUC 4.2). Other novel approaches using big data and social networks were less effective (MAD 4.1).

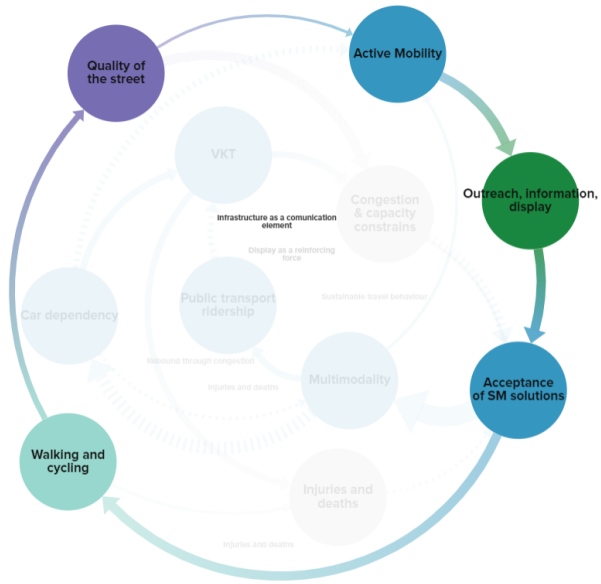
Due to the safety-centered approach of the measures used in the intervened areas, an increase in the number of pedestrians is to be expected, without a corresponding increase in accidents.



Car (dependent) users enjoy complete isolation during their trips. This has serious consequences for the public space, since drivers rarely experience mobility the way pedestrians or cyclists do. They are target groups that are difficult to address. Multimodality means to use and share public space, which in consequence acts as an advertisement for active mobility alternatives. People bring more people; this is a well-known fact that should be exploited by ensuring the visibility of users on the streets. This effect explains in part the continued growth of users observed in related Civitas ECCENTRIC activities. Without much support from advertising campaigns, users grew quickly and far beyond expectations in MAD 4.6, TUR 4.8, STO 4.9.



The visibility of active mobility infrastructures and services, combined with a shift from MIT to public transport, ensures more pedestrians and cyclists on the road. This once again serves as an advertisement to promote active mobility. People in the streets is the best advertisement for cycling and pedestrian measures. If the public space is occupied only by cars instead of people, these measures are not visible and an increase in active mobility is less likely. This is another reason to ensure high quality and visibility of public space while avoiding that MIT is the center of the design.



Walking and cycling infrastructure plays an important role in communicating the quality of the public space. Only by increasing the quality of the public space, more users can be attracted and more activities can take place, displaying all the possibilities that the street has to offer.

Some measures in Civitas ECCENTRIC had important displays of infrastructure. Again, MAD 4.6 and TUR 4.8. can attribute their success partly to the sizable visibility of the measures, even without large-scale investments. STO 4.9 demonstrated the impact that the quality of the deployment (in that specific case, the quality of the electric bikes) has on the introduction of more sustainable modes of transport.

Barriers and drivers

The role of policy and strategic or institutional processes and the importance of ensuring consistency between visions, policies and pilot projects is crucial for planning and implementation. This is a two-way process, as even demonstration projects that are well targeted and integrated into strategic visions and policies can suffer if budgets are cut or key stakeholders are unaware of the issue or of a possible role they may have to play. Overcoming such barriers is both a challenge for projects and, in some cases, a reason for them.

Similarly, public opinion – which shapes the political context of cities – can also influence implementation and outcomes. Cities have the opportunity to involve citizens in the planning process and work closely with them to ensure their local needs are addressed and their expectations are met. Achieving successful outcomes requires good planning including ex-ante analyses, design and technical planning, as well as post-ante evaluation. The experiences of CIVITAS ECCENTRIC illustrate clear pathways on how to address these points.

Bellow there are more points raised during the analysis of the process.

Barriers

1) Political/Strategic-Problem related: The barriers include a general concern of lack support of key institutional stakeholders and decision-makers on the implementation of the measures, since they have other priorities in the municipalities. It was perceived that the WP had a poor significance for the politic agenda. This threatens the continuity of such measures after the ECCENTRIC funds run out, since some of the measures are also related to high cost projects. This is quite related to the next barrier.
2) Financial: Experiences included limited budget or restrictions to the use of other funds in infrastructure improvements or bureaucracy to use funds for the implementation phase, and unclear justification for funding. It was also pointed out that the funding scheme is inconvenient; planning and implementation should be flexible and/or separated to match politic discussion and agenda.
3) Planning: In general, this was perceived as lack of a roadmap after identifying suitable actions to be done. Some examples include a lack of guideline-process on how conduct part of the pilot projects (road closure), difficulty to find convenient places to implement the measure or to test the pilot project. In some cases, not all potential problems were identified during the planning stage.
4) Institutional: The complexity of administrative structures slowdown a fast implementation of projects related to infrastructure, due to the long decision-making processes of institutions.
5) Positional: Some measures struggle to position their product in the market due to insufficient partner arrangements, or lack of involvement of stakeholders in the living lab and changes in ML over the project.

Other barriers included high segmentation of users, needs, preferences, and capacities. To overcome such barriers, on the political/strategic side, suggested actions included to approach key decision-makers and stakeholders at all stages of the measure, as well as to identify other potential partners that could support the measures.

To increase financial resources, teaming up with municipalities or SUMP as well as a good communication with stakeholders were also mentioned as potential actions. To overcome positional barriers, it was suggested to increase visibility by partnering with measures or similar projects, as well as to implement marketing strategies to promote the measure.

Drivers

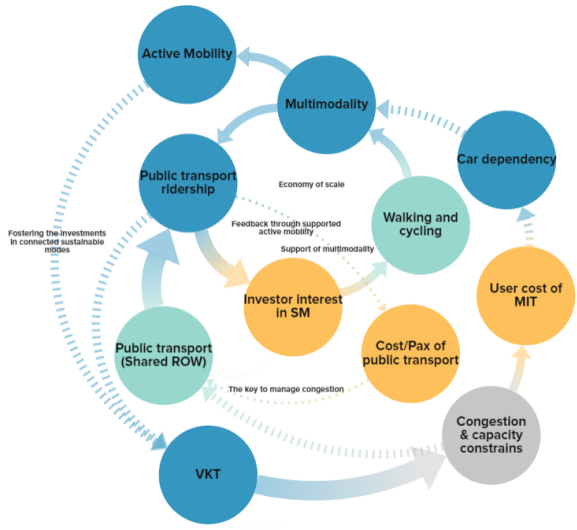
1) Organizational/Involvement: This driver was described as the good cohesion and high commitment within the teams of the organizations that coordinate the measures, as well as their leadership, and a clear segmentation of users.
2) Political and Strategic/Institutional: The measures are aligned with current policies and city strategies. They are meant to ease some cities problems that pose political pressure, since they depend on the public opinion. This translates in a favourable regulatory framework and environment towards the WP.
3) Positional: The measures support the goals of some SUMP and provide additional benefits to walking and cycling users. This creates a favourable attitude towards them and makes them more visible. In some cases, it has speeded up their progress (MAD 4.7).
4) Planning: Good ex-ante analysis, technical planning and involvement of users in the planning process.

Other drivers include financial drives, acknowledging the funding provided by CIVITAS and in some cases a good involvement and communication with stakeholders.

E.6 WP5 evaluation: Efficient and clean public transport solutions

For the conventions and color code used in the figures below, please refer to **Figure 14**.

Relevant variables and effects, reinforcing and counteracting feedbacks

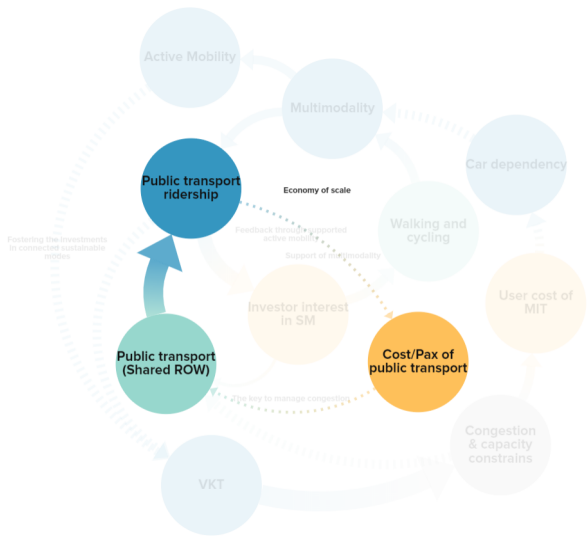


Efficient and clean public transport solutions system general overview. An interactive map is available at:

https://kumu.io/helbertlopez/ecc-wp5-public-transport

The walkthrough through the most important feedback cycles is available at:

https://helbertlopez.kumu.io/civitas-eccentric-wp5-efficient-and-clean-public-transport-solutions



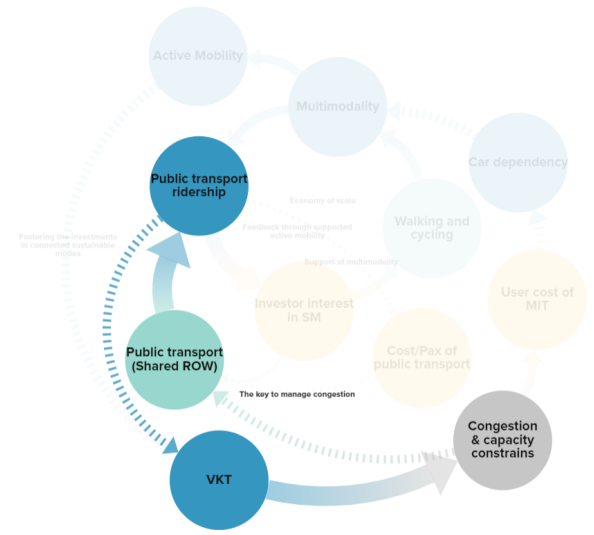
The success of PT is based on securing a customer base. Whenever ridership is large and permanent, PT can thrive. To ensure ridership, services have to align with the users' needs and demands in order to provide a high-quality system.

Users have several basic requirements when it comes to PT. Connections to their destinations (hopefully without switching vehicles), availability and low headways, uphold of the timetable, etc. These basic needs should be the priority for the service provider as they are taken for granted and the users make no compromise on them.

However, quality of PT is not only about basic needs, but also about changing and increasing expectations of the users. These range from comfortable seats, sufficient personal space, air conditioner, to modern-day standards such as wi-fi and real time information. PT operators have to address these expectations while keeping costs under control.

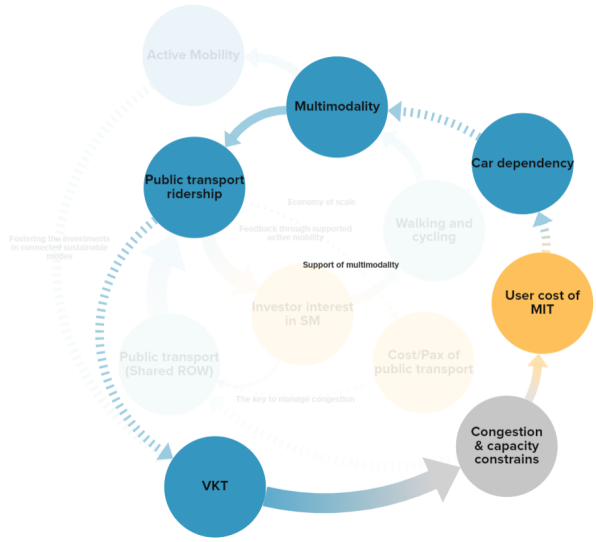
Securing PT ridership is an endless task, which is key to ensure not only the operation of the system but also its permanent improvement. Its benefits go beyond the mere financial sustainability of the system. The impact of PT extends to numerous aspects of the urban environment.

RUS 5.4. in ECCENTRIC has taken extraordinary actions to improve the service and secure users by providing night services also to peripheral districts. Measure RUS 5.3, even if it did not actually reorganize the PT network in Druzba, did manage to get a completely new transport scheme approved, offering a great opportunity for the transformation of mobility in the region.



A quality PT can effectively attract and maintain its ridership. From all the measures and policy fields addressed by ECCENTRIC, PT has by far the largest effect on VKT and therefore acts as an effective regulator of congestion and other capacity constraints existing in road and public spaces. Congested streets not only affect private vehicles, they also affect PT and are responsible for additional operational costs and low quality of the service (poor uphold of the timetable, delays, etc.). Sufficient and good PT has the potential to liberate space for other uses, including other modes of transport. Sufficient and good PT is in the interest of all users of the road.

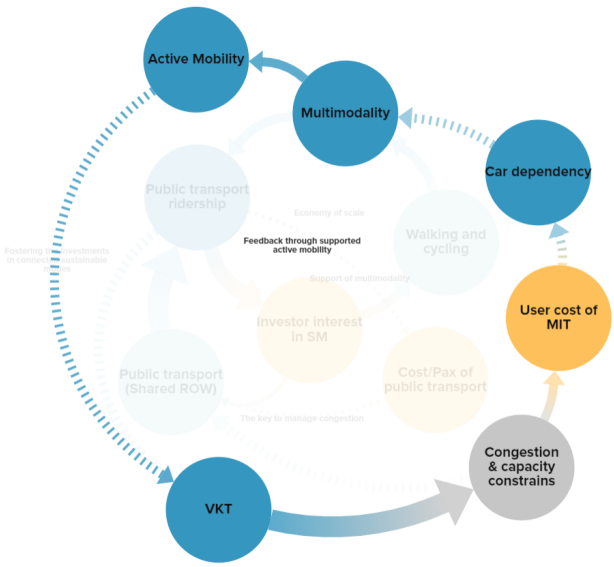
In ECCENTRIC, measure STO 5.2 examined the effects of relatively small measures on the speed and operation of the main bus lines, drawing interesting conclusions for many contexts. The more ambitious actions of MAD 5.1 were stopped by the decision-making process, but it is a testament to the demanding process that courageous PT implementations have to face.



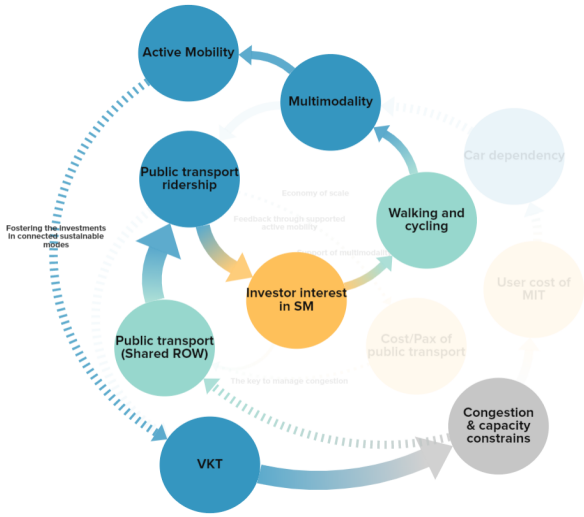
The regulatory aspect of PT on congestion (and in other forms of capacity constraints such as space available for parking) affects the users of Motorized Individual Transport (MIT), mainly by modifying the time components of their generalized costs.

Travel time, time spent looking for parking, walking times from parking to the final destination, etc. are components directly linked to PT because these two modes are the largest competitors for street space.

Inadequate PT generates a critical situation where none of the mobility options are beneficial. As soon as PT reaches a high level of quality, it turns into a real mobility option for everyone, and it is able to secure its ridership. As a consequence, space is liberated, congestion eases for all modes and flow conditions improve for all users of the road. No other mode of transport is capable of this.



PT reduces car dependency, and even if potential users do not become regular users of PT, it opens the door to a multimodal behaviour, with ramifications in other modes of transport, mainly in active modes. This again helps to decrease VKT and reinforce the regulatory effect of PT on congestion.



Enabling multimodality and making other modes more attractive is an incentive to the private sector to invest in public space, active and shared mobility, MaaS, etc. This is another reason to keep PT at the center of any sustainable mobility strategy. The analysis of other policy fields in ECCENTRIC shows the importance of having good PT to succeed. For instance, one of the indicators for the MaaS Readiness Index is the quality of PT and its integration with other modes. The analysis of Walking and Cycling demonstrates the immense importance of PT for active modes to succeed.

Measure TUR 5.5 in ECCENTRIC has proven the positive correlation between PT and other forms of sustainable mobility. Car-sharing companies are deploying their services in Turku after the efforts of ECCENTRIC, and the bike-sharing system is now operating after a rough start. Also, MUC 5.9 has reported a positive reception and delivered compelling lessons for more striking implementations in the future.

Barriers and drivers

Financing the high costs of electric and hybrid buses (up to twice the price of a diesel bus) and the fear of adopting a new and different technology (technological reliability, charging options) are the main barriers for implementing clean public transport. The existing regulatory framework, which in many cases does not take electric vehicles or shared mobility systems into account, also has difficulties with the integration of Public Transport with other modes. Finally, the reluctance of shared mobility operators to be integrated into a common digital mobility service app or mobility platform makes it difficult to offer a door-to-door mobility solution.

This needs to be addressed through a different political and administrative process in which the municipalities have to adopt the role of a leader to overcome these barriers, and upgrade the transport systems to make them more attractive and cleaner.

When new technologies and mobility services are included into the portfolio, the user should be in the focus, by assessing the potential impact on satisfaction levels, mobility behaviour, and ridership.

Below there are more points raised during the analysis of the process.

Barriers

1) Organizational and Institutional barriers: On the organizational part, since this WP works closely with infrastructure and PT services, changes in PT services, relocating or new building infrastructure were very time consuming, difficult to coordinate or to integrate the measure in the existing system, and in some cases it took longer than expected and became highly political when land/parking space was involved. Also, losing LEMs repeatedly threatened the flow of some measures. Institutional issues included lack of

clarity on who will give continuity to the measure after ECCENTRIC is done and difficulties to reach agreements when managing contracts between stakeholders. LEMs also reported ambiguities in responsibility and risk allocation across stakeholders and lack of competences for administrative and technical activities.

2) Problem-related: In general, many issues related to land conflicts were pointed out (i.e. ownership, allocation, competition with other modes, etc.). Issues like being dependent on the construction of an area to implement a measure (MUC 5.9), an unexpected time consuming scope on bikes/car sharing schemes, lack of methodologies for gathering information in PT passengers as well as limited resources to ensure parking regulations favours car sharing users were some examples.
3) Involvement & Communications/Finance: Difficulties engaging stakeholders, or the lack of involvement and awareness of potential users were mentioned as barriers.
4) Planning & cultural: Previous barriers made it hard to keep some measures on track, while others stated that the magnitude of the measure was better understood once the implementation started (RUS 5.4- initial number of units was too small). Conflicts between timelines (planning, implementation, etc.), legal framework and politic times were identified as a barrier that could hinder capital investment.

Technological barriers were also mentioned and were mostly related to the integration of new technology in the PT service (i.e. getting eTrikes in the market, installation issues, lack of charging interface, etc.). The lack of or unclear long-term finance for some measures might hinder the implementation. Some strategies suggested to tackle such barriers by promoting dialog between stakeholders during all stages of the measure to avoid organizational issues, launch large awareness campaign, considering room for flexibility on delays in the schedule and in changing the scope/re-structure the planning of the measure.

Drivers

1) Political and strategic: The measures are aligned with current policies and city strategies, and in some cases, they complement SUMPs, or existing related projects. As a result, a strong support from regional policy makers and keys stakeholders, as well as interest and commitment were identified in several measures.
2) Planning: Many measures reported satisfactory planning as a driver. Some examples of strategies that made it a driver included giving enough time for the planning stage, consider previous similar projects implemented, consult experts' opinions on the measure, and conduct an early market analysis.
3) Organizational: This driver was described as the good cohesion and high commitment within the teams of the organizations that coordinate the measures.
4) Involvement: Good communication between partners and strong organizational skills from key stakeholders.
5) Financial: The funding provided by CIVITAS allowed the measures to develop and in some cases (TUR 5.5), to increase the funding so the scope of the measure could expanse.

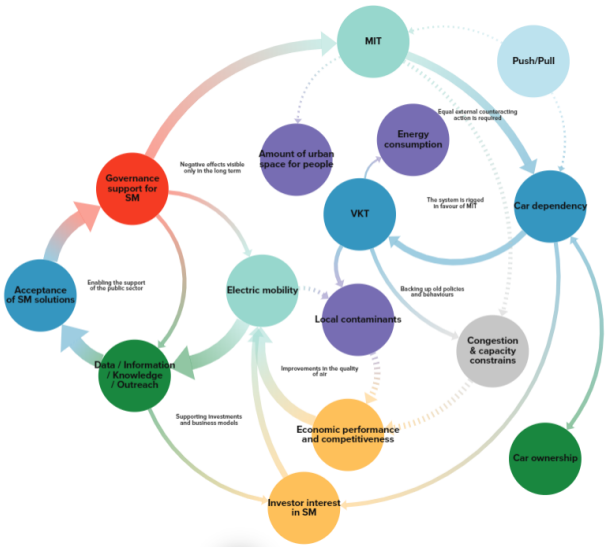
Other measures included positional, institutional and technological drivers. Important actions described by the measures to take advantage of such drivers were: maintaining a good communication and keeping the momentum of favourable conditions, use lessons learned

from previous projects, team up with experts on the field, align the measures to solve the problems of cities.

E.7 WP6 evaluation: Promoting the uptake of clean vehicles

For the conventions and color code used in the figures below, please refer to **Figure 14**.

Relevant variables and effects, reinforcing and counteracting feedbacks



Promoting the uptake of clean vehicles system general overview. An interactive map is available at:

https://kumu.io/helbertlopez/ecc-wp-6-ev-clean-vehicles

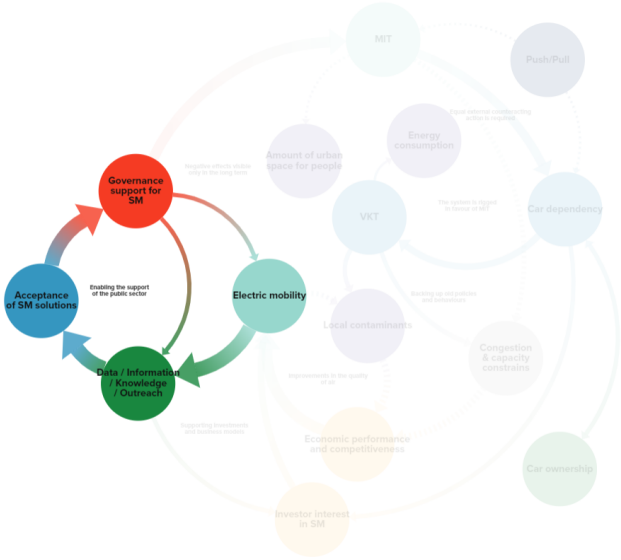
The walkthrough through the most important feedback cycles is available at:

https://helbertlopez.kumu.io/civitas-eccentric-wp6-promoting-the-uptake-of-clean-vehicles

The classic view of electric vehicles (EVs) holds up: EVs reduce the number of local pollutants in cities. Measure MAD 6.2 and STO 6.7 in Civitas ECCENTRIC have validated this assumption one more time.

Better air quality enables more competitive cities, although the impact of EVs can only be observed when their participation in the fleet becomes more significant. The same impact delay applies to cities with poor air quality. Economic performance is only affected after years of poor conditions. This explains why many cities remain attractive despite the prevailing environmental problems.

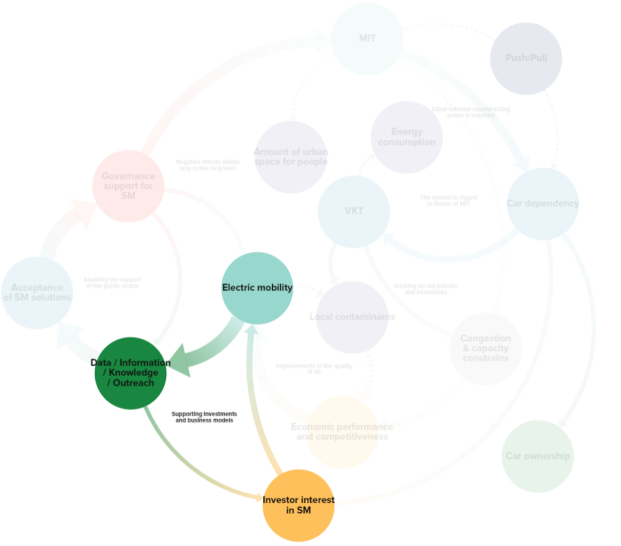
The high up-front costs of EVs for users and cities limit their widespread application to high-performing economies, even though the Total Cost of Ownership (TCO) is lower when environmental benefits are taken into account. That is why this relationship is so important.



All efforts to promote electromobility are paying off. Acceptance is growing, as is the governance support for EVs.

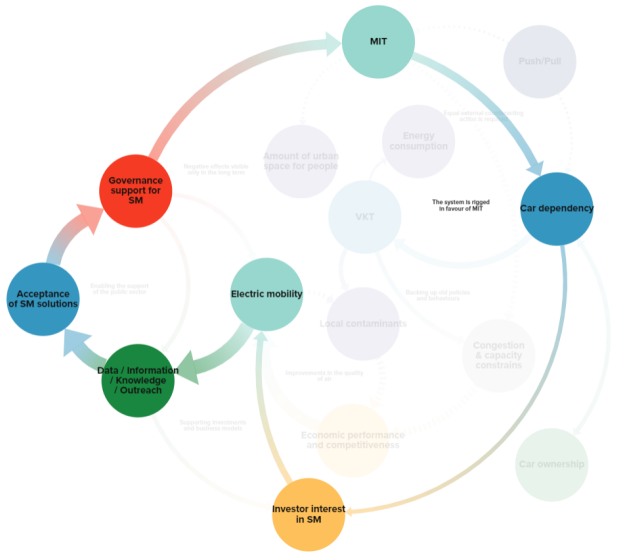
Civitas ECCENTRIC has implemented measures directly aimed at increasing the acceptance and information level of EVs. STO 6.1, MAD 6.2, and TUR 6.4 combined several forms of demonstration and testing of EVs together with information campaigns. STO 6.5, STO 6.6, and STO 6.7 tested different approaches to reach, inform and educate companies, communities, and public administrations about EVs and associated technologies, and to evaluate the feasibility of either acquiring EVs or installing charging points.

Nevertheless, the response and impact was mixed for ECCENTRIC measures. Sometimes positive and high, sometimes rather indifferent and low. The high associated costs and reliability (e.g. emergency services) of new technologies could be some of the external factors for the observed resistance. Civitas ECCENTRIC could not be conclusive on identifying more reasons behind this resistance, and further research is needed.



Information, tests, charging points and more EV units circulating on the streets are excellent advertising aimed at the end consumer, while simultaneously increasing the interest of the private sector to participate in the market.

Measure MAD 6.2 and STO 6.7 in Civitas ECCENTRIC were relatively successful in promoting the introduction of EVs and charging points. Once again, the reasons behind preventing a wider adoption of the promoted technologies remain uncertain, but it is possible to conclude that, in the long-term, efforts to promote EVs actually lead to more electric mobility in cities.



The efforts of the related Civitas ECCENTRIC measures made use of a system that is rigged to support motorized individual transport (MIT), regardless of the powertrain technology. Public policy can surely take advantage of this system to promote EVs.

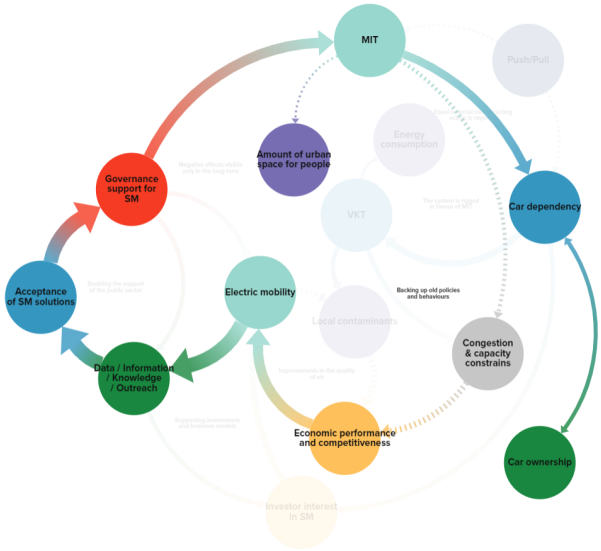
For instance, measure STO 6.1 identified how important it is for EV builders to target sizable markets. In fact, incompatibilities arose when customized performance specifications were required for specific tasks (policing, emergency medical services, SAR, etc.). It was neither feasible for producers to meet the specifications, nor for these groups to operate with the available EVs.

Nevertheless, electric mobility can take advantage of the widespread car dependency in cities, exploiting car manufacturers' preference for mass production.

Also, MAD 6.2 and TUR 6.4 demonstrated that leasing and other financing alternatives already available on the market, lead to high levels of satisfaction among the testers, and relatively low barriers for replacing vehicles in company fleets. These

measures were acting under the current market conditions, and did so with some level of success. It seems electric mobility has a paved road ahead.

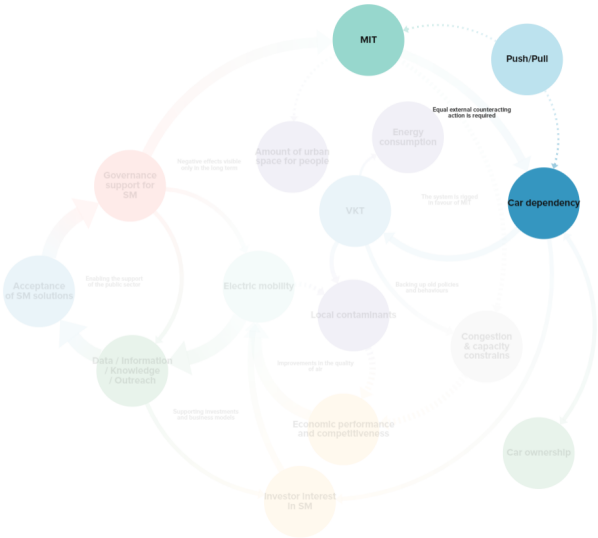
However, each action supporting electric mobility is an action supporting Motorized Individual Transport (MIT), and reinforces car dependency. This has deep implications for policy making in urban mobility.



EVs and their supporting infrastructure maintain the status quo. They continue to enable car dependency and make it even more difficult to reduce car dependency as EVs are used for longer periods of time than a normal car. Additional fixed infrastructure and longer periods for positive economic and socioeconomic indicators ensure this effect. A laissez-faire approach to EVs, or worse, a fixation on this technology can make moving away from MIT an even more difficult task than it is today.

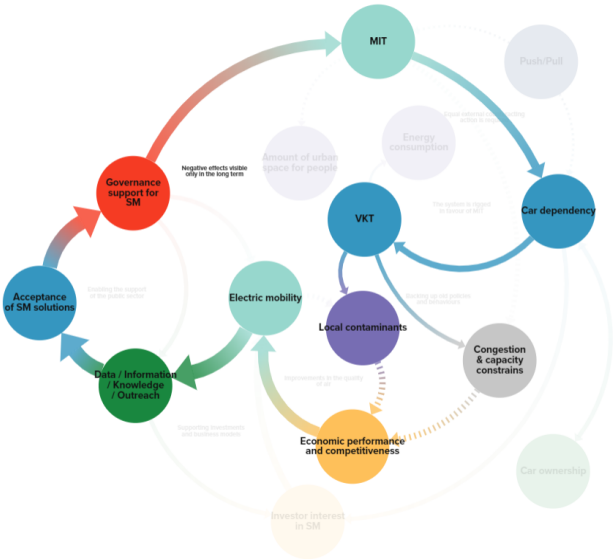
Every action supporting motorized individual transport and reinforcing car dependency is clearly a concurrent effort against other actions in favor of sustainable mobility.

With the perpetuation of MIT as the prevailing mode of transport in cities, the rise of electromobility will put the use of roads and public space at risk for decades to come.



Strong external action is needed to counteract a system that is already rigged in favor of MIT. The benefits of electric vehicles will be visible in the long term, but right now, efforts against MIT should prevail.

An overarching mobility strategy, prioritizing public transport and active mobility over any form of MIT should be the norm. If MIT is the only feasible option, EVs should be in focus.



Failing to counteract the appeal of MIT and the resulting (established) car dependency, will neutralize any benefits EVs can bring in favor of sustainable mobility.

Maintaining old policies and mobility behavior patterns prevents the reduction of vehicle kilometers traveled (VKT) and keeps traffic jams at least at the current level. Local pollution levels are not reduced either, as an immediate introduction of EVs and charging technologies is not expected and none of the Civitas ECCENTRIC measures prove otherwise.

From this perspective, the efforts and resources for EVs are not worthwhile unless they are accompanied by parallel and even stronger measures to counteract MIT, car dependency and VKT.

Failure to tackle local pollutants and traffic congestion today is likely to undermine long-term economic performance and competitiveness in the future and jeopardize EV technologies themselves.

Barriers and drivers

Electric vehicles appropriate for business uses (e.g. city employees, tradesmen and delivery services) are the key for a wide-scale fleet electrification. In the era of sharing economy, organizations and companies increasingly opt for leased or shared vehicles in order to maximize efficiency and reduce costs and administration. Therefore, the availability of EVs and services that go beyond ownership are important factors for the spread of EVs.

However, the purchase price of EVs still represents an obstacle in the choice of vehicle for many business customers and private individuals. Vehicle purchase bonuses, incentives for building a charging infrastructure or procurement criteria are examples of additional drivers for investments in e-mobility.

While home recharging is essential for the spread of EVs, the publicly accessible infrastructure serves as a tool to reduce the fear of range. The majority of EV users recharge overnight. Where people share facilities, such as in apartment buildings, services that allow billing and cost allocation make the investment transparent and easier to justify.

Despite a growing supply of EVs in all segments, the EVs available today may not provide a universal solution for all types of businesses and user groups. Reluctance towards EVs and new concepts is still prevalent among organizations and individuals. Connections of charging points to the electricity grid, different standards and compatibility issues between systems are the most common causes of delay in the deployment of charging infrastructure. Moreover, on-street infrastructure for opportunity charging is particularly challenging as it has a direct impact on public space, which is limited and contested in most cities around Europe. Parking ordinances, land-use regulations and urban design norms and rules come into play, making it a sensitive topic politically and technically.

Large-scale electrification requires a coordinated approach in which political commitment is the key to developing a long-term master plan for infrastructure charging, pilot project

support and innovative procurement. Political support is also important when new business models require new approaches and existing regulations need to be updated at a local or national level.

Barriers

1) Problem-related: Some aspects of the EV performance are not as competitive compared to combustion cars (i.e. range limit, availability of charging points/parking, and heating system competing with range in EV (STO 6.1, MUC 6.3, and TUR 6.4). LEMs reported that the WP is quite demanding in terms of labor and resource, there were also delays on the measure due to its interaction with the ACM project (MUC 6.3*, TUR 6.4 and STO 6.7. A rapidly changing landscape makes it difficult to keep citizens and prospected EV users up to date on increasing vehicle ranges and decreasing total cost of ownership (TCO).
2) Financial: In general, investment cost in EV is still too high compared to combustion engine vehicles (STO 6.1), and the charging stations are not as profitable (MAD 6.2), furthermore there are few incentives towards EV (MAD 6.2), which decreases its support from other stakeholders. Some projects have limited budget (STO 6.7) to advertise the measure.
3) Technological: EV struggle to meet some measure needs, especially range (MAD 6.2). Many failures were reported (range issues). STO 6.5 cannot fully describe in the portal those technologies that are not fully developed (off-road machinery).
4) Institutional/regulatory: Administrative procedures for the procurement of new vehicles do not favour EV (MAD 6.2). In some cases, laws/regulations on street and parking space do not consider the case for EV (STO 6.6), and neither its use in multiple ways (MUC 6.3). Since the project competes for street space, the lack of legal framework for clear allocation is an issue. Signposting regulations for charging streets/ on-street charging is complex and not easy for users to understand (STO 6.6). Regulation and land-use plans were in some cases incompatible with charging in public space, and some stakeholders had the “Don’t fix it if it is not broken” mentality.

Other barriers included a high demand for street space for other uses, which makes it harder to get spaces for EV charging stations and parking (STO 6.6), uncertainty on some available EV state-sponsored subsidies’ future (STO 6.7), and difficulties in promoting the EV (STO 6.7). Some actions taken to overcome such barriers included good communication with stakeholders to increase knowledge and understanding for EV and charging stations and look for strategies to fix technological barriers. Select an implementation area that favours EVs, highlight comparative advantages, provide information to users on best ways to use EV (fast charging), coordinate with stakeholders to keep material updated and advertised. Maintain a close cooperation with other related projects.

Drivers

1) Political/ strategic: There is a growing support from some local governments towards EV, and interest from other stakeholders to develop EV infrastructure and promote cleaner ways of transport. Measures took advantage of these factors to promote the uptake of electric vehicles (STO 6.1, MAD 6.2, MUC 6.3, and STO 6.6). There were also master

cross-sectorial plans and an existing momentum and impulse coming from different sides, which helps to effectively overcome technologic barriers.

2) Cultural: In general, people have a positive image of EV (STO 6.1, MAD 6.2, MUC 6.3, STO 6.6. and STO 6.7), and their demand is growing relatively quickly in terms of infrastructure, such as charging stations nearby users (STO 6.6 and STO 6.7). Car/sharing is increasing its popularity (MAD 6.2). This allows measure to promote the services of the WP in an easier way.
3) Involvement and Communication: The positive attitude towards EV has influenced its commitment and involvement of target populations and stakeholders (TUR 6.4 and STO 6.5), since it is also supported by some SUMPs and regulatory framework, the commitment also increases in some cases (MUC 6.3, 6.4 and STO 6.5).
4) Financial: The funding provided by CIVITAS was considered as a driver as well as the possibility to apply for additional grants to promote EV, such as State-sponsored funds (MUC 6.3 and STO 6.7). Economic incentives are effective although they impact other modes.
5) Technological: In terms of technology, EV and their charging infrastructure are mature enough to offer several options and can be combined with car-sharing strategies (MUC 6.3 and TUR 6.4).

High visibility and promotion from different sources were also identified as a driver. In order to make the most out of the drivers, measures suggested identifying potential subsidies and policies that can benefit the measure, maintain a close cooperation between partners and stakeholders, implement a good marketing strategy and open enough channels for feedback.

E.8 WP7 evaluation: Towards better and cleaner urban freight logistics

The volume of traffic caused by delivery services has increased rapidly with the success of e-commerce. Due to limited space in the city the higher the volume the higher the conflicts between delivery services and the different road users. The different tested logistic systems have proven to be a feasible solution to reduce the traffic volume of the delivery of goods and simultaneously have reduced the environmental impacts using cleaner freight vehicles. Temporary and flexible storage systems for last-mile deliveries located in the city boundaries such as micro depot boxes (MUC 7.3) or bigger consolidation centers (MAD 7.1) are a useful solution for inner-city deliveries since the deliveries trucks are kept outside the city center.

Nevertheless, the cost of the operation and maintenance of the storage systems strictly depend on the support of the different key stakeholders. It was identified that it is key for the success to involve all stakeholders from the planning and concept development phase. The consolidation systems must be adapted to the courier services' needs and embrace their pain points. Having explicit and transparent communication with the courier drivers about the functionalities of the consolidation centers is also fundamental, especially because it is a new concept. As well it is a way to assure their interest and support throughout the project lifetime.

Properly estimate the consolidation size according to the shipment volumes was an issue for MUC 7.3 and MAD 7.1, the savings cannot compensate the significant cost increase for shipments and the full capacity of the consolidation centers is not achieved, thus, making the measure not feasible for medium-term. A better fitting process for the connectivity and integration of the consolidation centre in the freight transport grid should have been implemented. Besides, for a higher number of shipments more stakeholders needed to be involved. Measure MUC 7.5 also highlighted the need for involvement of final customers in the deliveries pick-up points. Nonetheless, the demonstrations showed that, despite wide awareness and acceptance, attracting new customers was difficult.

Overall, the different measures have achieved a significant reduction in CO2, PM and NOx emissions attributed to the decrease of VKT of the heavy vehicles or the replacement of delivery trucks to hybrid trucks (MAD 7.1 and STO 7.4), the use of geofencing technology (STO 7.4), trucks that use locally produced biogas (TUR 7.7) or to cargo bikes (MUC 7.3). Besides, the measure TUR 7.7 apart of showcasing biogas use in heavy traffic has also served effectively in promoting biogas as a viable option for passenger cars by promoting the expansion of the biogas filling station network.

Further, the clean cargo delivery prototype developed in MAD 7.6 had an innovative technological approach with the potential of significantly expanding the current range of electric vehicles for urban delivery from a maximum growing weight of 3.5 tons to a gross vehicle mass of 12 tons. For its feasibility, it is adapted to the local logistics operation’s needs, and the measure is complemented with a commercial strategy and exploring replication options.

Measures with a different approach also managed to decrease emissions. STO 7.4 for example, reduced driving noise, shorten the travel time, reduced energy consumption, and therefore also decrease emissions by shifting the freight transport to night-delivery and using

modern sustainable hybrid vehicles that operate on diesel in the outskirts and uses a battery in the inner part of the city. However, it is also stated the need for a high involvement with the different stakeholders as well as fomenting the communication constantly.

Additionally, STO 7.2 opt to improve the efficiency of freight transport by investigating the possibility of using waterways transportation as an alternative to land-based transport in construction projects. Although noise and cost were not significantly different, the pilot project showed that more material can be transported on the water when using barges, thus, reducing emissions. It demonstrates the need for cities to know their quays and their connection with possible waterways and with the land infrastructure to assess waterways transportation. Besides, a strong relationship with stakeholders is highly important.

Barriers and drivers

Barriers

1) Planning: Lack of definition in the operations planned on the early stages (MUC 7.3), limited scope for consolidation experiences as the testing of the measure is limited to just one operator company (MAD 7.1), lack of a comprehensive analysis of options to use EV for operations and potential conflicts that could affect night delivery due to commercially available E-trucks (STO 7.4) were some examples mentioned in measures.
2) Institutional/legal: Difficulties to interact or comply with the relevant regulations due to the innovations proposed, e.g. MAD 7.6 faced new requirements for batteries type approvals and little input from the regulatory body in the prototype design. Some examples include challenges to comply with night noise levels established by the authority, the design and development of other measures (STO 7.2, and MAD7.1) were determined by political decisions
3) Involvement and Communication: Difficult coordination between private stakeholders and public bodies. Insufficient involvement and communication of key institutional actors, partners and other stakeholders.
4) Positional: On one hand, measures that share resources with other activities could diminish the identity and visibility of the measure, while those that are too isolated from common freight practices could experience a similar barrier. Others pointed out difficulties to break user habits to shift to new transport services offered by the measure.
5) Financial: Lack of finance or profitability was also mentioned as many times as positional. Some aspects of the EV performance are not as competitive compared to combustion cars (i.e. range limit, availability of charging points/parking, and heating system competing with range in EV”).

Barriers such as technological, spatial and problem-related were also mentioned. Some suggested actions included involving final users in the planning process of the measure, collect high-quality data on occurred conflicts and consider such data for future expansions, consider at least two different delivery companies during testing. Implement strategies to minimize noise disturbances during delivery (training, use certified equipment for silent deliveries, etc.). Improve communication between stakeholders and create public-private coordination mechanisms,

Drivers

1) Political &strategic: The measures are aligned with increasing interest to integrate urban freight in current policies and city strategies; in some cases, they complement SUMPs or long-term city goals that pose political pressure. This translates in a favourable input for regulatory framework, a strong support from regional policy makers and keys stakeholders, as well as interest and commitment towards the WP.
2) Business development and innovation: Urban freight is under a dramatic change to cope with more demanding requisites and disruptive changes in customer behaviour (e.g. e-commerce); relevant institutions, professional clusters and researchers related to some of the measures showed a positive response and keen interest towards these initiatives promoted by ECCENTRIC. Some cities have strong networks of professionals that facilitate the outreach to the relevant companies.
3) Technological: The demand of clean technology is being promoted by the strengthening of environmental requirements in urban areas which simultaneously are boosting and incentivising the development of innovative technologies that provide better performance in terms of emissions. Complementary, the technology employed in the measures brings comparative advantages and in some cases improvements on the services provided (i.e., less noise, faster services, etc.). Also, there is also a high emerging interest from research projects and industries towards to develop electric trucks, which promotes cooperation and synergies.
4) Financial: The funding provided by CIVITAS allowed to develop such measures in each city, it also increases the possibilities to access other sources of finance (i.e., city funds, state-sponsored funds).
5) Involvement & Communications: Some measures reported a good interaction and communication with other stakeholders and an opportunity to boost public-private dialogues, other pointed out that working along with other ECCENTRIC measures, mainly of WP 6, brings additional benefits.

F. Evaluation conclusions

This section differentiates between the actual conclusions of ECCENTRIC at project level, and the concussions of the evaluation process.

The former provided a very condensed assessment of the lessons learned. For more details, please refer to the other sections of this report, particularly to Section E: Cross-Site Evaluation.

F.1 Conclusions of ECCENTRIC comparative, integrated and cross-site evaluations

Better public transport, more active mobility, more accessible mobility options, etc. These are conclusions easily drawn from ECCENTRIC and other similar projects. Those conclusions hardly come as a surprise, but unveiling the actual entangling of the different modes, and highlighting the relevant aspects of the implementation strategy are the actual contributions of this project.

Below some general findings every city should observe when dealing with urban mobility in peripheral areas (although these can be as well applied to central areas as well)

1. Great public transport should be at the center of any mobility strategy, seamlessly integrated with walking and cycling. This is in everyone's interest, including drivers of private vehicles.

2. As other means become available in a given territory, a proper MaaS should step in and provide the user a one-stop-shop for an alternative mode to the private vehicle. This is key to break the limited convenience barrier characteristic of non-private modes of transport.

3. For groups with particular mobility needs, understand very well their mobility needs and provide highly tailored solutions.

4. Incentivize electric and clean mobility for private vehicles, always within the frame of an integrated view of mobility and the use of public space. Avoid lock-in effects at all cost.

5. Congestion is not to be solved, is to be managed. Cities can choose between clogged streets, busy public transport, or thousands of bikes on the street. Or even better, a mix of modes enabling multimodal behaviour and intermodal trip chains.

6. Public opinion regarding sustainable mobility is volatile, and even success can backfire. Citizens can question at any time the investments risking any leverage on politic support achieved beforehand. Keeping a positive acceptance is a permanent fight, and no less important than the measures themselves.

7. A reduction of car dependency is possible. If many other aspects align (which surely have nothing to do with the existence of other mobility options), maybe (and only maybe) some people will get rid of their cars.

8. Data, Information, Knowledge, and Outreach are all basic requirements to tip the governance's scales in favour of more sustainable modes of transport.

F.2 Conclusions of ECCENTRIC evaluation activities

This section discusses the conclusions about the actual evaluation process, and provides some recommendations for the evaluation of future Innovation and Research projects following the rationale of CIVITAS and similar programs.

These recommendations are also intended for the institutions rolling out these programmes, which need to reflect some of these points in the calls for proposals and grants awarded.

The recommendations were drafted in a joint effort with the Project Evaluation Managers of the sibling CIVITAS projects: DESTINATIONS and PORTIS and with the support of SATELLITE. A workshop involving 34 participants among INEA and DG MOVE representatives, decision-makers from the partnering cities, researchers, and consultants involved in evaluation processes facilitated the identification of 8 points that need to be addressed in order to make of evaluation an activity actively contributing to change the mind-set of stakeholders and the decision making process in the cities involved.

1. Understanding the process is as important as producing figures. Decision makers and private sector cannot make decisions based only on Key Performance Indicators (KPI). These figures are context dependent, and producing trustworthy values need significant amount of resources, normally not available for the evaluation in research and innovation projects. Process evaluation has to claim a relevant position in evaluation activities, and has to go beyond the reconstruction of the planning and implementation process, and the usual barriers and drivers. It needs to include the immediate context (politic, social, and economic) where the testing is taking place.

2. A multi-stakeholder perspective is essential. Evaluating the communication and feedback to and from each stakeholder contributes to paint a complete picture of the process. Understanding the effectiveness of the outreach efforts, the response, and the changes in the perception, position, and engagement of public entities, private companies and users makes part of a complete process evaluation. Tracking systematically and quantitatively figures related to the performance of stakeholders is a necessary addition to the process evaluation, and to the list of KPIs in the governance category.
   The benefits of a multi-stakeholder approach are twofold. Not only provides a better perspective of the process, but also ensures better communication and collaboration during the actual evaluation, unlocking the access to facts, knowledge and data which otherwise would remain hidden.

3. Less quantity, more quality for figures. Covering more categories of impacts does not make evaluation results more useful. Instead, focusing in raising certainty in the figures (statistical significance) and investing in direct measurements rather than estimating via modelling should produce data that is useful for planning and decision making processes.
   Weak datasets does not only not reflect the actual impact of the tested implementations, but also generates mistrusts in the evaluation, hurts upscaling and replications, and finally hinders innovations to have a permanent and prominent place in planning and decision-making processes.
   It is frequently assumed that decision makers need to assess one measure against another, compare their impacts, and decide how to move forward. That is true when there are multiple solutions for the same problem in the same context. It is not the case for innovation projects involving laboratory areas in different cities though. For these kind of projects, decision makers need context and a few, usable and defendable transparent figures not obscure indicators or thin CBA calculations.

4. Select and measure KPIs efficiently. The effect of pilots and demonstration measures often gets diluted into the “noise” and trends of the city. Very frequently, their impacts are also indivisible from the effects of other actions in the study area. The impact evaluation of single measures should focus on what they are directly connected with (usage, users/stakeholder perceptions, etc.).
   Retrieving figures connected to mobility behaviour and environmental impacts is important, but very costly if high granularity of data required. If there is not a direct impact of measures on these indicators, or achieving figures with statistical significance is too far fetch, these are to be measured or tracked at an aggregated level (neighbourhood, laboratory area, etc.), and always contextualized with reference data from the next available scale (city, region, etc.).
   If the fine level of detail is still required, be prepared to assign a significant amount of resources (6-7 significative figures) to generate baselines and ex-post figures with statistical significance for individual measures. In most cases though, local surveys of mobility behaviour and environmental figures, paired with context data of the city or regions should suffice.

5. Misalignments of evaluation scheduling and project life cycle hinder the evaluation results. Many impacts only materialize in the long run, an in the other hand, evaluation results become available only at the end of the project, leaving very little time to make these results useful for an effective dissemination.
   For some parts of the evaluation, it makes sense to enable enduring efforts to track changes in e.g. mobility behaviour, and to generate products that reach decision makers effectively.
   On top of that, reporting consumes a large part of the evaluation efforts, and ends up in documents of little if not negligible impact for upscaling and replication purposes. Relying in MERs, PERs, and conferences whose target audience are the same partners of the CIVITAS projects has not been the most effective strategy and needs to be improved. Time is needed to produce documents and organise dissemination activities that reach decision makers effectively.

6. Evaluation resources are always scarce, but particularly for small parties this is a problem. Gathering information, let alone developing and implementing comprehensive evaluations could have serious consequences for many small cities and partners with limited financial and skill resources. After taking part in a research and innovation project, many of these parties could have learned very valuable lessons on how to evaluate projects, but they might pay a high price as well. The high requirements of evaluation could hinder the collaboration in research and innovation projects after repeated negative experiences.

7. The purpose of evaluation (and research and innovation projects in general) is to motivate changes, innovation, and further testing. Hence the importance of shaping evaluation and its outputs towards those who can make those decisions. Dissemination efforts have to identify these target audiences and find more effective ways to reach them.
   Innovation is not only about new technologies, is not re-inventing the wheel. Is also trying known solutions in new environments, is finding new ways to collaborate in a society and demolish the existing barriers.

8. Innovation and Research projects tend to overestimate the impact of their actions, and the competitive nature of the bidding process creates an incentive to oversell the potential benefits of the proposed measures.

G. Annex

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A. Social Cost Benefit Analysis calculations

Below are the broken-down components of the SCBA for each measure. Importantly, commas were used to separate groups of thousands.

A.1.1 RUSE 2.6: Park and Ride in the peripheral district

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Project investment cost	-€ 48,099	€ 0	€ 0	€ 0	-€ 54,105	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	-€ 3,207	€ 0	€ 0	€ 0	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240	-€ 240
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 51,306**	**€ 0**	**€ 0**	**€ 0**	**-€ 54,345**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**	**-€ 240**
Direct Benefits																										
Revenues from demand increase	€ 166,744	€ 0	€ 0	€ 0	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480	€ 12,480
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Energy savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
External Benefits																										
CO2 emissions savings	€ 49,417	€ 0	€ 0	€ 0	€ 2,281	€ 2,395	€ 2,515	€ 2,640	€ 2,773	€ 2,911	€ 3,057	€ 3,210	€ 3,370	€ 3,539	€ 3,715	€ 3,901	€ 4,096	€ 4,301	€ 4,516	€ 4,742	€ 4,979	€ 5,228	€ 5,489	€ 5,764	€ 6,052	€ 6,355
NOX emissions savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
PM emissions savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 216,161**	**€ 0**	**€ 0**	**€ 0**	**€ 14,761**	**€ 14,875**	**€ 14,995**	**€ 15,120**	**€ 15,253**	**€ 15,391**	**€ 15,537**	**€ 15,690**	**€ 15,850**	**€ 16,019**	**€ 16,195**	**€ 16,381**	**€ 16,576**	**€ 16,781**	**€ 16,996**	**€ 17,222**	**€ 17,459**	**€ 17,708**	**€ 17,969**	**€ 18,244**	**€ 18,532**	**€ 18,835**
ENPV / Net benefits	**€ 164,855**	**€ 0**	**€ 0**	**€ 0**	**-€ 39,584**	**€ 14,635**	**€ 14,755**	**€ 14,880**	**€ 15,013**	**€ 15,151**	**€ 15,297**	**€ 15,450**	**€ 15,610**	**€ 15,779**	**€ 15,955**	**€ 16,141**	**€ 16,336**	**€ 16,541**	**€ 16,756**	**€ 16,982**	**€ 17,219**	**€ 17,468**	**€ 17,729**	**€ 18,004**	**€ 18,292**	**€ 18,595**
B/C Ratio	**4.213**																									

Table 1. SCBA of measure RUSE 2.6

A discount rate of 4% was applied
The Climate Change valuation applied was of €90 per tonne of CO2 emission saved.
To monetize the demand the reported value of €1,30 per service was applied

A.1.2 MUC 2.7: Community information and participation portal

Category	Total	2016	2017	2018	2019	2020	2021
Project investment cost	-€ 18,276	€ 0	-€ 19,007	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 18,276**	**€ 0**	**-€ 19,007**	**€ 0**	**€ 0**	**€ 0**	**€ 0**
			Direct Benefits				
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Energy savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
			External Benefits				
CO2 emissions savings	€ 49,399	€ 0	€ 0	€ 0	€ 26,370	€ 15,480	€ 15,480
NOX emissions savings	€ 62,596	€ 0	€ 0	€ 0	€ 34,419	€ 19,084	€ 19,084
PM emissions savings	€ 9,030	€ 0	€ 0	€ 0	€ 6,041	€ 2,183	€ 2,183
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 121,025**	**€ 0**	**€ 0**	**€ 0**	**€ 66,829**	**€ 36,746**	**€ 36,746**
ENPV / Net benefits	**€ 102,749**	**€ 0**	**-€ 19,007**	**€ 0**	**€ 66,829**	**€ 36,746**	**€ 36,746**
B/C Ratio	**6.622**						

Table 2. SCBA of measure MUC 2.7

(1) A discount rate of 4% was applied

The Climate Change valuation applied was of €90 per tonne of CO2 emission saved, €17,039 per tonne of NOx emission saved and € 220,461 per tonne of PM emission saved.

A.1.3 MUC 2.9a: Neighbourhood oriented marketing of sustainable multimodal mobility services: Direct and dialogue marketing

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023
Project investment cost	-€ 41,580	€ 0	€ 0	€ 0	-€ 46,772	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	-€ 330,791	€ 0	€ 0	€ 0	-€ 81,293	-€ 81,293	-€ 79,667	-€ 79,699	-€ 79,699
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 372,371**	**€ 0**	**€ 0**	**€ 0**	**-€ 128,064**	**-€ 81,293**	**-€ 79,667**	**-€ 79,699**	**-€ 79,699**
				Direct Benefits					
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Energy savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
				External Benefits					
CO2 emissions savings	€ 1,143,486	€ 0	€ 0	€ 0	€ 295,740	€ 272,880	€ 272,880	€ 272,880	€ 272,880
NOX emissions savings	€ 534,661	€ 0	€ 0	€ 0	€ 153,010	€ 123,533	€ 123,533	€ 123,533	€ 123,533
PM emissions savings	€ 75,057	€ 0	€ 0	€ 0	€ 24,026	€ 16,640	€ 16,640	€ 16,640	€ 16,640
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 1,753,204**	**€ 0**	**€ 0**	**€ 0**	**€ 472,776**	**€ 413,053**	**€ 413,053**	**€ 413,053**	**€ 413,053**
ENPV / Net benefits	**€ 1,380,833**	**€ 0**	**€ 0**	**€ 0**	**€ 344,712**	**€ 331,760**	**€ 333,386**	**€ 333,354**	**€ 333,354**
B/C Ratio	**4.708**								

Table 3. SCBA of measure MUC 2.9a

(1) A discount rate of 4% was applied

The Climate Change valuation applied was of €90 per tonne of CO2 emission saved, €17,039 per tonne of NOx emission saved and € 220,461 per tonne of PM emission saved.

A.1.4 STO 5.2: Speed up core bus routes

Category	Total	2016	2017	2018	2019
Project investment cost	-€ 699,260	€ 0	€ 0	-€ 756,319	€ 0
Operation and Maintenance cost	€ 0	€ 0	€ 0	€ 0	€ 0
Replacement cost					
Residual value of investment	€ 0	€ 0			
Total economic costs	**-€ 699,260**	**€ 0**	**€ 0**	**-€ 756,319**	**€ 0**
Direct Benefits					
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 450,145	€ 0	€ 162,209	€ 162,209	€ 162,209
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	-	-	-	-	-
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 0	€ 0	€ 0	€ 0	€ 0
Energy savings	€ 0	€ 0	€ 0	€ 0	€ 0
External Benefits					
CO2 emissions savings	-	-	-	-	-
NOX emissions savings	-	-	-	-	-
PM emissions savings	-	-	-	-	-
Noise	-	-	-	-	-
Safety	-	-	-	-	-
Total Economic benefit	**€ 450,145**	**€ 0**	**€ 162,209**	**€ 162,209**	**€ 162,209**
ENPV / Net benefits	**-€ 249,114**	**€ 0**	**€ 162,209**	**-€ 594,110**	**€ 162,209**
B/C Ratio	**-0.356**				

Table 4. SCBA of Measure STO 5.2

(1) A discount rate of 4% was applied

A.1.5 TUR 5.7: Introduction of electric public transport

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Project investment cost	-€ 600,000	-€ 600,000	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 600,000**	**-€ 600,000**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**
						Direct Benefits									
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 6,190	€ 0	-€ 1,031	-€ 1,031	€ 619	€ 681	€ 749	€ 823	€ 906	€ 996	€ 1,096	€ 1,206	€ 1,326	€ 1,459	€ 1,605
Energy savings	€ 57,894	€ 0	€ 3,851	€ 3,851	€ 3,851	€ 4,236	€ 4,659	€ 5,125	€ 5,638	€ 6,201	€ 6,821	€ 7,504	€ 8,254	€ 9,079	€ 9,987
						External Benefits									
CO2 emissions savings	€ 21,502	€ 0	€ 1,430	€ 1,430	€ 1,430	€ 1,573	€ 1,730	€ 1,903	€ 2,094	€ 2,303	€ 2,533	€ 2,787	€ 3,065	€ 3,372	€ 3,709
NOX emissions savings	€ 724	€ 48	€ 0	€ 48	€ 48	€ 53	€ 58	€ 64	€ 70	€ 77	€ 85	€ 94	€ 103	€ 113	€ 125
PM emissions savings	€ 800	€ 0	€ 53	€ 53	€ 53	€ 59	€ 64	€ 71	€ 78	€ 86	€ 94	€ 104	€ 114	€ 126	€ 138
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 87,110**	**€ 48**	**€ 4,303**	**€ 4,351**	**€ 6,001**	**€ 6,601**	**€ 7,261**	**€ 7,987**	**€ 8,785**	**€ 9,664**	**€ 10,630**	**€ 11,693**	**€ 12,863**	**€ 14,149**	**€ 15,564**
ENPV / Net benefits	**-€ 512,890**	**-€ 599,952**	**€ 4,303**	**€ 4,351**	**€ 6,001**	**€ 6,601**	**€ 7,261**	**€ 7,987**	**€ 8,785**	**€ 9,664**	**€ 10,630**	**€ 11,693**	**€ 12,863**	**€ 14,149**	**€ 15,564**
B/C Ratio	**0.15**														

Table 5. SCBA of measure TUR 5.7

(1) A discount rate of 4% was applied
(2) The Climate Change valuation applied was of € 90 per tonne of CO2 emission saved, € 3,328 per tonne of NOx emission saved and € 191,237 per tonne of PM emission saved.
(3) Electricity cost factor of € 0.016555556 /MJ was used to calculate the energy savings

A.1.6 MAD 5.8: Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistic in urban centres

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Project investment cost	-€ 566,252	€ 0	€ 0	€ 0	-€ 636,957	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 566,252**	**€ 0**	**€ 0**	**€ 0**	**-€ 636,957**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**
Direct Benefits															
Revenues from demand increase	€ 1,072,490	€ 0	€ 0	€ 0	€ 132,414	€ 132,414	€ 132,414	€ 132,414	€ 132,414	€ 132,414	€ 132,414	€ 132,414	€ 132,414	€ 132,414	€ 132,414
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 1,323,620	€ 0	€ 0	€ 0	€ 163,419	€ 163,419	€ 163,419	€ 163,419	€ 163,419	€ 163,419	€ 163,419	€ 163,419	€ 163,419	€ 163,419	€ 163,419
Energy savings	€ 436,741	€ 0	€ 0	€ 0	€ 53,922	€ 53,922	€ 53,922	€ 53,922	€ 53,922	€ 53,922	€ 53,922	€ 53,922	€ 53,922	€ 53,922	€ 53,922
External Benefits															
CO2 emissions savings	€ 106,720	€ 0	€ 0	€ 0	€ 13,176	€ 13,176	€ 13,176	€ 13,176	€ 13,176	€ 13,176	€ 13,176	€ 13,176	€ 13,176	€ 13,176	€ 13,176
NOX emissions savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
PM emissions savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 2,939,571**	**€ 0**	**€ 0**	**€ 0**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**
ENPV / Net benefits	**€ 2,373,319**	**€ 0**	**€ 0**	**€ 0**	**-€ 274,027**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**	**€ 362,930**
B/C Ratio	**5.191**														

Table 6. SCBA of measure MAD 5.8

(1) A discount rate of 4% was applied
(2) The Climate Change valuation applied was of €90 per tonne of CO2 emission saved
(3) For the valuation of revenue by a shift in demand a factor of 1.1712 €/passenger was used
(4) Electricity cost factor of € 0.028055556/MJ was used to calculate the energy savings

A.1.7 MUC 5.9: Intermodal (E-) mobility stations

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Project investment cost	-€ 266,294	€ 0	€ 0	-€ 288,024	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	-€ 169,894	€ 0	€ 0	-€ 22,633	-€ 22,633	-€ 22,633	-€ 22,633	-€ 13,855	-€ 13,162	-€ 12,504	-€ 11,879	-€ 11,285	-€ 10,721	-€ 10,185	-€ 9,675	-€ 9,192	-€ 8,732	-€ 8,295	-€ 7,881	-€ 7,487	-€ 7,112
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 436,188**	**€ 0**	**€ 0**	**-€ 310,657**	**-€ 22,633**	**-€ 22,633**	**-€ 22,633**	**-€ 13,855**	**-€ 13,162**	**-€ 12,504**	**-€ 11,879**	**-€ 11,285**	**-€ 10,721**	**-€ 10,185**	**-€ 9,675**	**-€ 9,192**	**-€ 8,732**	**-€ 8,295**	**-€ 7,881**	**-€ 7,487**	**-€ 7,112**
									Direct Benefits												
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Energy savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
									External Benefits												
CO2 emissions savings	-€ 583,012	€ 0	€ 0	€ 0	-€ 30,780	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640	-€ 53,640
NOX emissions savings	€ 279,186	€ 0	€ 0	€ 0	€ 51,969	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491	€ 22,491
PM emissions savings	€ 23,973	€ 0	€ 0	€ 0	€ 8,933	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548	€ 1,548
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**-€ 279,853**	**€ 0**	**€ 0**	**€ 0**	**€ 30,122**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**	**-€ 29,601**
ENPV / Net benefits	**-€ 716,041**	**€ 0**	**€ 0**	**-€ 310,657**	**€ 7,489**	**-€ 52,234**	**-€ 52,234**	**-€ 43,456**	**-€ 42,763**	**-€ 42,105**	**-€ 41,480**	**-€ 40,886**	**-€ 40,322**	**-€ 39,786**	**-€ 39,276**	**-€ 38,793**	**-€ 38,333**	**-€ 37,896**	**-€ 37,482**	**-€ 37,088**	**-€ 36,713**
B/C Ratio	**-0.642**																				

Table 7.SCBA of measure MUC 5.9

(1) A discount rate of 4% was applied

The Climate Change valuation applied was of €90 per tonne of CO2 emission saved, €17,039 per tonne of NOx emission saved and € 220,461 per tonne of PM emission saved.

A.1.8 STO 6.1: Offering EV-test fleets to selected target groups

Category	Total	2016	2017	2018	2019
Project investment cost	-€ 13,013	€ 0	€ 0	€ 9,993	-€ 25,030
Operation and Maintenance cost	€ 0	€ 0	€ 0	€ 0	€ 0
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 13,013**	**€ 0**	**€ 0**	**€ 9,993**	**-€ 25,030**
		Direct Benefits			
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 895	€ 0	€ 0	€ 494	€ 494
Energy savings	€ 234	€ 0	€ 0	€ 129	€ 129
		External Benefits			
CO2 emissions savings	€ 55	€ 0	€ 0	€ 30	€ 30
NOX emissions savings	€ 1	€ 0	€ 0	€ 0	€ 0
PM emissions savings	€ 0	€ 0	€ 0	€ 0	€ 0
Noise	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 1,184**	**€ 0**	**€ 0**	**€ 653**	**€ 653**
ENPV / Net benefits	**-€ 11,828**	**€ 0**	**€ 0**	**€ 10,646**	**-€ 24,377**
B/C Ratio	**0.09**				

Table 8. SCBA of measure STO 6.1

(1) A discount rate of 4% was applied
(2) The Climate Change valuation applied was of €90 per tonne of CO2 emission saved, €5,247 per tonne of NOx emission saved and € 197,450 per tonne of PM emission saved.

(3) An electrcity cost of €/MJ 0.017861111 was utilized

A.1.9 MAD 6.2: Test fleets, policy incentives and campaigns for the uptake of electric vehicles

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Project investment cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	-€ 88,723	€ 0	€ 0	€ 0	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954	-€ 10,954
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 88,723**	**€ 0**	**€ 0**	**€ 0**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**	**-€ 10,954**
Direct Benefits																					
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Energy savings	€ 136,126	€ 0	€ 0	€ 0	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807	€ 16,807
External Benefits																					
CO2 emissions savings	€ 31,850	€ 0	€ 0	€ 0	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932	€ 3,932
NOX emissions savings	€ 1,251	€ 0	€ 0	€ 0	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111	€ 111
PM emissions savings	€ 15,373	€ 0	€ 0	€ 0	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367	€ 1,367
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 179,947**	**€ 0**	**€ 0**	**€ 0**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**	**€ 22,217**
ENPV / Net benefits	**€ 91,225**	**€ 0**	**€ 0**	**€ 0**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**	**€ 11,263**
B/C Ratio	**2.03**																				

Table 9. SCBA of measure MAD 6.2

(1) A discount rate of 4% was applied
(2) The Climate Change valuation applied was of €90 per tonne of CO2 emission saved, €4,964 per tonne of NOx emission saved and € 195,252 per tonne of PM emission saved.
(3) Electricity cost factor of € 0.028055556/MJ was used to calculate the energy savings

A.1.10 TUR 6.4: Electrification of c city's fleet and promotion of electro-mobility

Category	Total	2016	2017	2018	2019
Project investment cost	-€ 26,184	€ 0	€ 0	-€ 28,321	€ 0
Operation and Maintenance cost	-€ 50,549	€ 0	€ 0	€ 0	-€ 56,861
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 76,734**	**€ 0**	**€ 0**	**-€ 28,321**	**-€ 56,861**
		Direct Benefits			
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 21	€ 0	€ 0	€ 0	€ 23
Operation cost savings	€ 0	€ 0			
Energy savings	€ 21	€ 0	€ 0	€ 0	€ 23
		External Benefits			
CO2 emissions savings	€ 6	€ 0	€ 0	€ 0	€ 6
NOX emissions savings	€ 0	€ 0	€ 0	€ 0	€ 0
PM emissions savings	€ 0	€ 0	€ 0	€ 0	€ 0
Noise	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 47**	**€ 0**	**€ 0**	**€ 0**	**€ 52**
ENPV / Net benefits	**-€ 76,687**	**€ 0**	**€ 0**	**-€ 28,321**	**-€ 56,809**
B/C Ratio	**0.00061**				

Table 10. SCBA of measure TUR 6.4

(1) A discount rate of 4% was applied
(2) The Climate Change valuation applied was of € 90 per tonne of CO2 emission saved, € 3,328 per tonne of NOx emission saved and € 191,237 per tonne of PM emission saved.
(3) Electricity cost factor of € 0.016555556 /MJ was used to calculate the energy savings

A.1.11 MAD 7.1: Consolidation centre with EVs and local regulations for clean urban freight logistics

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Project investment cost	-€ 51,775	€ 0	€ 0	-€ 56,000	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	-€ 282,492	€ 0	€ 0	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304	-€ 31,304
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0													
Total economic costs	**-€ 334,267**	**€ 0**	**€ 0**	**-€ 87,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**	**-€ 31,304**
						Direct Benefits									
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 0	€ 0													
Energy savings	€ 15,216	€ 0	€ 0	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686	€ 1,686
						External Benefits									
CO2 emissions savings	€ 3,639	€ 0	€ 0	€ 403	€ 403	€ 403	€ 403	€ 403	€ 403	€ 403	€ 403	€ 403	€ 403	€ 403	€ 403
NOX emissions savings	€ 197	€ 0	€ 0	€ 22	€ 22	€ 22	€ 22	€ 22	€ 22	€ 22	€ 22	€ 22	€ 22	€ 22	€ 22
PM emissions savings	€ 2,643	€ 0	€ 0	€ 293	€ 293	€ 293	€ 293	€ 293	€ 293	€ 293	€ 293	€ 293	€ 293	€ 293	€ 293
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 21,694**	**€ 0**	**€ 0**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**	**€ 2,404**
ENPV / Net benefits	**-€ 312,573**	**€ 0**	**€ 0**	**-€ 84,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**	**-€ 28,900**
B/C Ratio	**0.06**														

Table 11. SCBA of measure MAD 7.1

(1) A discount rate of 4% was applied
(2) The Climate Change valuation applied was of €90 per tonne of CO2 emission saved, €4,964 per tonne of NOx emission saved and € 195,252 per tonne of PM emission saved.
(3) Electricity cost factor of € 0.028055556/MJ was used to calculate the energy savings

A.1.12 TUR 7.7: Introducing biogas for urban freight logistics

Category	Total	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Project investment cost	-€ 118,681	€ 0	€ 0	€ 0	-€ 133,500	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation and Maintenance cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Replacement cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Residual value of investment	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total economic costs	**-€ 118,681**	**€ 0**	**€ 0**	**€ 0**	**-€ 133,500**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**	**€ 0**
						Direct Benefits									
Revenues from demand increase	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Travel time savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Congestion and reliability	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Revenues from relative travel cost	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Fuel savings	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Operation cost savings	€ 108,644	€ 0	€ 22,278	€ 22,278	€ 8,226	€ 8,226	€ 8,226	€ 8,226	€ 8,226	€ 8,226	€ 8,226	€ 8,226	€ 8,226	€ 8,226	€ 8,226
Energy savings	€ 40,757	€ 0	€ 13,324	€ 13,324	€ 1,929	€ 1,929	€ 1,929	€ 1,929	€ 1,929	€ 1,929	€ 1,929	€ 1,929	€ 1,929	€ 1,929	€ 1,929
						External Benefits									
CO2 emissions savings	€ 70,982	€ 0	€ 7,449	€ 7,449	€ 7,029	€ 7,029	€ 7,029	€ 7,029	€ 7,029	€ 7,029	€ 7,029	€ 7,029	€ 7,029	€ 7,029	€ 7,029
NOX emissions savings	€ 2,101	€ 0	€ 155	€ 222	€ 216	€ 216	€ 216	€ 216	€ 216	€ 216	€ 216	€ 216	€ 216	€ 216	€ 216
PM emissions savings	€ 1,885	€ 0	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189	€ 189
Noise	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Safety	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0	€ 0
Total Economic benefit	**€ 224,369**	**€ 0**	**€ 43,395**	**€ 43,461**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**
ENPV / Net benefits	**€ 105,688**	**€ 0**	**€ 43,395**	**€ 43,461**	**-€ 115,911**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**	**€ 17,589**
B/C Ratio	**1.89**														

Table 12. SCBA of measure TUR 7.7

(1) A discount rate of 4% was applied
(2) The Climate Change valuation applied was of € 90 per tonne of CO2 emission saved, € 3,328 per tonne of NOx emission saved and € 191,237 per tonne of PM emission saved.
(3) Electricity cost factor of € 0.016555556 /MJ was used to calculate the energy savings

B. Site evaluation reference information

B.1 Madrid

B.1.1 General characteristics of the laboratory area

The following section gives a brief general description of the City of Madrid and a more detailed overview of its Living Lab, the districts of *Puente de Vallecas* and *Villa de Vallecas*.

Madrid makes part of the Region of Madrid, one of the seventeen Spanish Autonomous Communities. The municipality had 3,266,126 inhabitants in 2018, distributed over a territory of 606 km^2. This equals to a 49% share of the regional population (6,507,184 inhabitants in 2018). Whereas the residents in the municipality have hardly grown in the last 50 years (in 1970, the population in the municipality was already close to today's, 3,120,941), the regional population has significantly increased (by 25% since 2000). Despite this regional growth, population density remains substantially higher in the municipality: 5,232 inh./km2 compared to 804 inh./km2 of the regional area. This value increases to some 7,915 inh./km^2 if the extensive natural- and almost unpopulated- areas within the municipality are not included.

The Region of Madrid is traditionally divided into four areas for the analysis of mobility figures:

- Inner districts (Madrid Almendra): inside the M-30 orbital motorway (15% of the regional population).
- Urban periphery (Madrid Periferia): districts of the municipality outside the orbital motorway. (34% of the regional population).
- Metropolitan ring (Corona Metropolitana): municipalities closer to the capital, with significant daily commuting flows. (44% of the regional population).
- Regional ring (Corona Regional). Municipalities more distant from the capital. (7% of the regional population).

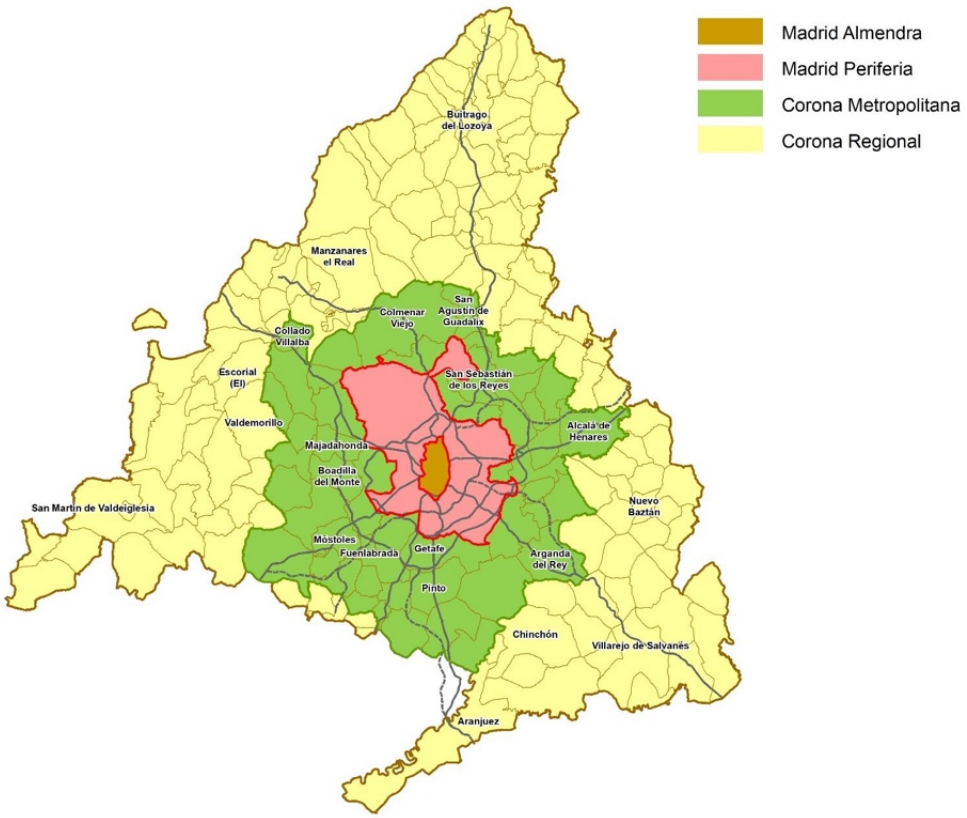

Figure 1. Territorial distribution by transport rings. Source: EDM2018 (CRTM).

In accordance with the last household mobility survey (Consorcio Regional de Transportes de Madrid, CRTM, 2018), 15.8 million trips are made in the region on an average working day, of which 5.4 million are made on foot and 10.4 million in mechanized modes.

The share of walking trips compared to mechanized trips has ranged from 37.2% in 1996, to 31.1% in 2004 and 34.0% in 2018. The share of bicycle trips has always been very low, growing in the last years to reach just 0.5% of total trips (71,936) in 2018.

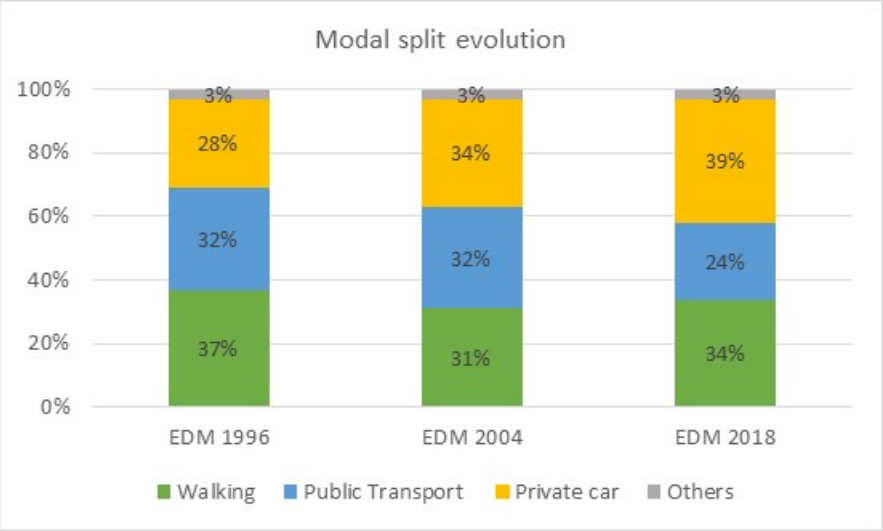

Figure 2. Modal split evolution (trips in an average labour day). Source: EDM2018 (CRTM).

The share of public transport remained constant at around 32% between 1996 and 2004 (household surveys EDM96 and EDM04 but has significantly decreased in the 2018 survey (EDM18), to just 24.3% of the trips. The use of private cars is slowly but steadily increasing, from 28% in 1996 to 34% in 2004 and 39% in 2018, consistent with the population and employment growth outside the city of Madrid and with urban development policies encouraging low-density urbanism and car-friendly road network design.

Mobility trends can be better described considering each of the four metropolitan subareas mentioned above. As a rule, the share of sustainable transport modes (on foot and by public transport) decrease as we move away from the central area. The opposite occurs with private car, that increases considerably in the most external rings, from 20% in the central area to 56% in the regional ring.

	Walking	Public Transport	Private car	Others
Madrid Almendra	40.0%	34,8%	20,3%	4,9%
Madrid Periferia	32,2%	32,8%	32,4%	2,6%
Metropolitan Ring	34.0%	16,4%	47,7%	1,9%
Regional ring	29,6%	10,8%	56,2%	3,4%
Region of Madrid	34%	24,3%	39%	2,7%

Table 13. Modal split by metropolitan subareas. Source: EDM2018 (CRTM).

The motorization rate, with a 2018 average value of 429 cars per 1,000 inhabitants, follows a similar trend, increasing with the distance to the centre (Figure below). Furthermore, in Madrid Almendra, 37.6% of households do not own any car, whereas in the Regional Crown this percentage decreases to just 19.9% of households.

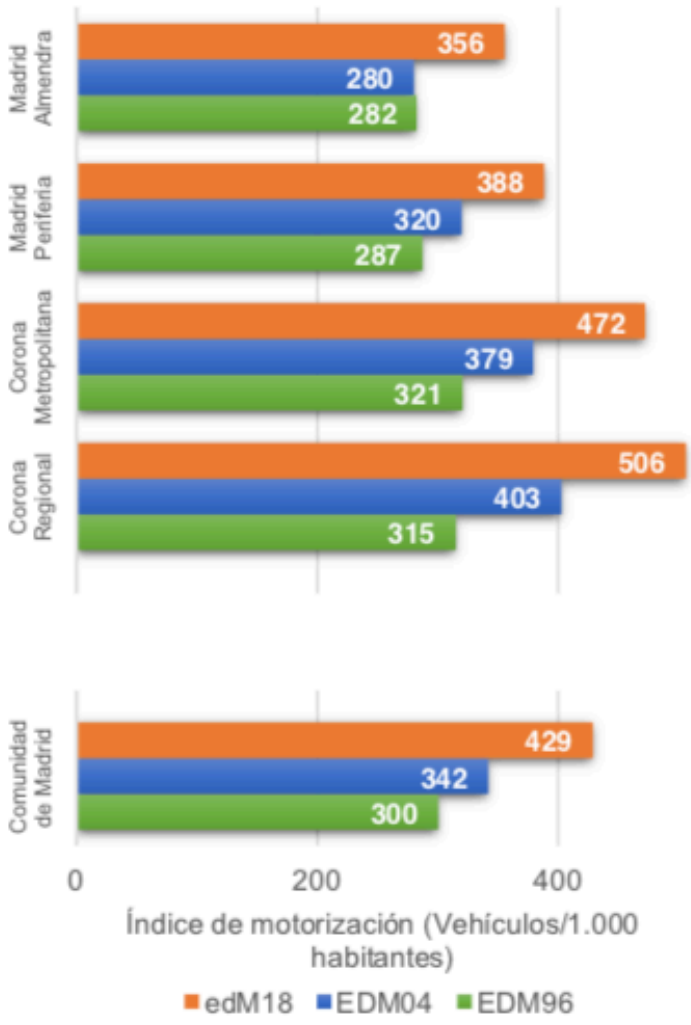

Figure 3. Motorization rate. Source: EDM2018 (CRTM).

The ECCENTRIC Madrid Living Lab

The Living Lab area includes two south-eastern districts of the municipality: Puente de Vallecas and Villa de Vallecas, with 328,000 inhabitants. Both districts are part of the urban periphery area mentioned above, and are included in the inner zone (zone A) of the public transport fare system (see figure above).

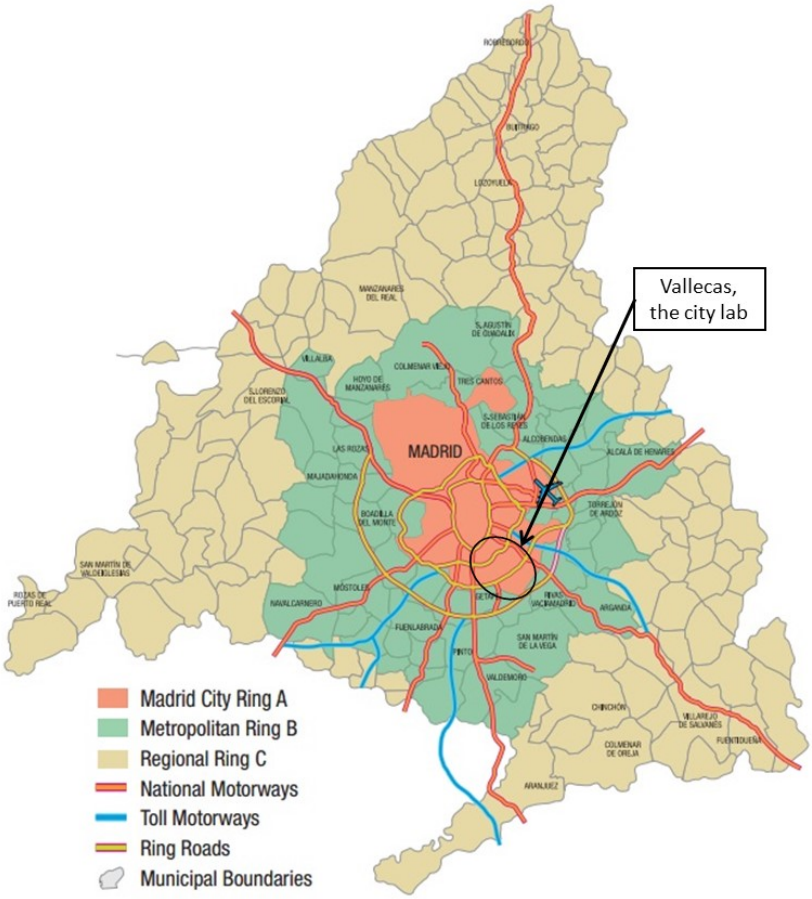

Figure 4. Vallecas: The laboratory area.

For administrative purposes, the municipality of Madrid divides its districts into neighbourhoods; the main characteristics of those included in the Living Lab are summarized in the table below. Most of them lost population in the last decade. The only exception is the neighbourhood *Casco histórico de Vallecas*, which almost doubled its population (+96.7% or 38,218 inhabitants), due to a huge new development known as *Ensanche de Vallecas*, one of the main new residential areas planned by the 1997 Land Use Plan, and progressively built up since the mid-2000s, based on medium-to-low densities and a car-oriented urban design,

	Population 1/1/2016	2016-2006 Growth	% of City Lab Population.
Total 13. PUENTE DE VALLECAS	227,195	-6.7%	69.0%
13.1 Entrevías	33,521	-10.4%	10.2%
13.2.San Diego	38,953	-7.6%	11.8%
13.3 Palomeras Bajas	39,245	-6.4%	11.9%
13.4.Palomeras Sureste	41,888	-1.9%	12.7%
13.5 Portazgo	27,647	-8.5%	8.4%
13.6 Numancia	45,941	-6.5%	13.9%
Total 18. VILLA DE VALLECAS	102,140	52.8%	31.0%
18.1 Casco Histórico de Vallecas	77,752	96.7%	23.6%
18.2 Santa Eugenia	24,388	-10.7%	7.4%
TOTAL Both districts (13+18)	329,335	6.1%	100.0%

Table 14. Population in the demonstration area. Source: Subdirección General de Estadística. Ayuntamiento de Madrid

Compared to the central districts of Madrid, the Living Lab population is younger, and shows lower income and employment rates. The percentage of elderly is 18,6% in Puente de Vallecas and only 12% in Villa de Vallecas, far lower than the city 27.7% average. 19.2% of the population in Villa de Vallecas is under 15 years old, higher than the value in Puente de Vallecas and the city average (14.5%).

Due to the loss of traditional industrial activity in Puente de Vallecas, and the significant population increase in *Ensanche*, there is a significant imbalance between jobs and residents. The ratio of jobs to employed population is just 37% in Puente de Vallecas and 67% in Villa de Vallecas. The average income is also lower than the city average: 25% lower in Puente de Vallecas and 9% in Villa de Vallecas.

The urban structure is characterized by dense and consolidated neighbourhoods, particularly in Puente de Vallecas, which includes the densest neighbourhoods: San Diego (364 inhab/ha) and Numancia, Palomeras Bajas and Portazgo, with more than 220 inhab/ha. The neighbourhoods built after 1970 have still high, but much lower densities, such as Palomeras

Sureste (135 inh/ha), Santa Eugenia (116 inh/ha). The neighbourhood of Centro histórico de Vallecas has an unusual low density (just 16 inh/ha) due to the extensive undeveloped areas it includes, as well as to the still half-developed new Ensanche de Vallecas area.

There is a sharp contrast among the street pattern of the older neighbourhoods (narrow streets following the own trails and roads), the neat patterns of the planned neighbourhoods of Santa Eugenia and Palomeras, and the over-dimensioned, wide and straight avenues in Ensanche.

This mainly affects non-motorized mobility. The sensorial experience of walking through the traditional neighbourhoods is totally different from the pedestrian experience in Ensanche, characterized by the excess of road space dedicated to car, lack of social interaction and urban vitality.

Figure 5. Historical center of Villa de Vallecas. Author: unknow.

Figure 6. Ensanche de Vallecas. Author: Alvaro García.

Regarding the urban context, the Living Lab is separated from the city centre by the M-30 ring road, and is surrounded and intersected by large road and rail metropolitan infrastructures, providing high metropolitan accessibility but, at the same time, creating major barriers for local mobility and blighting in the vicinity. The two districts in the Living Lab, Puente de Vallecas and Villa de Vallecas are separated by the M 40 ring road; the other two ring roads, M-45 and M-50, go through the Eastern part of Villa de Vallecas.

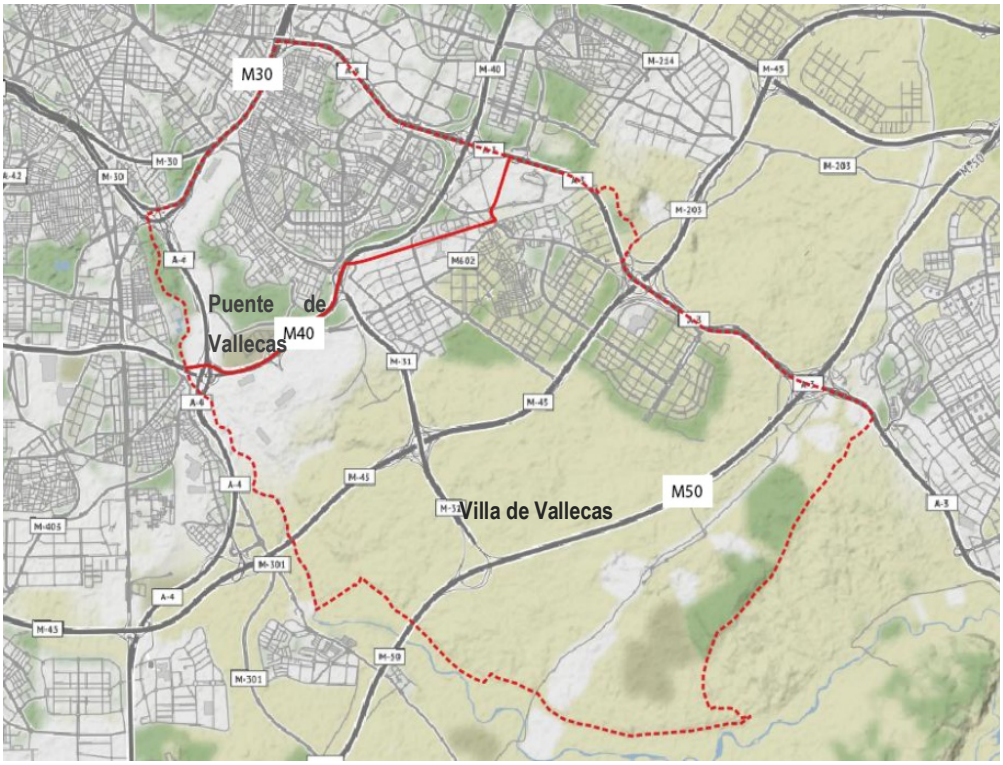

Figure 7. The urban structure.

Mobility figures

The Table below summarizes the main mobility characteristics in Puente de Vallecas and Villa de Vallecas, in accordance with the last household mobility survey (EDM 2018):

	TOTAL	Rest of Region	Metropol. Ring	Madrid Municipality	Puente de Vallecas	Villa de Vallecas
Population 14-80	5,375,334	337,878	2,396,227	2,370,261	186,845	84,122
Cars/household	1.08	1.44	1.28	0.88	0.73	1.06
% pop. travelling	89%	87%	90%	89%	84%	89%
Trips/person	2.59	2.49	2.58	2.64	2.27	2.52
% NMM	34.4%	29.7%	34.5%	35.3%	35.2%	25.8%
% PT	24.3%	10.3%	16.0%	33.5%	36.0%	30.9%
% Car	39.0%	56.7%	48.0%	28.4%	26.9%	41.3%

Table 15. Key mobility indicators in Madrid and in the demonstration area. Source: CRTM (2019).

Based on the table above, a number of mobility traits can be highlighted about the mobility patterns in the demonstration area:

First of all, the relative homogeneity within the whole region in the percentage of the population travelling on a working day, although with a lower percentage in the case of Puente de Vallecas (84% compared to the 89% regional and municipal average value).

The number of trips per person also shows significant homogeneity within the whole region, although with the residents in the capital city showing higher mobility than the rest (2.64 trps per day compared to a regional average of 2.59. Mobility demand in Puente de Vallecas and Villa de Vallecas is lower than both, the capital and the regional average, particularly in the first case (2.27 trips per person per day in Puente de Vallecas and 2.52 in Villa de Vallecas).

The share of private car use is significantly lower in the capital (28.4%) than the region average (39.0%). There is a sharp contrast between the lower car use in Puente de Vallecas (26.9%), below the regional and capital average) and Villa de Vallecas (41.3%, well above the regional

average). This can be explained by the influence of the residents in the car-oriented new neighbourhood of *Ensanche*[1].

As mentioned before, in general terms, the neighbourhoods in Puente de Vallecas district have high population densities, employment opportunities and a greater presence of proximity services. In the case of Villa de Vallecas, this is only the case of the Casco Histórico neighbourhood, whereas the rest of the district has lower urban densities, a strong residential character, and car-dominated street design, discouraging travelling on foot or by bicycle. This explains the low percentage of non-motorized trips in Villa de Vallecas (25.8%), compared to Puente de Vallecas (35.2%) the capital average (35.3%).

The picture is similar in what refers to the use of public transport, with Puente de Vallecas showing a higher modal share than the capital's average (36.0% versus 33.5%) while public transport use in Villa de Vallecas is lower (30.9%).

The number of cars per household is also lower in Puente de Vallecas (0.73) than the capital's average (0.88), whereas in Villa de Vallecas (1.06) is higher and close to the regional average (1.08).

B.1.2 External actions influencing the performance of ECCENTRIC

The following table summarizes the actions, policies and marketing aspects affecting positively or negatively the impacts discussed in the impact evaluation section.

Topics	Opportunities	Threats
Urban regulation	In 2011 the central government passed legislation requiring all cities receiving grants from the national budget in support of public transport to develop a sustainable urban mobility plan. In Madrid, the regional and the capital's governments produced their (Sustainable Urban Mobility Plan) SUMPs in 2013 and 2014 respectively (Plan estratégico de movilidad sostenible de la Comunidad de Madrid 2013-2025 and Plan de movilidad sostenible de Madrid (SUMP 2014-2020). The Regional Transport Strategy (Plan Estratégico de Movilidad Sostenible de la Comunidad de Madrid, 2013-2025) prepared by CRTM in 2013 identified	The current Madrid Land Use Plan, approved in 1997, has led to a dramatic urban sprawl, creating new neighbourhoods on the outskirts with medium to low densities, limited mix of uses and a car-oriented road structure. Around 17.11% of the municipality's surface was classified as suitable for urban development, encouraging real estate speculation and an increase in land prices. With a predominantly residential structure, the new neighbourhoods are heavily

[1] In January 2019 the population of the District was distributed among neighbourhoods as follows: 36% in Casco Histórico, 22% in Santa Eugenia and 42% in the new neighbourhood Ensanche.

	more than 200 actions, grouped into twelve packages: (1) traffic management and roads; (2) private car measures; (3) public transport measures; (4) urban quality; (5) mobility management; (6) universal accessibility (PRMs) (7) logistics and freight distribution; (8) land use-transport integration; (9) environmental quality and energy efficiency; (10) company mobility plans; (11) safety; (12) monitoring, reporting and evaluation. The Madrid Sustainable Mobility Plan (SUMP-2014) considers that mobility conditions in the urban periphery have lacked proper attention from the municipality, as actions have focused in the central districts. It is structured along eight strategic lines: management of Freight delivery, car demand management, public transport improvement, non-motorised modes, safety and public space quality, air quality, monitoring, review and participation. Other plans that provided a supportive regulatory environment for ECCENTRIC were the Madrid Traffic Safety Plan (2012-2020), that seeks to achieve a 50% reduction in the number of annual fatalities compared to the 2010 baseline; and the Air Quality and Climate Change Plan for the City of Madrid (Plan A), approved in 2017 (with a shortterm-2020- and long term- 2030-horizon).	dependent on the central area, inducing a large number of trips made by public transport or private car. The low density and monofunctionality of Ensanche de Vallecas is one of these new developments. Its urban design discourages walking and cycling, even for short distances. The Loyola de Palacios school, for example, located in newest residential area within Vallecas, was the only ECCENTRIC school that increased the car share during the evaluation period, while it decreased in all the other schools.
Public transport and road infrastructure	The Regional Transport Strategy (Plan Estratégico de Movilidad Sostenible de la Comunidad de Madrid, 2013-2025) included the expansion of the network, of segregated bus lanes in the urban periphery, in order to improve the operation of existing or new transversal	The strong investment made since 1995 in public transport focused on metro network expansion, but was neutralized by the expansion in the road network capacity, justified on the grounds of respect to “the free choice of transport mode

	bus lines interconnecting the peripheral districts. Amid many other important measures, the local SUMP-2014 proposes the definition of a main pedestrian network and the expansion of the bike network; the extension of some metro lines (L9, L10b, L11, L13); additional traffic enforcement with a focus on peripheral districts; improvement of freight delivery with better control of reserved areas and expansion of night delivery solutions; promotion of clean fleets (municipality, taxis, buses) and support and promotion of company mobility plans. Finally, the City Council and the EMT Management Board launched a fleet renewal programme, started in early 2016. Although focusing on CNG buses, it also foster the introduction of a few hybrid and full-electric bus models.	by citizens", and operationalized with the concept of finding a "balance" between public and private transport. In particular, car mobility was facilitated by two additional orbital motorways (M-45-50), the redevelopment of M-30, increasing its capacity in the south and east sections, and four new radial motorways.
Promotion of electric mobility	In June 2018, the national government removed some existing regulatory barriers to the expansion of charging points, facilitating a quicker deployment of the public charging network. An array of measures is under implementation somce then, including the expansion of the public network, public grants for private charging points and regulatory incentives. At term, is also planned making compulsory the installation of charging points at private collective parking lots. The engagement of the municipality has also increased, linked to the approval of the Air Quality Plan (Plan A), and has materialised in the search for agreements with private companies to establish public charging point, and the approval of some additional incentives such as free parking and access to low emission zones (Madrid Central);	There are various management and market threats to the expansion of e-mobility: 1. Limited offer of electric vehicle models in the market and difficulties in covering certain uses (heavy vehicles, long distances); 2. Low vehicle autonomy; 3. Insufficient coverage of the charging network. 4. Technical and administrative hurdles to deploy the charging network in municipal facilities: increase power is needed, and maintenance costs of the charging network are high. 5. Development of the public charging network is expensive, complicated and requires time. Some companies do not offer

	Operating lease was identified as a convenient option by the local government to overcome administrative barriers, to limit the technological uncertainties about maintenance costs and reliability, and to cope with the higher up-front costs; The general public is more sensitive to car-emissions since the dieselgate scandal. It Is also more interested in alternative options such as car-sharing services and micromobility solutions. Currently, 10 private companies are offering electric car and moto sharing services in the city; Manufacturers have announced to put in the market new models of electrical vehicles, tripling the current offer by 2025. A higher supply will probably reduce the price of the vehicles. The difference in the Electric Vehicle (EV) leasing cost compared with an Internal combustion Engine (ICE) car is expected to decrease in the coming years, as leasing companies get better knowledge of the risks associated to electric cars, and their purchase price decreases.	products with sufficiently tested quality. 6. Complex administrative procedures within the municipality for the procurement of new car models, such as electric ones. 7. The difference in the EV leasing cost compared with an ICE car is significant (45%), only partially compensated by lower operating and maintenance costs and fuel savings. 8. The electric mobility business model is not well developed by private companies. For many of them, any additional upfront cost is a critical barrier.
Walking and cycling	Alignment with the general planning and policy framework in Madrid. Cycling and pedestrian-friendly actions were supported by the new Air Quality Plan and by the new mobility regulations, passed by the City Council in 2017 and 2018 respectively, as well as with the revision and update of the Urban Mobility Plan (Madrid 360), started in 2018. This alignment was critical to gain the support of some decision makers. Favourable environment for the improvement of the public space in Vallecas: the municipality has been	Due to high endebtment to finance expensive infrastructure projects in the past decade, the municipality was forced to comply with strict budgeting rules reducing its investment capacity These budgetary limitations have jeopardise actions to improve public spaces, such as segregated bicycle paths, expansion of sidewalks, installation of urban furniture…

	developing during 2018 its city-wide regeneration plan Madrid Regenera (MADRE) including actions in the two districts included in the city lab. It is worth highlighting the Itinerario Miradores project. It provides a high-quality pedestrian and cyclist corridor in Puente de Vallecas, connecting the major green areas in this district, while improving north-south connectivity for pedestrians and cyclists in the area.	critical for measures MAD 4.6, MAD 4.7 and MAD 4.1.
Clean Urban Logistic	The approval of the Air Quality Plan (2017), the new Low Emission Zone (LEZ) (Madrid Central, 2018) and the new Local Regulation on Sustainable Mobility (2018) have significantly raised the interest of logistics operators on electric vehicles for urban freight distribution in Madrid. Measures 7.1 and 7.6 has been developed in a context of increasing interest in electro-mobility (e.g. the annual Fair "Vehículo Electrico Madrid (VEM)" in 2018 and 2019, were the electric prototype ad its commercial potential were presented and discussed with a wide array of stakeholders).	Lack of clients interested in clean logistics: the environmental aspect is not as valuable as price and speed of delivery.

Table 16. Opportunities and Threats

B.1.3 Baseline

The baseline shows the context of Madrid and the Living Lab at the beginning of ECCENTRIC, taking the 2017 scenario as a reference. It brings a reflection on how the indicators would behave if ECCENTRIC had not existed (Business as Usual - BaU), considering only the external factors. The analysis will be structured through the most recurrent indicators used in the evaluation of the measures.

Awareness, Acceptance, and Satisfaction

These indicators assess the attitude of users and other key stakeholders regarding each measure. During the project's implementation period (2016-2020) there have been some relevant policy actions at the city level, such as the approval of the new Air Quality Plan (Plan

A), the approval and implementation of the Municipal Ordinance on Sustainable Mobility and the approval and implementation of a Low-Emission Zone (LEZ) covering the central districts, it is unlikely that these general actions could have changed the awareness, acceptance and satisfaction of stakeholders towards the specific measures included in ECCENTRIC for two reasons: in the first place, because the existence of a favourable normative and policy framework creates a promising scenario, but it is not enough to actually carry out these actions without the mobilization of the necessary resources and the involvement of the relevant stakeholders. In the second place, because peripheral districts are not usually considered as a primary objective for the implementation of new policies, which tend to focus on central districts and better-off neighbourhoods: without a project oriented to the specific needs of peripheral areas, it would be unlikely that the districts of Vallecas would receive so much public attention and resources.

Therefore, without the existence of ECCENTRIC, these indicators would probably not have showed any significant changes.

Modal shift

Despite the efforts made by the different spheres of government to promote sustainable modes of transport, the general trend in the last three mobility surveys is the progressive growth in the share of trips made by private cars. The rate of motorization has also grown continuously and, depending on the evolution of the Covid pandemic, the use of private cars could further increase in future.

On the other hand, walking and cycling have not changed significantly in recent decades. The share of walking trips has ranged from 37.2% in 1996, 31.1% in 2004 and 34.0% in 2018. Bicycle trips account for only 0.5% of total trips (71,936). The figure below summarizes the modal split in 1996, 2004 and 2018.

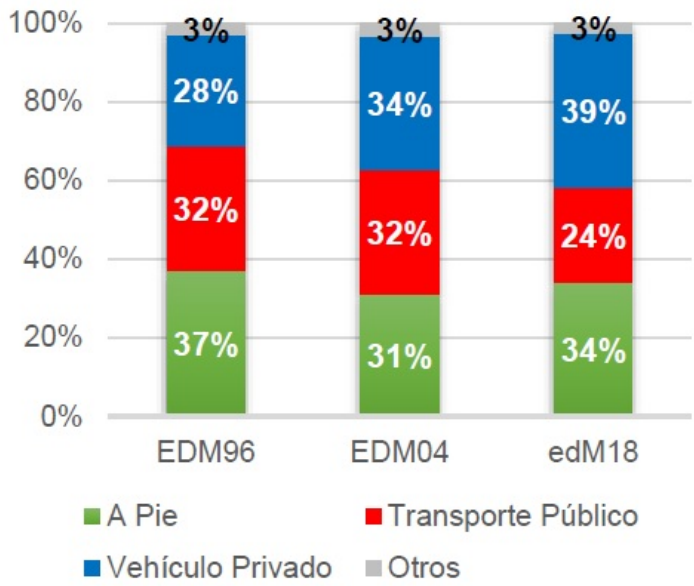

Figure 8. Modal split in the region of Madrid in 1996, 2004 and 2018

Modal split varies significantly in accordance with the area of residence (central districts - peripheral rings, metropolitan ring, outer region), as illustrated in the figure below. The modal

share of private car trips has traditionally been below the regional average in peripheral districts (like Vallecas), although following the same trend to increase with time. Accordingly, it is unlikely that a modal shift would occur at the Living Lab without the interventions promoted by ECCENTRIC.

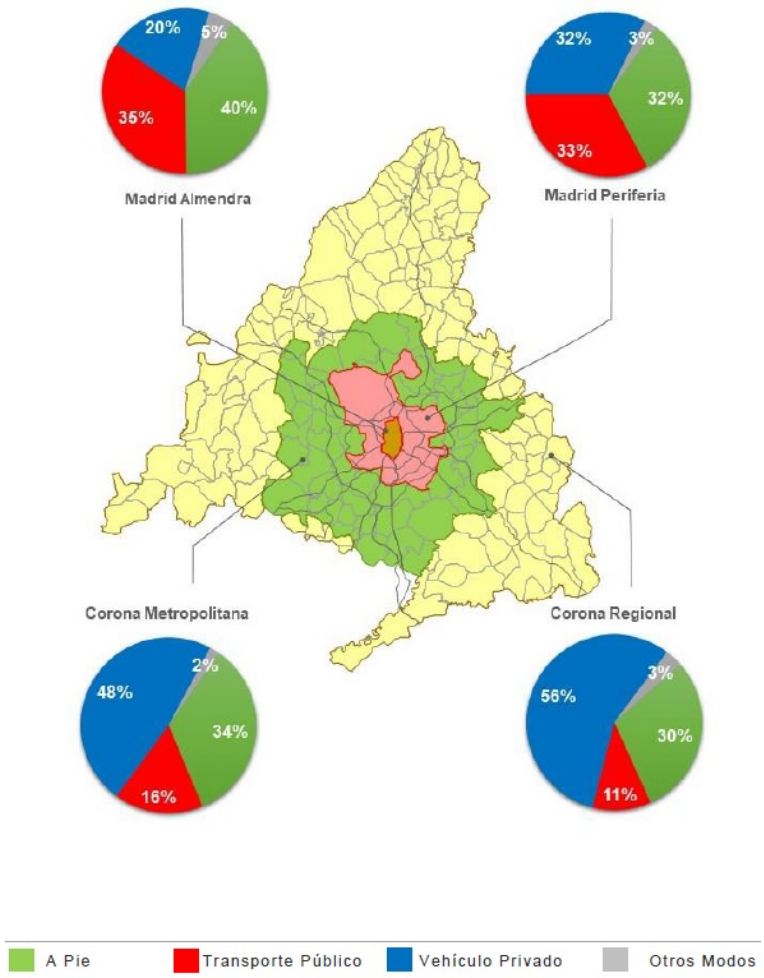

Figure 9. Evolution of the daily trips between different rings.

CO_2, NO_X, PM emissions / Average energy savings

Substantial reductions in energy use and pollutant emissions can be obtained through the replacement of internal combustion vehicles by hybrid or electric vehicles. Modal shift towards public transport or non-motorised modes (walking and cycling) also has significant effects.

It is likely that the municipality would switch from conventional vehicles to hybrids or electric vehicles in the short to medium term, even if the project did not exist. It can be said, however, that ECCENTRIC catalysed this process. By testing these vehicles under real conditions, the municipality was able to have more tools to evaluate future purchases or leasing of vehicles.

On the other hand, the savings in emissions and costs resulting from the modal shift, promoted mainly by measures MAD 2.8, Mad 4.6 and MAD 4.7, would probably not occur without the existence of ECCENTRIC; since it contradicts the trend observed throughout the Region of Madrid.

Economy (costs)

The results of the project pointed to significant cost savings obtained through fuel economy, energy use, vehicle maintenance and GHG emission abatement cost. In the measures MAD 5.8 and MAD 6.2, operating costs have been cut by more than half. However, these savings are still insufficient to fully compensate the higher purchase (or leasing) costs of these vehicles.

In the medium term, this economy could happen even if the project did not exist, since the replacement of combustion vehicles by electric vehicles is a strong current trend in local public administration. However, as mentioned above, ECCENTRIC has catalysed this process by monitoring these vehicles, and measuring the cost savings with maintenance, energy, etc.

B.2 Munich

B.2.1 General characteristics of the laboratory area

The following section gives a brief general description of the City of Munich and a more elaborated view into the Living Lab which consists of an area called Domagkpark and Parkstadt Schwabing.

Munich, the capital of the State of Bavaria, is the third largest city in Germany with a population of 1.559.502 residents (as of 11/2019; Statistisches Amt München). The population has strongly increased over the last years and currently reached its peak, however forecasts predict that the population will increase up to 1,85 million until 2040. These fast rates of growth have not been matched by a similar pace of development, and the city is currently experiencing pressure from this. Throughout the city, living space is expensive and traffic networks are overloaded. However, this issue is more present in some parts of the cities - the rate of growth of the north side of Munich is double compared to the city average (CIVITAS Initiative, 2017).

The ECCENTRIC Living Lab lies in the north of the city, between Mittlerer Ring and Frankfurter Ring. The area is defined in the south by the Schenkendorfstraße (part of Mittlerer Ring), in the north by the Frankfurter Ring, in the west by the Leopoldstraße (B13) and in the east by the A9 highway to Nuremberg (see Figure 10). It's overall size of 65 ha with 8.000 inhabitants results in an average density of 12.308 inhabitants per square kilometre. The area consists of the two quarters, Parkstadt Schwabing in the south and Domagkpark in the north, which are separated by Domagkstraße.

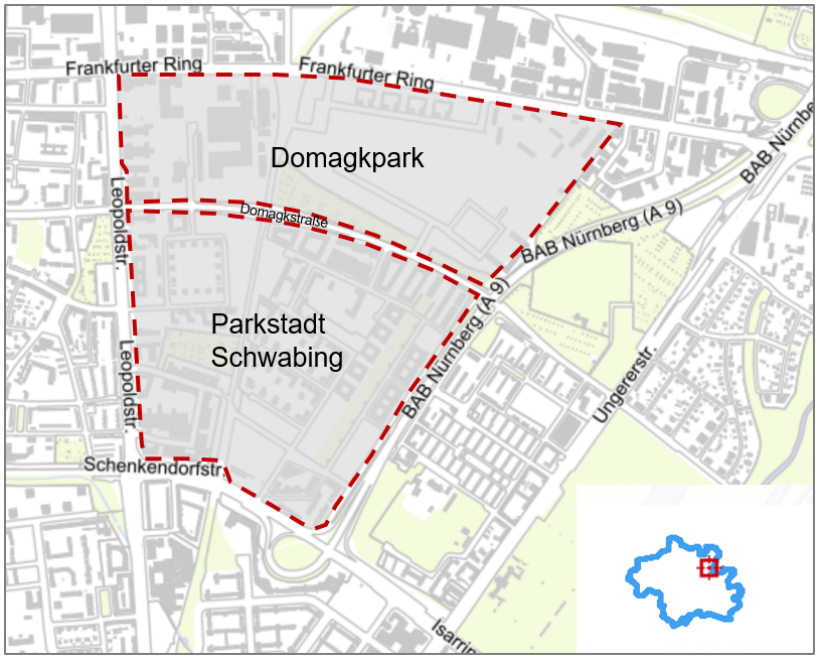

Figure 10. Location of the Living Lab Domagkpark and Parkstadt Schwabing

Parkstadt Schwabing is a commercial area with 1.500 apartments and 4.000 residents. About 12.000 jobs are provided by 200 companies from the IT, fashion, healthcare, logistics and hotel sector[2]. Domagkpark is a new housing area from 2016 which is still under development, with 24,3 ha, 4.000 residents and 1.600 apartments[3].

To get a better insight into the Living Lab and its situation regarding transport and mobility some crucial mobility figures are described below. The numbers for the following KPIs are retrieved from the ex-ante household survey, which was obtained in May 2018. The survey was addressed to all 2.100 households within the Living Lab. The participation rate was 27%, what means that 935 people from 572 households answered the online survey or participated via telephone.

The **car ownership** in Domagkpark is with 0,83 cars per household slightly below the city-wide average of 0,9 (infas, 2010), while another, smaller study found the same car ownership in a Munich control group (Schreier, Becker, & Heller, 2015). The car ownership ratio for Parkstadt Schwabing is with 1,03 cars per household slightly higher than the city-wide average.

In detail, around a quarter of the 572 households stated to be car-free, about 60% answered to have one car and 16% answered to have 2 or more (Figure 11).

[2] https://www.nt-parkstadtschwabing.de/über-die-parkstadt/

[3] https://www.domagkpark.de/nachrichtendetail/Parkgestaltung.html?file=files/domagk/Aktuelles/Aktuelles%20bis%20Dez.%202018/aktuelles%20bis%20Sep.%202018/2016_11_15_ECCENTRIC%20Pr%C3%A4sentation_Domagkpark.pdf

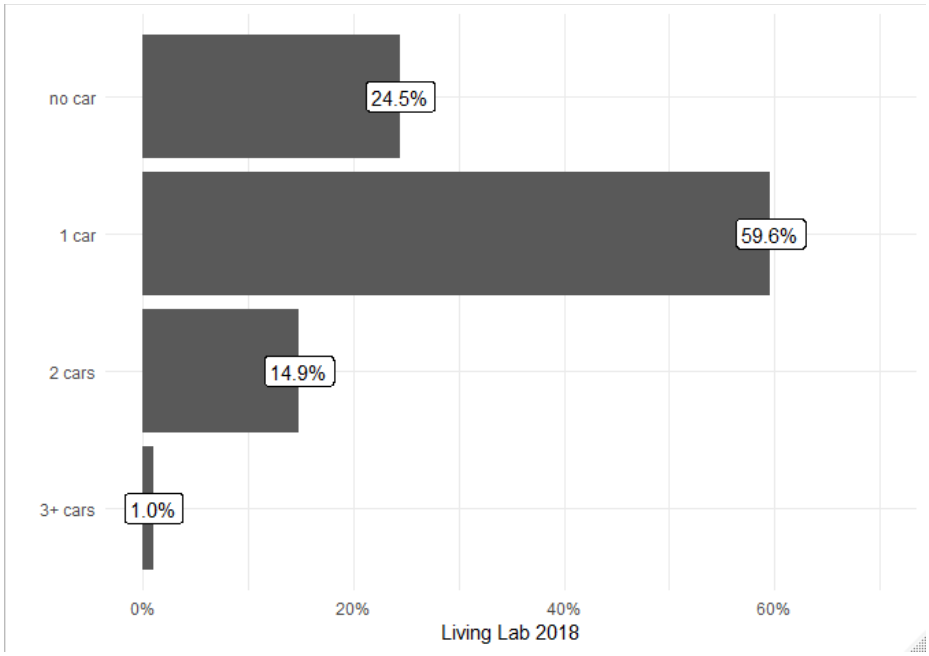

Figure 11. Number of cars per household, 2018

The **modal split** (trip-based) of this group is visualized in Figure 12, based on the answers of 572 households reported about 2.419 trips in April/ May 2017 as part of the ECCENTRIC household survey (05/2018). About one third of all Living Lab inhabitants is walking and 21,4% cycling. 19,4% are using their own car and slightly less, 17,8%, are using PT. Only two percent are using sharing options like bikesharing or carsharing.

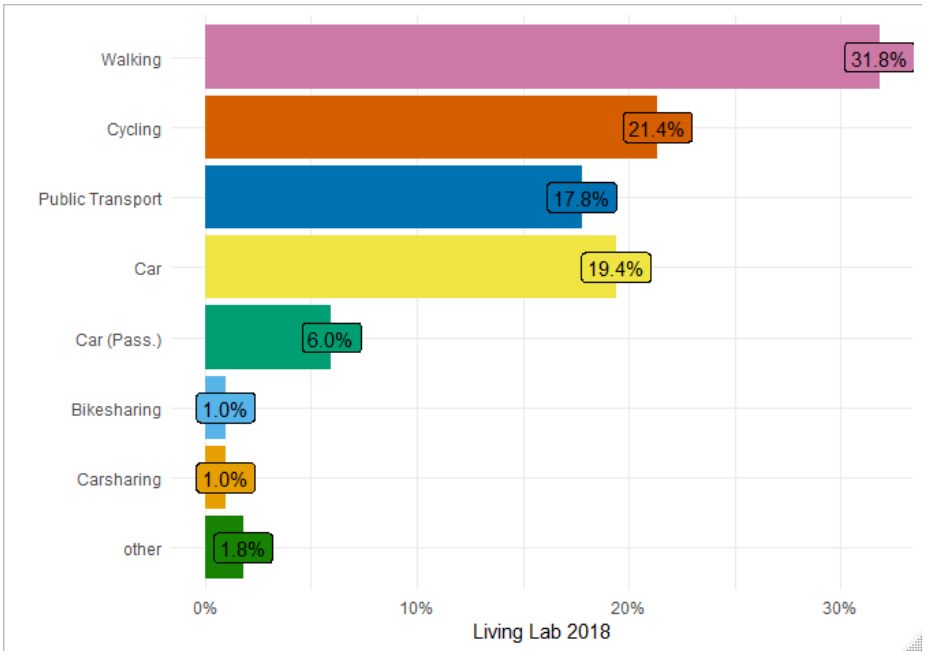

Figure 12. Modal Split of Living Lab residents, 2018

The average **VKT** per household (including also those without a car) is at 9.810 km per year (see Figure 13 for the distribution), summing up to a total VKT in Domagkpark and Parkstadt

Schwabing of approx. 4,89 million VKT per year. The data was obtained with the household survey in May 2018.

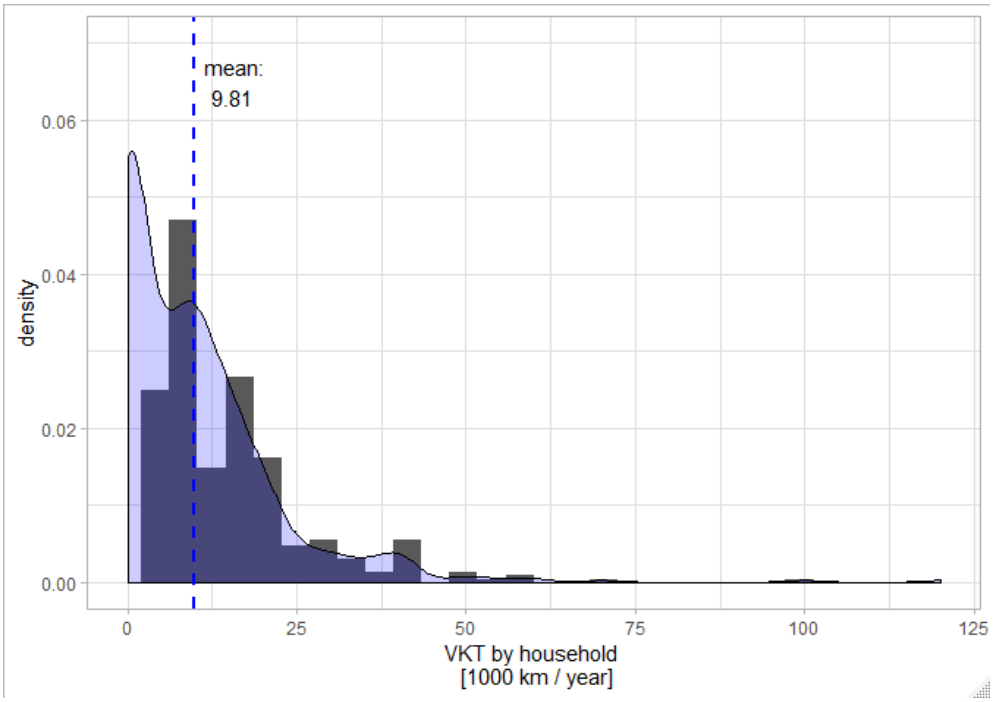

Figure 13. VKT by household (density plot), 2018

Transport-related emissions are calculated based on emission factors from the standard database "HBEFA" (*Handbook Emission Factors for Road Transport*) and information about both VKT and the vehicles in the Living Lab. See Table 17 for the used factors, based on the German fleet average[4].

In 2017 HBEFA assumes the following shares of emission concepts, differentiated between Gasoline and Diesel:

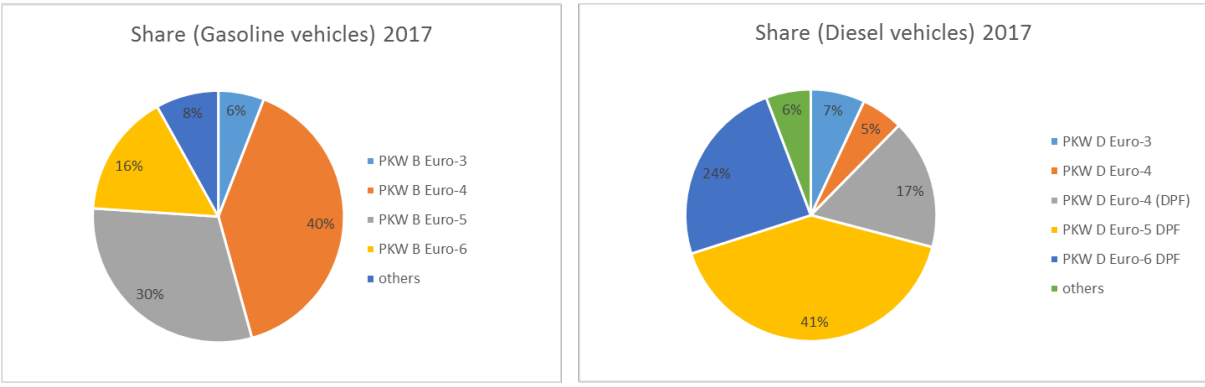

Figure 14. Shares of emission concepts in Germany, Gasoline and Diesel (HBEFA, 2017)

[4] The number of hybrid/electric cars is too low to be considered as a separate category.

The highest share among Gasoline vehicles consists of Euro 4 (40%) and Euro 5 (30), followed by Euro 6 (16%). Regarding the Diesel vehicle share, there are 41% Euro 5 and 24% Euro 6. Euro 4 has a smaller share of 17%.

Pollutant	Fuel Type	Emissions per VKT
CO_2	Gasoline	127,837 g/km
NO_x	Gasoline	0,060 g/km
PM	Gasoline	0,00102 g/km
CO_2	Diesel	118,911 g/km
NO_x	Diesel	0,589 g/km
PM	Diesel	0,00675 g/km

Table 17. Emission Factors (HBEFA, 2017)

The following calculations are based on the HBEFA factors of 2017 and the annual VKT, differentiated by car type (first or second car) and fuel type (gasoline or diesel). The amount of kilometres is then multiplied with the HBEFA factors and number of cars mentioned in the household survey (conducted in 05/2018).

Thus, the total annual emissions (based on VKT) for all 2.100 households in Domagkpark and Parkstadt Schwabing sum up to the following totals:

Pollutant	Emissions (2017)
CO_2	3.864 t
NO_x	10,22 t
PM	122,252 kg

Table 18. Living Lab Emissions 2017

After giving a first overview of the Living Lab's situation and showing important mobility figures, the next chapter tells more specific about the measures which were implemented in Domagkpark and Parkstadt Schwabing.

B.2.2 External actions influencing the performance of ECCENTRIC

In Munich,several other projects and measures in the field of mobility have been and are still conducted, that also address indicators of ECCENTRIC. The following are particularly positively affecting the measures' impacts.

In general, the City of Munich pursues innovative and sustainable mobility with various municipal guidelines. These include also new guidelines like the city-wide Sharing and Cycling Directive. In general, the City of Munich committed itself in 2019 to an even more sustainable transport planning. This idea of sustainability will also be increasingly incorporated into the new Department of Mobility, which will be founded in 2021 in Munich and will strongly focus, among other things, on mobility management. The contents of these guidelines are reflected in the mobility campaign and thus brought it closer to the citizens.

In order to achieve such political goals, the involvement of economic actors is essential. Therefore, the City of Munich has initiated the Climate Pact, in which companies have voluntarily committed themselves to saving CO2 since 2016. In order to achieve the common objectives, measures are being implemented in the areas of energy supply, energy-efficient buildings and production, low-emission mobility and employee awareness.

Particularly in the area of mobility, the City of Munich offers companies the possibility of consultancy for a corporate mobility management "Betriebliches Mobilitäts Management" (BMM). The aim is to optimize the mobility of employees through individual measures in order to save resources and operating costs, to have fewer cars on the roads during rush hours, to reduce emissions and to make optimal use of available parking space.

In 2008 a Low Emission Zone was established inside the ring road Mittlerer Ring in Munich. Cars with high emissions were stepwise banned from this area and since October 2012 only vehicles with a valid green badge are allowed to enter the zone. This affects all cars, buses, campers and trucks.[5]

The topic road safety has a high priority on the political agenda in Munich. In 2018, the City Council agreed on "Vision Zero" - the project of zero death cases and severely injured road users in Munich (cf. Die Grüne Fraktion, 2019; Ride of Silence Munich, 2019). It aims to prevent traffic death and fatal and severe crashes. Furthermore, handling human failing by better road safety education and looking at a holistic system approach for the whole city.

A cooperation between the City of Munich and the BMW Group, called *Inzell Initiative*, brings together various players from administration, industry and science to work together on the implementation of future-proof solutions for sustainable mobility in Munich (muenchen.de – Das offizielle Stadtportal[6]). Its program, called "Inzell, Modellstadt 2030" (cf. Inzell Intitiative) aims to find solutions for the first and last mile transport and a better accessibility within a flexible local transport system. Another goal is to strengthen the more divers mobility options. By offering and

[5] https://www.muenchen.de/rathaus/Stadtverwaltung/Referat-fuer-Gesundheit-und-Umwelt/Luft_und_Strahlung/Umweltzone/Worum_geht_es.html

[6] https://www.muenchen.de/rathaus/Stadtverwaltung/Kreisverwaltungsreferat/Verkehr/Mobilitaetsberatung/Civitas-Eccentric/Projekttagebuch/Inzell-Initiative.html

showing other mobility options, especially the dialogue marketing measure (MUC 2.9) contributes to Munich's climate protection strategy, which aims to have a (almost) climate neutral city by 2050 (cf. City of Munich, Klimaschutzstrategie).

The existing parking management system in Munich is one of the most important measures that has emerged from the conceptual work of the *Inzell Initiative*. Due to its great success, the project *Parking management in inner-city suburbs* was extended to other districts with high parking pressure after its trial by the City of Munich, thus it is also implemented in Domagkpark and discussed for Parkstadt Schwabing (cf. Inzell Intitiative). However, a lack of regulations currently leads to the situation that illegal parking in spaces reserved for car sharing cannot be sanctioned.

With City2Share another mobility project of the Horizon 2020 program is currently carried out in the City of Munich, implementing mobility stations, reorganizing delivery logistics and adding smart infrastructure devices.

The sum of these initiatives and projects are mainly possible because of a positively inclined political landscape within the City of Munich. Local politicians are bringing the topic of transport more and more into focus and therefore welcome and support projects like ECCENTRIC. Especially because ECCENTRIC is not focusing on the inner city but more to the suburban districts which also need particular attention.

Other aspects which are significantly affecting the impact can be found within the Living Lab. Local social infrastructure (e.g. neighborhood associations), such as Nachbarschaftstreff Parkstadt Schwabing, Nachbarschaftstreff Domagkpark and DomagkPark Genossenschaft eG support the ECCENTRIC measures by communicating them to the residents.

Several interviews with Measure Leaders, residents and other involved stakeholders and subjective observations by the LEM show that the fact that the Living Lab is a newly built housing area (from 2016) may influence the results as well, not necessarily always in a positive direction. The new residents who have bought property are, measured by the real estate prices in Munich, mostly part of the high-income class. It could be assumed that after a certain initial phase (presumably after paying off the property), the density of cars has increased to some extent. This impression is in line with the new CAR study, which shows that with increasing prosperity in Germany, the density of cars has increased significantly. This subjective feeling is also reflected in the household surveys where Living Lab residents state that they got themselves a new car "because I can afford it".

B.2.3 Baseline

The following baseline scenario shows the situation of Munich and where possible of the specific laboratory area in the very beginning of ECCENTRIC (2017). Furthermore it is reflected how this area would have been developed if ECCENTRIC would have never happened, means Business as Usual (BaU). Regarding **Error! Reference source not found.** (p.**Error! Bookmark not defined.**) which gives an overview of all Munich measures and the KPI which are considered, the following chapters focus on indicators which have been looked at most frequently throughout all measures.

For **Awareness, Acceptance**, and **Satisfaction**, no significant changes are expected in the Business as Usual (BaU) scenario. Without the mobility marketing actions there will also be no bigger changes regarding the mobility behaviour, because the residents of the Living Lab are not

aware of the mobility offers in their surroundings. Small changes towards a more sustainable and emission free lifestyle is to be expected, though. This aligns to the general trend in Germany (UBA, 2019[7] and 2020[8])

Car Ownership does not show big changes on the nationwide level (2002-2008-2017), while the ratio cars per inhabitants in the relevant part of the city ("between middle ring road and city boundary") has been decreasing slightly over the last 10 years, from approx. 430 cars per 1000 inhabitants in 2005 to 412 in 2015 (-1%). However, for the reporting period until 2020 we expect stable conditions.

Mode Split & VKT

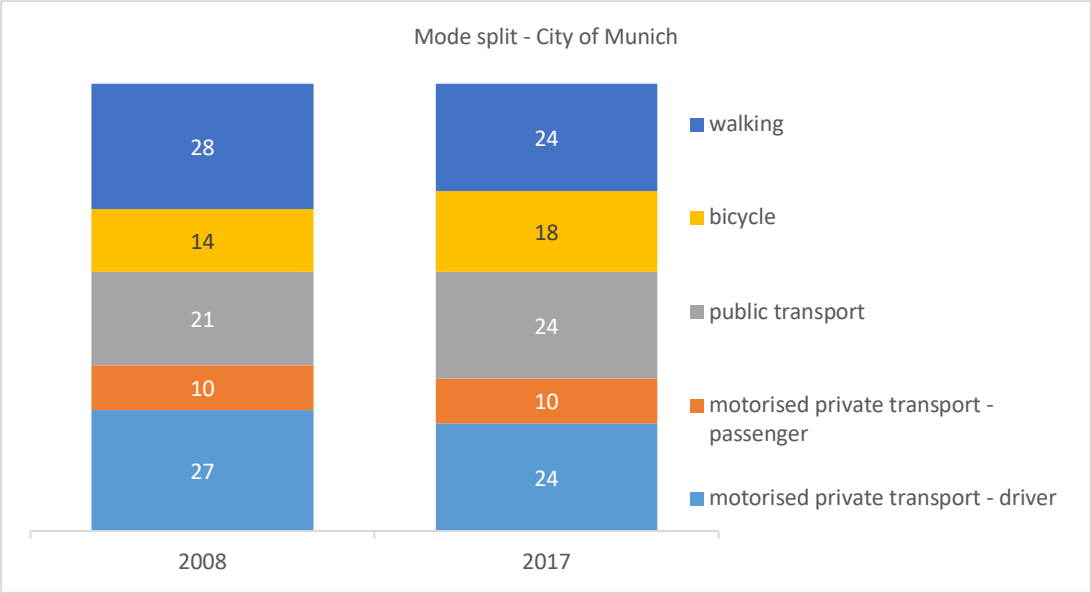

Image: City of Munich, Data: infas edited (2018)

Figure 15. Modal Split in Munich (2008+2017)

The nationwide mobility survey "Mobilität in Deutschland" acts as a reference to determine trends and future mobility behaviour in Munich.

In general, the Munich population drives less and walks less, while PT and cycling increase over time (change 2008-2017: car -3%, PT +3%, cycling +4%, walking -4%). Extrapolating this trend from 2008 to 2020, we can assume the following mode shifts in the BaU-Scenario for 2020:

Car: -1%; PT: +1%; Bike: +1%; Walking: -1%.

These changes will be reflected in VKT as well, so that we expect VKT to decrease by 1% as well, being cautious because nationwide, the km per vehicle are slightly decreasing (2017: -

[7] https://www.umweltbundesamt.de/themen/nachhaltigkeit-strategien-internationales/gesellschaft-erfolgreich-veraendern/umweltbewusstsein-in-deutschland
[8] https://www.umweltbundesamt.de/daten/private-haushalte-konsum/umweltbewusstsein-umweltverhalten#stellenwert-des-umwelt-und-klimaschutzes

0,7%, Kraftfahrtbundesamt (2018) and the emissions are as well decreasing regarding the data of HBEFA 2020 scenario.

Note: A recent study by the Center Automotive Research (CAR) of the University of Duisburg-Essen published in 12/2019 that the number of cars is constantly increasing within the last ten years in Germany's larger cities. Comparing the number of cars from 2009 until 2019, there is an increase of 18,5% in car ownership measured in Munich (cf. CAR, 2019). This resembles a different trend then expected above in the BaU-Scenario assumptions of 2018.

In order to estimate BaU **emissions**, we use the HBEFA projected emission factors for 2020 as well as the by 1% increased VKT that we assume in the section " Mode Shift & VKT".

Thus, the following factors are used:

Pollutant	Fuel Type	Emissions per VKT
CO_2	Gasoline	117,785 g/km
NO_x	Gasoline	0,049 g/km
PM	Gasoline	0,00108 g/km
CO_2	Diesel	110,410 g/km
NO_x	Diesel	0,484 g/km
PM	Diesel	0,0045 g/km

Table 19. Emission Factors (HBEFA, 2020)

In 2020 HBEFA assumes the following shares of emission concepts, differentiated between Gasoline and Diesel:

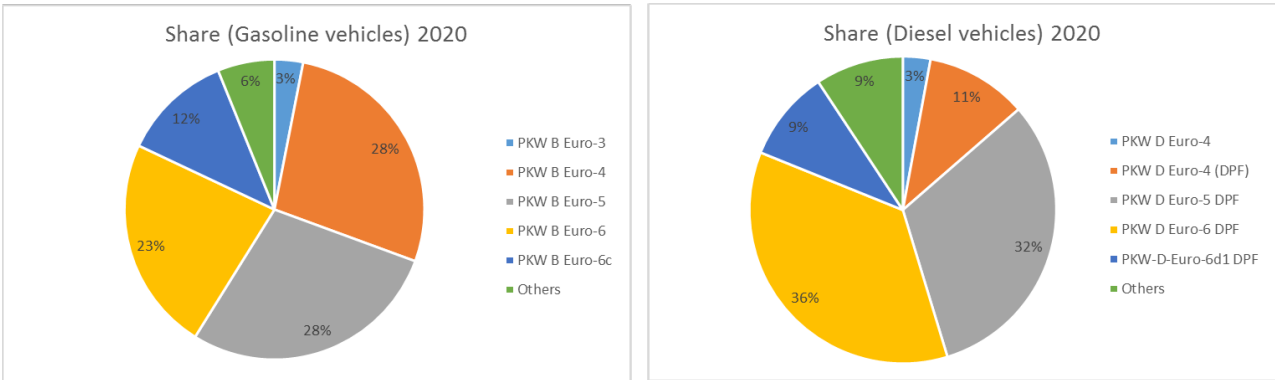

Figure 16. Shares of emission concepts in Germany, Gasoline and Diesel (HBEFA, 2020)

Regarding the Gasoline Euro classes in 2020, there are about two-thirds of all Gasoline vehicles to be found with Euro 4 (28%), Euro 5 (28%) or Euro 6 (23%). The share of Diesel vehicles is similar but compared to HBEFA 2017 assumptions, Euro 6 has the biggest share in 2020 (36%, 24% in 2017).

Note: These emission factors assume technological progress and a renewal of the average fleet in Germany until 2020. In the light of "*Dieselgate*" and great uncertainties in the accuracy of emission information by the car manufacturers, the HBEFA assumptions have to be verified. New HBEFA assumptions are to be published in the end of 2019 (after MER-2).

This results in the following emissions for 2020 (the calculation is analogue to the one in C.1.2):

Pollutant	Emissions (2020)	% change to 2017
CO_2	3.610 t	-7%
NO_x	8,49 t	-17%
PM	88,76 kg	-27%

Table 20. Living Lab Emissions 2020

B.3 Stockholm

B.3.1 General characteristics of the laboratory area

The initial Living Laboratory identified in Stockholm was Årsta, a near-suburban district that lies within the City of Stockholm but is located directly to the south of the core city centre area, separated by a water channel. Several of the measures (specifically, measures 2.4, 2.5, 4.9, and 6.1) could be conducted with a particular focus on the Årsta district. However, the other measures either had to be relocated to other sites in the City of Stockholm for various reasons, or were intrinsically non-localised so that they in fact applied either to the City of Stockholm as a whole (6.6, 6.7) or even to the entire metropolitan area or Sweden as a whole (3.5, 6.5).

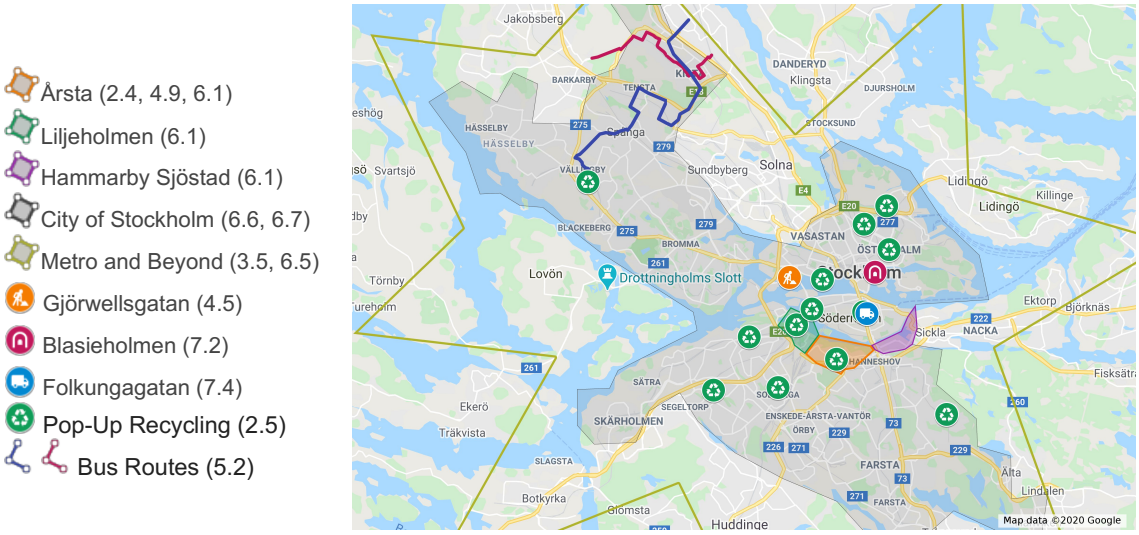

Figure 17. Study Areas for Eccentric Stockholm Measures

Owing to the somewhat geographically dispersed nature of the implemented measures, we report statistics for several relevant districts as well as for the City of Stockholm as a whole. Starting with population, in 2018, there were estimated to be 962,154 residents living within the City boundaries, with a growth of 26401 since 2016, i.e. an average growth rate of 1.4% per year. Stockholm has a typical age profile with a slight overrepresentation of young adults and underrepresentation of children in the inner city compared to the city as a whole. Gender is essentially evenly split.

The vast majority of private homes in Stockholm are in multi-family buildings (85%), of which the majority (56%) are in private cooperatives but a large share is in social housing (17%) and the remaining are ordinary rentals (27%). However, differences can be seen between Årsta, Liljeholmen and Hammarby Sjöstad, which are more centrally located and have very few single-family homes, compared to Spånga-Tensta and Rinkeby-Kista, which do include some “villa” areas of single-family homes, although these are still the minority.

During the project period, the unemployment rate in Stockholm remained at or around 3% and the median annual income was about € 36,000. Overall, nearly 60% have completed some university education. Strong differences can again be seen between Årsta, Liljeholmen and Hammarby Sjöstad on one hand, and Spånga-Tensta and Rinkeby-Kista on the other. The former group of three have higher incomes, lower unemployment, and higher educational attainment, while the latter two have lower incomes, higher unemployment, and lower educational attainment. In all three respects, the two groups of neighbourhoods could be said to be at opposite ends of the spectrum among Stockholm districts.

Statistic	City of Stockholm	Årsta	Liljeholmen	Hammarby Sjöstad	Spånga-Tensta	Rinkeby-Kista

Population (2018)	962,154	19,249	15,173	18,902	39,106	50,404
Multi-Family Homes (2018)	419,931	10,436	6,896	8,195	8,954	17,558
Single-Family Homes (2018)	45,305	3	43	5	4,421	1,661
Unemployment (2019)	3.0%	2.4%	2.1%	1.9%	5.3%	6.6%
Median Annual Individual Income (2017)	€36,000	€34,100	€41,500	€45,300	€29,100	€23,300
Pop. With Some University Education (2018)	59.2%	67.5%	69.0%	67.5%	42.0%	35.9%

Table 21. Stockholm Target Neighbourhood Characteristics (City of Stockholm, 2019)

Car use in Stockholm has grown but not quite at pace with the population. In 2019, the number of cars in traffic per population was estimated by Trafikanalys to be 375, a slight reduction compared to 2018. Car choice is gradually shifting from petrol and diesel toward electrics and their variants (see Figure 18). This is leading to a slow shift of the overall vehicle fleet in Stockholm, but the changes expected over the period of the Eccentric project are marginal (see Figure 18).

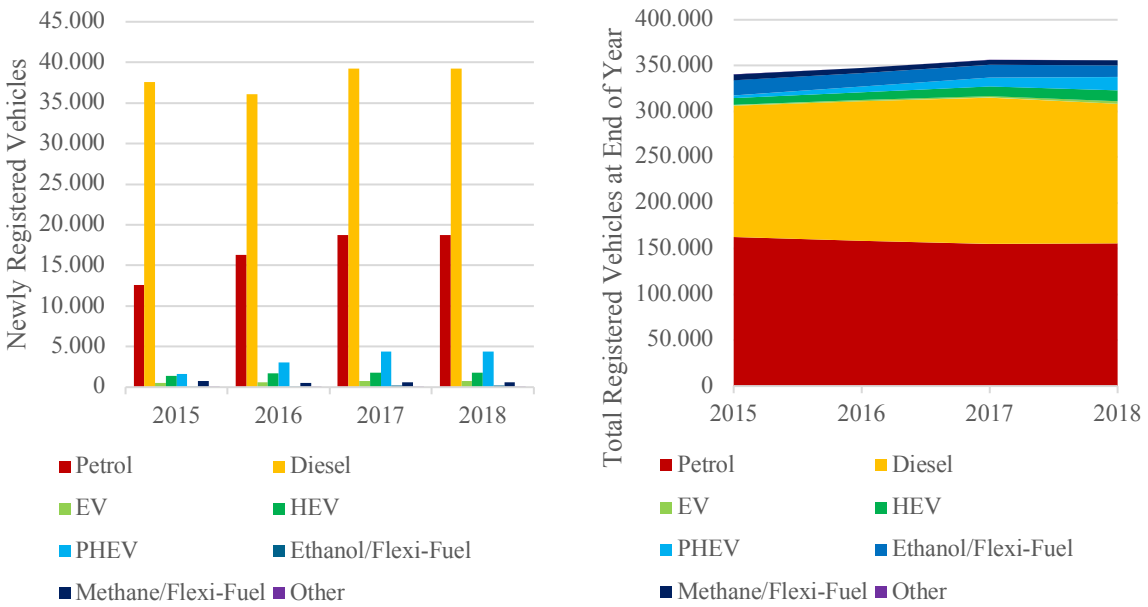

Figure 18. Newly registered vehicles (left) and total registered vehicles (right) in the City of Stockholm (Trafikanalys, 2020)

Car use during this same time period has increased during the early part of the Eccentric project but stabilised over the subsequent years (see Figure 19). The increasing trend began after a minor economic slump in 2012.

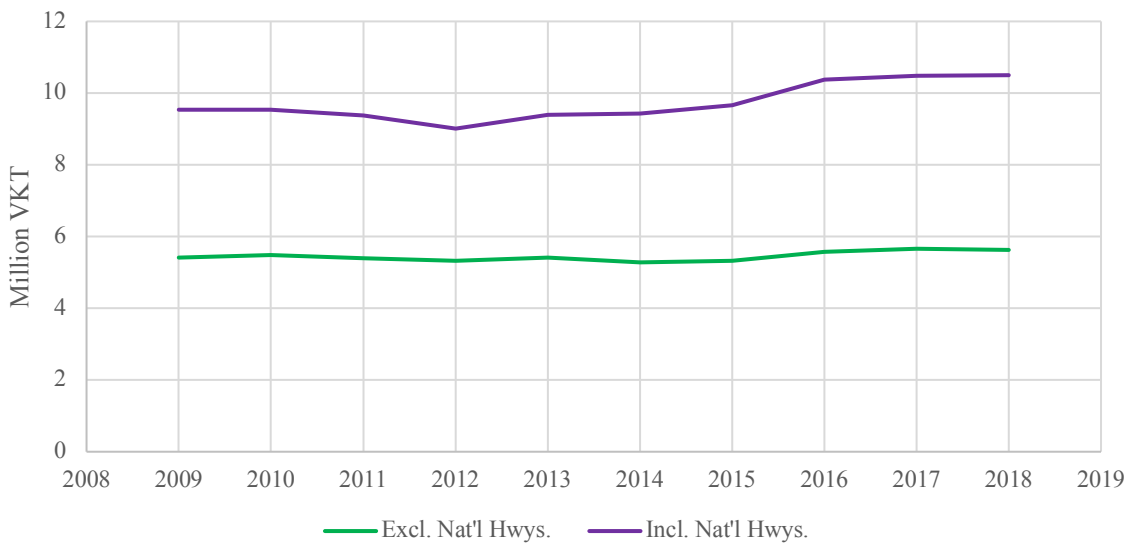

Figure 19. Annual vehicle-kilometres travelled (City of Stockholm, 2019)

Around that same time period of growth in distance travelled, slight changes in commute mode splits were also seen in the City of Stockholm. Traditionally, public transport is the dominant mode for Stockholm residents' commutes (see Figure 20). Car also comprises a large share – around 20% - as does cycling during the warmer half of the year. In fact, both car and bicycle use for commutes gained over the period from 2013 to 2016, while public transport and walk modes lost share. These differences are more or less the same for both winter and autumn seasons. More recent mode share data is not yet available, so the continuation of these aggregate trends during the project period cannot yet be assessed.

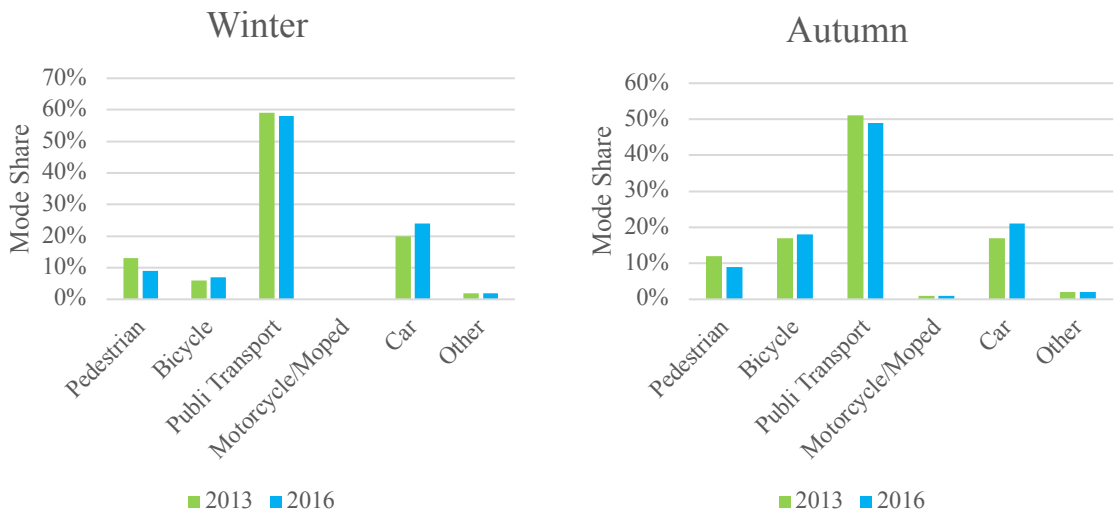

Figure 20. Commute Mode Splits by Season (City of Stockholm, 2020)

One of the key consequences of transport activity is the emission of greenhouse gas emissions, particularly carbon dioxide. As shown in Figure 21, CO2 emissions per resident are estimated to have decreased over the Eccentric study period, but most of that change can be attributed to cleaner and more efficient electricity generation and heating. Transport has also produced fewer emissions per resident, but the reductions are much more modest.

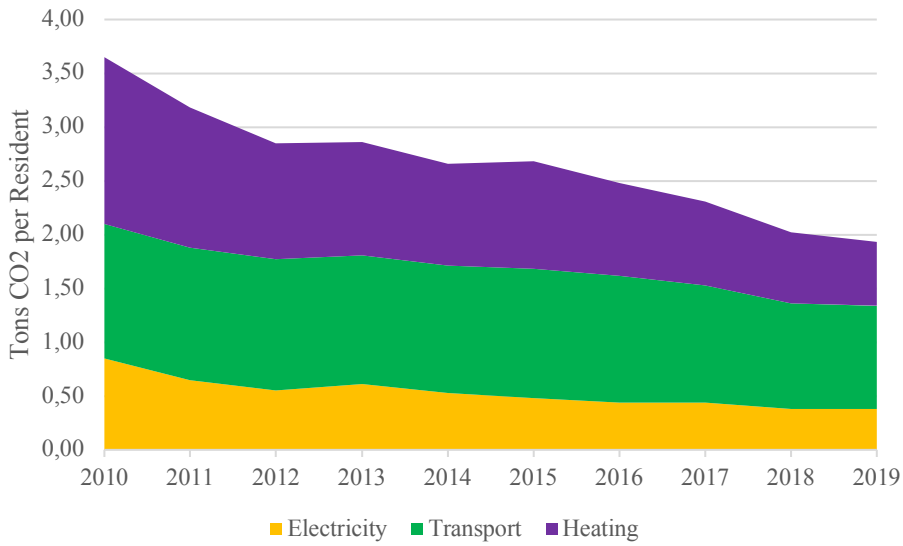

Figure 21. Carbon Dioxide Emissions by Source (City of Stockholm, 2020)

B.3.2 External actions influencing the performance of ECCENTRIC

Sustainable mobility in the City of Stockholm has, during the period of the Eccentric project, been mostly affected by broad economic and technological trends and by government incentives and pricing schemes.

Firstly, one of the main determinants of the attractiveness of motor vehicles for travel is fuel price. Prices have varied somewhat over the time-period of the Eccentric prices, but with different overall trends per fuel type (see Figure 22). Both petrol and diesel have become significantly more expensive, with overall increases of 24% and 38% respectively. Ethanol prices have also increased but only by 13%. Electricity prices has also increased by 23%, but this is less impactful since for electric vehicles, fuel costs are a far smaller share of costs to begin with compared to combustion engine vehicles.

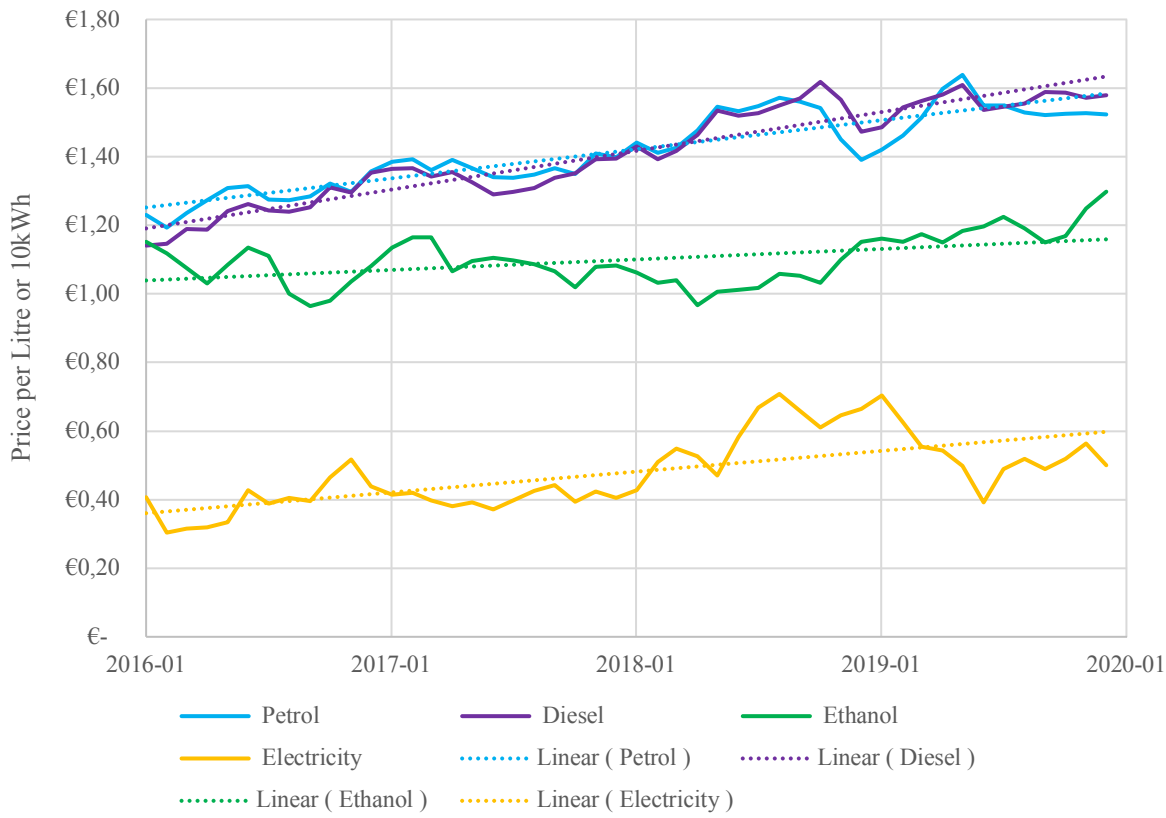

Figure 22. Fuel prices in Sweden (Swedish Institute for Petroleum and Biofuel, 2020; Swedish Central Statistics Office, 2020)

Aside from fuel costs, the total costs of automobile and truck use are affected by parking prices and by Stockholm's cordon-based congestion tax, which has been in place since 2006. In 2016, the Stockholm congestion tax system was modified to include not only crossings over the original cordon, but also for crossings between north and south along the main motorway link that traverses the east-west waterway through the Stockholm metropolitan area. Prices for crossing the pre-existing cordon line were also raised rather significantly, with a rise of between 10% and 75% depending on time of day.

Fees for residential on-street and city-owned parking lots in Stockholm were extended in mid-2016, including higher fees in pre-existing fee areas in the inner city and new fees extended to many outer areas of the City of Stockholm.

Due to the durability of vehicles, the fleet of in-use vehicles in Stockholm depends not only on policy changes during the Eccentric project but also prior to its start. Some relevant developments are that a purchase rebate on a broadly defined group of "clean vehicles" was discontinued in mid-2009, and as a consequence, ethanol and flexi-fuel vehicles no longer benefited. In 2012, a new purchase rebate was introduced, known as the "super-clean vehicle" rebate, in practice applying to plug-in hybrid-electric vehicles and fully electric vehicles. However, this benefit was constrained by a limited budget and not all qualified vehicles received the benefit. In mid-2018, this was replaced by a self-sustaining bonus-malus system, with diesel and petrol vehicles emitting over 95 g/cm CO_2 paying an extra fee at purchase to compensate for a rebate for vehicles with less than 70 g/km CO_2.

During the same time period, public transport prices have also risen. After an extended period since 2011 of no change in the cost of a monthly public transport card (one of the most popular tickets for Stockholm residents), the price was finally increased in 2017 from 690 SEK (€77) to 830 SEK (€81), with successive rises each year since. The price in 2020 is 930 SEK (€90).

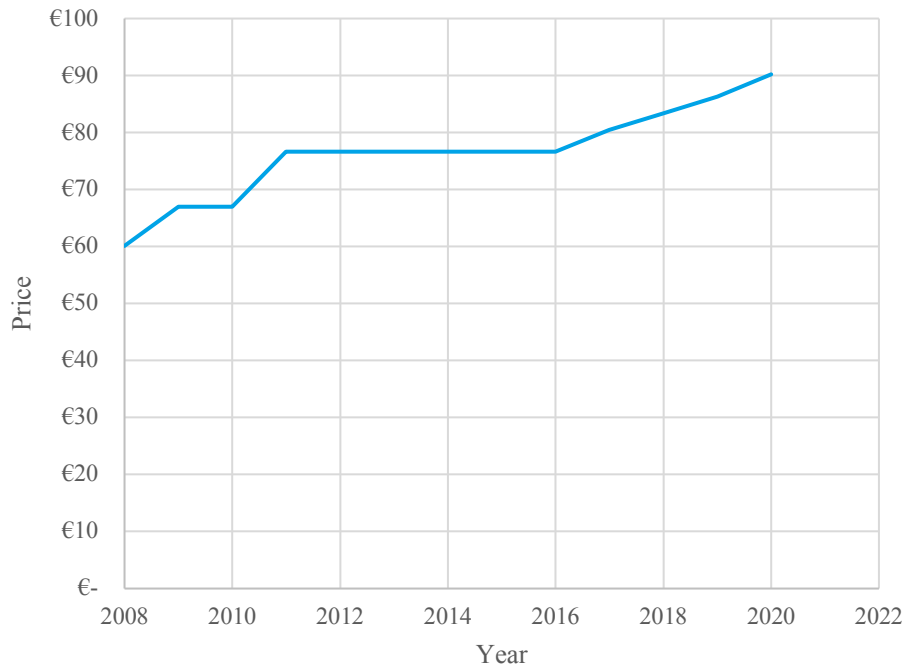

Figure 23. Price of a Monthly Public Transport Pass (Stockholm Region, 2020)

Overall, the price developments suggest an overall increase in the cost of both automobiles and public transport, with the green vehicle incentives somewhat increasing the attractiveness of fully electric and plug-in hybrid electric vehicles. Compared to these two modes, bicycling and walking should have appeared more attractive during this period, as there are no appreciable cost differences affecting them over this period.

B.3.3 Baseline

Taking 2017 as a baseline and extending forward toward 2020, without Eccentric we would expect several trends to be somewhat different.

Starting with **Awareness, Acceptance,** and **Satisfaction**, there are several developments in sustainable mobility that would likely not have reached as broad an audience if not for the initiatives taken within Eccentric. We expect that awareness of electromobility options (both EVs and electric bicycles) would marginally increase from year-to-year as manufacturers increase production and diversify product lines, as they increase their marketing to promote this, and as early adopters communicate their experiences. We would also expect awareness of new mobility services, such as those that fall under the umbrella-term MaaS, would also marginally increase as news of experiences elsewhere to reach Stockholm. For less widely understood strategies, such as waterborne material transport and night-time deliveries, we would expect less progress toward awareness and acceptance.

In the **Transport System**, particularly for service characteristics, we would essentially expect the same conditions to prevail over the duration of the project if no Eccentric measures were implemented. However, demand would continue to develop without Eccentric and hence we would still expect a steady increase in Vehicle-Kilometres Travelled.

On **Environmental** indicators, focusing first on CO_2 emissions, we would expect the trend shown in Figure 21 for the City of Stockholm to continue over the time period of the Eccentric project. NO_x and particulate emissions would follow a similar trend. Noise levels would remain the same for most of the areas where residents are exposed, since those densely populated areas already have relatively stable travel patterns.

The **Costs** of the Eccentric measures, both operating and investment, would under a baseline scenario be zero. Revenues for parking enforcement (measure 2.4) would remain steady.

B.4 Ruse

B.4.1 General characteristics of the laboratory area

The Bulgarian Living Lab “Druzhba” (Friendship) is situated in the south part of Ruse that is the largest Bulgarian city on the Danube River and the fifth largest city in the country in terms of number of inhabitants. Ruse is located in the northeastern part of the country, on the right bank of the Danube, opposite the Romanian city of Giurgiu, approximately 75 km south of Bucharest, 200 km from the Bulgarian Black Sea Coast and 300 km from the capital Sofia. It is the most significant Bulgarian river port, serving an important part of the international trade of the country. The territory of the municipality is a crossing point of two Pan-European transport corridors - №7 (Rhein-Main-Danube) and 9 (Helsinki - Vyborg - St. Petersburg - Pskov - Gomel - Kiev - Ljubashevka - Chișinău - Bucharest - Dimitrovgrad - Alexandroupolis).

The city is conditionally divided into two parts – north and south, by a railway and a large road artery crossing the city from west to east. The industrial zones of the city are located in its north-eastern, north-western and south-eastern parts. The residential districts "Druzhba", "Charodeika" and "Zdravetz", where most of the city's population is concentrated, are situated in the southern, south-eastern and north-eastern parts of the territory of the city.

The passage of the train railway along the entire length of the city significantly complicates the road communications between the northern and southern sections. The efforts to provide direct connections between the focal points in the city, in the context of this hindering factor, lead to traffic overload and congestions in the existing communication road arteries.

The Druzhba District. It is divided on three parts named Druzhba 1, 2 and 3. The population is about 27 000 inhabitants or nearly 20% of the Ruse population. The surface is 2,12 km2. The density is 12 000 inh./ km2 with a car ownership rate of 450 (cars/1.000 inh.).

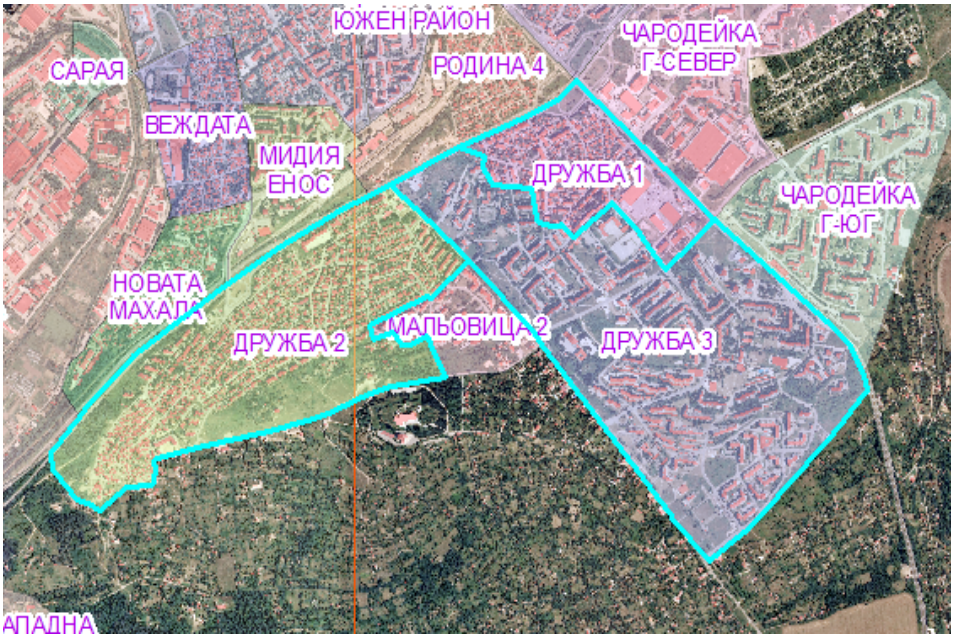

Figure 24. Map of Druzhba district

The district has been built in 70s according the typical socialist urban planning with uniform 8-12 floor condominiums shaping the named “living complexes”, relatively narrow streets without pavements and empty spaces in between blocks. Nowadays the landscape is not attractive because of the extremely depreciated pedestrian infrastructure and the big number of cars parked everywhere. Nearly 70% of the public space in Druzhba is used mainly for parking of the private cars.

Figure 25. Druzhba landscape

The main challenges in relation to the mobility of people that this area was facing were:

- The public transport providing the connectivity between the peripheral district "Druzhba", the city centre and the industrial zones around the city was slow and unreliable
- A large share of citizens living in Druzhba used personal cars and taxi services to travel to the city centre or go to work in the industrial zones
- There was no opportunity to use public transport after 21 h. and citizens prefer to use personal cars and taxi services instead of PT in the late hours of the day
- High traffic of taxis and personal cars coming from the peripheral district and outside the city towards the city centre leading to congestions and higher risk of road accidents
- Lack of pedestrian areas, pavements, crosswalks and sidewalks. All pedestrian crosswalks in the district were not secure enough and presented high risk for accidents leading to injuries and fatalities
- Unattractive appearance of the peripheral district because of dirty streets and public spaces packed with cars
- Insufficient parking spaces in the residential area of the peripheral district
- Citizens didn’t have any information about the PT lines and timetables. They were not able to plan well their time and schedule when using public transport. Most citizens didn't know how to get from one place to another by using the PT service
- Most people with disabilities didn't go on the streets or travel around the city due to the lack of convenient infrastructure, specialized public transport vehicles and services. There was a high risk of road accidents involving people with disabilities elderly people and children.

B.4.2 External actions influencing the performance of ECCENTRIC

The Druzhba measures have been influenced by the Ruse SUMP actually in implementation outside of ECCENTRIC. The pilot measures of ECCENTRIC will become part of the new Ruse transport and mobility infrastructure having as a main goal to increase the road safety and the share of walking/cycling in the Ruse modal split, as well as to facilitate the access to and the use of PT.

B.4.3 Baseline

The data for the mobility indicators in 2017 (before the implementation of the ECCENTRIC actions) was as follows:

Modal split - According to the survey made by CSDCS in the beginning of the ECCENTRIC project (May 2017), the modal split in Druzhba was as follows: 49% of citizens use PT; 19 % walk; 5.5 % cycle; 26.5 % use car/taxi.

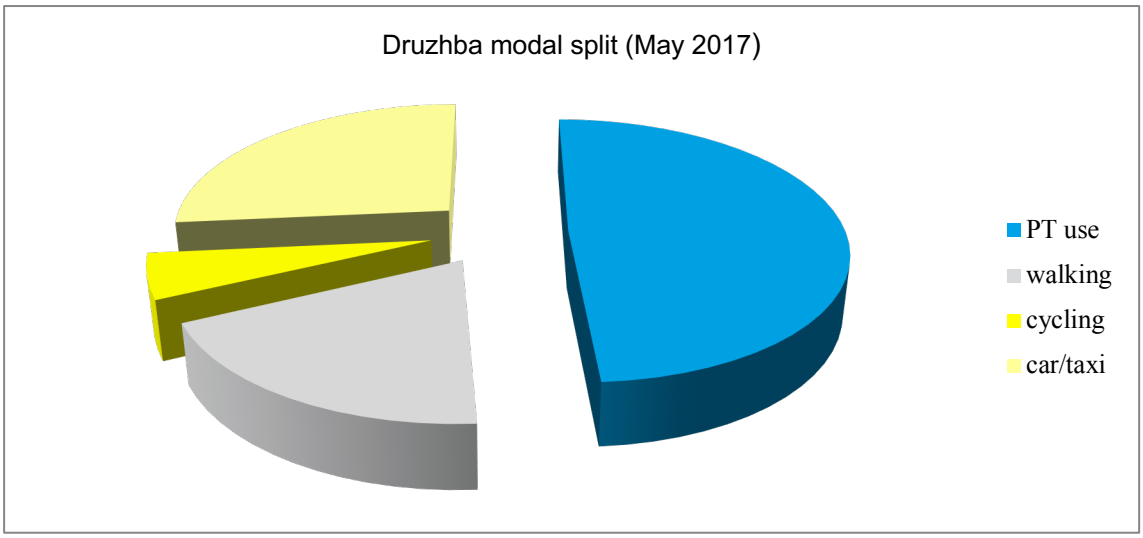

Figure 26. Druzhba modal split in May 2017

Awareness - Only 14% (mainly young people) were aware about the sustainable mobility, SUMP and the planned ECCENTRIC measures in Druzhba.

Satisfaction – In average 78% of the local people were complaining of the quality of the PT in Ruse, didn't feel safe on the streets and estimated to be deprived of good transport connections to the city centre. 90% the citizens of Druzhba district were not satisfied with the PT service after 21 h. estimating that they were deprived of transport links to the city centre. People felt isolated and excluded from the night life in the city, because all the Ruse attractions (restaurants, bars, cinemas, night clubs, etc.) were situated in the central part at 3 km from Druzhba.

Road safety – The survey in the schools has shown that 73% of children didn't feel safe when they were walking, cycling and crossing the streets. 85% of the children estimated that their quality of life would improve if the transport environment was better. The research among the disadvantaged groups clearly demonstrated the problem of the bad pedestrian infrastructure -

95% of the respondents were not satisfied with the pedestrian infrastructure and didn't feel safe when crossing the streets or reaching the PT.

The number of the road accidents in Druzhba was as follows: 2014 – 87 accidents, 3 dead; 2015 – 89 accidents, 3 dead; 2016 - 25 accidents, 1 dead; 2017 - 26 accidents, 1 dead.

Air pollution - The level of CO2, NOx and PM emissions in Druzhba were obtained by the mobile station of the Regional Inspectorate of the Ministry of Environment and Waters (MOEW) in Ruse. They measure the emissions' level in Druzhba every day and publish the average daily data for each month. Although we think that the impact of such a small P&R facility will be insignificant over the district with 27 000 inhabitants, we collected the data for the month before opening the parking (April 2019) and they were as follows:

- CO2 - 10 mg/m3
- NOx – 106.4 µg/m3
- PM – 52.3 µg/m3

If ECCENTRIC never happened, the indicators above would become worse with the time because the transport demand will increase in line with population ageing, the internal migration from rural to urban areas, and greenhouse-gas (GHG) emissions. City dwellers will travel more with their private cars or taxis, which will create intense traffic from the peripheral district towards the city centre. This will lead to further congestions, air pollution and noise and the quality of life in Druzhba quality of life will deteriorate more and more.

We are not expecting that the implementation of some small-scale pilot measures in Druzhba will change radically the situation, but it will show the way for a positive change. We hope that the local government will decide to implement similar measures in the entire district and in the whole city of Ruse.

B.5 Turku

B.5.1 General characteristics of the laboratory area

The following section gives a general description of the City of Turku and takes a closet look at the Kupittaa area where the Turku laboratory area is located.

Turku is located in the southwestern coast of Finland at the mouth of the river Aura. In addition to the distinctive river landscape, the city is characterized by seven hills located in and out of the city centre. The total land area of Turku is 245.7 square kilometres. With its 192 962 residents (2019) Turku is the sixth largest city in Finland after Helsinki, Espoo, Tampere, Vantaa and Oulu. A great portion of inhabitants in Turku are students. The city has two universities and four higher education institutions with over 35 000 students altogether. The city has spread out to a long and narrow land area: the distance between the northernmost and southernmost tips is 45 kilometres while the city is only 15 kilometres wide at its widest. Turku has several islands of which the largest ones are inhabited. Out of the total land area, 97.7 square kilometres have been planned. Turku shares municipal borders with municipalities Aura, Kaarina, Lieto, Masku, Mynämäki, Naantali, Nousiainen, Parainen, Pöytyä, Raisio and Rusko. Turku is the heart of the region which has altogether over 330 000 residents. Population in the region is steadily growing with an approximate 1% yearly population increase.

The laboratory area of Kupittaa is a multifunctional district that is under constant redevelopment with poor mobility offer and an enormous pressure on parking spaces due to increasing number of inhabitants and jobs in the area. In addition to diverse types of housing, a university hospital, a train station and Finland's largest urban park, the laboratory area also houses a Science Park and all the central campuses of the University of Turku, the Swedish speaking Åbo Akademi University, and also the new campus of the Turku University of Applied Sciences since August 2020. In other words, a significant amount of people live, study, work, commute and spend their free time within the laboratory area of 2,85 km^2 . The estimated population in the laboratory area was 11790 people in 2015. With population density of 4363 people per km^2, the laboratory area is densely populated. The age distribution of inhabitants in the area is focused on the young to middle aged, with 74,6% of inhabitants between the ages 20-54.

The laboratory area is bordered by the River Aura to the north and the busy roads called Aninkaistenkatu/Uudenmaankatu and Hippoksenkatu to the west and south respectively. The eastern edge of the laboratory area cuts the Student Village in half and goes through a residential area called Nummi and the Itäharju industrial area. In addition to the River Aura to the north and the large Kupittaa Park in the south-western corner, the geography of the area is defined by two hills: Sirkkalanmäki and Yliopistonmäki.

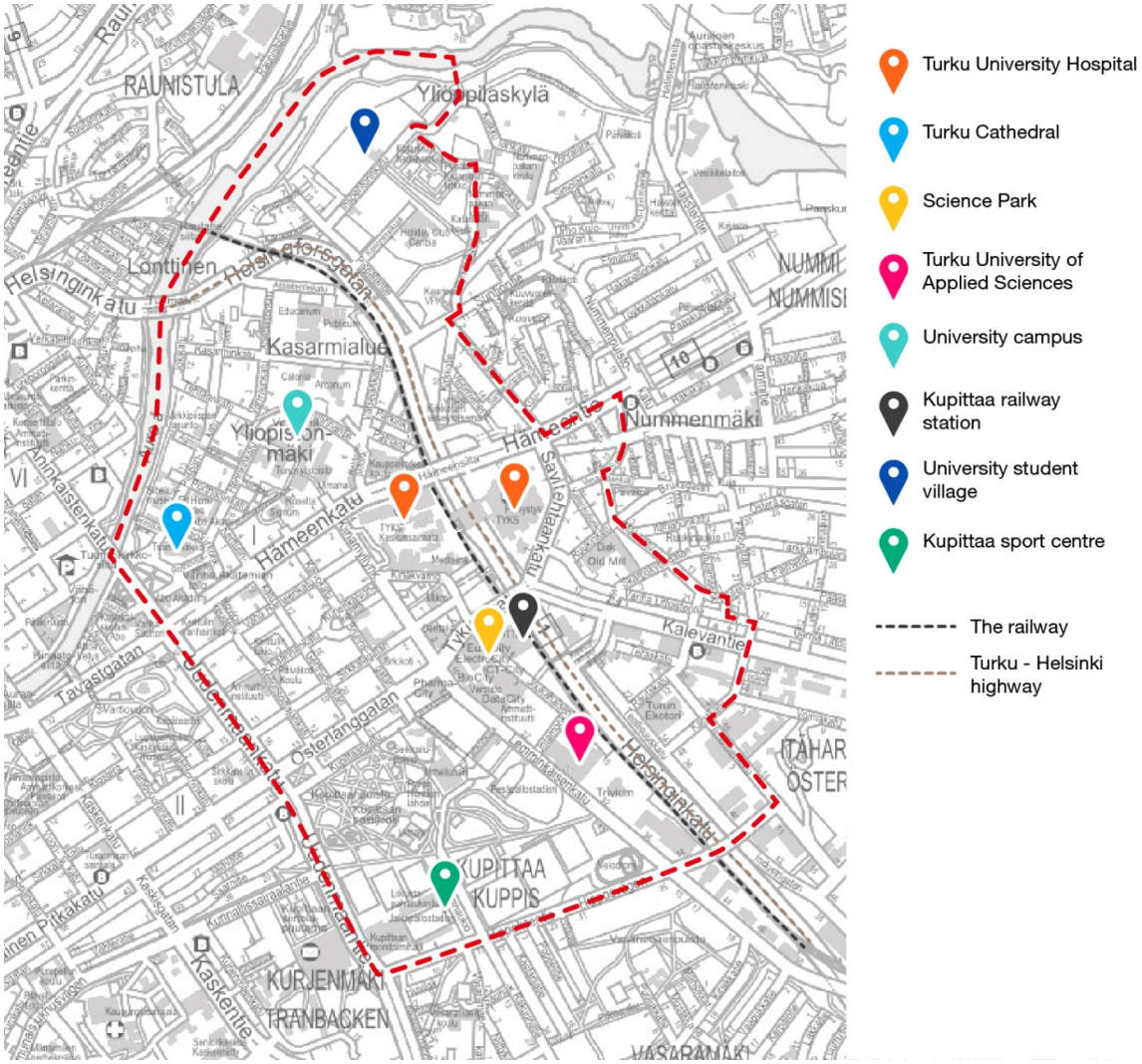

Figure 27. The Kupittaa laboratory area

Large construction works and developments have affected mobility patterns in the laboratory area and will continue doing so in the near future. The current Kupittaa campus area has just expanded as the major construction work for the Turku University of Applied Sciences new campus was finalized in August 2020. This means that thousands of new students, hundreds of teachers, university staff and businesses have now moved into the area. Other constructions that took place during the project in the area included the reconstruction of the Kupittaa railway station, Medisiina 2 (the new medical education building) and a visitor centre in Joukahaisenkatu. Several apartment buildings have been built to the area during the project and a new city-operated sports centre for 2500 spectators was constructed in 2017, attracting more leisure related traffic to the area. In addition, a privately-owned gym was constructed within the sports hall premises. To add to all this, the nearby Itäharju industrial area is also getting a facelift in the near future, increasing the amount of offices and housing in the area.

Part of the laboratory area is built according to a grid plan but the oldest parts around the Cathedral and the newer parts in the Student Village, Nummi and Itäharju regions are structured more freely. A dense bus network caters the needs of the people in the area. The laboratory area is very well connected to other parts of Finland due to the highway and train track passing through the area. The harbour and airport are just a few kilometres away. The Kupittaa railway station is located at the heart of the laboratory area.

The laboratory area is rather well covered with cycling routes, however in parts they are rather narrow and in other parts poorly placed. Car traffic is heavy particularly on Tykistökatu near the Kupittaa railway station, and Hämeenkatu, the big lane traversing the lab area between Kupittaa actual and the Yliopistonmäki, University of Turku campus area. The lack of safety for cyclists and walkers due to heavy traffic especially around the railway station area has been a recurring concern among citizens for some years now.

During the project, **a bike share system** was implemented in the city. Out of the 39 bike share stations, 10 are located in the laboratory area.The most popular start and end stations are located in the laboratory area (the student village station and the Hämeenkatu station in the university area). Some adjustments to station locations have since been made based on customer feedback, however not in the laboratory area.

Figure 28. Location bike sharing stations

B.5.2 External actions influencing the performance of ECCENTRIC

There have been several ongoing projects and developments in Turku in general and around the laboratory area specifically, creating momentum for the ECCENTRIC measures – or, on the other hand, setting pressure on promoting sustainable mobility in the area. The main developments are briefly cited below.

The spearhead projects

The city has implemented two spearhead projects with direct impact on the laboratory area: *The Turku Science Park project* with the objective of innovative development of jobs, services, housing, transport, and public city space at Kupittaa in co-operation with e.g. businesses and universities; and *Smart and Wise Turku* with the objective of using collected data to create new operational models in a way that actively involves citizens, clients, and stakeholders in the change.

Renewal of parking policies

The development of car sharing in connection to the mobility node was closely connected with the development of parking policies in the city. A process to modify these policies took place during the project and resulted in permit-based parking policies allowing for a better operating environment for shared cars via more flexible parking possibilities. This development has been essential for the future of car sharing in the city and would have been particularly useful in Kupittaa, had the mobility node been realized.

Promotion of walking and cycling

On city level, there are several strategies and plans in place to improve walking and cycling conditions. The promotion of winter cycling, for example, was already visible on policy level in

the Turku city cycling and walking strategy from 2010 along with the recognition of the importance of safety measures.

Construction projects

The laboratory area is under heavy redevelopment and as it is, it is already very densely populated in parts. Apartment and office buildings have been and will be constructed in the area in the future, as well as the nearby Itäharju industrial area. During the project the Kupittaa railway station underwent some reconstruction, the new Turku University of Applied Sciences building was constructed, as well as a new medical education building, a visitor centre was built in Joukahaisenkatu and a new city-operated sports centre for 2500 spectators was constructed in 2017. The heavy pressure on land-use in the area has likely influenced and will keep adding pressure to transport and mobility arrangements in the lab area.

Rise in car ownership

Some negative influences affecting laboratory area development should be mentioned as well. The rise in car ownership is a general trend in Finland, which is likely to have reflected on city level and the lab area as well.

B.5.3 Baseline

The following presents the situation in Turku regarding sustainable mobility prior to ECCENTRIC (2016/2017), reflecting the situation without project impact. Data has been derived from various sources. In some cases where data was not available on the laboratory area specifically, numbers fort the whole city were applied. The foocus is on indicators **awareness, acceptance, satisfaction, mode shift, vehicle-Km travelled, car ownership** and **contribution to policies, plans and programs.**

Awareness / Acceptance / Satisfaction

Information on awareness, acceptance and satisfaction of sustainable mobility and mobility measures was gathered via a survey targeted at the companies and housing cooperatives in the laboratory area. It is unlikely that much targeted awareness raising or mobility changes would have been made in the laboratory area without ECCENTRIC impact.

Awareness describes the level of awareness of MaaS measures among housing companies and companies in the lab area. Baseline information for this indicator was not available, however, as the survey to housing companies and private companies was sent already in the autumn of 2016, months before the Turku evaluation plan and indicators were finalized. The survey thus lacked relevant questions in terms of evaluation data.

Acceptance refers to the level of acceptance of MaaS measures among housing companies and companies in the lab area. Baseline information for this indicator was not available, however, as the survey to housing companies and companies was sent already in the autumn of 2016, months before the Turku evaluation plan and indicators were finalized. Interest towards pilot related to combined mobility services was inquired in the company survey, however. Out of the 87 respondents, 35% were interested in such pilots, 32% stated they might be interested and 33% stated they were not interested.

Satisfaction describes the level of satisfaction with the available MaaS services in the laboratory area. Again, baseline information for this indicator was not available as the survey to housing

companies and companies was sent already in the autumn of 2016, months before the Turku evaluation plan and indicators were finalized.

Mode shift refers to the share of travel modes in percentage of passengers which changed permanently of transportation mode for doing the same trip. The National Travel Survey from 2016 presents the following modal split for the Turku region for the baseline. All in all, the share of sustainable travel modes in the region was 48%. Unfortunately modal share was not mapped in the housing cooperative/company survey at the baseline phase. Hence, exact information on model share in the laboratory area is not available. According to the Turku Climate plan, the share of sustainable transport modes is expected to rise to 66% by 2030. An 18% rise in walking, cycling and PT use is thereby expected. The growth in specific modes has not been specified, however.

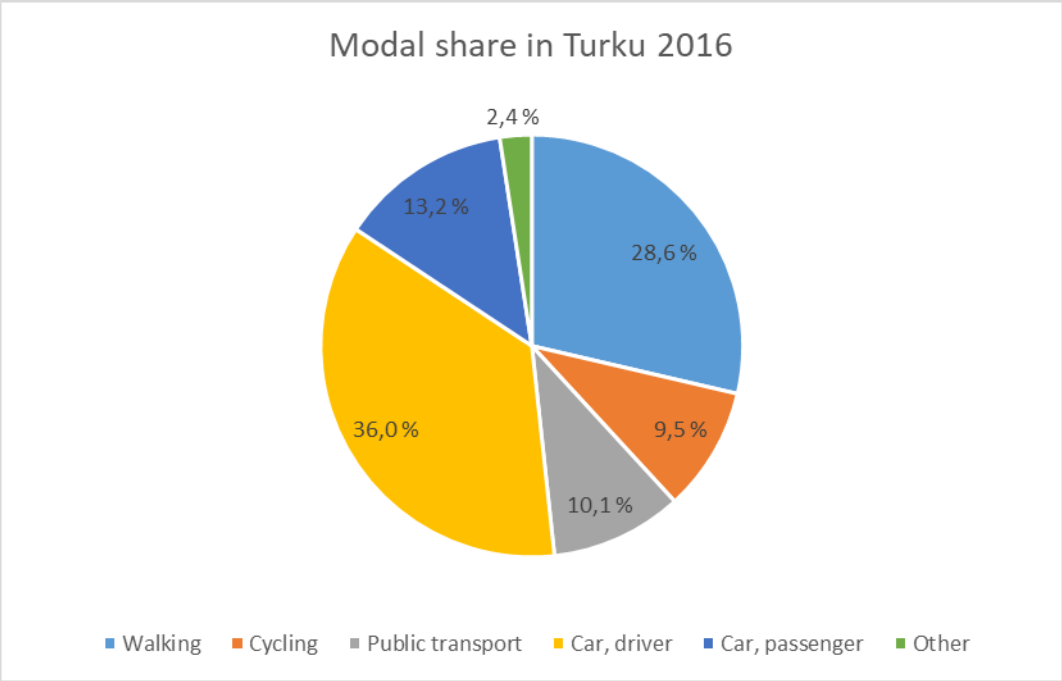

Figure 29. Modal share in Turku 2016

Vehicle-Km travelled refers to the sum of all kilometers travelled by a fleet or a group of users. All transport modes (walking, cycling, public transport, train, car) were applicable. Approximately half of the laboratory area is situated within the city center walking zone (in red) and approximately half within the sub-center walking zone (in brown). Thereby an average of the two was applied when estimating vehicle-km travelled. There was no data available on VKT for the laboratory area specifically – hence figures for the city center/sub-center need to be applied.

Figure 30. Turku city center/sub-center

Average trip lengths (km/person/day) according to the National Travel Survey. For the city center walking zone, n=319, for the sub-center n=68.

`	Walking	Cycling	Bus	Train	Car	Other
City center walking zone	1.7	1.0	1.1	0.2	13.7	0.7
Sub-center walking zone	1.0	0.9	2.1	0.0	15.2	0.3
Average	1.35	0.95	1.6	0.1	14.45	0.5
Km/YEAR/person	493	347	584	37	5274	182

Table 22. Vehicle kilometre travelled

Car ownership

In the city of Turku, there were approximately 408 passenger cars per 1000 residents in 2017. In the laboratory area specifically, there were 280 passenger cars per 1000 residents in 2017. The lower than city-average number could most likely be accounted for by the proximity to the city center, as well as the fact that there are many students living in the laboratory area. It should be noted that data on population in the laboratory area was indicative as the data was available by postage numbers. The laboratory area does not, however, cohere completely with these postage number areas completely and hence some of households may have been left out of the total population number. Overall, car ownership numbers are on the rise in Finland. From 2016 to 2017, the total number of passenger cars rose by 1.5%. It is thus estimated that at the end of

2019, following this yearly growth rate, the number of passenger cars would be 284/1000 inhabitants.

Contribution to Policies, Plans and Programs relates to the impact the measure may have on policies or strategies to promote sustainable mobility, develop planning processes and the development of a mobility node combining various sustainable transport modes and relevant information. The state concludes agreements concerning land use, housing and transport (MAL) with the main city regions of Finland. These agreements enhance cooperation among the municipalities in the respective city regions and between the municipalities and the state in the steering of community infrastructure and coordination of land use, housing and transport. In the Turku region MAL agreement (2016-2019), the Kupittaa laboratory area was already mentioned as one of the focal areas of development. The development of jobs, services, housing, transport, accessibility and public city space at Kupittaa were considered essential for the area due to its location and subsequent nature as transport node. Integration of travel chains and development of transport, supporting the One Hour Train project, were seen as one of the key aspects, and it was recognized that walking, cycling and public transport are important modes of transport in the densely populated area. It could be thereby stated that even prior to the project, the need and the potential of the laboratory area as a mobility node were recognized also on policy level to a fair extent.

Number of fatalities and seriously injured refers to road transport related serious accidents leading to fatalities or serious injuries. These are reported to Statistics Finland on a regular basis by Finnish municipalities. Prior to the winter cycling pilot between 2014- 2016, two fatalities incurred among cyclists or pedestrians and the number of serious injuries was 22. This equaled on average of **0.67 fatalities and 7.3 serious injuries per year**. Statistics on seriously injured have only been collected since 2014. None of these fatalities/seriously injured occurred within the laboratory area. The general trend in Finland and in Turku is towards a marked decrease in traffic related fatalities and seriously injured. The five-year average number of fatalities among cyclists and pedestrians (2012-2016) based on Statistics Finland is 8, which equals an average 1.6 fatalities per year. Statistics on seriously injured have been collected only since 2014. Therefore a three-year average (2014-2016 is used here, which equals 7.3 injuries per year (same as baseline).

Road user group	Fatalities			Seriously injured		
	2014	2015	2016	2014	2015	2016
Pedestrian	1	-	-	3	5	3
Cyclist	1	-	-	3	7	1

Table 23. Number of fatalities and seriously injured / baseline

Number of incidents refers to the number of incidents related to winter maintenance of cycling and walking paths. Cycling or walking related incidents that are reported to the police are further compiled to national statistics. According to data from Statistics Finland, there were 216 pedestrians or cyclists injured (not including seriously injured) in Turku between 2014-2016. The map below shows their locations in the city center (pedestrian incidents in orange, cyclist incidents in lilac). Data on the cause of the incident was available for each incident – however it was not specified in this data whether the incidents were road maintenance related. 23 of these incidents occurred within the laboratory area – however due to the fact that the cause of these incidents is not specified with enough detail, it is impossible to say whether they were related to winter maintenance. Overall, there is significant fluctuation in numbers of incidents each year, mostly likely due at least partially to the varying winter weather conditions in Turku.

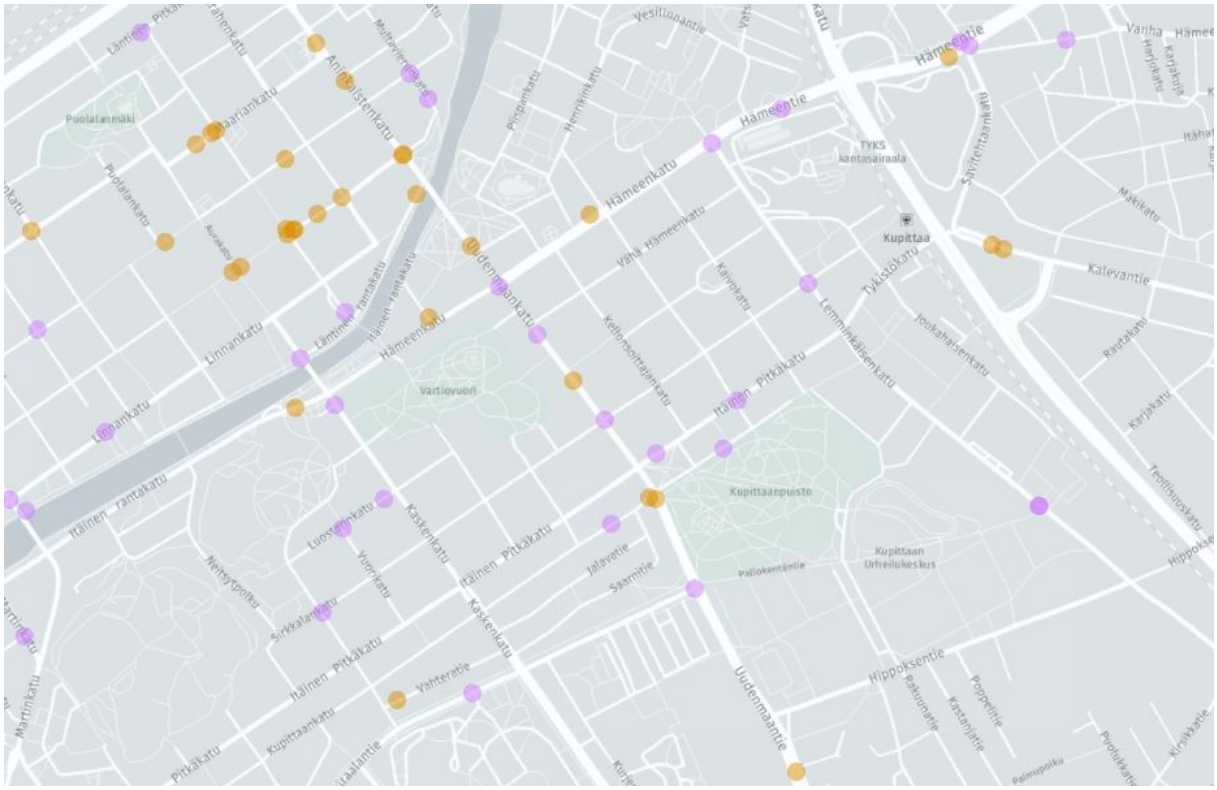

Figure 31. Pedestrian and cyclist incidents within Turku city centre 2014-2016. Source www.mobilityanalytics.ramboll.com

C. Validation of impacts: a look into the case of measure MUC 5.9

Background information MUC 5.9

The intermodal (E-)mobility stations implemented during the CIVITAS ECCENTRIC lifetime aim to implement a new multimodal mobility service for all citizens. These mobility stations are located within the Living Lab combine and provide different sharing offers with charging infrastructure and general information about the different mobility options. They are easy accessible in close location to public transport offers and serve as an alternative to individual car ownership.

The evaluation of MUC 5.9 showed that about 76% of the residents which are making use of the mobility offers are satisfied with the mobility stations and the selection of vehicles as well as the services which are being provided. In general, the usage rate of mobility stations is quiet low (depending on the station, between 3%-15%) and cannot promote a positive mode shift towards more sustainable transport options within the short project lifetime. Residents obviously need more time to change their mobility behavior. To raise the awareness of the mobility stations and make them more visible, residents wish to have a more striking color marking of the station and to integrate the service into Munich's mobility apps. For further details, see Measure Evaluation Report MUC 5.9.

Objectives for pursuing a detailed impact evaluation

Measure MUC 5.9 Intermodal (E-)Mobility Stations has obviously raised awareness and is well accepted within Munich's Living Lab of Domagkpark and Parkstadt Schwabing (see MER MUC 5.9). Due to successful stakeholder cooperation and transparent processes regarding the mobility station development, implementation and maintenance, the City of Munich showed big interest in upscaling and replicate the measure output. In addition to the development within CIVITAS ECCENTRIC, there were two other projects in Munich, namely SmarterTogether (H2020) and City2Share, which implemented a different form of mobility stations in two other districts of Munich. As there is now so much more knowledge about the usage, awareness, acceptance and satisfaction of mobility stations in general, the City of Munich aims to develop a city-wide concept of mobility stations in the future.

This detailed analysis of MUC 5.9 helps to provide reliable information which supports the decisions making process for Munich's City Council. For that reason, additional multivariate analysis was carried out to look deeper into the user requirements, especially how to reach the non-users and develop the mobility station concept to make it more attractive for different user types.

C.1 Detailed Evaluation findings

Evaluation approach / methods

For a better understanding of the usage behaviour of mobility stations, it is worth considering the indicators awareness, acceptance and (non-)usage. If a station is not known or not accepted, its usage can be directly excluded. For this reason, the three instruments were examined in chronological order: first the awareness, then the acceptance and third consequently the usage. By means of this analysis, it was consequently examined which factors could have an influence on the non-use of the stations.

The specific analysis of the non-usage, respectively the non-users helps to get to know more about this particularly important group of citizens who potentially could make use of the mobility station options. Besides the fact to find out how mobility stations could beup scaled in the city, the look into the social status and demographic background of both groups, users and non-users, provides important information to further build on.

In order to investigate these aspects, a household survey was conducted for the residents of the urban districts Domagkpark and Parkstadt Schwabing, in the time period from the 8th of september to the 18th of october 2019. In this survey, questions were asked regarding household and personal characteristics, awareness, and usage of the mobility stations in the neighbourhood and also personal mobility behaviour. The interviews were done either by telephone or online with an access code which was given to the citizens in advance. A total of 2095 households were questioned, which represents a response rate of 16 %.

The evaluation of the was conducted with the help of a statistical program. In the first step, a detailed evaluation of the instrument's awareness, acceptance and usage was done by using descriptive statistics and cross tables. Afterwards, the extent of the influence of several parameters was examined in order to predict the probability that the mobility station will not be used. For this purpose, logistic regression analyses were used. This verifies whether a relationship between several independent variables and a dependent variable, which is the non-usage of mobility stations, exists.

Results

Awareness

The three stations Fritz Winter, Gertrud Grunow and Marianne Brandt are listed with regard to whether they are known or not by the residents of Domagkpark. Table A.2-1 provides an overview of the results.

Station	Known	Not known	Not specified, not applicable[9]	Total
Fritz Winter	179 (68.1 %)	78 (29.7 %)	6 (2.3 %)	263 (100 %)
Gertrud Grunow	188 (71.5 %)	66 (25.1 %)	9 (3.4 %)	263 (100 %)

[9] For a better comparability of the awareness at different stations, the responses "not specified, not applicable" are included in the calculation.

Marianne Brandt	95 (36.1 %)	159 (60.5 %)	9 (3.4 %)	263 (100 %)

Table 24. General awareness of the three mobility stations in the study area

The Table 24 shows that the stations Fritz Winter and Gertrud Grunow are known by more than two thirds of the Domagkpark residents. Both are placed in Domagkpark, whereas the station Marianne Brandt is located in Parkstadt Schwabing, and therefore not in the direct vicinity of the survey participants.

All in all, 78.1 % of the residents know at least one mobility station in their living environment.

With this, a high degree of awareness of the stations is evident.

Acceptance

The Acceptance of new mobility options increased due to the project, which can be seen by the increasing number of loan processes of the new mobility offers (MUC 5.9) and the increasing number of users, having several apps for different mobility offers at the same time.

The following graphic, Figure 32, shows the personal statements of mobility sharing in general of all questionnaires.

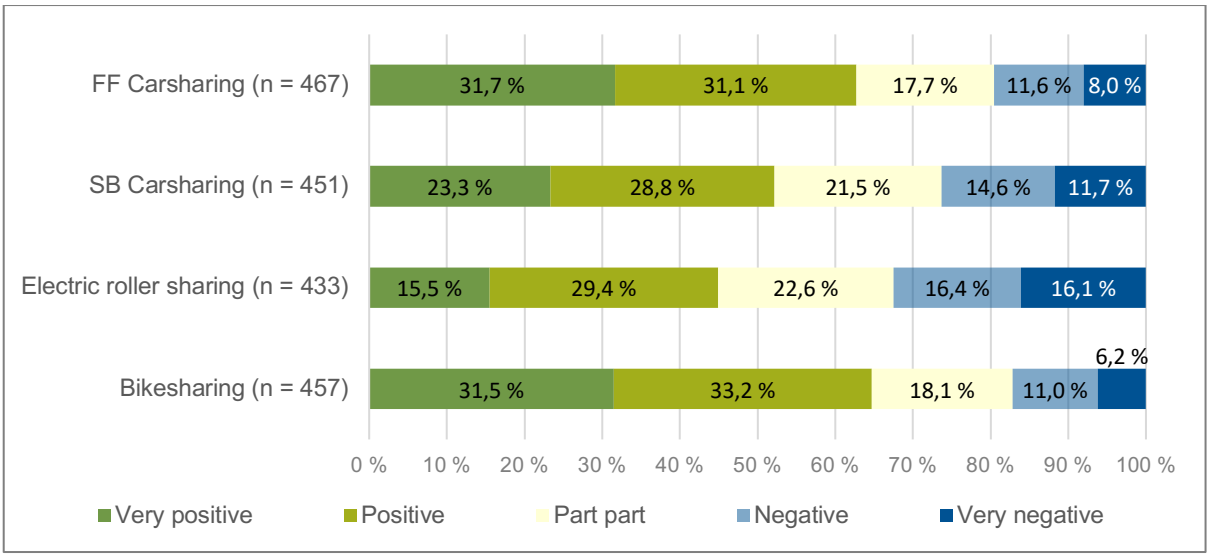

Figure 32. Personal Statements of mobility sharing in general

From the diagram it becomes apparent how different the opinions on the diverse services are. While the acceptance of bike sharing service is very high (64.7 % voted for 'very positive' or 'positive' and only 17.2 % for 'very negative' or 'negative'), the general acceptance of electric roller sharing varies. Here 44.9 % rate the offer as 'very positive' or 'positive', but 32.5% also dislike it. In the questionnaires on carsharing, it is striking that free-floating carsharing enjoys higher acceptance with 62.8 % '(very) positive' and only 19.6 % '(very) negative', than station-based carsharing with 52.1 % '(very) positive' and 26.3 % '(very) negative'.

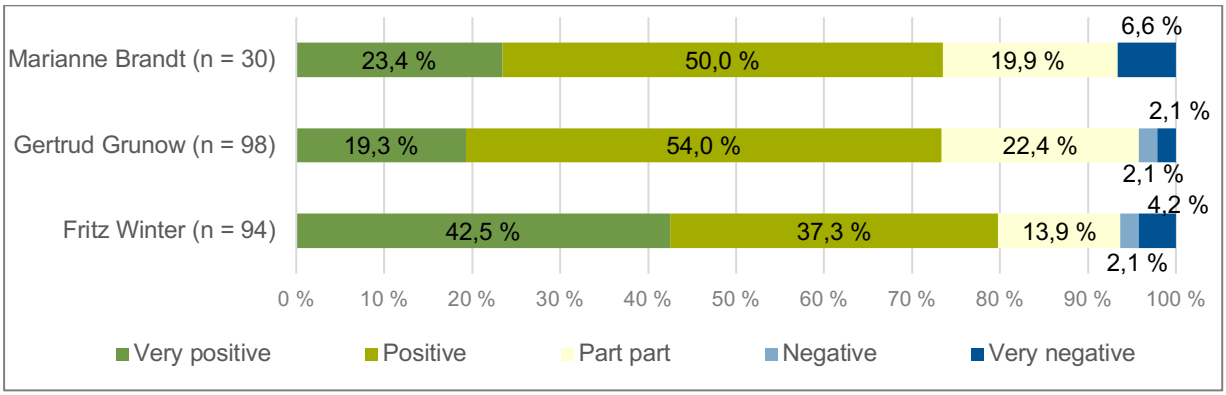

Figure 33. Personal statements of specific mobility stations (if station is known)

The scales of Figure 33 show that the majority (more than 70 %) of those who have expressed a statement have a positive to very positive perception of the mobility stations. The percentage of those who have a negative to negative opinion is just below 6.6 %. However, a large part also abstained from giving a statement.

It is remarkable that the proportion of people with negative or very negative attitudes towards specific stations is very low compared to the proportion of people with negative or very negative attitudes towards sharing in general (see Figure 32) indicates a good implementation which has resulted in an enhanced perception and therefore acceptance of the system.

Usage

The proportion of residents of Domagkpark who use at least one mobility station is 24.7 %. In each station, the most frequently used service is commercial carsharing, followed by e-carsharing. The information column is evidently the least frequently used.

The most frequent answer for the purpose was the usage for leisure trips with a rate of 86.2 %. 44.6 % of the trips are shopping trips and 27.7 % are working or educational trips (see Figure 34).

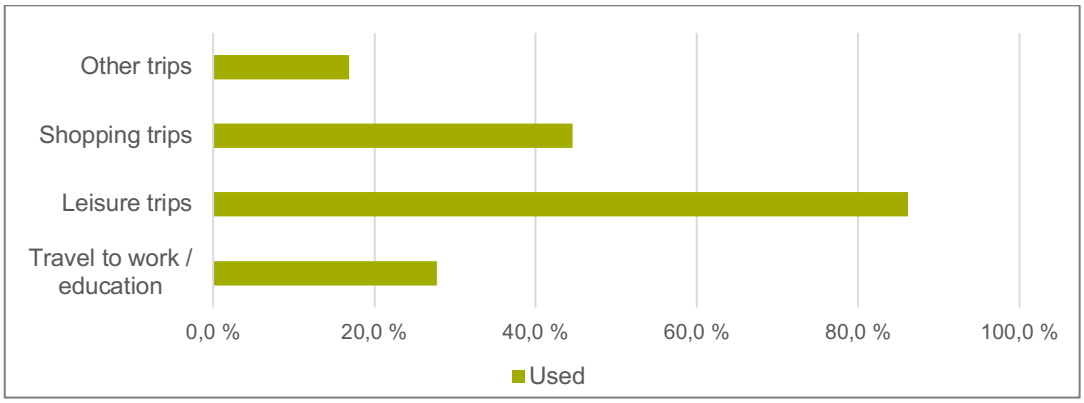

Figure 34. Purpose of usage; n = 65

Looking at the users more closely, several different characteristics can be seen. Regarding age, for example, car sharing is used most by people at the age of 30-39, followed by 40-49 (see Figure 35). With increasing age, use also falls significantly. The same trend can also be seen in the usage of bike sharing (see Figure 36).

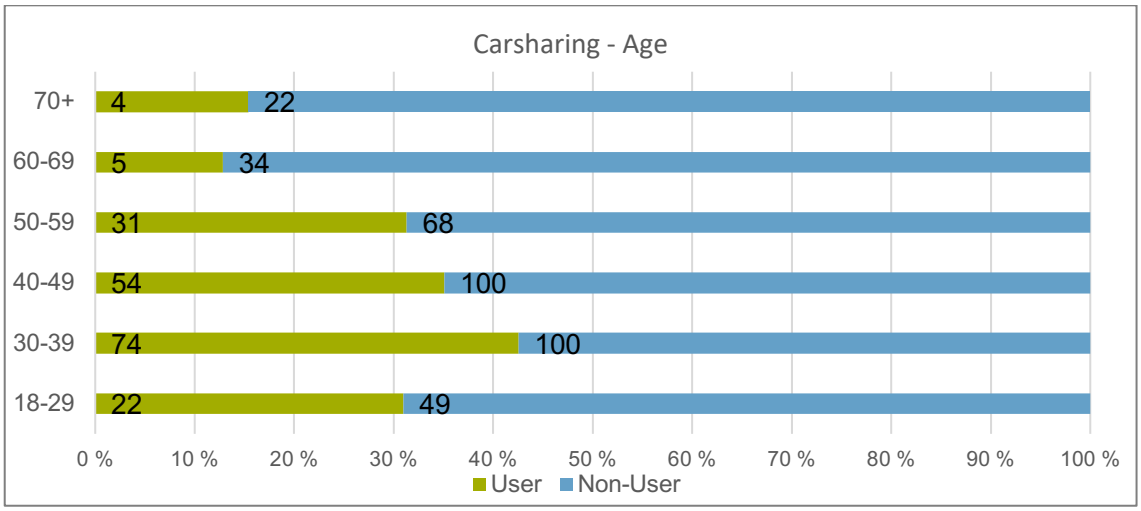

Figure 35. Carsharing age distribution; n = 563

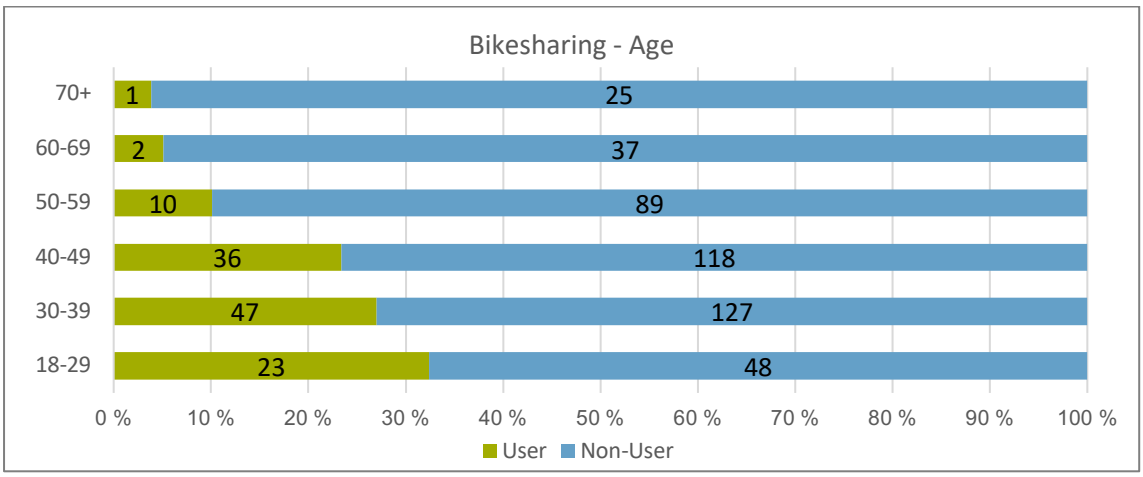

Figure 36. Bike sharing age distribution; n = 563

An examination of gender also reveals a greater use of men, both in car sharing and bike sharing. While 60.0 % of car sharing users and 65.5 % of bike sharing users are male, only 38.4 % of car sharing users and 32.8 % of bike sharing users are female.

In terms of profession, it can be seen that full-time workers tend to use car sharing services the most. The proportion of full-time employees using bike sharing is also considerable, although there is also a noticeable high percentage of students who use the service.

Non-Usage

On the next step reasons for not using the stations are to be investigated. Considering the question why the mobility stations are not used, there is no direct indication of improvement. Neither the costs, the complexity nor the vehicle availability can be seen as reasons for non-usage, as the answers were chosen by a maximum of 7.1 % of the respondents. As Figure 37 shows, the majority simply stated that they had no need (ca. 50.0 %). Therefore, it was investigated which factors might have an influence on the non-usage of the mobility stations in the study area and which influence factor is the most significant.

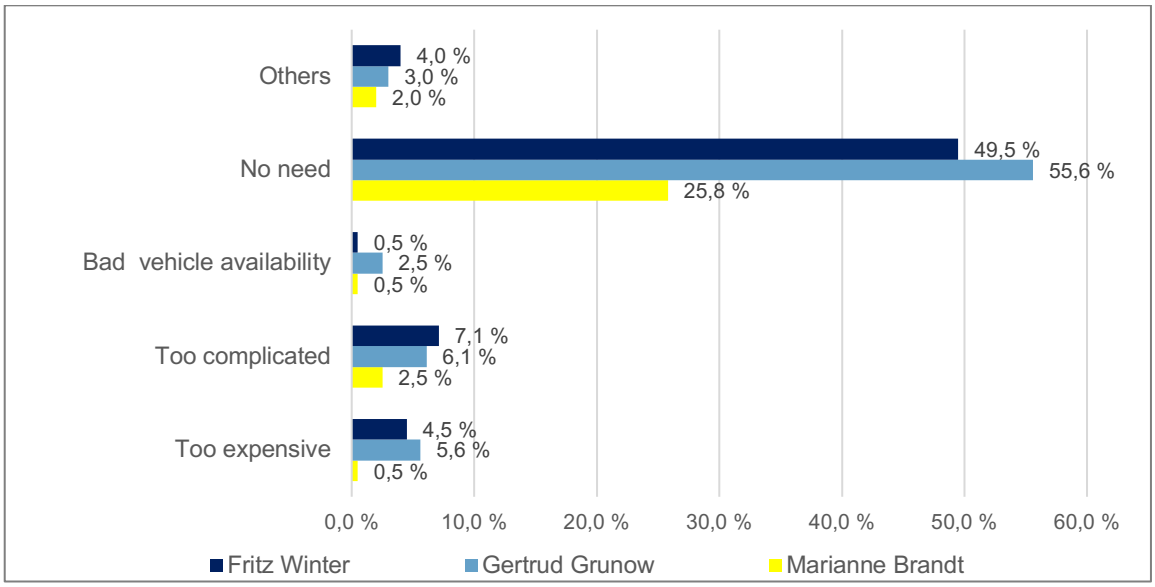

Figure 37. Reasons for non-use of the stations; n = 198

Remarkable is the high car ownership rate in the study area. The proportion of households who have at least one car available is 76.8 % in the entire study area. When comparing the car ownership rate of users and non-users, the difference is considerable: 85.8 % of the non-user have at least one car available, whereas only 44.6 % of the users do so. Based on this characteristic, the factor of car ownership will be examined as a potential influencing factor.

The percentage of residents who own (at least) one private bicycle is almost 85 %. Comparing the share of the bicycle rate of users and non-users, again a significant difference can be seen. The contrast is striking: 20.2 % of the non-users do not own a bicycle, whereas only 6.2 % of users do not own a bicycle. For this reason, the bicycle ownership was also further investigated for its influence

Also, age and economic activity were identified as further possible influencing factors. The majority of users is between 30 and 40 years old and works full-time.

Subsequently, these four factors were integrated into the following equation and their influence on non-use was examined by means of a logistic regression.

$$P(NU = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 * CAR_{OWSH} + \beta_2 * BIKE_{OWSH} + \beta_3 * P_{AGE} + \beta_4 * JOB_{FULLTIME} + \varepsilon)}}$$

Looking at the regression results, the significance values indicate that only the variables car ownership and bike ownership are significant (only those are lower than the significance niveau of $\alpha = 0.05$) and can be analysed. The factors age and fulltime job are not representative enough to be evaluated as a possible reason for not using the mobility station service.

By using a logistic regression model, the probability of occurrence of *NU* is predicted. Thus, a value close to 0 means that the occurrence of *NU* is very unlikely, while a value close to 1 means that the occurrence of NU is very likely. The odd ratio value (Exp(B)) of 'bicycle ownership' is below 1. This indicates a negative effect. In practice, this means that people, who own a bicycle, tend to use the service rather than not using it.

More striking is the variable ‘car ownership’. Its value of 7.569 shows that people, who live in a household with at least one car, tend to have a stronger tendency not to use the mobility stations of the study area than people who do not.

Based on the results, it can be confirmed that especially the factors ‘car ownership’ and ‘bicycle ownership’ have an influence on the non-use of the mobility station. This relationship was statistically verified. Especially the positive correlation of the variable ‘car ownership’ is striking which implies that a person, whose household owns at least one car, tends not to use mobility station services (which offers more than only carsharing services) compared to a person who does not own or has access to a car in its household.

B.2 Evaluation conclusions

This analysis shows findings on the evaluation of the mobility stations in the living lab of the CIVITAS ECCENTRIC project. As it can be seen the awareness is quite high. All in all, more than three quarters (78.1 %) of the residents know at least one mobility station in their living environment. Considering the different services of the station, it is remarkable that the majority knows the carsharing offers and that the information pillars are almost not known.

By the evaluation of the acceptance, it can be seen that the residential opinion about the mobility stations in the Domagkpark is very good. More than 70 % indicated a very positive feedback.

About 1/4 of those surveyed currently use the mobility stations. In the next step, user profiles are examined in more detail. Thus, not only the user but also the non-user could be characterized. For this purpose, only carsharing and bike sharing behaviour was investigated. When defining the non-users, they are likely to be high aged, female rather than male and tend to high household size.

Out of these results, a calculation was constructed which was intended to check if there is a connection between not using the mobility station and car ownership, bicycle ownership, age and full time job.

The findings show directions and strengths of the variables’ influence. Especially remarkable is the strong influence of car ownership.

Looking at the statements of the survey participants about their car usage, it can be seen that 33.77 % of the households have indicated that they would like to use their car less.

C.3 Additional information

The results of this more detailed evaluation of the intermodal (e-)mobility stations of measure MUC 5.9 directly support the decision-making process at city-level. As mentioned in the beginning, a city-wide concept of mobility stations is intended to develop for the city of Munich. The results of this analysis are to be discussed as a major decision support during future city council meetings. Thus, this detailed study is considered as a direct preparation of a possible city council decision regarding the upscaling of mobility stations in Munich, which is expected to be made in the upcoming year.

A further detailed evaluation approach which compares the awareness, usage and satisfaction with mobility stations in the three model projects in Munich is aiming to bring even more profound knowledge into the development of the mobility stations concept. Future analysis will focus on the following topics:

(1) Added value of mobility stations compared to isolated offers
(2) Effect of mobility stations on traffic behaviour and modal split
(3) Factors influencing the use of mobility stations
(4) Additional measures to influence usage: push vs pull
(5) Design aspects
(6) Public space
(7) Logistics solutions

These analyses are part of further investigations within the city of Munich, together with the stakeholder group which mainly formed during the CIVITAS ECCENTRIC project.

D. Interactions between variables

Interactions of Acceptance of Sustainable Mobility Solutions

Acceptance of Sustainable Mobility Solutions and Active Mobility (11&16) and Multimodality (11&13)

The higher the acceptance towards active mobility, the higher the probability to increase active mobility there will be. However, this is not a linear behaviour, acceptance does not mean adoption or a change in behaviour. For this interaction, active mobility is restricted by several factors, and it will not increase unless factors that limit it can be changed.

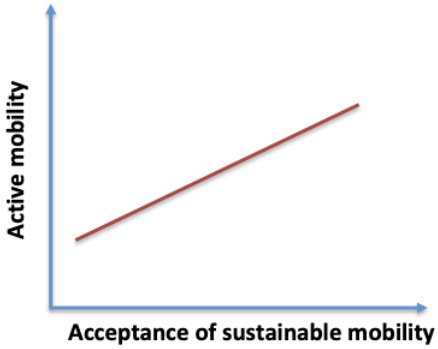

Figure 38. Interaction between active mobility and acceptance of sustainable mobility

Considering the previous section, it would be expected that the higher the acceptance of a sustainable mobility strategy the higher it will be the probability to increase the multimodality among the targeted population. If sustainable mobility strategies include a reasonable set of options for transport and mobility that incentivise multimodal service. This interaction does not ensure a switch in multimodal behaviour since acceptance is not the same as adoption but this increases its probabilities to be adopted; adoption will depend on other additional factors such as convenience, frequency, travel time, waiting time, safety, cost, etc[10]. (Goletz, Feige, & Heinrichs, 2016, pág. 56). In order to increase acceptance, the measure most be promoted and well-advertised on the first place.

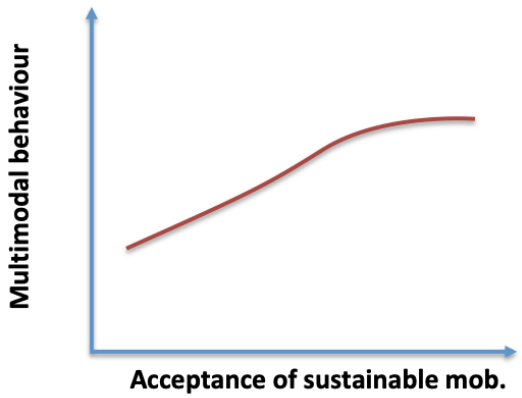

Figure 39. Interaction between multimodal behaviour and acceptance

Interactions of Amount of Urban Space for people

Amount of Urban Space for people and Quality of the Street (22&24) and Active Mobility (22&16)

Initially the amount of urban space for people will have a positive effect since it will increase the accessibility in the area; however, this doesn't mean that it will improve the availability of places of interest around the street. Nevertheless, it will have a positive effect on the first stages until the system reaches saturation and then a turning point will be expected with an inverse effect on quality of street.

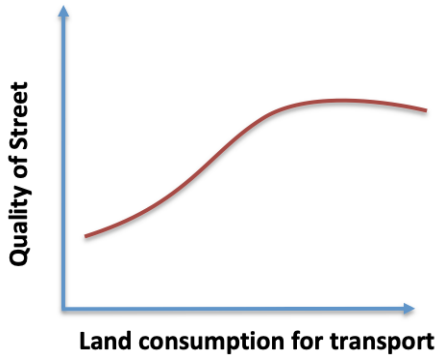

Figure 40. Interaction between quality of street and land consumption for transport.

As well, the amount of urban space for people will determinate the amount of available active mobility infrastructure, therefore the more space for high quality-safe infrastructure of active mobility networks the more active mobility there will be.

Attractiveness/Value and Amount of Urban Space for People (6&22)

Attractiveness/Value of land is an indicator on how profitable the area is for a specific purpose, such as residential, industrial or commercial purposes, which will also represent an opportunity cost for the owner; the higher the value, the higher the opportunity cost. In general, when land is privately owned and it has a high value it will be more difficult to unlock such land for transport purposes, producing a negative effect in land consumption for transport. The higher the land value, the lower the willingness of the owner to convert the land into transport infrastructure will be. This relationship also depends on the way the land ownership is legally

managed and the land planning in each specific area. When the government owns land, it would be easier to change the land use to transport infrastructure as long as the overall benefits are higher than the cost.

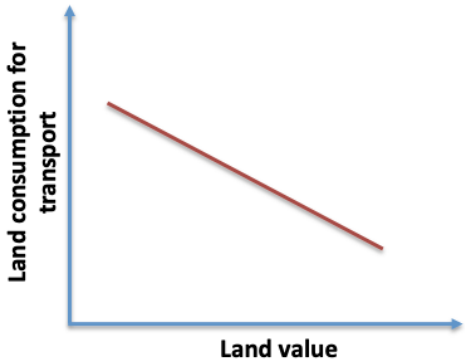

Figure 41. Interaction between land consumption for transport and land value

Motorized Individual Transport and Amount of Urban Space for People (26&22)

Private transportation infrastructure has a lower capacity per vehicle and requires larger amounts of land than public transportation, which leads to a positive relation. It can be estimated that the lager the private transportation infrastructure, the larger the land consumption there will be. Nevertheless, this relationship is normally limited by land availability, which depends on the specific conditions of the city or area of study.

Interactions of Car Dependency

Car Dependency and Car Ownership (12&9), Vehicle Kilometre Travelled (12&10), Multimodality (12&13), Active Mobility (12&16), Walking and Cycling (12&29), Ridesharing (12&15) and Investor interest in Sustainable Mobility (12&2)

Car dependency is positively associated to car ownership and it is affected by the same external factors. The main socio-demographic factors that influence car ownership of a person are age (positive and then negative), income (positive, but not sustained everywhere) and household size (positive) (Krygsman, 2004, pág. 77); at the same time, these are regulated by other variables of the built environment and user comfort (Ecola, Rohr, Zmud, Kuhnimhof, & Phleps, 2014). Although income has been positively associated with car ownership, this is not always the case; this interaction depend pretty much on the particular characteristic of the area of study, where develop or high income countries show a weaker relation between income and car ownership than in less developed countries (Acker & Witlox, 2010, págs. 68,73). Policies also play an important role, on encouraging (positive) or discouraging (negative) car ownership, however, discouraging policies does not always have the expected effect, this also depends on the socio-emotional connotation of car ownership.

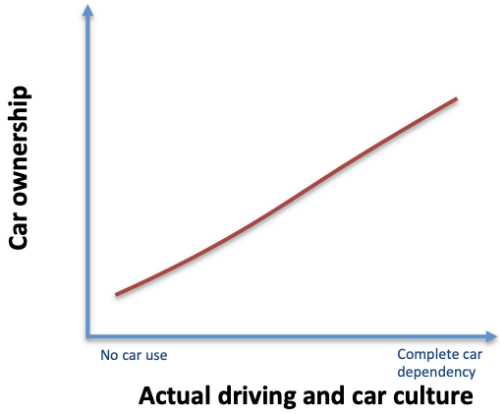

Figure 42. Interaction between car ownership and actual driving and car culture

There is a positive relation between the vehicle kilometre travelled and car dependency; the more car oriented a city is the more vkm there will be. Studies have shown that users that are more willing to participate in any type of car-sharing have shown a decrease in vkm; avoiding new car purchases also encourage the use of other means of transport, and users become more selective on the type of transport mode that they use for each travel. This case is true as long as the area provides to its users a good infrastructure in terms of transport, specially giving them the opportunity to drive a car when needed (Martin, Shaheen, & Lidicker, 2010). Socio-emotional factors are also quite important; when car ownership is associated to a positive social class affiliation there will be more resistance towards decreasing vkm (Goletz, Feige, & Heinrichs, 2016, pág. 58).

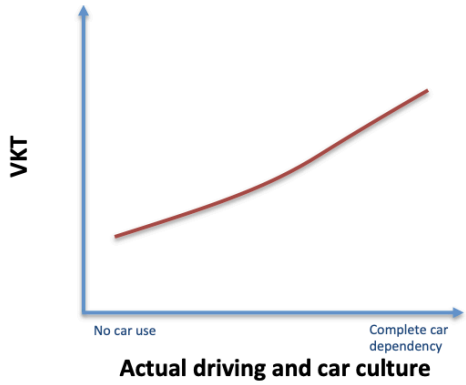

Figure 43. Interaction between VKT and actual driving and car culture

As well, existing studies have suggested that a society that is less dependent on car implies a higher level of the use of more than one transport mode within a giving period of time. Therefore, a positive increase in multimodality. The trends tend to be similar between alike socio-economic characteristics, with related constrained individual time budgets and shrinking monetary budgets.

A reduction on car dependency can address an increase in health-enhancing active travel. Travel habits influence travel amongst different groups, this varies according not only by the

different demographic groups (i.e age, income, gender, etc) but as well according to different factors such as residence location, accessibility, reliability, etc. (Hayden, Tight & Burrow 2017).

Also, distance to destination is one of the main decision factors between walking and cycling and use of car. The state of the active mobility infrastructure is a highly influence factor. (Hayden, Tight & Burrow 2017).

Users of ridesharing exhibit a more multimodal behaviour than car owners and seem less car dependent. This could be seeing as a negative relation with actual driving and car culture, where the higher the willingness to share mobility means the less car dependency there will be. However, this assumption is not always true, and it will never reach the opposite end of actual driving and car culture, which is no car use at all, since in principle, share of mobility resources involve motorized vehicles. Therefore, it will be expected to have a negative relation followed by a plateau and in some cases, a positive increase.

Car Ownership and Car Dependency (12&29)

Those with access to a car in their household tend to make more trip. When there is a strong cultural positive association (i.e. symbol of status/willingness to show social class affiliation), it has been observed that car ownership will trend to increase despite any discouraging policies and under this scenario, income will have a positive relation with car ownership (Goletz, Feige, & Heinrichs, 2016, pág. 59).

There is a considerable variation in patterns of car access and use across different sections of the population, generally people living in rural areas are more likely than those in urban areas to be drivers and to have household access to a vehicle and consequently car usage (Stradling, 2007).

User Cost of Individual Driving and Car Dependency (3&12)

It seems to be an inverse relation between the user cost of private motorized mobility and the number of car users. The lower the prices (including monetary prices and travel time) for individual motorized mobility, the more car users there will be. Car dependency is regulated by other factors that determine the elasticity of the curve.

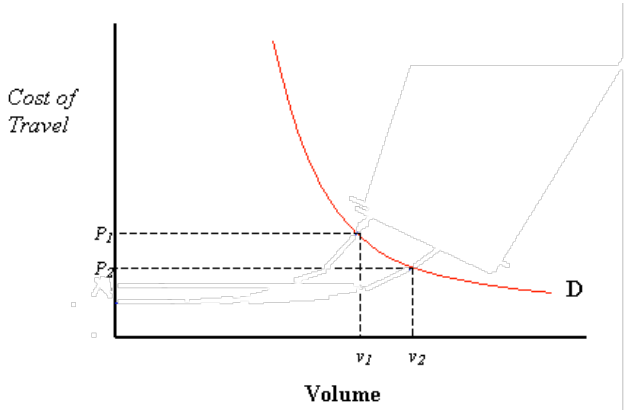

Figure 44. Interaction between cost of travel and volume

Motorized Individual Transport and Car Dependency (26&12)

Motorized individual transport infrastructure is expected to have a strong positive effect on Actual driving and car culture; the larger availability of these resources and the more car dependency there will be. This will be influenced by other factors such as availability of other means of transport (public transportation, cycling, and walking) and affordability of private transport.

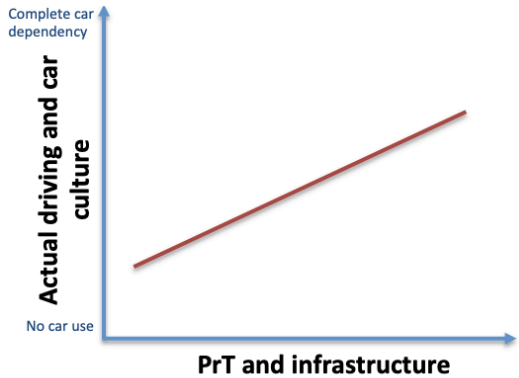

Figure 45. Interaction between actual driving and car culture and PrT infrastructure

Interactions of Congestion

Congestion and Economic performance and Competitiveness (32&1) and User Cost of Individual Driving (32&3)

Congestions seems to have a positive and inverse effect in economic growth; in the early stages it seems to be positively correlated to economic growth, until it reaches a point at which congestion has an inverse effect. According to some studies, congestion reduces national and regional economic competitiveness, but at the same time firms and workers adapt to congestions challenges (Fernald, 1999; Boarnet, 1997; Hymel, 2009). Nonetheless, higher congestion levels that affect capacity for additional travel (peak in the graph) appears to be associated with decreasing regional employment growth and slower productivity growth per worker (Sweet, 2014).

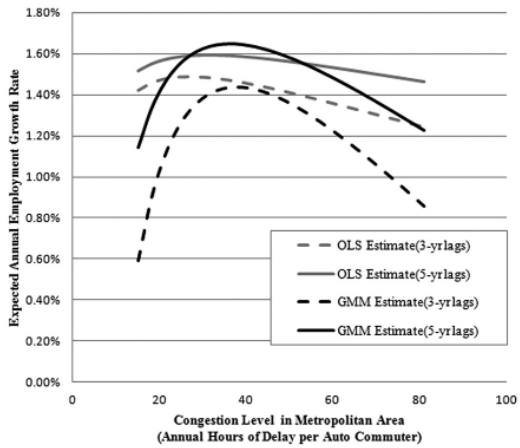

Figure 46. Expected behaviour graph (Sweet, 2014, pág. 2103).

When congestion increases so does the demand for road space and motorized vehicle services such as parking space, fuel, toll roads (road space), etc. Under this scenario, there are two possible outcomes, if the benefits exceed the cost and there is availability of land, there could be an increase in supply of road-space, which in theory could reduce the user cost of private logistics. However, this is more likely to occur in young cities where infrastructure is still growing, besides more roads will attract more drivers and congestion will increase again. The other possibility is to limit road space, which will normally include a rise in the prices of car ownership, such as fuel and car taxes, driving license and parking fees, increase in road pricing, etc., or they will reduce the comfort of car users through higher travel times and less comfort (Economis online, 2019).

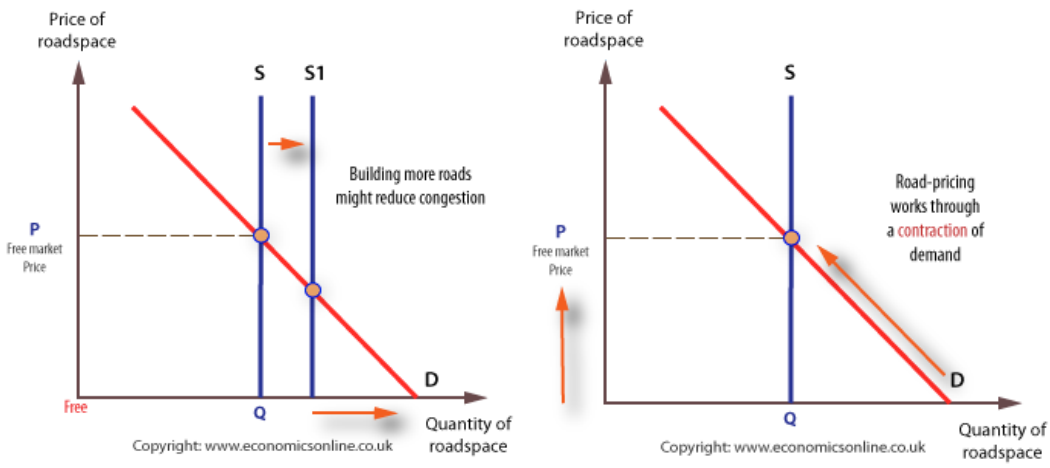

Figure 47. Interaction between price of road space and quantity of road space

Motorized Individual Transport and Congestion (26&32)

Ideally, private transportation will have an inverse effect towards congestion; the higher the supply of motorized individual transportation infrastructure, the lower the levels of congestion there will be. However, this interaction is limited by the land availability around the area and it is also affected by the urban structure of the area, its economic development and the availability of high quality public transportation; when these two first factors are high and the third low there is a very high probability for congestion to not to significantly decrease regardless of how much more PrT infrastructure has been built or for it to rise again.

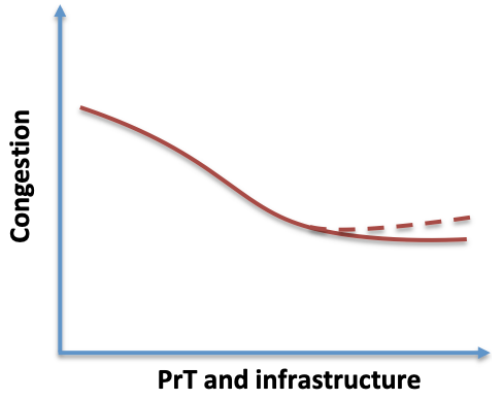

Figure 48. Interaction between congestion and PrT infrastructure

Interactions of Multimodality

Multimodality and Public Transport Ridership (13&14), Active Mobility (13&16), Walking and Cycling (13&29), Ridesharing (13&15) and Car Dependency (13&12)

Based on four studies conducted in European cities, the interaction between multimodality and PuT ridership has a positive feedback relation; the more willing a person is to use different transport modes the higher probability to increase public transport ridership. Ideally, this interaction would have a positive effect in the early stages followed by a plateau at which this behaviour will change due to the saturation of the system. This behaviour is true assuming the area of study has moderate to high population density and if the area provides several competitive transport modes that have an easy transition between each mode. The degree to how fast this relation moves depends on other external factors.

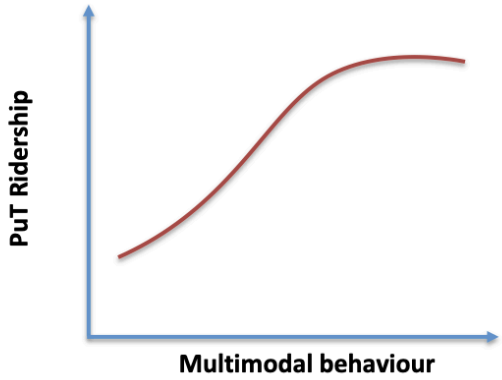

Figure 49. Interaction between PuT ridership and multimodal behaviour

Too, people exhibiting multimodal behaviour are more likely to use active mobility modes (positive relationship) limited by different by socio-demographic factors. The behaviour will show an increase in active mobility as people are more open to multimodality, but the trend will reach a plateau that is limited by several factors described below. Life stages: young (students) and old people are more prone to multimodal travel behaviour including mainly active mobility and PuT. More motorised trips associated to PuT show a positive relation with

full-time employment, large urban size (more than 20,000 inhabitants), and population density, while middle-aged, household size, income, employment rate, exhibit a positive relation with motorized car; urban size and population density have an inverse effect (Olafsson, y otros, 2016; Nobis, 2010).

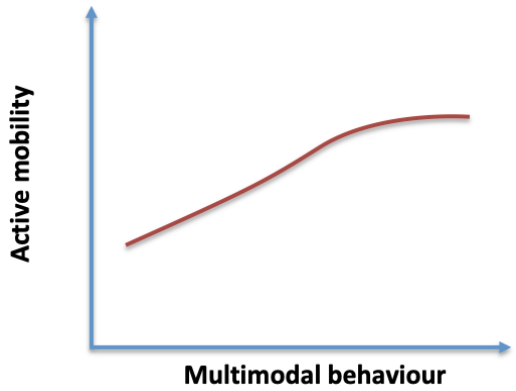

Figure 50. Interaction between active mobility and multimodal behaviour

Active mobility such as walking and cycling is also positively related to urban size and population density as well as the quality of the built environment (infrastructure), which highly influences the accessibility within an area. Trip characteristics such as distance and travel time have an inverse effect; particularly travel time. Longer distances are found to be negatively associated with active mode use, which is also related to the built environment. Season and weather characteristics could also discourage multimodal active behaviour, however, this depend on the maintenance of the walking and cycling infrastructure and the characteristics of the culture of each city (Ton, y otros, 2018, págs. 2-3). A mobility success also depends on the extent to which new and existing residential areas are able to develop critical mass of destinations such as workplaces and facilities within short distances (Bertolini & Clercq, 2003, pág. 588).

Multimodality is only an attractive alternative if the access and egress distance is not too large; travel-time is quite relevant in travel behaviour. For ridesharing to count as available, it must be within acceptable access/egress distance, and accommodate the users' needs (i.e. flexibility, comfort, etc.) (Krygsman, 2004, pág. 169).

On the other hand, multimodal behaviour will have a negative effect on the car dependency and car culture; the higher the multimodal behaviour, the less car dependency there will be. The ones that are more prone to complete car dependency are more reluctant to multimodality. Car culture is highly influenced by the surrounding environment and a country's culture; this includes not only the sense of mobility/freedom (positive relation), personal space and privacy (positive), favourable attitudes and beliefs of car ownership (negative), but how car oriented is the city (negative), population/spatial density (positive) and quality and availability of mode choice (positive) (Ecola, Rohr, Zmud, Kuhnimhof, & Phleps, 2014, pág. 55). Socio-demographic factors such as income, age, employment and car availability are also relevant for this interaction; and in some studies the provision of multimodal and intermodal traffic information is also relevant to increase multimodal behaviour in car users (Kopp, GerikeKay, & Axhausen, 2015, pág. 466).

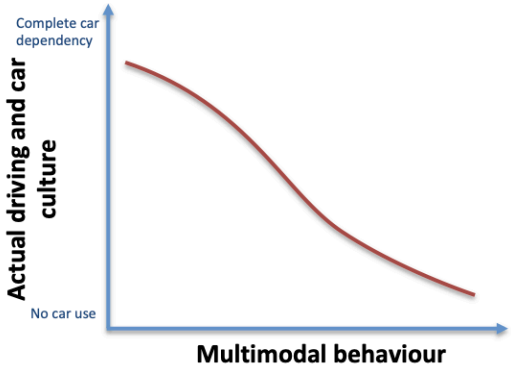

Figure 51. Interaction between actual driving and car culture and multimodal behaviour

Ridesharing and Multimodality (15&13)

According to several studies, it seems to be a positive relation between these two variables, which shows that the higher a shared mobility resources in a city, the higher the multimodal behaviour (Nobis, 2010; Martin, Shaheen, & Lidicker, 2010; Kopp, GerikeKay, & Axhausen, 2015). Studies related to users of ridesharing, show a more multimodality; users trend to use diverse mobility services, including public transportation, walking and cycling (Kopp, GerikeKay, & Axhausen, 2015, pág. 452).

Although it is not clear whether the behaviour was already there and the availability of shared mobility services enhance such behaviour, or whether it persuades people from getting a car and reducing its multimodal behaviour. However, for this to be true, there should be a reasonable and well know amount of alternatives to private cars in which the attractiveness of alternatives plays an important role in supporting existing multimodal travel patterns (Kopp, GerikeKay, & Axhausen, 2015, pág. 466). Some factors that seemed to be especially relevant to positively influence this relation are education and income.

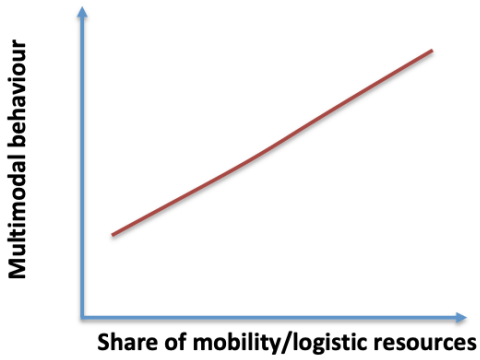

Figure 52. Interaction between multimodal behaviour and share mobility logistic resources

Interactions of Public Transport (shared ROW)

Public Transport (shared ROW) and Urban Structure (28&23), Multimodality (28&13), and Public Transport Ridership (28&14)

The interaction between Public Transport (shared ROW) and Urban Structure seems to have a positive correlation that does not directly depend on the interaction itself; Most developed countries in Europe show a stronger positive effect between these two variables assuming a positive economic development in the area, the more PuT transport a city offer the more people will be able to join to work in the city. Most high densely populated and monocentric cities trend to become polycentric at some point and having more PuT networks/services and infrastructure along the city allow the opening of new places of interest.

In cities with lower levels of development polycentric areas with high population density will trend to have higher amount of PuT infrastructure and services than monocentric and low-densely populated areas, but then the higher the population density the lower the quality of public transport service there will be. When the increase in population density is quicker than the increase in PuT infrastructure, the city will struggle to supply enough PuT, which can increase car ownership in such areas (Cooke & Behrens, 2017, págs. 3006,3014). In this case it will be a positive effect followed by a plateau and a decrease in quality of the services and infrastructure that will continue to decrease unless further actions are taken to level up the availability of public transport. This is strongly related to urban planning and its allocation of land for public transport (see other interactions). This relation seems to be regulated by country/area specific culture, conditions, governance and policies.

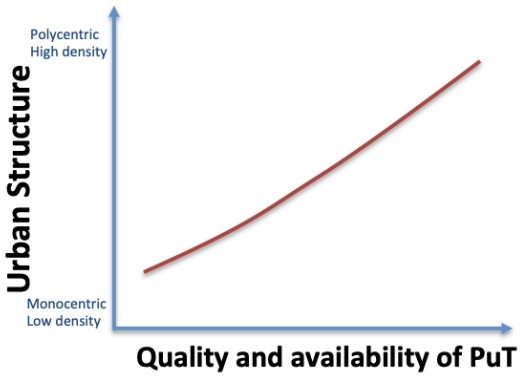

Figure 53. Interaction between urban structure and quality and availability of PuT

The availability of public transportation have a positive relation with multimodal behaviour, specially the availability in peak hours and distance between each mode are particularly important in areas with high population density (Anderson, Nielsen, & Prato, 2013, págs. 228-230; Olafsson, Nielsen, & Carstensen, 2016, págs. 125-128; Krygsman, 2004, págs. 169-172). For this to be true, public transport infrastructure not only should provide a competitive option to other transport modes (car, cycling, walking etc.), but also provide an easy and quick transition from one mode to another creating multimodal nodes in high density areas (Bertolini & Clercq, 2003, pág. 588).

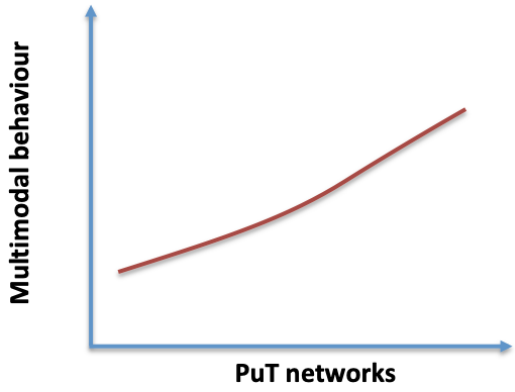

Figure 54. Interaction between multimodal behaviour and PuT networks

As well, the higher availability and high quality of PuT infrastructure, networks and services the higher the PuT ridership (positive relathionship). Nevertheless, as mentioned in previous sections, there are other factors that influence PuT ridership and those should also be considered when analysing interactions.

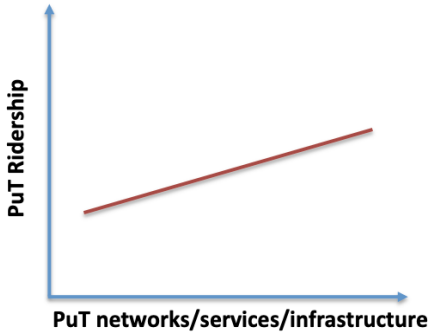

Figure 55. Interaction between PuT ridership and PuT networks/services/infrastructure

Cost/Pax in Public Transport and Public Transport (shared ROW) (4&28)

Public transport infrastructure plays a significant role in providing services to promote economic development. Forkenbrock and Foster (1990) indicate that improvement in transport infrastructure services is expected to reduce transport costs, with lower congestion, shorter distances and higher speeds to reach the goal of reducing fuel consumption and capital costs.

Interactions of VKT

Vehicle Kilometer Travelled and Congestion (10&), Local Pollution (10&20), Energy Consumption (10&21) and Injuries and Death (10&31)

It is expected that VKT will have a positive effect on congestion; the more VKT the higher the levels of saturation of the transportation network there will be. The rate at which this saturation level would increase will depend on other factors such as the configuration of the urban structure (polycentric slow down the rate, monocentric increase the rate), population density (increases congestion levels), economic growth (increases congestion), car discourage policies (reduces congestion), etc.

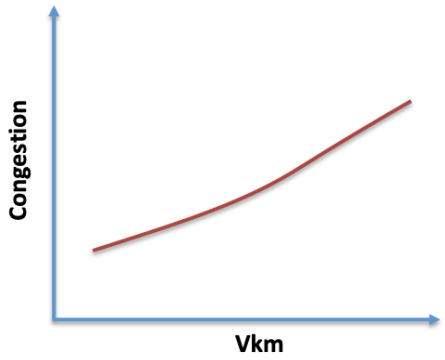

Figure 56. Interaction between congestion and VKT

In general, VKT has a positive effect on local pollution since the more kilometres a transport mode travels the more fuel it will consume and therefore the more air emissions it would produce. However, the production rate will vary according to several factors such as travel mode, passenger loadings, average age of the fleet, average level of maintenance of vehicles, and congestion levels would affect the results. For electric vehicles (including e-bikes), energy efficiency, and energy mix that power the charging station (coal, natural gas or renewable energies) is very relevant. If there is a fleet of only EV that are powered by renewable energy these relationships could have no effect on local contaminants.

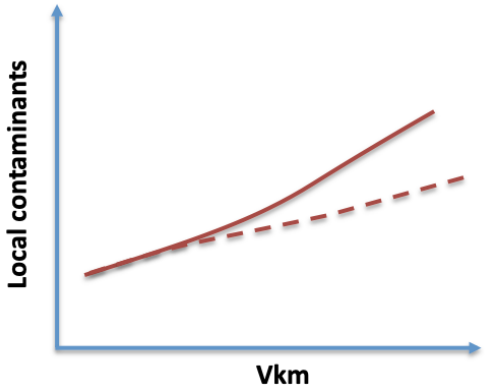

Figure 57. Interaction between local contaminants and VKT

Too, the VKT will have a positive effect on energy consumption; the more vehicle kilometre travelled by a transport mode, the more energy consumption there will be assuming only VKT from motorized modes. In the same way, the amount of energy will also vary according to the characteristics of the transport mode; most important characteristics might include type of vehicle, fuel consumption ratio/energy efficiency of the vehicle, occupancy levels, and type of fuel or energy mix.

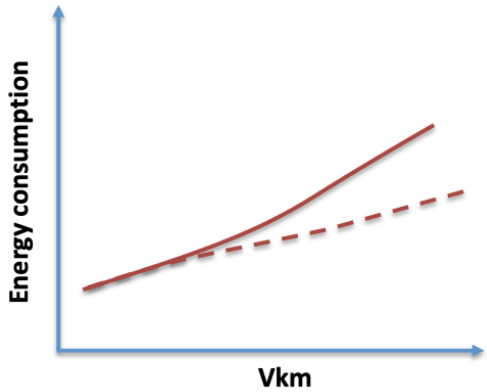

Figure 58. Interaction between energy consumption and VKT

On the other hand, research has shown that at the beginning of motorization of an area, accidents and fatalities tend to increase (transportation safety decreases) as the number of VKT increases. However, this relationship seems to reduce its growth rate and even sometimes reduce the accident/fatality rate as it interacts with other factors.

The accident/fatality rate will be defined by external factors such as population density, transport infrastructure, economic development, quality of transport safety standards and their enforcement, driving behaviour, etc. For example, higher accident rates are normally associated with less developed countries and the rates will tend to decrease as development increases (Al Haji, 2005; Gargett, 2010; Wachnicka, Kustra, Jamroz, & Budzyński, 2016).

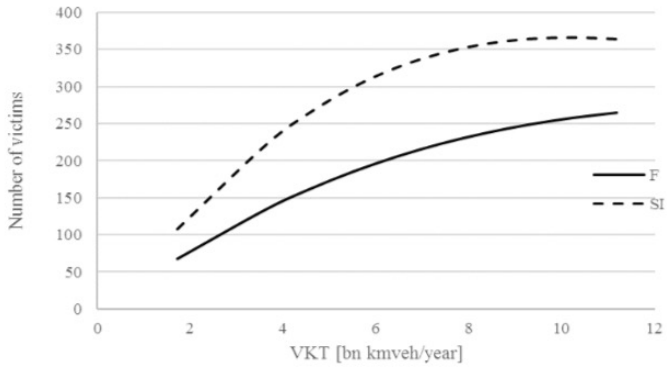

Figure 59. Interaction between number of victims and VKT

Ridesharing and VKT (15&10)

Studies have shown that ridesharing users have shown a decrease in vkt by discouraging new car purchases. Availability of shared vehicles might persuade potential car users (people that are considering buying a car) and encourage the use of other means of transport and multimodal behaviour. It has been observed that users become more selective on the type of transport mode that they use for each travel. This case is true as long as the area provides to its users a good infrastructure in terms of transport, specially giving them the opportunity to drive a car when needed (Martin, Shaheen, & Lidicker, 2010). Under these assumptions there will be a negative effect; the higher the sharing culture of ridesharing the lower the vkm there will be.

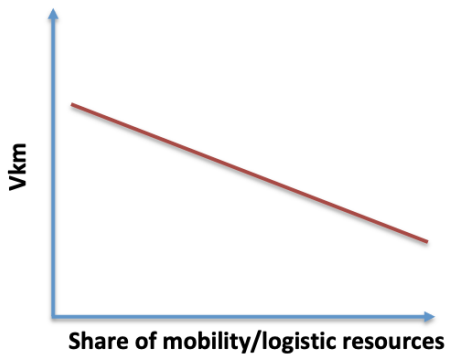

Figure 60. Interaction between VKT and share mobility/logistic resources

Public Transport Ridership and VKT (14&10)

The increase in PuT ridership will have an inverse effect on vkm; the higher the public transportation ridership there is the lower vkm there will be.

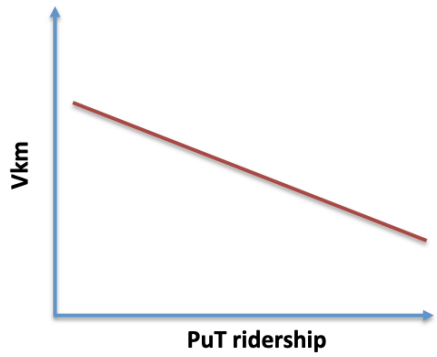

Figure 61. Interaction between VKT and PuT ridership

Active Mobility and Vehicle Kilometre Travelled (16&10)

There is Negative relation between this variables, since the more trips conducted by active modes, the less vehicle kilometre travelled there will be, while the more trips conducted by motorized modes, the more vehicle kilometre travelled there will be, although, since some of these will be conducted by public transport, this relation will not be linear, and it will vary depending on the mode choice.

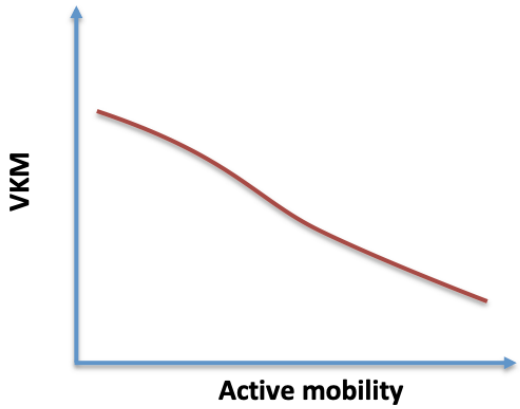

Figure 62. Interaction between VKT and active mobility

Interactions of Electric Mobility

Electric Mobility and Local Pollution (25&20)

In general, it is expected a negative effect. Assuming an ideal situation in which grid power come from cleaner energy sources and only emissions from EV usage are considered EV technologies will have a substantial negative effect on local contaminants (air emissions, not all contaminants dimensions).

The higher the share of electric based mobility infrastructure and its efficiency, the lower the local emissions from transport there will be. However, if power comes from coal and the whole lifecycle is included in the analysis (production, use, and end of life of both technologies) these benefits could revert this relationship to an almost flat line. Although this is not the scope of local contaminants, more environmental externalities can be expected on the end of life of EV, such as water pollution and toxicity from batteries (Hawkins, Singh, Majeau-Bettez, & Strømman, 2012); these externalities will be regulated by local policies that support sustainable frameworks.

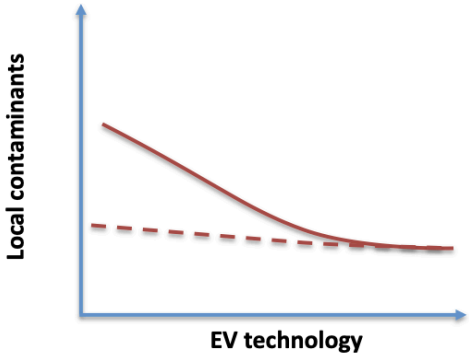

Figure 63. Interaction between local contaminants and EV technology

Economic Performance and Competitiveness and Electric Mobility (1&25)

The economic performance is one of the several barriers that prevent EV adoption, nevertheless a framework for e-mobility business model potentials builds a basic work for the first phase of a systematic development process for innovative business models. It is widely accepted that EVs have a high purchase price compared to petrol or diesel fuelled counterparts and additional components such as battery packs, which are is passed on to consumers. This issue acts as perhaps the most prominent obstacle to adoption of EVs particularly for commercial users.

Investor Interest in Sustainable Mobility and Electric Mobility (2&25)

There is a positive effect; the more attractive EV technologies and infrastructure are for the private sector the larger availability, penetration and refinement levels of electric mobility infrastructure and services there will be.

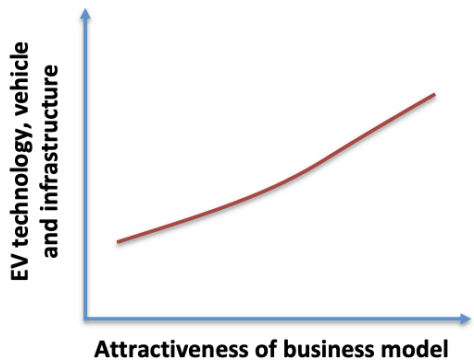

Figure 64. Interaction between EV technologies, vehicle and infrastructure and attractiveness of business model

Interactions of Quality of the street

Quality of the street and Active Mobility (24&16), Active Mobility and Quality of the Street (16&24), Walking and Cycling (24&29) and Attractiveness/Value (24&6)

Active mobility works better with short distances and travel time, longer distances are found to be negatively associated with active mode use, while travel time have an inverse relation and stronger effect in the decision making (Ton, y otros, 2018, pág. 3). Some studies have also shown that availability and proximity of activities and places of interest not only for leisure but work and facilities have a positive effect on active mobility (Vos, Schwanen, Acker, & Witlox, 2018, pág. 14). However, it could also be assumed such areas will have higher transit of people which could have a negative effect on street quality. Overall, it could be assumed that the higher quality a street has the more it will exhibit a more balanced allocation of space and activities for all users of the street, and the more it will encourage active mobility, this assuming a relative small area related to a street. Surrounding areas at a larger scale such as city levels (urban structure) will also massively influence this relationship. Active mobility networks and services have a positive effect in quality of street.

Figure 65. Interaction between active mobility and quality of the street

Areas that allow an easier access or that contain more places of interest (i.e. leisure, work and facilities) within walking distances trend to have better residential market value or rental prices (Xiao, Webster, & Orford, 2016; Matthews & Turnbull, 2007). However, these interactions are not as significant at a smaller level, unless larger places of interest are developed nearby (i.e. parks, malls, train or subway stations); land value is mostly affected by its location within a city and its characteristics (urban structure). Improvements in the built environment such as walking or cycling paths or quality of infrastructure have a stronger effect in commercial areas prices than in residential ones (Carmona, Gabrieli, Hickman, Laopoulou, & Livingstone, 2018).

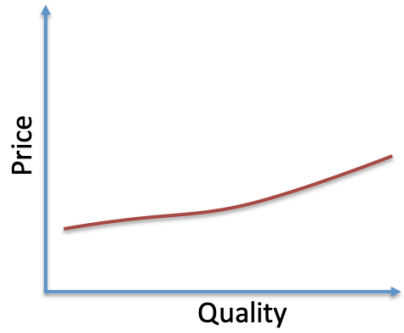

Figure 66. Interaction between price and quality

Local Pollution and Quality of the Street (20&24)

A significant part of air pollution exposure can occur during commuting or time spent in transit through cities. Specifically, elevated levels of pollutants in transport microenvironments may contribute significantly to daily total exposure despite the short period of time, for example, Dons et al. (2012) found that while only 6% of time was spent in transport, it accounted for 21% of personal exposure to black carbon and ca. 30% of inhaled dose.

Vehicle Kilometer Travelled and Quality of the street (10&24)

A balanced allocation of spaces and activities for all users of the street leads to the promotion of non-motorized transportation, therefore decreasing simultaneously the vkm.

Interactions of Urban Structure

Urban Structure and Cost-Pax in Public Transport (23&4), Public Transport Ridership (23&14) and Car Dependency (23&12)

The Urban structure has a negative effect in user cost of PuT in terms of its two main characteristics, urban density and configuration. Cities with higher densities with either mono-centric or polycentric configurations will generally offer lower cost of PuT in comparison to low-density cities. The higher the density, the lower the cost of PuT until this relation reaches plateau in which regardless the increase in population density user cost of PuT will not decrease. When densification occurs in isolation of other improvements to the land use environment, a disproportionate rise in peak passenger volume will prevent PuT cost to decrease. Assuming densely population areas, polycentric cities in theory will have shorter distances than mono-centric ones. If urban infrastructure was planned well enough to distribute population density across the trunk service lines of the PuT network cost will be reduced even

more making the service more affordable and economically sustainable, especially in radial systems (Cooke & Behrens, 2017, pág. 3014).

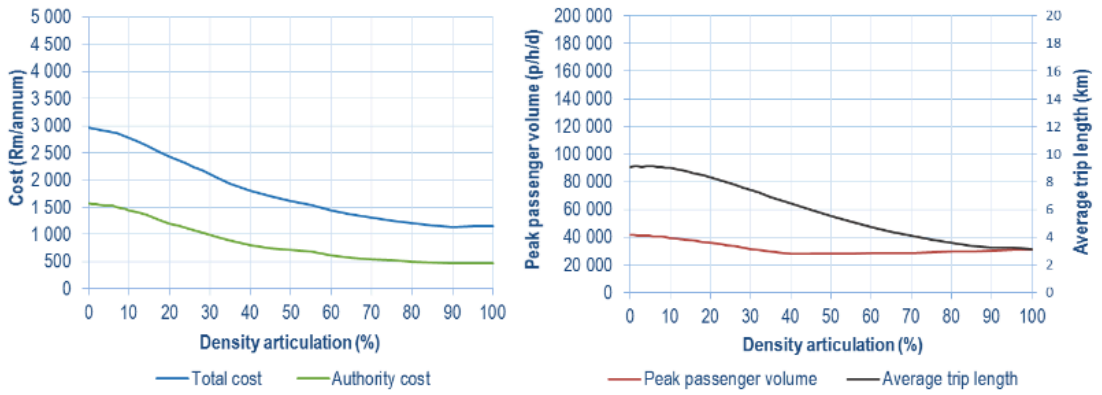

Figure 67. Graphs assuming a well-planned population density along the area (Cooke & Behrens, 2017, pág. 3011)

Simultaneously, the urban structure and transport effectiveness are inter-dependent. An adequate urban structure positively affects PuT ridership; the better the urban structure is according to density and connectivity, the higher the ridership will be.

On the other hand, there is an opposite effect with car dependency. The locational land use mix is one of the most important factors decreasing car use, city structure is critical in determining car use. (McIntosh, Trubka, Kenworthy & Newman, 2014).

Interactions of Planning Capacity

Planning Capacity and Investor Interest in Sustainable Mobility (8&2) and Governance in Support of Sustainable Mobility (8&2)

The higher the planning capacity of stakeholders to produce sustainable mobility schemes, the better products and services will be produced with lower uncertainties and risk exposure and the more attractive those will be as a business model towards the private sector to get involve. therefore, it can be said there is a positive relationship.

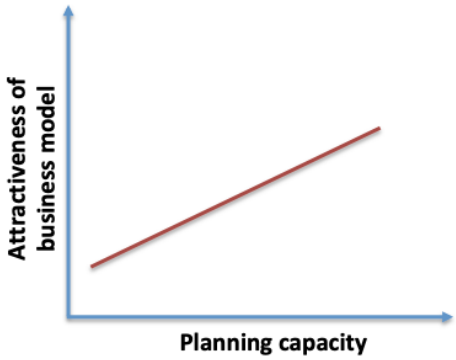

Figure 68. Interaction between attractiveness of business model and planning capacity

As well, there is a positive relationship between the Planning Capacity and the Governance in Support of SM. The higher the planning capacity of society to coordinate themselves and cooperate at different levels to maximize efficiencies and individual outputs, the higher the levels of dialogue between the different actors and the larger involvement and balanced representation of all affected parts there will be as well as transparency and cooperation between them.

Figure 69. Interaction between governance and planning capacity

Data, Information, Knowledge, Outreach and Planning Capacity (7&8)

Data, information, and knowledge will have a positive effect on planning capacity; availability of information, communication, training and education allow a better cognition, cooperation and coordination of society at different levels. The higher the levels of data information and knowledge, the higher planning capacity there will be within a society.

Figure 70. Interaction between planning capacity and data, information, knowledge and outreach.

Other Interactions

Cost/Pax in Shared Mobility and Ridesharing (5&15)

As in any supply and demand interaction the user cost will have an inverse effect on the demand of ridesharing resources assuming this is an elastic good since more than one transport mode is already available. Under this scenario, the lower the price of shared mobility services, the higher the share of ridesharing there will be.

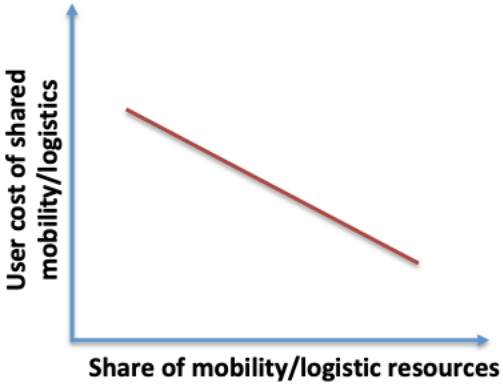

Figure 71. Interaction between user cost of share mobility/logistics and share of mobility/logistic resources.

Economic Performance and Competitiveness and Attractiveness/Value (1&6)

Population density is closely related to land Attractiveness/Value, and population density is also associated with economic growth within a region (Bertaud, 2015, pág. 29). More economic performance and competitiveness means more jobs availability within and area, and therefore more population density. Economic growth in a specific area has a positive effect in the land attractiveness/value of the area where most economic development is happening and even in its outer limits (Duranton & Puga, 2015, págs. 499-500).

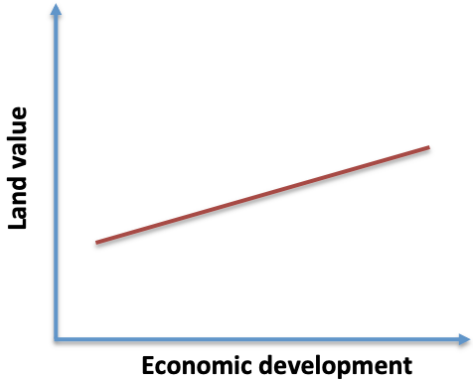

Figure 72. Interaction between land value and economic development

Local Pollution and Economic Performance and Competitiveness (20&1)

Former studies have focused on the relation of GDP per capita with environmental pollution finding an inverted U - shaped relation between the urbanization and air pollution (Environmental Kuznets Curve). It starts with a positive relation between both variables until it peak and begin to decrease (Wang, 2010). Air pollution due to transport will increase as GDP increases until the level of development is such that policy and investment in new and cleaner technologies revert this behaviour, however this rate will be slower. This relationship is also regulated by an earlier urban planning, the availability of new technologies and good scientific understanding on the topic (Colvile, Hutchinson, Mindell, & Warren, 2001).

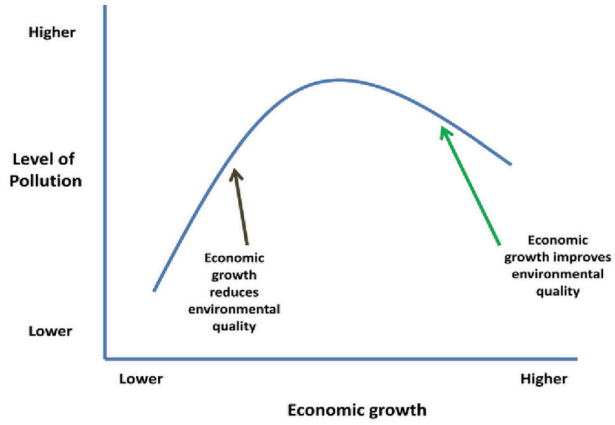

Figure 73. Interaction between level of pollution and economic growth.

Public Transport Ridership and Cost/Pax in Public Transport (14&4)

Ideally, and under the assumption of economies of scale and a sufficient number of potential public transport users it can be assume that these two variables will have a negative effect between each other; the higher the PuT ridership, the lower the user cost of public transport will be. However, this relation is not always the same; cities or areas with higher population densities provide a more attractive number of riders and a higher probability for PuT services to decrease its user cost in areas with a reasonable level of development. However, an over saturation of the system will often trend increase the capacity of the services but depending number of users this might not always be cost effective and possible when new public transport infrastructure is required. When the area is unsupportive of public transport the increases in passenger congestion leads to an insubstantial decrease in the cost per passenger trip served. This relationship is limited by the level of development of the area of interest, its subsidy policies, and its ability to provide a supportive land use environment (Cooke & Behrens, 2017, págs. 3008-3009,3014).

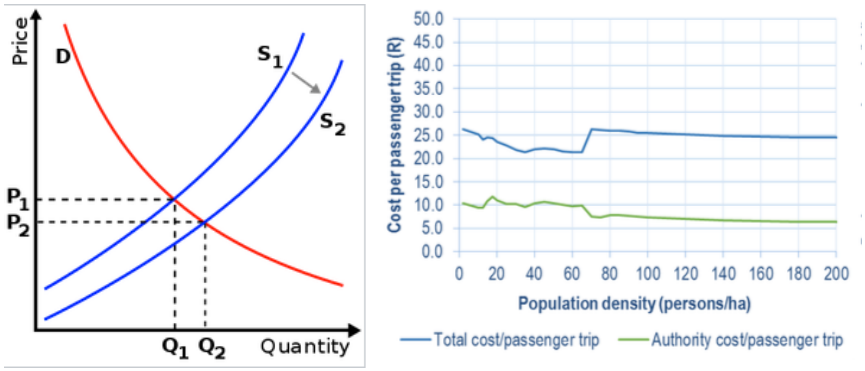

Figure 74. - Interaction between cost per passenger and population density. Source: (Cooke & Behrens, 2017, pág. 3009).

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2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

STO 2.4

Smart and flexible parking by emerging technology

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

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4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
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25	Turku University of Applied Sciences	Finland	TUAS
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27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

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* Partners with changes pending of GA amendment

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	Camilla Wikström		Camilla Wikström

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

The City of Stockholm aims to increase liveability of the city in two ways. First, the City aims to decrease occupancy rate of the parking spots to 85% by 2030. Second, it aims to optimize the search for parking, which can in turn reduce the CO_2 emissions.

(2) Strategic level:

In order to support the above stated objectives, this measure tests a couple of new technological solutions. The technology affords not only identifying occupancy, but can also support enforcement. This measure thus tests and compares the use of new technology with the use of the traditional methods as a way to support the above stated goals.

(3) Measure level:

Specifically, the measure aims to:

Provide drivers with better-quality information about available parking.
Provide a new digital parking system for parking surveillance.
Identify parking discrepancies between realty and the pre-registered parking information.
Digitize parking restrictions.
Test the digital system for surveillance/enforcement and occupancy.
Evaluate the system and compare it with the regular procedures.

The impacts listed below were planned to be measured, which was in the end not possible due to several reasons. First, there were delays in planning the measure, since the planned measure was not feasible due to legal restrictions. Second, this measure was merged with measure 2.5 in the beginning so that complicated the identification of the KPIs. Third, there was a high fluctuation of the personnel, among both the measure leaders and the evaluation team at KTH. Fourth, and most importantly, the measure was dealing with new technological developments and included an innovation contest. Therefore, the goals, possibilities, and market availabilities of the new technology were not known in advance.

A.1.1 Quantifiable impacts

Expected Impacts	The demonstration will contribute to a more liveable sub urban environment by reducing parking search time, improving traffic conditions and traffic safety, reducing emissions, optimising the available road space, indicating possibilities to reduce the number of parking spaces and increasing parking occupancy. The objective is also to provide new knowledge (pros and cons) from practical experience from the use of emerging technical solutions as basis for possible full-scale implementation.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and	Livability	Competitiveness	Efficiency of urban	Local economy
1	Increase of acceptance of new technologies and concepts						x	x			x
2	Increase of parking occupancy and reduction of traffic and time searching for parking	x	x		x	x	x	x			
3	Exploitation of the funding for implementation of the plan								x		x
4	Reduction of CO2 emissions	x	x					x			
5	Improvement of living environment						x	x			x

Table 25: Quantifiable impacts.

A.2 Measure description

This measure is a 'demonstration measure' that testes a new technology – Scancar. In particular, it tested two methods, a Light Detection and Ranging (LIDAR) solution and an Automatic Number Plate Recognition (ANPR) method to examine parking occupancy and parking enforcement. This Scancar technology was, inter alia, compared with a regular, manual procedures, i.e. parking guards manually checking whether a car is correctly parked and has paid the parking fee.

Digitalization of parking system, including examining occupancy, is a precondition for several measures, which a city can take to make the city more liveable. For example, it is an important precondition for introduction of dynamic fees. Such policy measure can then help decrease the full occupancy of the parking spots in the city and thereby ensure that there are always some parking spots available, which is one of the long-term goals of the City.

Implementation of a Scancar technology, which this measure tested, can not only help to reduce parking search time, but can also reduce emissions, and increase the liveability of the city. This measure thus responds to the above stated broader objectives of the city and aligns with the CIVITAS goals.

A.2.1 Measure outputs

The measure will produce:

- 2 applications from 2 suppliers available free of charge for IoS and Android showing parking occupancy, forecast and where it's most likely to find an available parking space.
- 2 technical Scan car SOLUTUONS, LIST THE 2. One with Scan Car and integration to parking machines and one with Automatic Number Plate Recognition (ANPR) and Light Detection and Ranging (LIDAR) solution (a new e-scan car with new technical solution).
- A static database with accurate parking rules for the Eccentric demonstration area.
- A stress test to ensure that the City of Stockholm parking databases can manage a higher requests of number plates due to new innovation.
- 3 legal investigations (reports) from law firms and city of Stockholm to determine the need of a legal permit to perform the demonstrations.
- The cooperation and involvement of APCOA Car Parking to investigate possible violating cars. Both suppliers have apps installed in parking officer tablet to receive information.
- Collected parking data from APCOA for pre-defined street in (and outside) Årsta used for validation of scan car data.
- Raw data generated from the scan cars.
- Own analysis based on raw data generated from the scan cars to compare results (report).
- Innovation contest which can be used as good example for future innovative projects.

A.2.2 Supporting activities

Supporting activities include:

- The manual parking surveillance system in the city of Stockholm.
- The innovation contest (2nd ever performed in the city of Stockholm)
- The parking plan.
- The digital parking machines.
- The online database where acquired permits and parking fee information and regulation is stored - PARIS (PARking Information System).
- Networking with ITS organisations to reach out with tender documents.

A.2.3 Interactions with other ECCENTRIC measures

Previously, measure 2.4 and measure 2.5 were merged. The idea was, that making parking spots available, or knowing when these will be available (for example when they are not reserved for cleaning or other services) will give space to the pop-up recycling stations (2.5), which is the core idea of measure 2.5. However, it was realized that these two measures (2.4 and 2.5) cannot be well combined thus they were separated. There are no anticipated interactions with other ECCENTRIC measures.

A.2.4 Interactions outside ECCENTRIC

There are no anticipated interactions with other measures outside of the ECCENTRIC project. The measure did, however, work with several partners outside of ECCENTRIC, for example the companies Parkling and Brickyard, which produced the majority of the results within this measure.

A.3 Target groups and/or affected part of the city or region

The main target groups in this measure are the people visiting the demonstration area or residents owning the cars in the demonstration area (Årsta), the parking guards with whom this measure collaborates, and potential target groups can be also the companies providing technological solution for occupancy and enforcement.

Target group		Affected area	
Type	**Description**	**Type**	**Description**
Residents and visitors of Årsta	Drivers looking for parking space	Årsta, Östberga, Liljeholmen, Aspuppden, Enskede	Eccentric demo area
Residents and visitors of Årsta	All drivers that park during the demo period will be subject to increased parking surveillance.	Årsta, Östberga, Liljeholmen, Aspuppden, Enskede	Eccentric demo area
Parking guards	The parking guards were introduced to a new way of working with parking surveillance.		

Table 26: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC project partners and other important actors

This measure included several stakeholders. The leading stakeholder was the traffic administration office at the City of Stockholm. KTH acted as a research institute, in particular for the evaluation part and finally the parking officers/parking surveillance companies and car owners are the two main affected stakeholders.

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
1	Residents of Årsta	S	Other	P	
2	Traffic Administration of the City of Stockholm	P	C	L	
3	Enskede-Årsta-Vantör District of the City of Stockholm	S	C	P	
4	KTH Royal Institute of Technology	P	KI	P	
5	Consulting companies operating as subcontractors in the project	S	PR	P	
6	ICT companies and technology providers for Smart Parking Concept and P-Stockholm application	S	PR	P	
7	Car drivers in the Årsta area	S	Other	O	
8	Parking officers (APCOA)	S	PR	P	
9	Scan car companies that won in the contest	S	PR	P	
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					

Table 27: Measure stakeholders.

A.5 Identified risks

Firstly, the city of Stockholm conducted the innovation contest for the second time in history. This brings an institutional risk that could bring delays, 'making mistakes' or even repeat the call/contest due to the lack of experience in the city with regards to innovation contests.

Secondly, when the contest is out, there is a risk that there would be lack of applications from companies which could provide the new technological solution that the city was looking for. In addition, there is uncertainty that the winning solution is feasible. This can be mitigated with allowing for flexibility and adjustments while still following the overall idea/criteria of what the aim is.

Finally, during the time of Eccentric, the GDPR law was introduced, which made it uncertain what is legally allowed to do with the images and what not. A special investigation has been conducted by the companies (their subcontractors) to investigate this.

Identified risk	Category	Mitigation actions	Responsible
Required personnel resources/competence not available in the area of ANPR, databases, innovation contest etc.		To expand the possibilities, not merely Swedish market was considered. Instead, the call for applications was sent to Europe. A network ITS Sweden is a branch promoting innovative ideas within transport. ITS Sweden is member of ITIKO which is the organization on the European level, so they sent it to every member state in Europe to their national organizations.	Measure leader and responsible section manager
Delays and misconceptions in the procurement of innovative technology, supplier to provide necessary functionality for demonstration	Institutional	Perform meetings with suppliers of technical equipment to understand what the market can provide to a demonstration and inform about the scope of the Eccentric demonstration	Measure leader and procurement staff
Difficulties in the implementation due to new, innovative technology	Problem related	It was uncertain if there will enough companies applying for the innovation contest, but luckily, 12 did. Expert jury evaluated the applications, 6 were invited to a working group and they could update their proposals to finally present. After that 2 were selected. Then, a pre-run/testing was done 2 weeks every quarter and testing was done for over a year until the final run was done simultaneously by both 2 companies.	Measure leader and procurement staff
Stability of the system	Problem related	Since Scancars submit requests to the same system that the manual parking guards use, the risk was that the system would not be able to sustain so many requests. Stress test was therefore conducted.	Measure leader and IT-staff (internal and external)
Legal permission to use innovative parking surveillance technology (GDPR)	Legal	While GDPR is a European legislation, every country has its interpretation in addition to its national laws. The City of Stockholm was engaged in the investigation what is allowed. The companies hired a local consultant, specialized in legal issues, which investigated a case and sent the report to the City.	Measure leader and parking legal expertise
Public acceptance of the use of innovative parking surveillance technology	Cultural	According to the two companies the public in Sweden appeared more curious than concerned about the use of the new technology.	Measure Leader and external stakeholders

Table 28: Risk analysis.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Deviations

- Deviation 1: Dynamic fees experiment – This measure planned to explore dynamic fees, which turned out to be impossible, due to current legal constraints. Thus, after exploring different possibilities the measure finally implemented an experiment with dynamic occupancy monitoring and information, which is a technical prerequisite for dynamic parking fees. The phase 1 was therefore, to re-define the measure.

Phase 1: Research and planning the measure content: Sept. 2016 – Sept. 2017

The original plan in this measure was to examine the dynamic fees, in order to assure 85% occupancy rate in parking. However, there were technical and legal obstacles when moving forward. First, there was a technological issue, i.e. there was no correct, up to date, database for the parking places and their occupancy. It was unknown what real occupancy rate is. While the City does manual check from time to time, there was no digital knowledge around the occupancy. Second obstacle was legal, in order to implement dynamic parking fees, one has to go through several levels of authorities to change the legislation, which is difficult and requires time. Thus, the measure leader had to find an alternative.

At that time (starting in 2016 and up till 2018) two transformations occurred. First, the parking machines became digital (it became no longer possible to pay with cash). Second, larger suburbs of the city became subject to the parking fees. The city installed in these new areas, thus fewer machines and launched an app for paying the fee. Linked to this transformation, measure 2.4 thus aimed to support this digitalization, by testing scancar technology – in particular in the suburbs of the city where the areas are vast and it is thus more difficult to manually monitor occupancy and enforcement.

During this first phase, also procurement was prepared. First it was considered whether it should be done a normal procurement, for which certain rules apply, but since it was about the new technological solution, the measure leader at the time was unsure what will be possible and what not, thus the innovation contest was the final selected procurement type. Innovation contest was done only for the second time in the history of the City of Stockholm.

Due to the above described reasons, the measure preparation was experiencing delays. This whole preparation thus caused delays, but finally in the autumn of 2017 the contest was ready to be launched.

Phase 2: Innovation contest: Sept. 2017 – February 2018

The second step, after the planning of the measure, was the innovation contest to find a suitable subcontractor. The measure leader was unsure if there will be any suitable companies, which could provide a technical solution for parking. In order to increase possibilities, the procurement, which was launched in September 2017, was sent to Europe, ITIKO –

organization which promotes innovative ideas within transport. This organization was reached through ITS in Sweden, which is one of its members. ITIKO sent then the call to each of its member organizations and while the measure leader received 12 submissions from different start-ups across Europe came in by the end of this call, November 2017. The number of submissions was beyond their expectations.

In order to select the contractor, an expert jury committee was recruited – to evaluate the applications. The committee included an expert in parking, an expert in legal matters, an expert in the internal IT system, an expert in the technical system and an expert for upscaling. Finally, 6 were selected for the second step, with which the traffic administration team met and then the 6 selected teams were able to update their applications for the second round.

In February 2018, the selected teams presented their ideas for the jury and in the end, two companies, namely Brickyard and Parkling won the competition.

Phase 3: Preparation: preparing the technology and legal examination: February 2018-May 2018

During the third phase, another potential obstacle became visible. During this time, the GDPR came into effect. Thus, the team had to additionally investigate the privacy issues and how it is allowed to handle the digital images. This became part of the investigation for the teams that won the competition, conducted in the collaboration with the City of Stockholm. In order to understand the national legislation, local laws, and how Sweden interprets GDPR, both Brickyard and Parkling hired a local consultancy firm, experts in legal issues. Simultaneously, the preparations started.

The particular outcomes are listed below:

- Performed legal permit investigation to chosen technical solutions if legal permit for camera surveillance is required and the effect of the GDPR law to national law.
    - Parkling, Brickyard, and the City of Stockholm hired a local legal consultancy firm to examine GDPR and Swedish legislation: Spring 2018
- 2 applications were developed in the spring of 2018, i.e. ‘path to park’ and ‘parking in Stockholm’. These were evaluated by the potential users at the time of the second run 2 (September 2018). They were, and still are, continuously improved.
- Planning and demonstration set-up in progress and pre-collection of data for the companies to build a Stockholm (Årsta) database to later show parking occupancy in sharp demonstration in the summer.
- Set-up with parking operator in Årsta (APCOA) to implement an app in their tablet showing possible parking violators.
- The City of Stockholm parking system database owner is on standby while demo is ongoing to alert on any potential problems.
- A static database with accurate parking rules for the Eccentric demonstration area.
- 2 technical system for Scan car. One with Scan Car and integration to parking machines and one with Automatic Number Plate Recognition (ANPR) and Light Detection and Ranging (LIDAR) solution (a new e-scan car with new technical solution).
- Stress-test – to examine how many enquiries Paris system can handle, so the manual guards, who rely on the system, would not have a problem during the demonstration.

Parkling conducted the stress-test and it was found out that 6 inquiries can be handled simultaneously.

- Recruit test-drivers as users to the parking "heat map" application. Develop informative sign in Swedish to be mounted on the scan car

Phase 4: Testing the technology and producing results: May 2018 – September 2019

Occupancy and enforcement was examined 2 weeks over a year – every quarter, each of the 2 firms did this separately. This allowed for testing the technology in different environments, weather conditions. Scancar drivers operate during 2 weeks per quarter according to a predefined route and time interval.

- Run 1: 2 weeks in May 2018
- Run 2: 2 weeks in September 2018
- Run 3: 2 weeks in November 2019
- Run 4: 2 weeks in February 2019

May 2019: Final, joint run, 2 scan-car companies (Parkling and Brickyard) drove and scanned licence plates on the same route (which they did not know about in advance) for one hour (7 times) in Årsta and for one hour in Kungsholmen. Meanwhile, on specific streets, there was a person manually checking how many cars are parked. That data was used for verification purposes.
September 2019: Raw data generated from the scan cars.

Nov. 2019 – Feb. 2020: Own analysis based on data generated from the scan cars to compare results (report).

B.2 Process evaluation activities

The measure leader has recorded progress with design and implementation in the measure report, including deviations and obstacles. In addition, the measure leader has completed a survey regarding barriers and success factors and provided feedback on a summary of deviations so far and on the online survey design so that it could be improved and adapted for distribution to other stakeholders involved in the measures. Finally, the measure leader has proposed which stakeholders have the highest interest-level and highest influence over the measures' outcomes.

Parkling and Brickyard, the suppliers of the parking management IT service in Measure 2.4, are seen as having both the highest interest and the highest influence. They first saw the possibility of a new market entry. They have used this demonstration to build a new network of business. At the same time, it was their own innovation that led to the success of the demonstration. Their staff have been helpful in resolving issues, even if those issues were more important for the City than for them.

APCOA, the parking operator in Årsta, saw the demonstration as the future for parking surveillance with potential, and if successful could put new demands on their daily business and operation. Thus they also had a strong interest in the success of the measure.

The process evaluation was continued by a KTH postdoc. Interview with the former measure leader, Thomas (after the departure of Thomas Sjöström, Camilla Wikström became the new measure leader September 2019) and Camilla, was conducted on the 17th of September 2019. Then after, a "histories workshop" was organized on the 13th of November. The participants in the workshop were a consultancy company Sweco, a former Measure Leader and the representatives of Parkling and Brickyard participated. The workshop lasted 2 hours and was partially conducted online, to include the contractors from Germany and the Netherlands. It worked well and very useful knowledge has been gained. Since the contractors are present at different EU markets, they have some insights into the context – have a more holistic perspective. In the workshop we covered the actors and collaborations, the timeline and the necessary procedures, barriers, driving forces as well as risks (this was captured via SWOT analysis), as well as learning and upscaling.

B.3 Barriers

Several barriers have been identified and certain actions were taken or were identified as needed to help overcome them.

No.	Barrier field	Description	Action to overcome the barrier
1	Institutional	The GDPR and the new law regarding video surveillance have come into force during the innovation competition. This has made conditions unclear on whether a permit would be required to carry out demonstrations, as well as which authority was responsible for issuing permits. Moreover, it was not clear what was allowed and what was not allowed to do	The legal department at the transportation administration at City of Stockholm made an investigation as well as the suppliers hired a local, external lawyer firm to perform a comprehensive investigation if a permit was needed or not. Both investigations produced the same result. In addition, one of the suppliers (Parkling) contracted another lawyer firm in Stockholm that also reached the same conclusion. We wanted to be 100% sure so we launched our 2 investigations which could be used for any technology using camera

		with the images, i.e. what can be saved and what has to be deleted.	monitoring the physical environment. This investigation increased the cost, but did not cause any delay.
2	Planning	In integrating new technology with the City Department of Transport's IT environment, it was unclear whether the IT system would be able to handle the demands of the new technology. In effect, the parking guards are relying on the same system (called Paris system) as they manually examine whether parked cars comply with the regulations (if they have a yearly pass, or they paid their ticket otherwise). Since ScanCar scans significantly more number plates than a manual parking attendant, there is a risk that the entire parking system will crash on the first demonstration day, and that extensive modifications of the internal system would be needed.	A "stress" IT test was launched to examine the system. Parkling, one of the suppliers, wrote an algorithm to simulate 6 Scan cars in operation at the same time, meaning 18 000 request/hour. The system manager for the Paris parking system led this operation. As several sub-systems are connected, each and every system manager had to be present during the test if the system would break down. The result was good with short response time.
3	Problem-related	New technology is a risk factor, putting into question whether the winning technology innovator will manage to develop its technical solutions during the given time frame and whether the technology will be genuinely innovative.	This barrier was dealt with through testing and through partnership. First, a specific (testing) phase was developed in the innovation contest to validate new technical solutions if needed before the full-scale demonstration in Årsta. Second, the main two companies (Brickyard and Parkling) of the project developed partnership with other companies to supplement with the additional knowledge and skills needed. Partnership with Flowbird was formed for the depiction of occupancy and for the development of the application "Path to Park". Partnership with Genetec and Agendum was formed in order to understand the Swedish parking enforcement procedures.
4	Organizational	Citizen acceptance and internal organizational challenges in the form of available resources.	The concern with this measure is that the citizens might react in a negative manner, feeling they are being watched by cars with ANPR cameras. The suppliers did not experience much of a problem. Brickyard was stopped by one concerned citizen to ask what they were doing and Parkling experienced that the public was more curious, than concerned, about the new technology and wanted to know more about it.

Table 29: Identified barriers and planned/taken actions.

In addition to the barriers stated above, the financial costs ended up higher than expected/planned for. However, for the suppliers it was an innovation project and not a project they intended to profit from, thus, finances were not experienced as a barrier.

B.4 Drivers

Several drivers have been recognized as possibly helping to bring about the success of the measure. In cases where it is possible to encourage and capitalize on these, we have identified actions to do this.

No.	Driver field	Description	Action to make use of the driver
1	Institutional	Extensive new geographical outer city areas are now subject to parking fees.	It is interesting to find a complement to today's parking enforcement in this situation. The driver, in other words, is a potentially significant cost savings for the City through use of new technology.
2	Institutional	Through the new parking plan, all analog parking ticket machines are being replaced with fully digital and climate-friendly machines. Therefore, the entire parking system will be digitalized and ready for new innovations.	This can be capitalized by implementing new digital solutions, which in turn can create conditions for further innovations.
3	Technological	The quality of the digital maps of the city, i.e. the accuracy of the geolocation.	Knowledge of how accurate the maps are (the distances) can be useful for developing the algorithms for the occupancy rate. Good accuracy is essential for further innovation and for implementation of dynamic parking fees for example. The city recognized the need to update the map.
4	Technological	The availability of the parking enforcement digital system	According to one of the collaborating companies, who are working in the European market, Stockholm is apparently one of the few cities in Europe which has a digital system like Paris.
5	Cultural	The willingness of a municipality, a city, or a government to test such a technical solution.	Established partnership between a municipality and a technological companies.
6	Cultural	The concern about the privacy by the municipality.	It is re-assuring that the municipality takes all the measures about the privacy issues, examines what is allowed and what will be done with the images etc. which the City of Stockholm rightfully did.
7	Cultural	Citizens' acceptance.	Citizens support for the implementation of new technology.

Table 30: Identified drivers and planned/taken actions.

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Required personnel resources/competence not available in the area of ANPR, databases, innovation contest etc.		Using the Europe market instead of merely Swedish. The call for applications was sent to Europe. A network ITS Sweden is a branch promoting innovative ideas within transport. ITS Sweden is member of ITIKO which is the organization on the European level, so they sent it to every member state in Europe to their national organizations.	Measure leader and responsible section manager
Delays and misconceptions in the procurement of innovative technology, supplier to provide necessary functionality for demonstration	Institutional	Perform meetings with suppliers of technical equipment to understand what the market can provide to a demonstration and inform about the scope of the Eccentric demonstration.	Measure leader and procurement staff
Difficulties in the implementation due to new, innovative technology	Problem related	It was unknown how many companies will apply for the innovation contest, but luckily 12 did. Expert jury evaluated the applications, 6 were invited to a working group and they could update their proposals to finally present, after which 2 were selected. Then, a pre-run/testing was done 2 weeks every quarter and then testing was done for over a year until the final run was done simultaneously by both 2 companies.	Measure leader and procurement staff
Stability of the system	Problem related	Since Scancars submit requests to the same system that the manual parking guards use, the risk was that the system would not be able to sustain so many requests. Stress test was therefore conducted.	Measure leader and IT-staff (internal and external)
Legal permission to use innovative parking surveillance technology (GDPR)	Legal	While GDPR is a European legislation, every country has its interpretation in addition to its national laws. The City of Stockholm was engaged in the investigation what is allowed. The companies hired a local consultant, specialized in legal issues, which investigated a case and sent the report to the City.	Measure leader and parking legal expertise
Public acceptance of the use of innovative parking surveillance technology	Cultural	According to the two companies the public in Sweden appeared more curious than concerned about the use of the new technology.	Measure Leader and external stakeholders

Table 31: Reported period risk assessment.

C.Specific observations on the supporting activities in this reporting period

The supporting activities were mostly meetings between the City and the companies that won the innovation contest.

C.1 Quality of the Supporting Activities

Meetings before each of the demo runs were found beneficial. The constant communication, interpreting the data together, and discussing what improvements could be made, helped to improve understanding.

Activity	Target group	Qualitative score
Meetings	- City of Stockholm - Brickyard - Parkling	Satisfactory

Table 32: Supporting Activities.

C.2 Influence of the Supporting Activities on the implementation process

The supporting activities contributed to the continuous improvement of the technology and the development of the apps “path to park” and “parking in Stockholm.”

C.3 Influence of the Supporting Activities on the impact of the measures

No influence on the impact can be identified. This measure has not delivered the impact report.

C.4 Lessons learnt on the Supporting Activities

The meetings before and after each run have been appreciated as it provided a platform for receiving a feedback which improved the performance during the succeeding run. Regarding the implementation process, the companies were satisfied with the implementation process. A question was raised whether the test runs were too spread over a year. This was according to the suppliers appreciated and valued, as it gave them the opportunity to test the equipment in the different seasons. Although, from a business/project perspective one could think that it is more efficient if it was condensed to a shorter, and intense, period of work, which was not indicated here.

D. Conclusions

D.1 Process evaluation findings

During the implementation of the measure, we found out that there are certain pre-requisites necessary for a city to implement ANPR and LIDAR solution for parking enforcement and parking occupancy detection (both technologies are used for both tasks).

D.1.1 Enforcement

In order for the ScanCar solution, using an ANPR and LIDAR, to be implemented, a City has to have a digitalized system. Meaning, a city first of all needs an accurate, digital map of the city – for the part of the city at interest. Second, a city needs a digital system where all the parking rules are stored as well as the details about whether the permit to park in the area has been obtained or if they purchased a digital parking ticket. If at the purchase of a parking ticket, a car owner does not have to enter the number of their licence plate, it is impossible to do enforcement regarding whether they paid or not, using a ScanCar. However, it is still possible to detect illegal parking.

D.1.2 Occupancy

For detecting the occupancy it is not necessary to check for licence plates. However, it is necessary for a city to have a digital map of the parking places and the attached rules, for example where it is legal/illegal to park and where is private/public land. Some suppliers can make these maps and the attached rules by themselves.

If a city planned to implement both, to measure the occupancy rate and do enforcement using a Scancar, then a city might have to make two tenders. 1) tender includes procurement of services of a company, which is able to make maps of the parking places and the rules attached to these places (as in this case – Parkling is specialized in occupancy detection and can make these maps themselves). 2) procurement is for the services of a company which is specialized in enforcement but needs the maps, made in 1) (as in this case – Brickyard is specialized in enforcement, but requires the maps). According to the experiences of Brickyard, whose main market is European market (having municipalities, cities and governments as customers), this is often the case in the European cities, that this procurement process is split into two parts.

D.2 Lessons learnt

Several lessons have been learnt mostly around the following topics:

a) Legal issues

In this measure it was learned that several perspectives have to be looked into when implementing such measure, for example one has to be aware of the legislative side (e.g. GDPR). In the particular case of Stockholm, the City was taking the issue of GDPR seriously and was concerned about how the images are going to be used, which was found important.

b) Technical issues

The proper database of the rules is needed which needs to be updated on the continuous basis (as in this was a Paris system), the IT department needs to do the development, and the digital maps are needed. Moreover, technical issues can arise on several levels, one example is the capacity of the Paris system, thus a stress test can support the process and increases the understanding of how many investigations can be done simultaneously. In this particular case, it was learnt that the system is able to process 6 car requests at the same time.

c) Demonstration on ground

Before implementing a measure in its full scale, it was learnt that it is important to conduct a demonstration on ground.

d) Public acceptance

When implementing this new technology for enforcement and occupancy, the existing risk is the public acceptance. According to the companies interviewed, during the demonstration in Stockholm, they experienced the public to be more curious around the new technology than concern. However, this is based merely on the observations and is contextual. Acceptance can differ across places. One hypothesis could be that the level of trust (that the City would protect the privacy of the citizens) can affect the acceptance level. Suffice to say that the topic of public acceptance needs to be considered before implementing such measure in full scale.

D.3 Process recommendations

D.3.1 Enforcement

In terms of enforcement, we found a ScanCar solution suitable for a fairly larger cities, of approximately 6000 parking places. The City finds it most suitable for the outskirts of the city, since the use of the technology can reduce the efforts of the parking guards (who have to walk through larger areas to monitor), whereas in the inner parts of the city it is easier for the parking guards to monitor these smaller parts of the city. ScanCar enforcement (currently) appears comparatively less efficient in Sweden than in the Netherlands for example, since in the Netherlands they do not issue a physical ticket anymore. It is thus found to be more efficient to use a ScanCar if the tickets can be also issued only electronically. However, the technology can still support the enforcement process.

D.3.2 Occupancy

In terms of occupancy, this 2.4 measure tested the technology in a residential area (Årsta), where according to Parkling was found less useful, since several parking areas were private. It could be more useful to measure occupancy in the denser part of the city and it can be useful in any size of the city, but in the more dense, central parts of the city. Occupancy rate measurements are also linked with the App which can support citizens to find their parking place, which is also assumed to be more needed in the inner parts of the city.

D.3.3 General recommendations

Generally speaking, if a City decides for the here tested new technology, it is advisable for the City to:

1) examine the privacy issues and expresses concern for its citizens, which was successfully done by the City of Stockholm,

2) have the rules and regulations in a digital form, which can be also done by a supplier,

3) develop a digital map of the city with good accuracy at least in the area where it intends to use ScanCar.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

Measure Package MPSTO1

Smart and flexible parking by emerging technology & Transforming parking areas to new green uses

Process Evaluation Report

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2020 CIVITAS
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ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KTH
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
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21	**City of Turku**	Finland	TUR
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22	Regional Council of Southwest Finland	Finland	RCSF
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24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS

Partner nº	Organization	Country	Abbrev.
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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ECCENTRIC	Stockholm		
Measure code	**Measure name**		
MPSTO1	**Smart and flexible parking by emerging technology & Transforming parking areas to new green uses**		
Last update	**Responsible**	**Last update**	**Responsible**
	Camilla Wikström		Camilla Wikström

A. Introduction

A.1 Expected results of the measure

The demonstration measure will contribute to a more liveable sub urban environment by testing freight service (collection service) in connection to a pop-up reuse parks. The objective is also to provide new knowledge (pros and cons) from practical experiences of the use of emerging solutions as basis for possible full-scale implementation.

The measure objectives are:

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

The city-level objectives are to:

- Reduce the need for car ownership
- Modal shift from cars to more sustainable modes of transport when managing the everyday life in Stockholm

(2) Strategic level:

Strategically, the city aims to:

- Increase awareness of re-use of households and make transportation of recyclable and reusable items a social event.

(3) Measure level:

Specifically, the measure aims to:

- Explore whether by providing pop-up reuse parks and transport service to and from these parks, car dependency in the city can decrease.

The impacts listed below were planned to be measured, quantitatively, which was in the end not possible due to several reasons. First, there were delays in planning the measure, since there were no existing buildings built under the new legislation, making the implementation of the plan impossible. Second, this measure was merged with measure 2.4 in the beginning, which complicated identification of the KPIs. Third, the measure was conducted using qualitative methods, which made it difficult to convert into the required quantitative KPIs. Fourth, there was a high fluctuation of the personnel, among both the measure leaders and the evaluation team at KTH.

A.1.1 Quantifiable impacts

Expected Impacts	The demonstration was expected to contribute to a more liveable sub urban environment by indicating possibilities to reduce the need for parking. The objective was also to provide new knowledge (pros and cons) from practical experience from the use of new solutions as basis for possible full-scale implementation.	**CIVITAS ECCENTRIC Objectives**									
		Reduce:				**Improve:**					
ID	**Quantifiable Impacts**	Energy use, CO2	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and	Livability	Competitiveness	Efficiency of urban	Local economy
1	Increase of acceptance of new technologies and concepts						x	x			x
2	Increase of parking occupancy and reduction of traffic and time searching for parking	x	x		x	x	x	x			
3	Exploitation of the funding for implementation of the plan								x		x
4	Reduction of CO2 emissions	x	x					x			
5	Improvement of living environment						x	x			x

Table 33: Quantifiable impacts.

A.2 Measure description

In the end of 2015, Stockholm adopted a policy for flexible and green parking standards that applies to new developments/buildings. Meaning, when a multi-family house is built, the ratio between the number of parking spaces and number of tenants should be kept at the minimum. In addition, the trend in the housing is going towards the disappearance of the bulk waste rooms, were residents could dispose their no longer wanted items (small furniture, electronics).

Since the bulk waste rooms are disappearing, the dependency on the access to cars, in order to dispose bulk waste can increase. However, since the idea is to reduce the number of owned cars in the cities, this measure examined the alternatives, by exploring the inclusion of the existing services that could support residents when they want to dispose their waste.

In 2016, the Stockholm Water and Waste Management started with pop-up recycling parks. Meaning, two containers appear in different parts of Stockholm, over a weekend, where residents could dispose, and recycle, their unwanted items (e.g. a chair, a lamp). The pop-up also allows citizens to collect items, free of charge.

In relation to these existing events provided by the Stockholm Water and Waste Management, this measure provided collection service linked to the pop-up events. The residents near the planed pop-ups could order free of charge the transportation of their bulky (but not too bulky) items, no longer needed items from their home to the pop-up. Equally so, a possibility to transport the items from the pop-ups to their home was also offered free of charge. An environmentally friendly transportation to, and from, the pop-up parks was used, such as an E-cargo bike and/or electric car.

A.2.1 Measure outputs

The measure produced:

- An environmentally friendly transportation (e.g. e-cargo bike, e-vehicle) transporting waste and re-use articles to and from the pop-up parks.
- A service where citizens could book this transportation from their home to the pop-up parks and from the pop-up parks to their home.

A.2.2 Supporting activities

Supporting activities included:

- Information campaigns to inform the citizens in Årsta.
- Pop-up parks in the different parts of Stockholm.

A.2.3 Interactions with other ECCENTRIC measures

There are some related topics with other ECCENTRIC measures (WP7). For example, there are explorations in Stockholm about a possibility for a pop-up recycling stations to be placed on water.

A.2.4 Interactions outside ECCENTRIC

This measure was developed in a close collaboration with the Stockholm Water and Waste Management. In particular, it is linked to their pop-up reuse and recycling events.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
Residents of Stockholm	Residents in need to dispose their waste	Different parts of Stockholm	Eccentric demo area

Table 34: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC project partners and other important actors

The following stakeholders have been identified as important to the two measures' implementations and effects.

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
P01	Resident of Årsta	S	Other	P	
P04	Traffic Administration of the City of Stockholm	P	C	L	
P10	KTH Royal Institute of Technology	P	KI	P	
S	Stockholm Water and Waste Management	S	Other	P	
S	LL-bolagen a transportation service which won the procurement competition	S	PR	P	
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					

Table 35: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Strong dependency on the Stockholm Water and Waste Management willingness to collaborate	Problem related	Since this measure highly relies on collaboration with one single stakeholder, this has induced a high risk. However, collaboration has worked out well and the key actors in the organization were willing to collaborate with the City and other Eccentric partners.	Measure leader
Legal restrictions and rules regarding the waste collection	Legal	Several legal requirements exist related to waste collection (e.g. it is not allowed to charge for the items collected from the pop-ups for example), and regulations regarding hazardous waste apply, thus the requirements have to be examined and followed.	Measure leader

Table 36: Risk analysis.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Deviation

- **Green parking standard in Årsta development** – Initially, measure 2.5 intended to measure the impact of the new parking policy on green and flexible parking standards. This policy entails, that when a building is built, the ratio between the number of parking spaces and number of tenants should be kept at minimum. This is to reduce the number of cars in the city, but also to reduce expenses. Thus, the measure 2.5 initially meant to explore the mobility habits of the affected citizens, i.e. whether they still own a car, or do they use car-pooling, a metro, etc. In that regard, a consultancy company Sweco produced a study regarding the green parking standards. However, this plan was aborted since the legislation was very recent and no newly built buildings were built under the new policy. Moreover, another national project was planned for such evaluation. Alternatively, the measure could update the guideline, however, the Eccentric project preferred to carry out a practical demonstration rather than just update a written guideline. In order to gain new insights of European interest, the project, in cooperation with Stockholm Water and Waste, has been transformed into a practical demonstration in a real environment. A unique collaboration was planned to be established, in which Stockholm's water and waste management and transport administration manage environmentally friendly transport to and from pop-up recycling. The service was seen as having a possibility to reduce the need of a car in the suburbs of Stockholm. The measure was implemented over the phases described following.

<u>Phase 1: Research and planning the measure content: Sept. 2016 – Sept. 2017</u>

Since this measure deviated from the original plan, the first stage was devoted to finding suitable focus, which caused substantial delays in the implementation of this measure. According to the former measure leader, a leader for both measure 2.4 and 2.5, it was the most challenging part of this project to bring forth a new idea, after they realized that neither of the initially planned measures was feasible. The main objective, to measure the effect of different policies/services on the reduction of car ownership in the city, remained though. Since the first idea considering the green and flexible parking standards, as explained above, was aborted, the second idea emerged. The second idea was intending to explore parking in relation to the cleaning days. Each parking street has a schedule when parking has to be emptied in order to clean the streets, but the contractors are sometimes not doing their work regardless. The second idea was thus, to consolidate the contractors and their schedule to better reflect the reality. However, since there were 20 contractors, each with their own way of planning, it was too cumbersome. Thus, the measure leader was seeking further, the possible services related to the car ownership, in particular – how do people deal with their waste. The gaze was turned to the bulk waste, and the need for an access to a car to transport it. The multi-family houses previously had a bulk waste areas, where residents could dispose bulk waste, which is now slowly disappearing. However, when it comes to waste collection, the Stockholm Water and Waste Management (SWWM) has a monopoly, thus, there were only two options available, abort the plan, or collaborate with SWWM. SWWM was willing to

collaborate. During that time, in 2016, the SWWM began with a pop-up reuse and recycling services. It was thus timely to attach this measure to these newly established services. The measure leader simultaneously established a collaboration with a PhD student at the Department of Sustainable Development, at KTH, who was interested in exploring the pop-up reuse and recycle services offered by the SWWM, and its relationship with the car ownership. The main person, Fredrik Johansson, therefore conducted the pre-study, and the main study.

Stage 2: Pre-study: Autumn 2018

The pop-ups events took place 14 times during 2018. In order to explore how citizens use the pop-up reuse and recycling, the sites were visited and observed. Conveniently sampled visitors at the events were interviewed 1st and 2nd of September 2018. It was observed that several people came to the pop-up several times. On Sunday, some came by car with their things. Personal sorted the checked in things, to sort them for either 1) a collection (by pop-up visitors free of charge), 2) second hand stores, and finally 3) for the recycling centre. Visitors appeared positive towards the events. 19 visitors were interviewed, those with and without a car. They reportedly dealt with their bulky waste in various ways: by overloading their bicycles and driving to the larger recycling centres in the suburbs (these centres are difficult to access without a car), or by waiting on a container at their multifamily house, which appeared from time to time. Generally, they thought pop-ups made their everyday life easier. During this pre-study it was identified: 1) there was a lack of space, the residents could not leave a lot, or larger/bulkier items 2) awareness issues: visitors came to know about the event too late and there was a lack of understanding what is allowed to bring and what not, 3) the event was visited by people with and without a car, but since the pop-up could not accept larger items, the car trips were replaced only partially. During this stage of the project it was identified that it could be helpful, if there was a service which would support the transport to and from the pop-up events. In collaboration with SWWM it was also decided to increase the space available, so that it would become possible to collect also larger items during the time of the project – when the service provided by LL bolag was available.

Stage 3: Service planning: Winter 2018

In the interview about the process, the lack of space was identified as one of the problems, which was brought up to the measure leader and SWWM. A suggestion emerged that instead of a container, a truck could be used, which would provide also an opportunity to drive the non-collected items to the larger recycling centre, where these items are normally collected. This suggestion was taken seriously by SWWM and with the additional provision of the transport service, it became possible for the residents (also those without a car) to dispose not only the items they can carry, but also items which typically needs to be transported by a car (this was possible only during the duration of this project). During the third phase of the project was thus concluded that the collection service is indeed feasible solution and therefore, a visitation call was launched. LL-bolagen, company which has long-lasting experience in waste transportation, won the visitation call and became the service operator. The communication, information provision, around this possibility was still responsibility of a department within the City of Stockholm.

Stage 4: Study: Spring and summer 2019

In the spring and summer of 2019 the collection transport service was provided for 14 events (weekends) and information about this possibility was provided on the SWWM website, Facebook pages. SWWM placed pop-up parks as 2 containers with a crane truck on a Friday

and return it on Monday during off peak hours. SWWM is responsible for managing all waste and re-use articles. The City Department of Transport was responsible for the public procurement of the mobility service provider and a dial-in service to book a delivery of waste.

The users of the service were then interviewed. A couple of problems limited the possibility to conduct a quantitative impact evaluation of this measure.

First problem was the difficulty to acquire quantitative data to calculate the KPIs. From the 80 people that used the service, the project team ended up with contacts to only half of those. There were more phone numbers than emails available. Thus, even though the survey was initially planned, it was not feasible to conduct the survey. We assume that the problem was lack of clarity around the objective and tasks among all the project participants. Practical implementation included the Communication department of the City, who was responsible for the communication around the service, the company that executed the service, and then two departments at KTH conducted the interviews and the evaluation, respectively. Thus, it might be that the company providing the service was not aware how important it is to have all the contact details to the customers and the necessity of this data collection for KTH, who were in the end analysing the data. The person in charge of the interviewing, on the other hand was also not aware what exactly will be (possible to be) measured and how. Moreover, it was stated by a researcher that a lack of the ability to measure the impact since the measure was conducted in a small scale: *"If you measure the impact, ok there are 80 people, who use this. Then I did ask them how many times they go to the recycling centre, so they go a few times a year, and maybe 1/5 have a car, and maybe this service replaces one car. But I mean you have maybe 15 people – 15 trips, 60 trips I mean from the City of Stockholm perspective its nothing."* Since the number of users (and the ones interviewed) was too small, it was difficult to conduct a reliable impact analysis.

Second problem was a lack of an established practice and a lack of targeted communication. This problem was described in the following way by a researcher: "*I think if you have socio-technological systems, it takes time for people to get into kind of – to develop a new practice, a new way to do things. So they are not used to having this service and then having just some information in social media and maybe on SWWM webpage and local media, for half a year is not enough for a lot of people to get aware of this and use it."* Indeed all the interviewed stakeholders in this measure mentioned the difficulty to establish awareness among residents, the fact that this service (pop-up and mobility service) exist, but also what is allowed to bring and what not. The representative of mobility service provider indicated that there was confusion around who needs to be contacted (SWWM or LL-bolagen) for booking the service. Moreover, since the service was free, it was difficult to distinguish among people who really needs a service (elderly, those without a car) and those for whom the service would not make much of the difference in their daily life. The main learning derived from the implementation of this measure is that it takes time to establish certain practice and communication is very important part that needs to be accounted for.

B.2 Process evaluation activities

The measure leader has recorded progress with design and implementation in the measure report, including deviations and obstacles. Finally, the measure leader has proposed which stakeholders have the highest interest-level and highest influence over the measures' outcomes.

For the purpose of process evaluation, the evaluation team at KTH has conducted interviews with important actors in this measure. Interviewed actors were: the measure leader, the PhD researcher (sustainable development department at KTH) who produced the final report for this measure, the representative from LL-bolagen, who won the tender and was providing the collection transport service, and a representative from SWWM (Stockholm Waste and Water Management) running the pop-up reuse and recycle mobility parks in the City of Stockholm. The interview included questions around the actors and collaborations, timeline and the development of the measure, the barriers and driving forces, as well as the learnings.

B.3 Barriers

Several barriers have been identified in this measure, listed in the table below, together with identified actions that helped, or could help addressing these barriers.

No.	Barrier field	Description	Action to overcome the barrier
1	Problem-related compact solutions have limitations	There is limited space in the city suitable for pop-up-recycling with mobility services. For example, benches or trees might be in the way or heavy vehicles might not be permitted in some areas. Moreover, the capacity is limited, e.g. it is not possible for residents to bring a lot of their items (or too big items). This is also problematic due to the limited capacity to sort items (hazardous waste, items for second hand market, items for give-away).	Stockholm water and waste used digital maps and other tools to investigate if the geographical area would be sufficient. This was inspected on-site. Bulkier items can only be transported to the Pop-up Park by the booking service. This way, we have exact control of the bulkier items that require much space and have no risk to be flooded of large items on site. Now, that the service is no longer provided, pop-ups established a rule that citizens who bring a lot of items with their car, are asked to drive to the recycling centre instead. Alternatively, E-cargo bikes or cars could have a limitation in terms of maximal number of items allowed to dispose. According to the service provider, since the space is limited (2 containers only), the pop-up and the service would be more suitable for the things one could reuse.
2	Limited loading capacity	E-cargo bikes and cars have also limited capacity.	There could be an educational value in this, but it becomes more expensive.
3	Limited time	The collection service was running during few months only and thus it was too short to evaluate how it runs.	No actions have been taken.
4	Planning	Market review showed that companies that could arrange drivers, vehicles and a booking service for residents for collection or drop-off of waste did not exists.	Based on the market study and discussions with SWWM, a procurement call was carried out. The issue was discussed with suppliers on the market before the launch of the tender documents so that they had time to adjust.
5	Communication-Lack of awareness	Unclear, ineffective communication	The advertising came in late and it took time before people understood that the service is provided for free. In the beginning it was not many people ordering the service while in the end there was much more people. Moreover, the collection service provider and the customers were unsure which items were allowed and which were not.

5	Lack of continuity	Service was offered during a limited amount of time.	This was the nature of this project. The service is no longer provided. It is possible to book and pay for a collection and transport to the recycling centre (not to a pop-up).
6	Lack of recognition	Service was new and there was a lack of awareness.	Advertising on the website, social and local media, possibility to advertise in the buildings.
7	Regulations	There are different rules and regulations concerning waste.	Hazardous waste was not allowed to be collected via the collection (freight) service provided.
8	Educational purpose can be lost	If citizens are only using the service and do not visit pop-up events themselves, there can be a lack of awareness around the value and work the items.	Invite the people to visit the pop-up events regardless.
9	Costly service	Freight/Collection service is costly.	The collection service is costly and could be offered only during the project. After the project, one can order the service for a fee, but not to a pop-up, only to the recycling centre, which is according to LL-bolagen more efficient. Also SWW offers a possibility for the citizens to borrow an E-bike to transport their things to the recycling centre.
10	Time consuming service	Using E-car and E-cargo bikes not many things could be loaded and it is more time consuming from the business perspective.	No action was taken to overcome this barrier, there can be seen an educational value.
11	More complicated system	From the collection service provider perspective (LL bolagen), this system is more complicated, it requires them to drive to the customers, load up, unload at the pop-up and then after, what is left, needs to be taken to the larger recycling station from the pop-up.	From the LL-bolagen perspective (and from economic perspective) it is more effective to collect items and dispose them at the larger recycling station. However from SWWM perspective, there is an educational value related to the pop-up events, people can visit the event and collect items they may need (which is not possible at the recycling centre) and the process of reuse and recycle (and the value of items) becomes visible and closer to people.

Table 37: Identified barriers and planned/taken actions.

B.4 Drivers

Several drivers have been recognized as possibly helping to bring about the success of the two measures. In cases where it is possible to encourage and capitalize on these, we have identified actions to do this.

No.	Driver field	Description	Action to make use of the driver
1	Cultural	Citizens in Stockholm are generally environmentally aware and support the idea of recycling, reusing, as well as sorting (hazardous) waste correctly.	Provision of a possibility to in a simple way exchange and recycle items through the pop-up stations. However then the event perspective, reuse (people can visit the event and collect the items), and educational value of the pop-ups would not come through.
2	Cultural	Citizens tend to understand, accept, and follow the rules as long as these are communicated and reasons are provided.	This driver could be used more (potentially in the future), by a clear communication and provision of the rules – what is allowed to bring, how, and why. One idea could be that the citizens could receive a text message informing them about the event.
3	Cultural	The pop-ups are social events that contribute to community building.	If the service is provided, the users should still be motivated to visit the event.
4	Social sustainability	Willingness to support people who are not mobile (elderly and those without a car).	The implementation of this measure.
5	Good collaboration	There was a good collaboration between the partners in the project.	The implementation of this measure.

Table 38: Identified drivers and planned/taken actions.

B.5 Influence on risks

The actor with the strongest influence was Stockholm Water and Waste (SWWM), which is responsible for the Pop-up recycle park and could have rejected our offer to cooperate with a mobility service since they have—according to the law—a monopoly to manage waste. This was the largest risk in this project. However, SWWM has been very helpful and supportive to perform a new and innovative test that “piggybacks” on their operation.

Identified risk	Category	Mitigation actions	Responsible
Strong dependency on the Stockholm Water and Waste Management willingness to collaborate	Problem related	Since this measure highly relies on collaboration with one single stakeholder, this has induced a high risk. However, collaboration has worked out well and the key actors in the organization were willing to collaborate with the City and other Eccentric partners.	Measure leader
Legal restrictions and rules regarding the waste collection	Legal	Several legal requirements exist related to waste collection (e.g. it is not allowed to charge for the items collected from the pop-ups for example), thus the requirements have to be examined and followed.	Measure leader
Opportunism/Exploitation of a free service	Problem related	One risk of a free service, identified after completing the project, is that some people would take advantage of it. Alternative could be to have a fee for the service.	

Table 39: Reported period risk assessment.

C.Specific observations on the supporting activities in this reporting period

Supporting activities include:

- Information campaigns to inform the citizens in Årsta.
- Meetings between the KTH PhD researcher, the City of Stockholm, and the SWWM.

C.1 Quality of the Supporting Activities

- Communication could be improved:
  - More targeted communication would be needed (e.g. senior people, who could well use the service probably use social media less often)
  - Communication should be clearer – there was confusion who needs to be contacted (SWWM or LL-bolag) for booking the service, this should be more clear.
  - Consistency: if the events were happening continuously and the same places, the recognition and knowledge about these events would be improved.

Activity	Target group	Qualitative score
Meetings	- City of Stockholm, SWWM, KTH	Satisfactory
Campaign	- Citizens in Årsta	Satisfactory

Table 40: Supporting Activities.

C.2 Influence of the Supporting Activities on the implementation process

- Communication affected implementation highly. Consistent awareness campaign would be needed as well as continuity of the provision of service since time is required to establish a new practice.

C.3 Influence of the Supporting Activities on the impact of the measures

- Improved communication could perhaps increase the amount of people using the service, however, it would still be difficult to measure the quantitative impacts of this pilot service.

C.4 Lessons learnt on the Supporting Activities

- Communication is crucial for success of a measure: the residents provided us with a feedback that it was difficult to find information and they were also confused who were they supposed to contact. A long terms communication is required.

D. Conclusions

D.1 Process evaluation findings

The process evaluation revealed the following:

a) Time and a strong communication campaign is required for increased awareness and use of a new mobility service.

Since the collection freight service was new and lacked recognition, it took a lot of effort and time for a service to get recognition and to be used. It took a couple of months at least for people to understand that the service existed. In the beginning of the project (advertisement came in also a bit late) there were not many people that ordered the service. This has increased over time till the end of the project. There were also misunderstandings around what, how much and how large the items can be collected.

b) Small scale demonstration offering a new service to the citizens' limited possibility to measure quantitative impacts.

This measure was formed based on an underlying hypothesis that the 'car ownership' could be reduced if services, for which one needs a car in the city are provided to the citizens. As one specific service taken here, was the provision of the transport service to the pop-up recycling. However, it was found in this measure, that it is difficult to prove the relationship between car ownership and availability of the transport service due to several reasons. First, this measure was a pilot, and a small amount of people participated in the study, too small to be able to determine impacts. Second, the majority of the individuals that did participate were already without the car. Third, the service was provided only during a limited amount of time (a year and a half), which results in the lack of awareness and no assurance around continuity. Finally, this was only one service that aimed to work towards the goal of decreasing the need for car in the city, which if singled out, may not suffice. However, it could be that had it worked together with provision of other mobility services, the main goal could have been supported.

c) Qualitative findings had limitations when fulfilling the need for a systematized quantitative data collection

In this Eccentric project, there was a systematized type of quantitative measurements selected from the predefined list of key performance indicators. In this particular measure, there was a limited possibility to identify the key performance indicators due to the small number of participants, but also due to a lack of contact information which was intended to be used for a survey - and thus collection of the quantitative data. While there was an intention to produce the required key performance indicators, the way process developed (e.g. the transport service provider might not be aware that the email contact intended to be used for the survey is highly important or perhaps some users did not even have an email address), this became challenging. The qualitative findings that were produced did not match the format of the systematized, quantitative indicators required and could not be reported in an impact report.

D.2 Lessons learnt

A few lessons were learnt during the implementation of this project:

a) A consistent collection of the contacts and agreement to participate in a survey (in exchange for the free service), would improve the quality of the data received and would make it possible to conduct a survey in addition to the interviews.

b) Questionable continuity of the mobility service: It takes time for the residents to recognize the service and trust that such a transport service exists and will exist on a long-term basis in order to examine any long term impacts (on the car dependency). If the events are provided on a regular basis, that can support the recognition and visitation.

c) Development of a new project requires time: this project was developed from scratch after the initial idea was not possible. Thus, there were no pre-established collaborations between actors. It took time to both develop the idea for the project and establish trust between the actors and to communicate the goal of the project.

d) Different items have different values and there is an educational perspective: during the project it was learnt the different value of the different items and thus should be treated differently. Three categories were developed during the process: things which are broken are taken to the recycling station, things which have a value (can be resold) are given to the partners and things which can be reused (e.g. one cup) can be collected at the pop-ups by the visitors. According to the collection service provider, since the space is limited, and from the business perspective, it is more efficient to take the things which are broken directly to the recycling station and maintain this concept (pop-up with the service) for the things which can be reused. This is also since by using E-car and an E-cargo bike it is not possible to collect a lot of things and it takes more time. According to the SWWM representative, there is however, also educational aspect to keep in mind, since people can learn about the value of different items when they visit pop-ups. Thus, if the service is provided for the transportation from people's homes, and people do not visit the pop-ups, the educational perspective is limited.

D.3 Process recommendations

a) Communicate the goals and requirements among all stakeholders

For the implementation process which involves stakeholders from various different organizations (research, the City as well as other business), it is highly important to communicate the goals of the project and the requirements for the data collection to all the stakeholders. The different stakeholders operate differently and can place different importance on the data collection, which was required in this Eccentric project. For example, an organization which provides service may place more importance to the delivery of a high-quality service rather than making sure that all the contact details are provided (if they are not aware of the importance of this for the data collection). Thus, in such projects (where there is a systematic data collection) all the different stakeholders need to be made aware from the

beginning of the project, of the goals, outputs of the project and the importance of the data collection.

b) Understand the importance of information campaign

This measure introduced a new collection service to the citizens as attached to the pop-up events. It was learnt in the project that it was very difficult to reach out to the individuals to have them understand that they have this service available. This means the communication of the service is highly important and could be a measure/project in itself. In this particular measure, the communication was part of this project, which was found to be challenging, especially for a new service like this one. It takes time for the citizens to become aware of the services. For example, it took years for the citizens to understand and to start visiting the pop-up events. When providing information, it is important to use the suitable channels for reaching different target groups, for example, the older people might not use social media for finding information.

c) Examine regulations

It is important to examine rules and regulations concerning waste. For example, in this particular project, it was not allowed to transport hazardous waste by the options provided – the E-cargo bikes and E-cars.

d) Weigh the alternatives

While the service (provision of transport to and from the pop-up recycling and reuse) has been found useful and needed, since “people require this kind of service”, it was also found to be expensive. Thus, costs and benefits should be explored, as well who should provide the services as well as the alternative options that could support the same goal. For example, one alternative could be to have reuse rooms for such larger items, another alternative could be to have a similar “cloud” as for the car-pooling or bike-pooling, provided for the reuse, and the third option could be, to have a possibility for citizens to book and pay for the service.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MAD 2.8

Mobility management strategies for vulnerable groups

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic Iberia	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
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	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

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ECCENTRIC	Madrid		
Measure code	**Measure name**		
MAD 2.8	Mobility management strategies for vulnerable groups		
Last update	**Responsible**	**e-mail**	**telephone**
28.02.2019	Pilar Martín de Castro	martincpi@madrid.es	

A. Introduction

A.1 Expected results of the measure

The measure objectives are as follows:

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

- To change transport behaviour on a wider scale by testing new innovative measures in so-called “living laboratories” to tackle the problems cities are facing.

(2) Strategic level:

- A shift in the daily mobility behaviour of children and elderly people, with positive results in terms of both health and independence as well as in the development of care solutions.
- Positive impact at neighbourhood level: change towards more sustainable and safer mobility.

Three more specific goals are identified for this measure at the strategic level:

- To develop meaningful policy guidelines to address mobility management for vulnerable groups within Sustainable Urban Mobility Plans (SUMP), especially for SUMPs developed at the district or neighbourhood level; guidelines would include the consideration of bottom-up information, a gender approach, and enhanced participation at the neighbourhood level.
- To shift urban mobility in the urban periphery from motorised travel to active modes.
- To increase safety levels and perception of safety (and security) in the urban periphery.

(3) Measure level:

- Society: Guidelines for addressing mobility management of vulnerable groups with a gender approach.
- Behavioural change: Empowerment of vulnerable groups in mobility plans.
- Energy: Support to active modes, reducing energy needs in the mobility of children and the elderly.
- Environment: Emission savings as a result of modal shift.
- Governance: Inclusive and participatory processes; mainstreaming of gender and age perspectives.

At the measure level, two specific short-term goals are identified:

- Punctual improvements in the safety and quality of public space in areas frequented by vulnerable groups: i.e. schools, parks and playgrounds, sport centres, health centres, day care centres for the elderly.
- Vulnerable groups increase their independence and perceived safety, including both children and senior citizens.

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Liveability	Competitiveness	Efficiency of urban freight	Local economy
1	More participation: at least 40 persons involved in the campaigns						X				
2	Decrease of car trips by 5-6 percentage points for children trips and 4 points for the elderly's, in the districts targeted	X									
3	Increase of the elderly's safety perception by 15%			X							
4	Increased visibility: 12 events organised along the project with vulnerable groups						X				
5	Reduction of CO2 and other emissions	X	X								

Table 41: Quantifiable impacts.

A.2 Measure description

With this measure, the Municipality of Madrid aims at reinforcing the SUMP planning process by developing a participative process targeted at vulnerable groups (children and the elderly, including those with disabilities), complemented with a gender approach, in order to support decision making and the design of measures. Following this bottom-up participative approach, a specific mobility management strategy will be developed, containing not only special information and communication strategies, but also physical improvements of the accessibility conditions to special facilities such as schools, hospitals and care centres. The methodology used for it builds upon the successful experience of the previous STARS project (within the Intelligent Energy Europe initiative, IEE), with an accreditation scheme based on peer-to-peer co-creation of participation and communication campaigns and activities at its core.

A.2.1 Measure outputs

A) Activities for elderly people/ senior citizens.

A.1 Co-creation of campaigns to promote inclusive, independent, sustainable and active mobility of the elderly: These have been designed and carried out by the elderly and directed to the elderly, in a peer-to-peer (P2P) approach, in order to promote sustainable and active mobility among older people.

A group of senior citizens has taken advantage of their experience in media skills (e.g. journalism, video making, theatre group, graphic design, radio) to act as campaign leaders and develop strategies and contents in sustainable mobility with special emphasis on: claiming the figure of the elderly by breaking current stereotypes; empowering themselves as public actors of urban life, helping them to have a proactive attitude; deciding together on the qualities and needs of a public space friendly for them; raising awareness about the advantages of independent and active life and mobility behaviour; using municipal media to disseminate contents (websites, radio, blogs, etc.); presenting the outputs to their senior colleagues and evaluating in detail the measure in cooperation with the measure technical team.

A.2 Age-friendly design in areas frequented by the elderly, designed to favour their usual active movements. Initially, these areas could include shopping, health care and day care centres, parishes, cultural centres and libraries, etc. In practice, and following the participatory workshops, the actions identified are located in the vicinity of the Elderly Community Centres (ECC). Accessibility, high density of benches, safety, green landscape and quality of pavement are the qualities demanded by senior citizens. Some of the pilot projects have been built in 2018, based on the elderly's demands in this project.

A.3. Participation of the elderly in the organization of yearly mobility events such as: European Mobility Week, International Day Against Climate Change, International Day of Older Persons, etc. The project is also encouraging the integration of senior residents in the Vallecas Mobility Board as a way to collaborate in the organization and promotion of active mobility events and its evaluation, once demonstrated their skills as mobility experts in ECCENTRIC measure.

A.4. Collaboration with EMT (Madrid public transport company), creating campaigns for the responsibility in the use of buses, visiting the headquarters and installing real-time bus information screens in the social day centres for aged people, to facilitate the use of bus by the older people, without needing to wait for the bus outdoors.

B) Activities with children and teenagers.

B.1. To recognize and assess schools willing to develop a sustainable mobility strategy, according to STARS-ECCENTRIC project standards.

B.2. To carry out sustainable mobility campaigns at each school, involving teachers, families, pupils and principals in the activities aiming to achieve active participation of children in expanding sustainable mobility practices.

B.3. All the students 10-11 and 13-14 years old participate in in a training organised by local police to improve their skills for using bicycles on the street.

B.4.To hold workshops about communication techniques for students in order to build up communication skills, in a P2P approach.

B.5. To organize teachers' workshops to support leaders of sustainable mobility in schools, create a network of active teachers.

B.6. To organize city-wide bicycle parades to show the desire of children and teenagers to go to school cycling and walking: Big cycle ride in the EMW (European Mobility Week) 2017 and 2018 (more than one thousand cyclists), participation in the 2017 and 2018 Christmas Parades, big cycle ride in the Environment Day (June, the 5th) in Vallecas (Living Lab) with the Major, the Councillors and the political parties.

B.7. Participation in the district and city workshops to hear the citizens as representative of district children and teenagers.

B.8. To co-create activities, campaigns, workshops to address relevant issues in teen-agers mobility: gender, safety, parents support… through innovative facilitation as music, theatre, video production, media interviews.

A.2.2. Supporting activities

No supporting activities have been identified. The lack of external supporting activities has been compensated by the effort the measure team has made to reach out to residents and targeted users. One good example are the activities undertaken to involve the senior residents in the neighbourhood in the process of diagnosis and definition of pilot actions, as a way to increase the acceptance and satisfaction with the activities organized. There have also been many initiatives to expand the involvement of families and teachers in the actions targeting schools, although in this case their involvement is more challenging, as many of them have quite busy daily agendas in which it is difficult to accommodate these participatory activities. All the actions implemented within this measure have included carefully-organised participatory processes, and the lessons learnt will be summarised in the SUMP guidelines to be provided at the end of the measure.

A.2.3 Interactions with other ECCENTRIC measures

Although there has been no interaction with other ECCENTRIC measures with an impact on the measure indicators, team members from other ECCENTRIC measures have contributed to measure MAD 2.8. For example, the municipal bus company EMT (*Empresa Municipal de* Transporte), leader of measure MAD 5.8 (new buses) provided support to the production of the video spots, and was heavily involved in the implementation of the real-time bus information screens in the Elderly Community Centers (ECCs). Similarly, Bicillecas, one of the associations involved in measure 4.7 (enabling cycling outside the city centre) has been involved in some of the activities promoting cycling in one of the participating schools.

This measure has also exchanged information with other ECCENTRIC cities. For example, it exchanged information on methodologies with measure MUC 2.9, and the joint presentation made by both measures with measure RUS 2.11 at the CIVITAS Forum in September 2017 inspired Ruse to integrate schools within the awareness campaign undertaken by the latter measure.

A.2.4 Interactions outside ECCENTRIC

Interaction has been relevant with the follow-up to the STARS project in Madrid. STARS (Sustainable Travel Recognition and Accreditation for Schools) was financed by the EU in the framework of the Intelligent Energy Europe (IEE) initiative and was concluded in March 2016. Since then, the municipality of Madrid has continued carrying on activities in schools following the project's principles. ECCENTRIC runs the schools in the Living Lab with new approaches (gender, intergenerational activities, neighbourhood approach,…). The other schools in Madrid have continued with the STARS consolidated methodology since the scholar year 2013-14, under the local project *'Educar hoy para un Madrid más sostenible ('Educating today for a more sustainable future')'*, including other environmental work-lines besides sustainability.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
10	Elderly residents attending elderly centres in the area		Five Elderly Community or Day Centres in Vallecas
10	Children residents attending schools in the area		Five Primary and High Schools in the Living lab (Vallecas districts): Loyola de Palacios, El Madroño, Valdecás IES Villa de Vallecas, IES Antonio Dominguez

Table 42: Target groups or affected parties.

Due to the particular characteristics of this measure, it is possible that additional schools or ECCs will join for the remaining of the project. They cannot be included in the measure evaluation as such, but the results achieved will be presented as part of the measure scaling-up effort. By now, two more schools in the living lab joined the measure in the second half of 2018 (CEIP Asturias and CEIP Eduardo Rojo).

A.4 Stakeholders: ECCENTRIC project partners and other important actors

The stakeholders initially identified as relevant in this measure are presented in the table below. The column “role-links” indicates whether the stakeholder is involved in actions regarding children mobility (A), or elderly mobility (B). Considering the final scope of the measure after the design stage, the local branches of the political parties outside the city government (No. 12 to 17) were not considered as relevant stakeholders by the measure team, and although they could get information through the dissemination activities undertaken by the team in the living lab, they did not react to them nor expressed interest in being involved; therefore, they were not approached directly by the team.

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
1	Directors, "champions" and teachers at participating schools	S	O	P	A
2	District (Vallecas) councillor-chair and district senior officials	S	C	O	A, B
3	City councillor for environment and mobility and senior officials	S	C	O	A, B
4	Local police	S	C	O	A, B
5	Coordinators and professionals of elderly social centres	S	O	P	B
6	Members of the steering board of elderly social centres	S	C	O	B
7	Local participatory forum. Puente de Vallecas	S	C	O	A, B
8	Local participatory forum. Villa de Vallecas	S	C	O	A, B
9	Residents' associations	S	NGO	O	A, B
10	Parents' Associations	S	NGO		A
11	School councils at participating schools	S	O	O	A
12	Partido Popular Puente de Vallecas	S	O	O	
13	Partido Popular Villa de Vallecas	S	O	O	
14	PSOE. Puente de Vallecas	S	O	O	
15	PSOE. Villa de Vallecas	S	O	O	
16	Ciudadanos. Puente de Vallecas	S	O	O	
17	Ciudadanos. Villa de Vallecas	S	O	O	
18	Ayuntamiento de Madrid	P	C	L	A, B
19	GEA21	P	PR	L	B
20	EMT CEO or senior officials	P	PT	O	A, B
21	Municipality. Staff in mobility, environment and public space services	S	C	O	A, B
22	Municipality. Staff in district services	S	C	O	A, B
23	Staff at health care services (Madrid Salud)	S	C	O	B

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

Table 43: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Low level of citizens and stakeholders involvement		Extensive public communication from the early stages of the project	Measure leader and team LDM
Travel behaviour of the targeted population does not change		Awareness raising activities from the early stages of the project. Design of pilot initiatives.	Measure leader and team
Administrative structures unable to deliver answers to the residents' proposals, particularly those involving public space improvements	2	ECCENTRIC measure partners identify and approach the relevant structures within the municipality	Measure leader, site leader

Table 44: Measure's risks

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

The implementation phases varied among the different schools and elderly centres involved in the measure. The design phase took place between September 2016 and April 2017.The implementation phase took place between October 2016 and August 2018. A few additional implementation activities regarding actions with the elderly took place between August and December 2018.

The operation phase is taking place since June 2017, and will conclude in September 2019.

The contents of these phases are different depending on the targeted group (children or elderly).

The activities carried out during the design phase consisted in the review and fine-tuning of the STARS methodology to the objectives of ECCENTRIC and the specificities of the living lab, the strategy to reach the senior population in the living lab, in a way consistent with the programmes and actions already undertaken by the municipality, the initial selection of schools and Elderly Community Centres (ECCs), and the design of the mobility surveys.

During the implementation phase, surveys were administered in the first participating schools (October 2017 and May 2018) and in the ECCs (March 2017).

Diverse meetings were organized with stakeholders at schools and ECCs, champions and focal contacts were identified and working groups were established.

Once this phase completed, the diverse schools and ECCs involved started with the participative diagnosis of the mobility as a first step to define the themes of the campaigns and activities.

The City of Madrid offered bicycle training to schools by local police and communication training workshops to the motor group in high schools, called ‘Mobility Ambassadors’, as well as assessment in health by Madrid Salud (community doctors) and support in the organisation of activities through ‘advisors’ contracted by the city.

Furthermore, city and neighbourhood wide bike rides, weekly walks by foot or bicycle, competitions, videos, workshops with specific themes like gender or intergenerational collaborations with senior participants have been implemented along 2017, 2018 and will continue in 2019 and 2020, integrating the new demands by schools and high schools. All these activities have been audited by city advisors, and the Living Lab schools were awarded gold, silver or bronze accreditations.

These activities have been supported by the district city councillor and the Major in the occasion of big events with all the schools participating in the city.

The ECCs started with participative workshops to identify the elderly’s needs and critical points in their daily mobility. They were held at the time of the administration of the initial mobility survey (February-March 2017). Some of the working topics initially identified by the ECCENTRIC team were not prioritised by the seniors’ groups, which preferred other options. According to these priorities, several critical walks with the elderly of five ECCs served to point out the most relevant ideas to focus the campaigns and pilot actions in accessibility: quality of

pavement, density and adequacy of benches, age-friendly sport areas, environmental comfort,etc The participants wrote the script, screen-acted and produced four short (and funny) videos expressing their approach to these issues, widely disseminated. (15,000 downloads till now and projection in almost ten dissemination events).

The seniors active in ECCENTRIC have participated in several dissemination activities (radio, local media…) and they have been recognised with the main Mobility Award by the City.

As a bottom-up initiative, aiming at continuing the awareness-raising activities and at engaging more seniors in the activities, one of the ECC established a senior mobility club (*Anda con nosotros/Walk with us*), which organised biweekly walks within the neighbourhood and periodic excursions out of the living lab.

During the operational stage, some of the actions identified through the co-creation process with schools and ECCs are being implemented, and dissemination activities continue. Apart from the current activities in schools and ECCs, the pilot actions implemented include:

(1) the reform of the urban space in *Plaza de la Constitución*, a square close to two ECCs, with improvement works in the pavement, benches, sport areas, accessibility, etc. inspired by the critical diagnosis accomplished by the elderly, with the aim of replicating this elderly-friendly design in other areas.

(2) the implementation of a real-time bus arrival information screen in three places (Santa Eugenia ECC, Pablo Neruda ECC and Madrid Salud Centre in Puente de Vallecas). Similar screens could subsequently be installed also in other ECCs, as a way to facilitate the use of public transport by the seniors attending these centres.

(3) preparation of guidelines on mobility of vulnerable groups in Madrid and recommendations for mainstreaming them within municipal mobility policies. A reflexion group with other cities and researchers was initiated at the National Environment Congress (CONAMA) at the end of 2018 and will continue in 2019 and 2020, trying to integrate bottom up conclusions from ECCs groups and top down research currently focused on the ageing city.

The only relevant change in this measure refers to the expansion of the implementation stage, in order to include the participation of additional pupils and schools in the city lab. The continuation of implementation activities is not interfering with the actions undertaken during the operation stage. The last year will be focused on upscaling and replicating the co-creation method successfully tested.

B.2 Process evaluation activities

This measure had been selected for detailed process evaluation within ECCENTRIC. Accordingly, the following activities were conducted:

(1) A process evaluation survey opened to those of the initially identified stakeholders that had actually expressed their interest and been involved in the measure.

(2) Interviews with key decision-makers in the district and in the city.

(3) A Learning History workshop organised on 4th February 2019, with the participation of most of the promoters' group in the ECCs (31 participants including all the key stakeholders: 24

seniors, 5 ECC coordinators and socio-cultural specialists from the municipality, and 2 municipal health specialists).

Furthermore, yearly evaluation workshops have been carried out at the end of the scholar year by the technical team with the teachers, the directors, and other stakeholders of the participating schools as a part of the methodology followed by this measure. Although focused on results and impacts, the measure team considers that these evaluation workshops have included some process-related issues.

The survey intended to assess the role played by each stakeholder in the process, including aspects such as motivation and engagement; and the mutual perception among stakeholders. The stakeholder analysis is important to develop actions to engage stakeholders in order to improve process and maximise impacts.

Although the survey was responded by thirty one persons, only twenty-three of them were made available to the evaluation team within the process evaluation deadlines: Six members of the Eccentric project team, three members of the municipality's technical staff (one from the Environment and Public Space Department, and two from the Gender Equality and Diversity department, including one Equality Agent), one member of the EMT technical staff, one member of the directive board and one member of the technical staff of one of the Elderly Community Centres, six teachers or directors of the participating schools, and five members of the technical staff of "Madrid Salud" (municipality's health care services).

The measure team found out that the survey was not easy to answer by some of the elderly, who, although actively involved in the measure were not familiar with some of the abstract concepts included in the questionnaire; in these cases, the on-line data collection procedure was substituted by paper templates.

The measure team claims that the new provisions in the Data Protection Law made it really difficult to contact some stakeholders, such as neighbourhood and other grassroots associations, and non-municipal entities. The measure team had to reach out to them through personal contacts or through general e-mail addresses, which proved not to be always read. This problem was common to evaluation and dissemination activities within this measure.

The Learning History workshop has been friendlier for senior participants than the on-line survey, resulting in a higher attendance and an intense dialogue among the diverse stakeholders on all the aspects of the implementation and operation of the measure.

The following conclusions can be made, based on the profile of the respondents:

- Outside the schools and ECCs, the involvement of local stakeholders included Bicillecas, a grassroots association promoting biking in the living lab, but did not get the active involvement of residents' associations or political parties. Nevertheless, some of the members of the Elderly Community Centres participating in this measure have a rich background participating in grassroots activism to improve living conditions in the district.
- The measure interacted with the existing participatory channels in the city lab (the local participatory fora at *Puente de Vallecas* and *Villa de Vallecas*) mainly through the presentation of the measure at various events (such as the European Mobility Week, *Universidad Social de Vallekas (USVK)…)*. Deeper involvement of these participatory Forums in the measure was not possible due to their heavy load of work and limited

resources, but they stated their high interest and support to it during the evaluation interviews.

- The involvement of parents' associations was satisfactory in two primary schools (Loyola de Palacios y El Madroño). However, the ECCENTRIC team was unable to get answers to the survey from them.
- The response to the survey was satisfactory in the case of technicians at the various municipal services, in spite of the lack of answers from technicians working at the district level. The measure team points out that they have been working with a variety of municipal services and professionals such as:
    - Puente de Vallecas district: social services, health services (Madrid Salud), local police, public space.
    - Villa de Vallecas district: social services and health services (Madrid Salud).
    - Central services of the municipality: Urbanism, environment, local police (bicycle unit), public space, social services, water and mobility. Experts from EMT (Municipal bus company), Health Service (Madrid Salud), and Employment Agency.

In accordance with the survey answers, seven of the respondents were involved in actions in schools, and eight of them in actions in ECCs; five respondents were involved in actions on both fronts. Three of the respondents were not involved in the measure, although two of them had known about it.

The respondents showed a high level of identification with the objectives of the measure. In a 1-5 scale, they gave an average score of 4.6 to the objective of "increasing the number of trips on foot or by bicycle", 4.5 to the objective of "improving the public space used by pedestrians in Vallecas", 4.4 to the objective "decreasing the number of car trips" and 4.1 to the objective "increasing neighbours' participation in decision-making".

For all the stakeholders considered there is a positive assessment of their interest in the measure (scores above 3.5). The differences between subjective (self-perception) and objective (perception from other stakeholders) of interest are low, below 1 point. Concerning the assessment on influence, differences between the subjective and the objective perception influence are higher than those on interest, particularly in the case of ECCENTRIC team members, ECC steering board members, ECC technical staff and EMT technical staff: all these stakeholders have a significant lower perception of their own influence than the other stakeholders. Furthermore, these are the only stakeholders that consider themselves as having a relatively low (2, 2.5) level of influence in the measure. All the other stakeholders are viewed with a high capacity of both impact and influence.

Among the stakeholders receiving lower scores in terms of interest (below 4), just one of them answered the survey.

Generally, the scores on influence are lower than the ones on interest. The only exceptions are city councillors and EMT executives.

In terms of actual impact in the measure's contents, subjective and objective perceptions remain well aligned, except in the case of ECCENTRIC team members. Those with lower scores correspond to stakeholders that did not answered the survey (EMT executives, municipal technical staff in the district, School councils and Parents' associations).

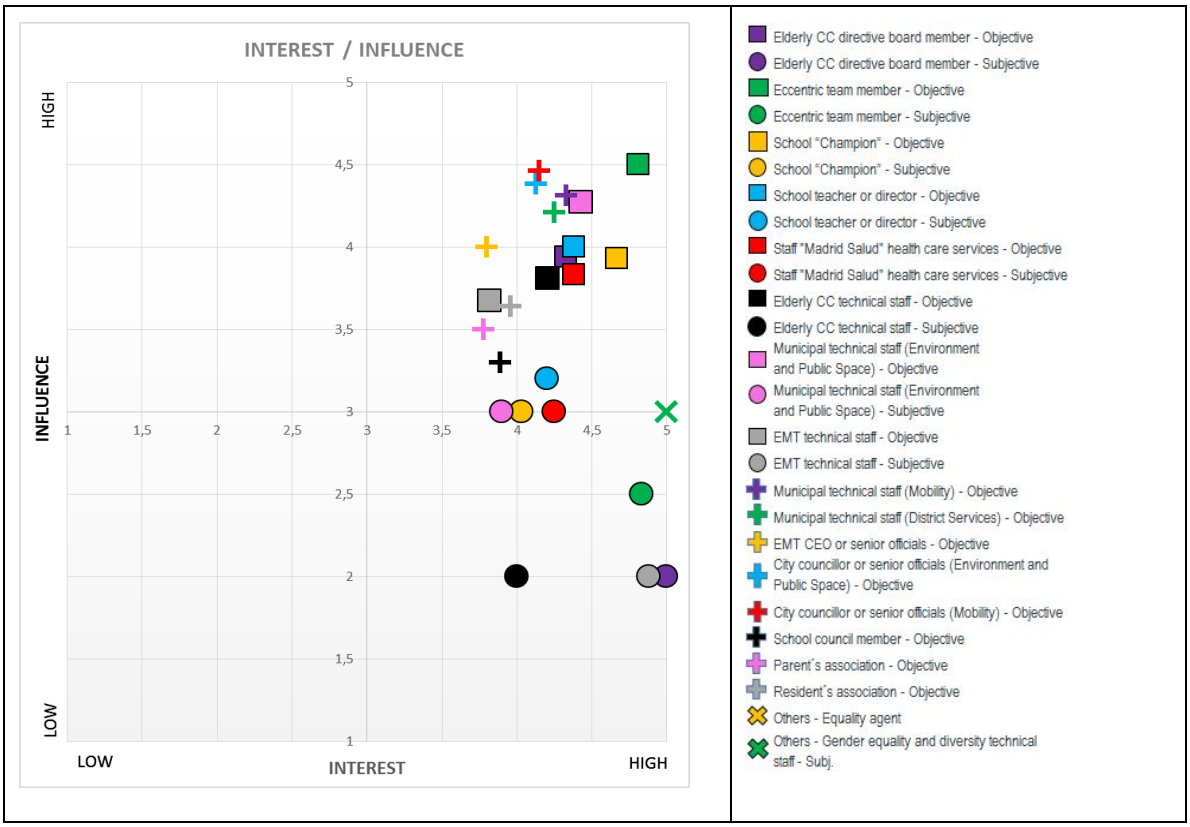

Figure 75: Interest & influence of stakeholders

Figure 76: Interest & impact of stakeholders

The information collected through on-line surveys was complemented by in-depth interviews to some key decision makers and stakeholders: the City counsellor chairing the two districts of the living lab (Vallecas), the City counsellor in charge of mobility, environment and sustainability and her deputy, the CEO of the municipal bus operator (EMT) and one of the members of the mobility section of the citizens' council of one of the districts (Foro Local de Puente de Vallecas). These interviews provided a general overview of the key drivers and barriers the project as a whole was facing, and an assessment of the relevance of the different measures from these stakeholders' perspective.

Measure MAD 2.8 had a very high priority (5) for all the key decision makers and stakeholders interviewed, and an average priority to the representative from *Foro Local.* Whereas the latter considered the children component of this measure as a high priority, his support for the elderly component seemed lower, which resulted in an average score for the whole measure (3).

In terms of interest, all the stakeholders provided a very high or high (5-4) score. All stakeholders considered that they had a high to very high influence (4-5) and impact (5) in the measure, with the sole exception of the stakeholder from *Foro Local* (1).

The stakeholder from the participatory platform (*Foro Local*) had a general concern about the effectiveness of communication strategies of projects in a district with the characteristics of Vallecas. From his view, there is a general communication barrier to reach district residents, who are not much concerned with traditional (local press) or emerging communication channels (social channels and internet). Therefore, communication strategies should pay more attention to more informal channels (mouth-to-ear, local leaders, grassroots associations...). An additional barrier arises when actions are focusing on technological innovations that can be too far away from the residents' daily experience and priorities. It is worth noting that these considerations are of limited relevance for measure 2.8, as its main channels of communication were the local schools and ECCs, and no technological innovations were included in this measure.

The stakeholders from the municipality (City counsellor of mobility, environment and sustainability and her deputy) pointed out that the city council's political priorities are well aligned with ECCENTRIC, and this should be an advantage for the project. Furthermore, these political priorities are resulting in plans and actions -Air Quality Plan, New Ordinance on Sustainable Mobility, new Protocol to fight Air Pollution, Madrid Central (a large Low Emissions Zone covering the whole central district)- that offer clear synergies with ECCENTRIC, and also a potential to scale up ECCENTRIC measures at a city-wide level.

The city is currently very much focused on short-term, urgent actions, and it needs to develop or strengthen a medium-to-long-term vision; this medium-term perspective can be partially provided by ECCENTRIC, and in this sense, the project can gain attention from local decision-makers.

The city councillor for mobility stressed that ECCENTRIC measures (including this one) require strong cooperation among municipal services, which are not always accustomed to react within the tight schedule for implementation set up in ECCENTRIC. In fact, this has been one of the main challenges for the measure team. During the process, the team members had to actively identify, approach and put pressure on the relevant municipal services to get the different

actions implemented; this proactive (and demanding) management action of the team served to bypass bureaucratic barriers and to gain the support and recognition of previously sceptical elderly participants. The tight budgetary rules imposed by the national government on municipal budgets further jeopardised and delayed implementation.

The process evaluation workshop was held on February 4, 2019, and took together the main participants in the measure activities related to elderly mobility: the ECCENTRIC measure team, technicians from the municipal health services (Madrid Salud, 2 participants, one from each district) and municipal social services (2 participants, one from each district), the municipal socio-cultural specialists of three ECCs (Santa Eugenia, Alto del Arenal, Pablo Neruda) and senior citizens active in most of the Elderly Community Centres in the Living Lab (22 participants). The workshop allowed to establish a common storyline of the activities undertaken within this measure and to identify some key barriers and drivers (see sections B.3 and B.4).

The participants enjoyed the exchanges to reach a common definition of the story of the measure, with workshop facilitators drawing a timeline on the wall, supported by attendants sticking images of every action accomplished. The exchanges and contributions focused on how the activities had been defined and carried out. The promoter's groups were happy to remember and comment on the process and to highlight the outputs. Comments were added to the wall collage through post-its.

The following barriers were identified during the workshop:

- The daily life difficulties inherent to aged people: some of those that participated at the initial stages of the measure were unable to continue because they were ill or had to take care of their families.
- An error in the selection of music for the fourth video has created difficulties for dissemination.
- The ECCs in Vallecas are overcrowded: there is a need of more community centres in the peripheral neighbourhoods.

The measure team considers relevant to highlight that, outside this workshop and in the context of the roundtable organised by ECCENTRIC at the National Environmental Congress (CONAMA) in November 2018, the participants pointed out the language barrier many technicians and academic researchers face while interacting with lay people, and particularly with the elderly. This barrier was mentioned in the process evaluation workshop, and the measure team is working to overcome this barrier in future exchanges.

The participants highlighted the following key drivers:

- The bottom-up approach followed in co-creation processes within the measure: all the ideas have come from the group of active seniors, really expressing their concerns and priorities. These ideas are interesting and relevant for older people and a big debate has sparked on these topics.
- The work in group, the collective way of addressing common problems and also enjoying the co-creation activities (i.e. diagnosis walks, excursions in group, theatre acting, video shooting…).

- The search for solutions, accomplished in the pilot projects (EMT screens, interaction with public transport managers, improvement of public space quality, in accordance with the seniors' priorities...)
- The empowerment of seniors, helping them to gain a fresh and more critical view over the city and the quality and adequacy of its public space to their needs.
- The ability of the promoter's group (particularly in one of the ECCs) to include more and more people in their initiatives (from the videos to the walkers' group).
- The way the City Council has listened to the ECCS' proposals and promptly reacted with solutions and pilot projects.
- Awareness of the older people's perspective on mobility and its integration within policy making, overcoming the usual approach, limited to general considerations on accessibility.
- The solidarity with the future generations: the relevance of intergenerational work and the ability to find shared ideas on the characteristics of public space.
- The valuable leadership role provided by some of the promoters of the measure in the ECCs.

The workshop also identified the main expectations for the measure follow-up:

- Focus on campaigns to disseminate the measure contents and results outside the living lab, reaching other ECCs in the city and participating in other events. The quality of the measure outputs deserves wide upscaling and dissemination.
- Strategies to convince other ECCs about the convenience of building upon these initiatives: workshops explaining best practices and lessons learnt, training for leading groups in ECCs…
- Further efforts are needed to integrate the fight against loneliness of aged people as a central concept (like healthy ageing) in the methodology, e.g. through replication of bottom-up walkers' groups activities for aged people.
- Future campaigns on remaining topics, to address issues and challenges identified in the ECCENTRIC activities and that have not been addressed until now.
- Interchanges among ECCs, as an additional methodology to explore within this measure.

A similar workshop was held on June 15, 2018 including most of the stakeholders active in the measure components addressing schools. The workshop allowed to establish a common storyline of the activities undertaken within this measure and to identify some key barriers and drivers (see sections B.3 and B.4).

The workshop reviewed all the activities developed along the year, and highlighted the best practices or more innovative actions. The following barriers were perceived:

- Activities such as the conferences held on climate change and mobility, that leave scarce opportunities for two-side communication and active participation of attendants.
- The need for further involvement of families.
- The lack of official recognition of the work done by the teachers involved. The last two barriers had already been addressed in the past, but have not been solved yet.

Otherwise, all the activities undertaken in 2017-18 were analysed, and the participants decided to continue with them in future, as they fulfil their goals and the group of students involved is

satisfied with them. The participants also shared their expectations for the future of the measure:

- More bottom-up initiatives.
- More activities of interchange of students between schools in Madrid and with other cities (also European ones).
- Dialogue with city managers to improve the cyclist network and road safety in the area of influence of the schools.

B.3 Barriers

The main barriers encountered during the reporting period and the actions put in place by the measure team are identified in the table below.

No.	Barrier field	Description	Action to overcome the barrier
	Institutional	Sectoral silos and rigid decision-making procedures within the municipality	Actions on a case-by-case basis, combining bottom-up initiatives (informal exchanges among officials) and top-down meetings with intense dedication of the team.
	Problem-related	Elderly's scepticism to municipality's answer to ECCENTRIC proposals	Quick implementation of a flagship action and regular follow-up to the other ones. Intense interaction between the measure team and the elderly, which resulted in high satisfaction from the latter, as stated at the evaluation workshop.
	Organizational	Lack of formal, stable structures to implement the measure.	Increased involvement and leadership capacity of ECCENTRIC team members.

Table 45: Identified barriers and planned/taken actions.

The barriers encountered during the reporting period have been successfully overcome by the project team. This is particularly relevant for the institutional field, as investment decisions within the municipality were slowed-down by the strict budget-control rules approved by the national government to meet the austerity targets imposed by the European Union. In many cases substantial dedication of the measure team was required, not only to move forward the actions in the decision-making chain, but also to keep the elderly participants engaged in spite of the administrative hurdles.

It is worth mentioning that no political barriers have been encountered. This can be explained as a consequence of the lack of political controversy associated with this measure. Local decision makers and politicians have backed the measure when needed, without considering that they should take a leading or even a significant public role in it.

Institutional barriers have been challenging at the time that the conclusions from the implementation process had to be translated into concrete actions in the field. This has not occurred in the case of children mobility, in which actions have been of an educational nature, not needing to mobilise other municipal services or requiring procurement procedures. However, in the case of elderly mobility, the implementation of actions has required significant time and efforts from the ECCENTRIC team. The municipal administrative procedures have had difficulties to accommodate the suggestions provided by ECCENTRIC, as they were not following the usual participatory and decision-making channels. The success achieved by the

measure in getting actions implemented and integrating new actors in the participatory channels (particularly those as children and the elderly that cannot rely solely on on-line participatory tools) provides valuable lessons for municipal management.

Although significant cultural barriers were not identified during this period, it is worth to point out that the measure team encountered some challenges, mainly the low familiarity of the seniors with on-line surveys and written material (a significant part of them had not completed primary studies) and the need to look for alternative communication channels. Otherwise, it is fair saying that vulnerable groups, such as children and elderly, are already well aware of sustainable mobility practices and keen to explore them. During this period, initially unforeseen gender differences were identified in the attitude of teenagers towards cycling: this cultural barrier will be further explored in the remaining of the project.

A relevant problem-related barrier was the relative scepticism and lack of confidence of some of the members of the Elderly Community Centre steering boards about the institutional response that would result from their involvement in the ECCENTRIC. Initially, these stakeholders complained that participatory processes like the one proposed in this case was unlikely to result in implementation of the conclusions by decision-makers. This barrier was overcome through a quick implementation of the two pilot actions (the bus information screen and the improvement of Plaza de la Constitución, an area close to the ECCs according their criteria), and the involvement of EMT (an ECCENTRIC partner not initially involved in this measure) and other municipal areas, which made these stakeholders eager to continue participating in the process to achieve the implementation of other actions. The quality of the campaigns (videos…), the recognition of their work (prizes, media,,,) and the truly participative process have been also appreciated as trust-builders in the conclusions of the learning history workshop.

No positional or planning-related barriers have been identified during this period. Related to the former, the characteristics of ECCENTRIC, as a project focusing on the urban periphery, and the profile of this measure, targeting vulnerable groups, could have been considered as a significant handicap; however, it was the opposite, as the team and the more active stakeholders enjoyed considerable freedom to shape and carry out their activities. As for the latter (planning), the actions considered did not find contradictions with the existing planning framework in the city and the city lab. In fact, the measure was well aligned with the City Council's priorities, and the technical team provided the competences and experience needed for these processes, which in some cases were building upon previous initiatives (e.g. STARS project).

Organisational barriers have been relevant, due inter alia to the lack of pre-existent formal structures to frame the interaction with local stakeholders and the targeted population. These barriers were properly handled by the project team. Organisational barriers may have appeared as a consequence of the lack of stable structures to support the project's actions in the city lab. The management option followed by the team had the advantage of offering considerable flexibility and room for adaptive management; however, it proved to require significant additional efforts from the ECCENTRIC team and probably did not mobilise the full potential of local stakeholders, which although supportive to the project, played a relatively secondary role. The support of municipal staff (e.g. at the ECCs) was particularly valuable to overcome this barrier.

This measure is well placed to deliver an innovative method involving vulnerable groups in co-creation processes. The last stage of the project is focused on upscaling the pilot actions, establishing medium-term strategies that can be implemented in the future in the participation processes in mobility plans, the current revision of Madrid's SUMP, programming of annual activities for critical diagnosis and improvement of the environment or integration of mobility in education, inter alia.

B.4 Drivers

The main drivers encountered during the reporting period are identified in the table below.

No.	Driver field	Description	Action to make use of the driver
	Political	Sustainable mobility and regeneration of the periphery as two political priorities of the municipality.	Both dimensions (sustainability and focus of peripheral districts) have been highlighted in the meetings and documents associated to this measure.
	Institutional	Strong informal networks of municipal technicians, supporting the project's priorities	Regular update through these informal networks about progress and challenges of the measure
	Cultural	Some ECC board members with valuable previous experience in associations	Board members engaged in workshops and other practical events to design and implement the actions.
	Cultural	Strong identification of children and elderly with their neighbourhood	Identification of opportunities for action in the public space
	Financial	Modest but decisive funding available through ECCENTRIC	Technical support to participants through co-creation workshops.
	Technological	Interest of EMT to test technological solutions (information screens)	Involvement of EMT in the measure.
	Spatial	Opportunity to implement physical projects through the municipal Madrid regeneration programme (MADRE)	Interaction with ECCENTRIC measures 4.6 and 4.7 and with MADRE actions in the city lab.

Table 46: Identified drivers and planned/taken actions.

A relevant political driver is the commitment of the current local government for both sustainable mobility in the whole city and urban regeneration in the urban periphery. This driver is facilitating the implementation of most of the ECCENTRIC measures, even if it has not been translated into explicit public support to the project from the side of city councillors.

From an institutional perspective, the lack of institutional arrangements and the limited city councillors' support have been partially compensated by relying on informal networks among local civil servants placed in different municipal services and able to reach across bureaucratic boundaries and sectoral silos to accelerate approval procedures. These informal networks have proved to be very supportive of innovations, and very keen in pushing forward bottom-up actions like the ones co-created within this ECCENTRIC measure with the elderly.

Some of the members of the Elderly Community Centres participating in this measure have a rich background as active citizens in Vallecas, a neighbourhood with a long tradition of grassroots activism to improve living conditions. This background has been of great value in the design and implementation of actions within the project.

Most of Vallecas residents, including the children and elderly, share a widespread feeling of belonging and identification with the neighbourhood. They consider themselves as the main figures in the fight for the improvement of Vallecas since the 1960s, asking at that time for basic urban services (electricity, sewage, transport…) to be improved and social facilities to be provided. This background facilitates their engagement in the activities of this ECCENTRIC measure.

Although the funding provided by ECCENTRIC is modest, compared with the city lab needs, and with the ambition of many of the actions identified during the measure implementation stage, it has been decisive to provide the necessary technical expertise in communication to channel the suggestions of the participants and to transform them into feasible projects, to be subsequently presented to the municipality for approval and implementation.

The current commitment of the municipal bus company (EMT, an ECCENTRIC partner, although initially not involved in this measure) with technologies providing new channels of information to the user was instrumental for the implementation of the information screens in ECCs suggested by the participants at co-creation workshops.

There is a favourable environment for the improvement of the public space in Vallecas: the municipality has been developing during 2018 its city-wide regeneration plan *Madrid Regenera* (MADRE) including actions in the two districts included in the city lab.

B.5 Influence on risks

The preparation and implementation of the measure was successful in coping with the risks initially identified (section A.5):

- Risk 1: There is a high level of participation of citizens, but some potential stakeholders were initially reluctant to participate despite the great effort in communication (e.g. residents' and grassroots associations with a tight agenda and limited available worktime as they are volunteers in a district with many problems, or political representatives with many competing urgent priorities).
- Risk 2: The behaviour of senior people involved has probably changed, but the impact in the whole living lab is difficult to measure, as the area of the Living Lab is too large to detect the increment in the two areas where the pilot actions have been implemented.
- Risk 3. Participation of senior people in the activities proposed by the project has been really impressive with a large promoters' group that triple the first envisaged participants. The promoter's group is composed by more than 100 elders from five centres, engaged in all the phases of the preparation and implementation of the measure.

The main risk identified at this stage regards to the difficulties to get actions implemented. The actions identified during the co-creation workshops require, in some cases, administrative procedures for approval, budget allocation and procurement. The administrative competences are not always in the realm of the municipal services closer to those in charge of the ECCENTRIC project. This risk is being addressed through adaptive management approaches from the site manager and the measure leader, which for the time being have delivered the

expected results. The measure team will continue working in this direction during the dissemination and replication stages. Accordingly, the assessment of this risk remains as moderate to low.

Identified risk	Category	Mitigation actions	Responsible
Administrative structures unable to deliver answers to the residents' proposals, particularly those involving public space improvements	2	ECCENTRIC measure partners identify and approach the relevant structures within the municipality to speed up decision making and administrative response. The pilot actions serve to empower children and seniors to build stable channels of communication and influence.	Measure leader, site leader
Local government's engagement insufficient to implement ECCENTRIC guidelines and lessons into administrative procedures, mainstreaming good practices within the regular policies in the district and in the city.	1	Development of an exit strategy involving key city councillors and other stakeholders	Measure leader, site leader

Table 47: Reported period risk assessment.

As the measure approaches its final stage, it has to deliver also in terms of guidelines on sustainable mobility practices in the city targeting vulnerable groups and in terms of mainstreaming some of the actions implemented within the city's policies. The measure team considers that the involvement of municipal decision makers in the measure has been satisfactory thus far, so that they assess as low the risk that the guidelines would not be officially approved or that mainstreaming efforts would not be undertaken. In any case, this risk, which is shared with other ECCENTRIC measures that envisage to influence future municipal policies, could be addressed through more intense communication with the key city councillors and senior officials within the municipality, should such need be identified.

C.Specific observations on the supporting activities in this reporting period

Although no external activities have been identified supporting this ECCENTRIC measure, the measure has undertaken some actions to reach out to residents, and targeted users (see section A.2.2). Furthermore, the dissemination activity organised in the context of the National Environment Congress (CONAMA) in November 2018 has resulted in a reflexion group with other cities and researchers, which is expected to continue in 2019 and 2020, trying to integrate bottom up conclusions from ECCs groups and top down research on the ageing city. The lessons learnt from these activities will be summarised in the SUMP guidelines to be provided at the end of the measure.

E. Additional Evaluation findings

As this measure had been selected for detailed process evaluation, a closing workshop was held on 19 February 2020. The workshop gathered together participants from different departments of the municipality, three members of the ECCENTRIC team, a member of the steering board of Vallecas elderly social centres, a medical doctor from the municipal health service (*Madrid Salud*) and a member of the municipal programme *Educar Hoy*.

The workshop allowed to deepen into the drivers and barriers identified in the previous workshop, as well as to discuss the lessons learned and possible process improvements for future actions and policies.

The following topics can be highlighted:

- The design and implementation of the measure took place through a successful bottom-up approach. In the case of the elderly, the participants at the various co-creation workshops actively joined the project team at all the stages of the emasure process, from the design of the campaigns to the reconfiguration of the public space. Furthermore, the measure facilitated the consolidation of a network of seniors interested in active mobility (*Anda con nosotros/Walk with Us*), thus contributing to the continuation of bottom-up, participatory processes beyond the project's termination.
- Difficulty in including actions in participatory municipal budget: digital voting procedures are complex for the elderly. The project team organized digital training, with instructions also printed on paper. However, this initiative was not enough to fully empower them to use the municipality's participatory platform. Therefore, the municipality should undertake additional initiatives after the project termination in order to facilitate the involvement of senior citizens in digital participatory processes.
- The lack of a safe and connected cycling infrastructure and bicycle storage spaces makes it difficult to increase cycling trips in Madrid, particularly for children. In Vallecas, this situation is even more challenging, as the expansion of cycling structure is

jeopardised by high car pressure, narrow streets and scarce off-street parking space. Cycling is also difficult in the new neighbourhoods developed in Vallecas at the turn of the century with a strongly car-oriented design. From a process evaluation perspective, it seems necessary to develop specific strategies tailored to these particular conditions, rather than simply expanding to the area the cycling strategy implemented in the central districts. From this perspective, the cycling network designed by ECCENTRIC within measure MAD.4.7 provides an excellent basis to undertake the implementation of a cycling strategy well adapted to Vallecas and inclusive of children's and other social groups' needs.

- It was difficult to involve parents in the process, and to convince them to support and encourage active mobility among their children, for a variety of reasons. Some parents are highly car-dependent, using the car in their trips to their working places and for convenience activities, in other cases, their awareness of sustainability issues is low; finally, for some social groups and communities in Vallecas (a district with high cultural diversity), cars are highly valued as a status symbol. From a process evaluation perspective, this highlights the need to embed actions with children within a wider framework in order to reach out to their families and also to empower children to act as sustainable mobility ambassadors within their families.
- It is well known that urban planning patterns and public space design have a strong influence on active mobility, particularly for vulnerable groups. This was confirmed by the modest modal shift results obtained in one of the participating schools (Loyola de Palacio), located in the recently developed area of *Ensanche de* Vallecas, with a strongly car-oriented design (which was also implemented in other parts of Madrid at the turn of the century). From a process evaluation perspective, it can be concluded that the implementation of sustainable mobility measures in these neighbourhoods will hardly be effective unless broader regeneration strategies are adopted to redesign the urban space, and allocating to that task the necessary resources.

D.1 Barriers

In addition to the barriers already mentioned in section B3, the second workshop identified other aspects that have hampered the MAD2.8 measure design-to-implementation process:

No.	Barrier field	Description	Action to overcome the barrier
1	Technological	Digital voting procedures are difficult for the elderly.	The project provided assistance to seniors. For the future, the project recommends the municipality to improve the accessibility of the participatory municipal budget platform and to provide targeted training to vulnerable groups.
2	infrastructure	Lack of a safe and connected cycling infrastructure in the living lab, adapted to its particular conditions.	To foster cycling mobility in Vallecas, measure MAD.4.7. updated the 2008 Bicycle Master Plan to the conditions in the living lab, prioritising the shared use of road space. The revised plan is being implemented, although it will need to be continued beyond the termination of ECCENTRIC.

3	Planning	Difficulty in engaging parents in the project.	The project worked with groups of parents who are involved in the environmental committee of each school and has supported their action as multiplier agents.
4	infrastructure	Some schools are located in a recently developed area with a very car-oriented design.	The involvement of additional stakeholders (public space managers, urban planning services, public transport operators) could facilitate the design and implementation of actions to improve the walkability/cyclability of school itineraries, as well as a less polluting use of motorised transport modes (public transport, carpooling…). adequate for the longer distances travelled.

Table 48: Identified barriers and actions adopted or recommended for the future.

D.2 Drivers

The following main drivers to the implementation of the measure were identified during the workshop:

No.	Driver field	Description	Action to make use of the driver
1	Political	Since June 2016, the municipality is more active in supporting active modes.	Take advantage of favourable moment to propose actions addressed to cycling mobility (expansion of the bicycle network connected to public transport, bicycle storage spaces etc).
2	Organizational	In some schools and elderly social centres there are professionals with a great interest in and knowledge of sustainable mobility.	Support the training and awareness of health and education professionals on active mobility issues.
3	Political	Favourable urban regulatory framework (*Ordenanza de Movilidad, Plan A de Calidad del Aire, Madrid Central etc).*	Propose projects that combine restrictions on individual transport and promotion of active mobility.

Table 49: Identified drivers and planned/taken actions.

E. Conclusions

E.1 Main process findings

The interventions in the public space promoted by measure MAD.2.8 have taken place through a process of "co-design". This form of involvement goes beyond "participation". Through this closer and more committed relationship, the team not only sought to know and transmit the elderly needs, but also to engage them in this process as protagonists, or rather agents of change. The elders were involved from the beginning of the project: from conception to diagnosis and intervention.

The process has contributed to the consolidation of an elderly support group that already has more than 100 members (*Anda con nosotros/Walk with us*). Besides fostering active mobility, and breaking the social isolation and increase the autonomy of seniors, it empowers them to get their voices heard by the municipality and other stakeholders.

In the case of children's school mobility, some significant barriers could not be totally overcame, such as the insufficient engagement of a significant number of parents. Although the project team organized some meetings and training sessions with parents, the outcome was modest. This calls for changes in the design of implementation processes of school actions in the future including (1) more sustained efforts to reach to parents during the measure design and implementation process and (2) better integration of school actions with the municipalities' projects to improve the cycling infrastructure network and its surrounding environment, making it safer and better connected.

E.2 Process lessons learnt

The following lessons can be highlighted:

- The systematization of the design and implementation process for this measure provides a valuable tool that can be replicated in other districts or cities. Although this systematization has been made, some concrete activities could have been documented more extensively, to support practitioners in their replication activities. For example, the activities leading to the renovation of *Plaza de la Constitución* could have been recorded on video.
- The ludic dimension is important to better engage the participants in the activities promoted by the project. The process has demonstrated that the most successful activities combined learning and fun, both for the elderly and children.
- The technological gap makes it difficult to carry out intergenerational activities. Many of the elderly don't have smartphones and hardly ever interact with computers. However, this is rapidly changing: in the final months of the project many participants of the elderly group had obtained mobile devices from their families and had learned to use social media platforms; however, the use of mobility apps remained more challenging for them.
- Although attaining digital literacy can be relevant in activities addressing seniors, it is important to provide also with more conventional participatory channels, in order to avoid their exclusion in public debates. In the case of ECCENTRIC, it was decided that the organization of smartphone workshops was not a priority, as many participants did not have access to one and they would be marginalized should the use of smartphones become too relevant in the process. Instead, the project team gave priority to teach and support them in the use of the digital platform of the municipal participatory budget, so that they could make their own proposals (as developed in the co-creation workshops) and cast their votes. As many of them had difficulties in using the tool, the team also provided paper-based instructions. In spite of these efforts, the result was not fully satisfactory, showing both, the need for the municipality to both, facilitate conventional participatory channels in any public involvement process and to provide training and access to digital devices to vulnerable groups.

E.3 Process recommendations

At the end of the project, the following recommendations can be highlighted:

- To facilitate replication and upscaling, the methodological approaches followed in measure MAD.2.8 with children and the elderly provides an excellent starting point, but may need to be adapted to the specificities of particular urban environments and socio-economic contexts.
- To increase engagement and tackle scepticism, it is important to work with the perspective of *delivering results*, i.e. problems identified during the critical visits should be prioritized by the municipality. It is also important to ensure proper recognition by registering the participants' names on the intervention spot.
- Due to the technological restriction, and in order to enhance individual and group engagement, the measure team mainly opted for face-to-face activities. As virtually all the measure's activities were terminated by March 2020, the Covid19 crisis did not produce a significant impact on the measure's final results. However, future projects and replication actions may need to combine these approaches with remote activities.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MUC 2.9c

Neighbourhood oriented marketing of sustainable multimodal mobility services: Mobility management for companies

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
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	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
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21	**City of Turku**	Finland	TUR
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22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

Partner nº	Organization	Country	Abbrev.
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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Project	City		
ECCENTRIC	Munich		
Measure code	**Measure name**		
MUC 2.9c	**Neighbourhood oriented marketing of sustainable multimodal mobility services**		
Last update	**Responsible**	**e-mail**	**telephone**
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A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- Reducing energy use & CO2 emissions
- Reducing air pollution
- Reducing road congestion
- Improving accessibility for all
- Better social inclusion and equal opportunity
- Improved liveability

Strategic level:

- To test the new approach of providing mobility management to an entire housing/business area, i.e. embracing all mobility needs, interests and patterns
- To analyse how mobility behaviour of citizens already resident in the city can be changed towards more sustainable modes and whether this neighbourhood approach can be transferred to other development areas

Measure level:

- To animate companies and their employees to decrease car use and shift to sustainable modes for commuting, local business travels and company fleets
- To encourage employees working in the Living Lab to share rides / carpool to and from work in order to reduce motorised commuter traffic in the region and the Living Lab and to reduce parking pressure at local level.
- All three mobility management components (sub-measures MUC 2.9 a), MUC 2.9 b), MUC 2.9 c)) will achieve a reduction of 5% in car use, a reduction of CO2 emissions of 180 tons per year and a reduction of car kilometres of at least 870.000 km per year in the laboratory area
- In addition, the measure will contribute to a reduction of NOx and PM emissions in the laboratory area, an increase in traffic safety and a decrease of accidents on the way to school

A.1.1 Quantifiable impacts

Expected Impacts	Wide awareness and acceptance of mobility services in the area. Increased use of the various existing and new sustainable mobility services. Increase of use of active modes. Reduced individual car use in Domagpark and Parkstadt Schwabing (for both way-to-school trips and commuters). The large majority of children (and their parents) go to day care/ school by sustainable modes, i.e. on foot, by bike or public transport.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Awareness about the mobility services among the residents and targeted groups					X	X				
2	Acceptance of mobility offers, sustainable mobility is a priority among residents and targeted groups					X	X	X			
3	Mode shift towards more sustainable modes by residents and targeted groups	X	X		X						
4	Reduction of car ownership among residents and targeted groups							X			
5	Reduction of VKT of residents and targeted groups	X	X								
6	Reductions of CO2 emissions from residents and targeted groups	X									
7	Reductions of NOx and PM emissions from residents and targeted groups		X								

Table 50: Quantifiable impacts.

A.2 Measure description

The measure aims to implement neighbourhood-oriented marketing of sustainable, multimodal mobility services in the newly built areas “Domagkpark” and “Parkstadt Schwabing”. Both residential areas will be home to more than 8.000 people. In addition, over 200 companies are located in the business area of “Parkstadt Schwabing”. To achieve car independent lifestyles, people and companies need sustainable mobility concepts and the ability to make use of the mobility offers available.

Sub-measure MUC 2.9 c) will offer mobility management to companies located in the business area of “Parkstadt Schwabing”. Following a wider company mobility management programme, the City of Munich will initiate a cross-company ride sharing cooperation, called “JobRide” in order to reduce commuter traffic and emissions in the district and region.

The sub-measure is complemented by sub-measures MUC 2.9 a) direct and dialogue marketing and MUC 2.9 b) mobility management for local schools – see separate MERs/ PERs for details.

A.2.1 Measure outputs

The expected output from this sub-measure will be:

- A mobility management concept for companies, mainly in the form of a joint ride-sharing platform for companies in the Living Lab (app, website, plus marketing/information for employees).

A.2.2 Supporting activities

Currently a parking management scheme is developed for the area. On-street parking will be reduced significantly, which could make ridesharing more attractive. In addition, families and children have joined forces in the neighbourhood to draw attention to the high volume of traffic in the neighbourhood. The City of Munich will deal with this request in 2020 and will develop further solutions, which will lead to a reduction in traffic in the long term.

The cooperation JobRide is based on the activities of the Munich Corporate Mobility Management and the Munich Climate Pact, which aim to promote ridesharing on a city-wide basis.

A media-effective opening event in 02/2018 promoted the measure MUC 2.9c JobRide on a city-wide level.

A.2.3 Interactions with other ECCENTRIC measures

Measure MUC 2.9c, known as the mobile application “JobRide” could possibly be announced within MUC 2.7 (community portal). Measure MUC 2.7 is a community information and participation portal supervised by the ran by DomagkPark Genossenschaft eG. The website could promote the JobRide app in the section “News” or put the information into the regular newsletter.

A.2.4 Interactions outside ECCENTRIC

None

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
6	Commuters working in the Parkstadt	Living Lab	Parkstadt Schwabing

Table 51: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
1	City of Munich (Department of Public Order, KVR)	P	C	L	Measure leader
2	City of Munich, Economic development	S	C	O	Coordinating authority for economic / business issues
3	BMM Companies, Company mobility	S	PR	P	Role model, multiplier, target group
4	Other Companies, Company mobility	S	PR	O	Target group
5	Ride sharing Provider	S	PR	O	Mobility service provider
6	Politics	S	C	O	Process support

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

Table 52: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Number of companies is too low	Involvement	Circle of acquisition will be extended within the Living Lab, cooperation with companies to recruit users	ML
Number of active users is too low			

Table 53: Risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning milestones

Based on the work of the Department of Labour and Economic Affairs of Munich (2016/2017), the interests and user needs of employees and companies in the project area could be analysed in order to reduce motorised private transport in the long term.

An operational mobility management programme has been carried out with several companies located in “Parkstadt Schwabing” in 2016 by the Department of Labour and Economic Affairs. Due to the synergies with CIVITAS ECCENTRIC in the pilot area, the program was included as a direct measure and the initiative of “JobRide” was created.

Phase 2: Procurement & Implementation

In cooperation with the department of Labour and Economic Affairs and the District Administration Office of Munich, the carpooling initiative “JobRide” has been fully prepared and officially launched in February 2018 with four participating companies. Through this initiative, 2.500 employees have already been reached as potential users. The initiative was launched with the help of a broad marketing campaign by the companies and the City of Munich. Shortly after the launch, ML #1 changed to another internal job position and in 05/2018 ML #2 started.

Due to the communication and marketing strategy of the City of Munich and the participating companies, further interested parties could be won for “JobRide”, who were invited to a network meeting in October 2018. For this purpose, a relaunch was discussed, which was scheduled for the beginning of 2019.

Due to some uncertainties of the software provider, the relaunch has been postponed and no new official licenses have been issued since March 2018. A continuation of existing customers was successfully achieved and was welcomed by the companies involved. In summer 2019, the software provider announced that the software “TwoGo” will be sold, but that it would continue to be used. Nevertheless, the acceptance and thus the use of the app decreased. In 09/2019 ML #2 left the Department of Public Order and ML #3 started to take up the work.

In 02/2020, a new provider will take over the existing software and in cooperation with the City of Munich, the “JobRide” initiative will be continued and the planned relaunch will be implemented. Meetings with interested and already participating firms are scheduled for the beginning of 2020 to prepare a re-launch.

Phase 3: Demonstration & Monitoring

“JobRide” has reached the demonstration phase and is running continuously. Due to the successful demonstration of “JobRide” till summer March 2018, it is planned to re-launch the scheme in order to expand its outreach and open-up the cross-company collaboration for businesses located outside the pilot area in 2020.

B.2 Process evaluation activities

For JobRide (sub-measure c), the implementation process was monitored closely from the start and informal interviews with the participating companies, as well as non-participating companies could be done for example at the kick-off event. In addition, close contact was held with the MLs to exchange about the latest encountered barriers and drivers.

Standardized form surveys were used to get information about the roles, tasks and backgrounds of the various stakeholders, as well as their view on barriers, drivers, and risks of the measure. The online survey was spread to all applicable stakeholders with the help of the ML and reminders were used to maximise the response rate.

In a joint effort with other LEMs, a common survey framework was developed and operationalized with the open source survey tool "Limesurvey" (in the case of Munich).

After collecting general information about the stakeholder and its role in the project (job, tasks, contact information, and engagement in which phases (planning / implementation / operation / maintenance / others), we asked for opinions about barriers and drivers in a two-level-approach:

- In a multiple choice set, stakeholders were asked to identify supporting thematic areas / sectors for the measure:
  - Political / strategic
  - Institutional
  - Laws and regulations
  - Cultural
  - Problem-related
  - Involvement / Communication
  - Planning
  - Organisation
  - Financial
  - Technological
  - Spatial
- In the next level, we asked for a detailed description of the drivers in detail as well as how these drivers were used to maximise the measure's impact.

Through this approach, we are able to identify both general supporting sectors, but also detailed, measure-specific information about drivers with a high level of information. Showing the full list of sectors first did also 'inspire' stakeholders to include all possible drivers they could find.

The same methodology was used to collect information about barriers.

The last block in the survey asked about risks of the measure. For each risk, we asked for an assessment about the likelihood as well as about the risk's potential to endanger the measure's success.

We have received five completed replies in total, from the City of Munich as well as from the operator company SAP.

To complement the information which is given through the stakeholder online survey, an emerging pattern of all stakeholders is mapped in a three-dimensional chart. All ML were asked about the perception where to locate themselves and other relevant stakeholders within the

stakeholder analysis matrix. The objective of the stakeholder analysis is to engage stakeholders in order to improve process and maximise impact. Each stakeholder is given a coordinate within the chart. The coordinate depends on the stakeholder's power potential (the bigger the bubble the higher the power potential), the interest (between low and high) and the ability to impact the measure (from low to high).

Figure 78 shows the stakeholder analysis of the measure MUC 2.9c. As the ML City of Munich (Department of Public Order, KVR) has the highest interest and ability to impact the measure, it is coordinated as the biggest bubble in the highest right corner. There are several companies using the App which is delivered by SAP. The companies have a bigger power potential as the platform provider (ASP) has because they in the end make use of the application in their daily commuting. But as can be seen in the matrix, the interest of the companies can range from low to high due to the fact that some companies are promoting the app more than others do.

The politics are coordinated with a certain high interest and a medium ability to impact the measure and medium power potential because they are generally interested in measures in the field of Ride Sharing in cooperation with other current projects within the city (e.g. City2Share, Smarter Together). The Department of Labour and Economic Development can be seen as a supportive stakeholder but with medium interest and impact ability itself. They basically deliver information and contacts to KVR because they are involved in several other comparable projects.

Other methods added to the above described **stakeholder online survey** and **stakeholder analysis** (matrix) to assess a more Detailed Process Evaluation, are:

- **Review of measure reports** as well as some informal observations from the Living Lab.
- Carrying out several **guided (expert-)interviews** with all Measure Leaders who participated during the project lifetime (three in total).
- Carrying out two **learning history workshops:** one with all three ML and a stakeholder from the Department of Labour and Economic Affairs. Another meeting organized as a small learning history workshop took place at one of the participating firms.

The **review of measure reports** as well as some informal observations from the Living Lab and its residents are taken into account for process evaluation. In order to get a complete picture, all opinions from the former MLs as well as from the current ML were included in this report.

Especially the **guided interviews** help to look deeper into the process and its main barriers and drivers, hence give a helpful overview for the lessons-learnt part. The interview questions contain the following matters:

- General information about the current status of the measure status
- Thinking about the JobRide set-up: positive thoughts and worries
- Explaining the whole process and developments from his/ her own viewpoint: drivers and barriers
- Lessons learnt through the process

The choice for executing guided interviews was made because it is a simple method to gain deeper insights from all MLs and to keep the time expenditure of the key-stakeholders and the LEM on a low level. The interviews were guided with the same questions so that there can be a valid comparison of the answers in the end. In total there were three interviews carried out.

The interviews lasted about 30-60 minutes and were recorded in key sentences on paper. The results of the interviews are to be found in section B.3 Barriers and B.4 Drivers.

The **Learning History workshop** is a method for evaluating the whole process of a measure ex post regarding its planning, implementation and operation performance. For this purpose, the stakeholders involved in the measure are invited to explain their experiences, regarding the applied strategies, the achieved results and what happened why, in chronological order. The aim is to learn from the actions and experiences of those involved and to draw conclusions that will be of added value for the planning of future projects.

The workshop was structured in the following steps[11]:

- Reconstruction of the measure process with timeline and milestones
- Milestone evaluation with defining barriers and drivers of the process
- Definition of "actions to overcome" the corresponding barriers and possibilities to make use of the drivers
- Reflection of the results and concluding the experiences of the participants under "lessons learnt".

For this measure, the first Learning History workshop was organized by the ML and LEM and conducted at the ML's institution with the LEM, all three MLs and one project partner from the Department of Labour and Economics who is coordinating Munich's Corporate Mobility Management (BMM – Betriebliches Mobilitätsmanagement) (01/2020). As a result, the following timeline (see Figure 77: Learning History Workshop timeline + results (barriers and drivers)), including the most important processes and milestones was developed and analysed. For a more detailed description of the important milestones see chapter B.1 (p.294). The second learning history workshop was conducted with employees of one of the participating companies. Three persons which are responsible for the mobility management of the firm and are involved in the JobRide actions almost since the beginning were present (02/2020).

As a second step, the most important barriers (see chapter 0) and drivers (see 0) of the process were identified and discussed. Also, the experiences, how barriers were overcome und drivers were used to foster the measure were discussed. Finally, the experiences of the participants were concluded under "lessons learnt".

Figure 77: Learning History Workshop timeline + results (barriers and drivers)

[11] Learning History Workshop was designed after "Refined CIVITAS process and impact evaluation framework", 08/2017, see ANNEX 7 LEARNING HISTORY SESSIONS.

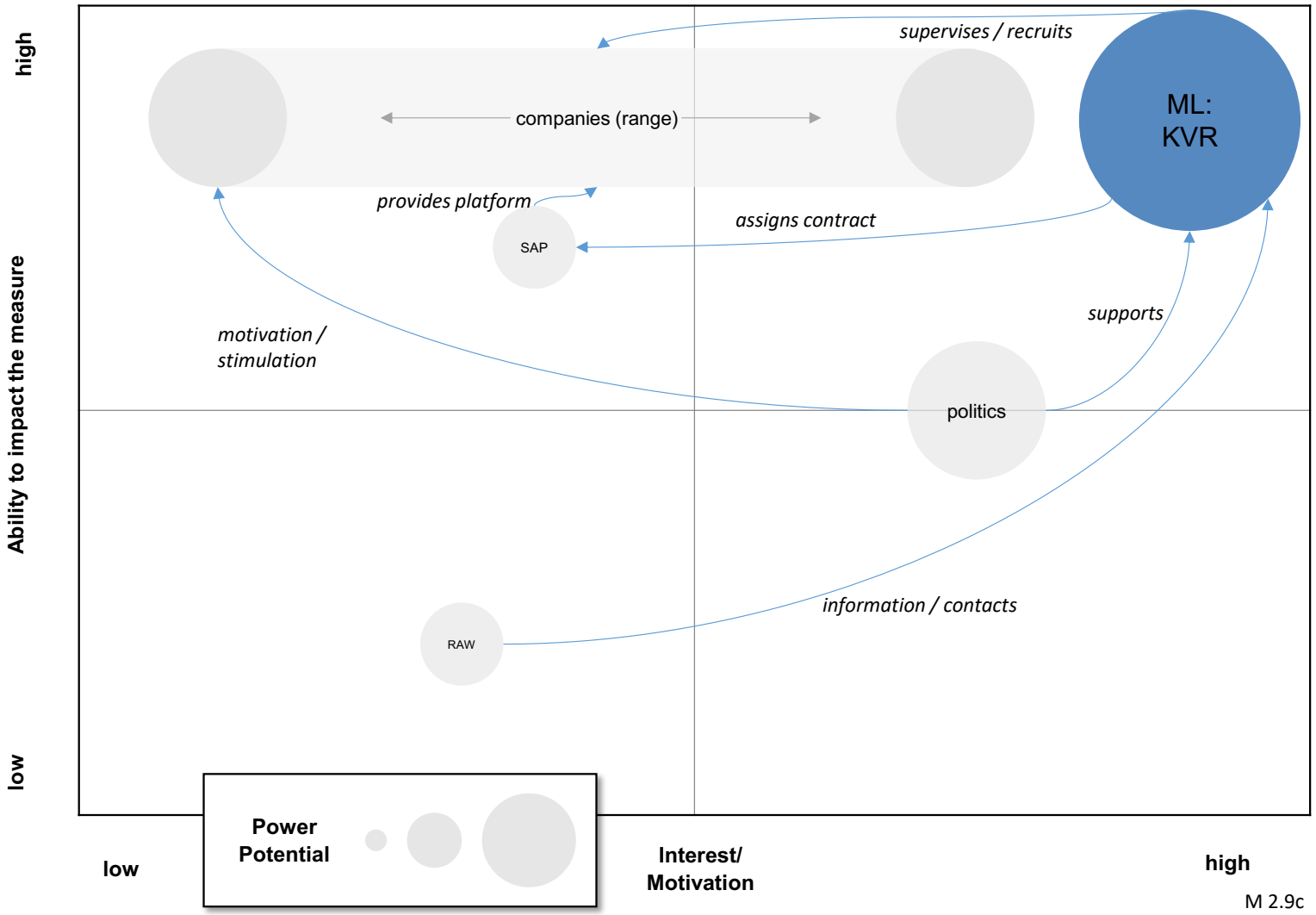

Figure 78: Stakeholder Analysis

B.3 Barriers

The barriers are retrieved from several sources (source description see above):

- Stakeholder online survey (11/2018)
- Guided interviews with the Measure Leaders
- Learning history workshop at ML's institution and other relevant stakeholders from the City of Munich (01/2020)
- Learning history workshop with stakeholders from one of the participating firms (02/2020).

Table 54 shows the barriers fields which have been addressed by the different stakeholders, mainly and most important the involved Measure Leaders. However, we can conclude that neither *political* or spatial barriers hindered the measure's success. Political support is given and there are no spatial issues. In detail, the following concrete barriers were identified:

No.	Barrier field	Description	Action to overcome the barrier
1	Institutional	It was relatively easy to find someone in the companies who is interested in improving mobility, but he/she had to convince the management that the topic is relevant.	Support decision-makers with good arguments, municipal support.
2	Institutional	Internal regulations make it difficult to share a ride with colleagues from other companies in company cars.	Make companies accepting to share rides with people from other firms.
3	Institutional	Time-consuming procedures within the companies induced by: – General hierarchical structures and – especially the workers' councils	Transparent and regular participation of representatives of the companies (e.g. workers' council).
4	Institutional	Giving incentives to employees which are using the app isn't always easy for the firms due to internal regulations and accounting problems which can occur.	Incentives could be distributed by the technical subcontractor. Then there is a common incentive-concept and no internal struggles regarding accounting are to be expected.
5	Laws/Regulations	Company-internal data protection / privacy regulations make the implementation of a new measure a long-term project with many concerns.	Facilitate communication between companies in order to speed up the process
6	Laws/Regulations	Company-internal legal concerns ("Is it allowed that employees from two different companies do ridesharing with a company car? Who is liable in case of an accident?"); long-term process to clarify.	Facilitate communication between companies in order to speed up the process
7	Cultural	Ridesharing is a complicated issue, because it thwarts the idea of "individual freedom" in private vehicles. Also, dependencies (is the driver on time? How is his/her driving style?, …) add an extra layer of dis-comfort for many.	Use the app's rating tools for drivers to build confidence.
8	Involvement and communication	The idea only works if a critical mass of users is reached.	Marketing among the target group.
9	Involvement and communication	Communication among the participating firms to exchange about best practices and occurring questions wasn't adequate. Same goes for the communication between ML and technical subcontractor.	Set up a platform for inter-company communication right from the start. Furthermore, assure regular meetings between ML and subcontractor.

10	Organizational	The subcontractor sold the used app software to another firm and wasn't very transparent about this plan.	Transparent communication at fixed dated could have been prevented a lack of decisive information.
11	Organizational	Due to personnel changes regarding the measure-lead knowledge partly got lost and transition between MLs couldn't always be as fluent as intended.	These changes of the ML are unforeseen and difficult to predict.
12	Technological	Technical subcontractor stopped to sell licences for the app usage to the companies.	Transparent communication at fixed dated could have been prevented a lack of decisive information.
13	Technological	The app layout can be confusing. Route calculation not transparent or comprehensible enough.	The app layout can be improved by some user tests being done.
14	Technological	JobRide advertisement couldn't be displayed due to wrong data format.	Check with the firms which data platforms will be used for advertisement and customize the data format.
15	Strategic	An external competitor who offered the exact same service (free rider) interferes the entire process and confuses the participating firms from time to time.	City of Munich applied for a patent to secure the name JobRide and the logo.

Table 54: Identified barriers and planned/taken actions.

Sub-measure MUC 2.9c identifies some company-internal bureaucracy as one of the main barrier fields (**institutional**): While it was easy to find a contact in the firms who would like to implement innovative mobility solutions, these persons were usually not the decision-makers and thus had to gain support from management first. This is a time-intense process and not easy to complete as there is often no dedicated person within the firms to contact. Another barrier which is given due to rules and regulations within the participating firms is the fact that the process of rolling out the measure is actually difficult because it's simply not always allowed to share rides with people from other firms with company cars. Due to the fact that the app was not very much used by the employees, the ML decided to give the participating firms a list of possible incentives which could be handed out to the app users/ ride sharers. An example would be determined parking spots at the company car park for employees using the ride sharing option. This and other developed incentives form the list couldn't be adapted by the firms due to their internal regulations, impeding laws and accounting structures. A solution regarding the relaunch under the lead of the new subcontractor could be incentives which are organized and/ or financed by them. For example, handing out vouchers for employees using the app or implementing the idea of a competition among the participating firms.

Another institutional barrier can be found in the companies' administrative structures, means that the official workers' council of participating firms delays the entire process due to time-consuming investigations. Actually these extensive checks by the workers' council delayed another launch date, from 11/2017 until 02/2018. In addition to that, there are general hierarchical structures within the companies which make it more difficult to interact. To overcome this barrier, the ML could have made use of this strong alliance like the workers' council by participating them more often and on a regular basis during the entire process.

Others barriers were depicted in the field of **laws and regulations**. Internal regulations both about privacy and data protection ("How do we invite potential users?", "Whom are we allowed to send emails about the measure?") as well as legal/insurance questions ("Who is allowed to sit in a company car?", "Who is liable in case of an accident on the way to work?") made it

complicated for many companies to join the measure. In many cases, the offices in Munich are not the headquarters of the respective firms, and local managers had to reach out to global decision-makers and lawyers first. A way to overcome these barriers could have been the facilitation of communication between companies in order to speed up the process.

Furthermore, some **cultural** barriers make ridesharing less attractive than driving alone: While the private car is widely used because of its perceived individual freedom, flexibility and privacy, ridesharing is changing some of these aspects. Suddenly, coordination between driver and passenger is needed, and one is no longer alone in the car. Also, relatively high-wages make the money-saving aspect of ridesharing less relevant, especially for employees who get a company car with a gas flat rate – a practice that is very common in Germany.

Regarding the barrier **involvement and communication** it is to be mentioned that a critical mass has to be generated, in order to make the trip matching algorithm work. A broad marketing campaign at regular intervals among the target group could have promoted the app better. Another barrier regarding the category communication aggravated the process: There was no exchange or connection among the participating firms about best practices and occurring questions. One of the participating firms stated that there were apparently no common rides shared among two or more different firms, even though the idea was to promote inter-company shared rides to reach a critical mass of app users. Later on a platform (named: Alfresco Forum, 03/2019) was introduced by the project partner from the Department of Labour and Economics to enable fast and regular exchange. Same goes for the communication between ML and technical subcontractor. But this communication platform was not appreciated by all participating firms because for them it's just additional effort to use this new system, also administration-wise (4 pages of data protection regulations, etc. had to be signed).

Due to additional **organizational** problems of the subcontractor the level of communication was decreasing as the subcontractor had already plans to sell the software app but didn't disclose this information until a later point during the advanced process. They didn't take part in relevant meetings and workshops anymore and became almost invisible. Regular meetings or fixed dates of transparent exchange between ML and the technical subcontractor could have prevented this barrier. These organizational problems of the subcontractor's firm were also reflected in other places: There was no data transparency of the app's backend and neither the ML nor the firms knew about the system usage of the JobRide app. This particularly occurred at a time when there was a change of ML within the City of Munich's Department of Public Order. There was a short familiarization period with the new ML but due too low capacity of the former ML the time period before the ML-change (right after the launch) could not be well enough accompanied. The firms were used to be closely advised by the ML and partly lost track during the two months of ML-transition.

As there were no real **technological** barriers regarding the app itself, but there were some about the licences which were necessary for the companies to use the app, though. If a company wants to use the JobRide app, they have to buy the exact number of licences they want to give to their employees. In 03/2019 the subcontractor apparently stopped to sell the needed licences but didn't inform the ML about this. By chance the ML found out about this but wouldn't get to know the reason (it is to assume that the subcontractor firm was already thinking about their selling plans of the app). Other comments given by the learning history

workshop participants was about the app design in general. There could have been some improvements been done regarding the personal profile set up. Wrong boxes could easily and unintentionally be ticked by the app users. One participating firm stated that the platform on which the companies' own statistics can be accessed is not very user-friendly and intuitive. Regarding the next planned relaunch, firms could be more involved in the development of this platform and the design in general. Another aspect which is not very clear is about the routing of the app itself regarding the detour calculation. App user got the impression that these calculated detours are not showing the most optimal route in the end. More transparency of the calculations could help to understand this better. Another technological aspect is not regarding the app itself but more the digital internal advertisement of JobRide. Due to a wrong data format, the JobRide advertisement couldn't be displayed on the information screens in front of the canteens. This didn't help to attract more participants to use the app.

The last but not least **strategic** barrier influencing the process is a more delicate topic and probably a very special case within this Munich example. An external competitor who offered the exact same service interferes the entire process and confuses the participating firms from time to time by making offers at different prices. This seems to make the ML and his institution less trustworthy and hence reduces his authority towards the cooperating companies. This barrier was overcome by the ML by communicating in a more transparent way with the firms and giving them comprehensive information about further steps.

B.4 Drivers

The drivers are retrieved from the same sources as for the barriers (source description see above).

Table 55 shows the various driver fields of the measure MUC 2.9c. Most important driving factors are the financial support through ECCENTRIC, as well as political support and technological advantages.

In detail, the following drivers were identified:

No.	Driver field	Description	Action to make use of the driver
1	Political / strategic	City council supports ridesharing, so there is political support.	City council is informed about the activities and will support. This fact is used to advertise the measure.
2	Political / strategic	The city's department of economic development ("RAW") supports with existing company contacts.	The amount of possible JobRide partners has been increased. Existing structures could be used.
3	Technological	The measure is based on an existing software solution (TwoGo by SAP) with both an app and an online version – the software works for all companies.	The multi-interface approach maximises the number of potential users. Possible use among all companies is critical for the measure.
4	Spatial	The companies are located in a very suitable way for ridesharing.	Short distances and a high density of workplaces with a very good connection to major highways are a good foundation for ridesharing.
5	Problem related	Shared sense of urgency among key stakeholders to sustainable mobility.	Easy to find interested companies to join and increase the JobRide app usage.
6	Involvement and communication	A common platform (Alfresco Forum) was established for communication among participating firms and the ML	Use the platform to discuss problems and best practices and have a fast way of communicating.

7	Involvement and communication	Local media reporting has made the project public.	Gain more interested and potential companies to use the JobRide app.
8	Organizational	The new subcontractor brings a new energy into the projects and sets a milestone in improving the app.	Close cooperation from the start between ML and the new subcontractor can assure a more successful realization of ideas.
9	Financial	Financial support through ECCENTRIC	The money was essential to set up the JobRide app in the Living Lab.
10	Financial	The user licences are very affordable for the firms, there is an optimal cost-benefit relation.	Firms can easily afford app licences and give them to their employees.

Table 55: Identified drivers and planned/taken actions.

Sub-measure MUC 2.9c is strongly supported by local **politics**, as a city council decision was made to foster ridesharing city-wide. Also, existing contacts between the City's department of Labour and Economics (RAW) and the companies in the Living Lab are an important driver of the measure. There is a round table consisting of companies situated in Parkstadt Schwabing already existing since 2016/2017, the Corporate Mobility Management (BMM – Betriebliches Mobilitätsmanagement). This provides an ideal set of partners and contacts to potential JobRide users. The project partner leading this regular event is in very close contact with the MLs and supports the process and measure implementation at any time. This responsible person is a constant contact for the firms in Parkstadt Schwabing.

Furthermore, no new **technology** was needed to implement the measure, as SAP's TwoGo solution could be sub-contracted, allowing easy integration of various companies by a company that is known for their business IT solutions. Specifically, JobRide is accessible both from a smartphone app as well as from a website, so the barrier to use the service is relatively low and it is also accessible for demographics without a smartphone.

Spatially, the proximity of the participating companies allows building a critical mass from more than one firm, and the location close to the highway and other major roads makes ridesharing – or the car in general – an attractive travel option.

One **problem related** driver can be seen regarding the shared sense of urgency among key stakeholders to sustainable mobility. Many firms are willed to offer their employees sustainable ways of transport and offer help to become less car-dependant. Also image-wise German companies try to focus more on this innovative and sustainable mobility topic.

One of the barriers named above regarding **communication and involvement** could be eradicated during the ongoing process. Complaining about too less communication and a non-transparent process, the Department of Labour and Economics offered a common platform (Alfresco Forum) to communicate ad-hoc and discuss problems and share successful activities among the participating firms and the key stakeholders from the City’s side. Another big advantage which pushed the whole process was the media-effective appearance of the JobRide app in local press. The launch was well attended by well-known local media representatives which reported on the project. One of the participating firms named several channels of advertisement which were successfully used to promote the app. There were in-house mails addressing all employees, posters, intranet-articles and in addition city-wide press releases. Advertisement on social media platforms (Facebook) and short clips about the JobRide idea and its functions were displayed by the local ECCENTRIC dissemination team.

From the **organizational** point of view, the whole logo and app-name development as well as the marketing strategy and actions coming from the ML's institution can be seen as very successful. Transparent discussions and meetings with relevant stakeholders have made this possible. Another organizational driver can be found in a before mentioned barrier: The fact that the subcontracting firm was sold, opens up a new chance for the new subcontractor to start with new energy and ideas how to improve the app and its usage. One participating company which joined the learning history workshop already showed good ideas of promoting JobRide in a more comprehensive way. The participating firms could organize "mobility days" for Parkstadt Schwabing where other innovative and sustainable mobility solutions could be presented. The new subcontractor could make a road show roadshow through company canteens and promote JobRide.

Of course the **financial** support through ECCENTRIC was a major reason for making this measure MUC 2.9c possible. The money was essential to set up the JobRide app in the Living Lab. Another financial driver which is stated by one of the participating firms is the fact that the user licenses for the app use are very affordable for the firms as one license costs about 10 Euro per year. From the companies' perspective this has a very advantageous cost-benefit.

Lessons learnt

As a result of Learning History workshop the experiences of the participants were concluded under the following "lessons learnt":

- Offer a network opportunity/ exchange forum between companies, moderation by the Measure Leaser
- Plan long preparation times for planning, conception and implementation of the measure: a comprehensive strategy is necessary.
- Technical test run of the app before the start.
- As a ML, support the stakeholders well, especially at the beginning of the process, e.g. by delivering incentives and ideas and material for joint marketing actions.
- Process of naming and logo creation was very important and well done.
- Difficult to find the critical mass for the app use of JobRide: unexpected existence of spatial and cross-company difficulties.
- Carpooling continues to be a niche offering when it comes to job-related transport: a cost-benefit advantage should provide the app user incentives to actually use the service.
- Firms appreciate the positive cost-benefit of the JobRide usage because the user licences are very affordable.
- The group of participating firms should be organized and guided by the ML's institution. There shouldn't be any firm dominating the actions.
  -
  -

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
If a critical mass of users cannot be reached, the system does not work because not enough "matches" can be generated. Thus, users do not find partners to share a ride and will stop using the service.	Involvement	– Recruitment of as many companies as possible – Internal advertisement among employees	ML, Companies
Internal regulations that do not allow to carry external passengers in company cars can prevent some users from using the service.	Laws / Regulations	Legal clarification of the situation	Companies

Table 56: Reported period risk assessment.

The risk of not enough users is real and has a quite high probability, as well as severe consequences for the measure. The measure team is working hard to increase the number of companies in order to reach the critical threshold of users.

The risk of regulations is at a medium level, with a medium possible impact on the measure.

C. Specific observations on the supporting activities in this reporting period

In section A.2.2 four main supporting activities are mentioned:

- The parking management scheme which is being implemented in the Living Lab where measure MUC 2.9c takes place and
- the existing Corporate Mobility Management (BMM)
- in combination with the Climate Pact Munich decided to comply within the next years.
- The media-effective opening event of the JobRide app with local press.

Looking back at the measures' developments these four supporting actions have had a positive impact on the process.

C.1 Quality of the Supporting Activities

No.	Supporting activity	Target group	Level of penetration	Score
1	Parking management scheme	Businesses (ca. 200 companies with about 12.500 employees) and households in Parkstadt Schwabing (ca. 1.500)	Firms know about the future implementation of a parking management scheme for on-street parking and try to develop mobility options which reduce the number of cars on the streets. There is no data available to quantify this political regulation but it's (stated by the firms) clearly contributing to the implementation of new opportunities like JobRide.	**
2	Corporate Mobility Management group (BMM)	Group of about 85 companies which join the round table of BMM (each year ten active participants, others are associated partners) organized by the Department of Labour and Economic Affairs.	Meetings with the round table takes place several times a year on a regular basis. Among others, the JobRide topic is present in all these meetings.	***
3	Munich's Climate Pact	15 Munich-based large companies, three of them located in Parkstadt Schwabing	A voluntary self-commitment during a project lifetime from 2019-2021 pursue a joint savings target of at least 20.000 tons of CO_2. Common climate protection projects are planned, JobRide is one of them.	**
4	JobRide Launch (event)	Several local newspapers, participating and interested firms, representatives of ADAC and Munich's District Council	About 20 participants from the public sector, private companies and other institutions engaged in the mobility sector joined the event. Furthermore, local press released articles and fostered the flow of information about JobRide.	***
Score: * = Poor	** =Satisfactory	*** = Excellent		

Table 57: Quality of the Supporting Activities

The parking management scheme which is planned to be implemented within the business area, Parkstadt Schwabing, will cause parking problems because it will restrict the on-street parking regulations. Not everyone is allowed to park cars on street anymore without special

permission. This actually might be an advantageous situation for the ridesharing activity JobRide. The laws and regulations are not being implemented yet (as of 02/2020) but is soon to come and change the streets image radically.

Existing structures on which a project can base on is a huge support for the implementation of a measure and the start of a process. Munich's local Corporate Mobility Management is existing since 2016/2017 and consists of important players being situated in the Living Lab's business area, Parkstadt Schwabing. One of the key stakeholders from the Department of Labour and Economics is involved in this Mobility Management group and has close contact to the ML and the ML's institution. This round table brings up the JobRide topic on a regular basis and helps to develop new (marketing) ideas to bring the project forward.

The climate pact is another politically driven supporting activity which aims to reduce emissions and congestion within the city of Munich. Measure MUC 2.9c is a good example of what companies can actually contribute to this goal.

Another supporting activity was the media-effective event when the JobRide app was officially launched. Representatives of known local press were present and released press articles where they introduced the idea of ride sharing. The launch event has given the project a boost among the participating companies. This has also been raising company internal awareness.

C.2 Influence of the Supporting Activities on the implementation process

The existing Corporate Mobility Management had a major influence on the implementation process of MUC 2.9c. Contacts could be used to discuss the project idea and search for a solution which is preferred by the majority of the participating companies. The process didn't have to be established from scratch and had a fast and easy start.

The influence of the parking management scheme is not yet noticeable on the streets because laws and regulations are still being developed. Munich's Climate Pact is also just indirectly influencing the implementation process as it results in a political landscape which opens the mind for a sense of urgency to sustainable mobility.

The launch event of JobRide also had major influence on the implementation process because it brought up the topic in local media and therewith promoted the whole project on a city-wide level.

To sum up, the supporting activities #2 and #4 can be rated with three stars (★★★= Excellent) as they really had an influence regarding the general awareness of the app and the knowledge transfer due to the existing structures of the BMM. Activities #1 and #3 have a score of two stars (★★= Satisfactory) regarding the influence. They can more be appreciated as accompanying political drivers but with higher impact than other drivers being described in chapter 0 Drivers.

C.3 Influence of the Supporting Activities on the impact of the measures

A ranking of the four supporting activities, beginning with the one which has the biggest influence on the impact of the measure, can be as followed:

1. The existing Corporate Mobility Management (BMM). Score: ★★★= Excellent
2. The media-effective opening event of the JobRide app. ★★★= Excellent

3. The parking management scheme. ★★= Satisfactory
4. The Climate Pact Munich. ★= Poor

- Existing structures as the mentioned Corporate Mobility Management influenced the impact of the measure MUC 2.9c in the sense of making the topic visible on a regular basis when the round table took place.
- This round consists of people who felt responsible for the project implementation and brought information from the round table into the companies. The platform was used to discuss common actions, especially regarding the marketing and helped to clear out other open questions.
- The opening events influenced the impact of the measure with making the topic public and attracting more people to actually make use of the app.
- Firms spread the information about the official kick-off event and invited their employees to become part of JobRide and activate an account. The more people use the app the more likely the critical mass of users is reached and more ride sharing matches come up and CO_2 is saved.
- The parking management scheme and the Climate Pact more indirectly support the impact of measure MUC 2.9c. The parking management scheme influences the impact a bit more, though. When people are no longer allowed to park on-street they might start to think about other options than their own car to get to work. This is an opportunity for JobRide to step in and get more active users.

C4 Lessons learnt on the Supporting Activities

- It is good to have existing structures and contacts to build up on.
- A positive political landscape towards sustainable and innovative ideas helps to influence the process in general.
- Media-effective events are a good activity to promote projects like JobRide because local press helps to place this topic on a city-wide level. This leads to a higher awareness among all citizens but especially the participating firms and their employees.

D. Conclusions

The following section sums up the main process findings and lessons learnt. Some process recommendations conclude the Detailed Process Evaluation Report of MUC 2.9c.

D.1 Main process findings

The process was mainly driven by the supporting activities that were already existing and came up during the process: the existing Corporate Mobility Management (BMM) located within the ML's institution (City of Munich) and composed by people working actively and highly motivated in this field. In addition to that measure MUC 2.9c is strongly supported by local politics, as a city council decision was made to foster ridesharing city-wide

Another finding shows the importance of a transparent communication process between all stakeholders –and especially towards the target group of the app: The employees. On the other hand, the process is highly depending on the availability and support of the technical subcontractor.

D.2 Process lessons learnt

- It's always important to use existing structures, like the Corporate Mobility Management (BMM) and build up on political support, in this case coming from the City Council with the goal to foster ridesharing.
- As communication and the exchange among the participating firms was an important part, an online exchange platform "Alfresco Forum" was introduced. This wasn't used in the helpful way it was supposed to do as there wasn't anyone in the lead of being the main moderator.
- Regarding the very low usage of the JobRide app, it is to assume that there could have been more advertisement of the app itself among the employees.
- It is very important to have good support by the technical subcontractor. There should be transparent communication and full support at any time.

D.3 Process recommendations

Regarding the communication part, there should be more transparent communication on a regular basis between all relevant stakeholders, such as the ML, the App provider and the participating firms. Especially due to personnel changes and therewith the loss of tacit knowledge communication among the stakeholders should play a major role. It is important to check the needs of the stakeholders and bring them together in the best possible way. The "Alfresco Forum" was a good approach to enable the stakeholders to exchange their experience and have a platform to discuss questions. As mentioned by some stakeholders, the forum was not really used. As a recommendation there should be someone in the lead of moderating the online forum and be the interface between the ML and the participating firms. Also the technical subcontractor should be part of it to be able to answer relevant technical issues in short time.

To engage the employees, the app's target group, more it could have been helpful to involve them more into the process and have kind of "information days" at the firms where people could go and get to know JobRide. On the other hand, there could have been some incentives to attract employees to use the app.

Regarding the app, there could have been regular meetings between all relevant stakeholders to evaluate the functions and design. App users could join a short survey to capture their user experience

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

RUS 2.11

Information, training and awareness raising

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
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Partner nº	Organization	Country	Abbrev.
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3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
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9	**Stockholms Stad MF**	Sweden	STO
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12	UbiGo Innovation AB	Sweden	UBIGO
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15	GoMore ApS	Denmark	GOMORE
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	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
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22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

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List of Tables

Project	City		
ECCENTRIC	Ruse		
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2.11	Information, training and awareness raising		
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A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- To create awareness of the need for sustainable mobility and its benefits for the City of Ruse as an important factor for improving the quality of life;
- To encourage the different actors to embrace sustainable mobility habits, making walking and cycling safer and the use of PT - more desirable way of travelling in the peripheral district Druzhba and in the whole city.

(2) Strategic level:

- Mode shift towards public transport (PT), walking and cycling and away from private cars;
- Raising the awareness about the traffic safety with the aim of sensitizing the population in order to use the new crosswalks and sidewalks and to reduce the risk of road accidents.

(3) Measure level:

- Acceptance of the implemented ECCENTRIC measures in Ruse;
- Satisfaction with the provided training and information.

A.1.1 Quantifiable impacts

Expected Impacts	Increase the use of PT Decrease the use of private cars and taxis Reduce the air pollution	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	60% of the citizens informed about the sustainable mobility					X	X	X			
2	10% decreased number of road incidents in Druzhba			X				X			
3	70% of satisfaction of citizens with new mobility measures						X	X			
4											
5											
6											
7											
8											
9											
10											

Table 58. Quantifiable impacts

A.2 Measure description

This measure consists of providing training and awareness raising activities in Ruse. The main objective was to create awareness of the benefits of sustainable mobility in Ruse and its importance for increasing the quality of life. One seminar was organised for public transport personnel, six workshops - for citizens and NGOs, three mobility conferences and a large media campaign for stakeholders and the school community. The aim was to encourage the different actors to embrace sustainable mobility habits, to increase the use of public transport, and to make walking and cycling safer and transforming them into a desirable way of moving in the city. A special focus on traffic safety was made, with the aim of sensitizing the population in order to reduce the risk of road accidents.

In the Application form of the project were planned the following activities: one seminar for public transport personnel; six workshops for Druzhba citizens and other stakeholders including NGOs and the school community; three mobility conferences and a large information and promotional campaign targeted to the general public.

During the different events organized in the frames of 2.11 the new mobility measures (implemented in Ruse as part of the CIVITAS ECCENTRIC project) were largely discussed and promoted in order to change the people's perceptions concerning the urban mobility, and to increase their knowledge about the benefits of using sustainable modes of transportation.

A.2.1 Measure outputs

The planned outputs of the measure 2.11 were to conduct one seminar for transport professionals, six workshops for different target groups in Ruse and three Conferences on mobility.

During the project lifetime we achieved to provide:

- **Output 1** – One seminar for professionals
- **Output 2** – Six workshops for different target groups in Ruse
- **Output 3 –** Three Conferences, Participation in Danube Forum 2019 and in Automotive Forum 2019 (planned a 4th Conference and a participation in the Ruse Tourism Fair 2020 till the end of the project).

A.2.2 Supporting activities

	Type of supporting activity	Activity	Target group	Main objectives
1.	Promotion	Opening event with a press-conference	Ruse citizens, media, SMEs, academia	• To raise the awareness about the sustainable mobility • To support the ECCENTRIC measures
2.	Promotion	Media and non-media campaign	• Large public (radio, TV, newspapers, social media) • Transport professionals and academia (CSDCS-site, ENDURANCE BG network)	• To raise the awareness about the sustainable mobility • To support the ECCENTRIC measures
3.	Promotion	International transport events	• International Transport Community (participation with presentations in CIVITAS Forums, ETC2019, TRA2020	• To inform the international transport community about the ECCENTRIC implementation in Bulgaria

Table 59. Supporting activities

A.2.3 Interactions with other ECCENTRIC measures

This measure has interactions with all the other Ruse measures. From one hand, the technical measures for Ruse (2.6, 3.6, 4.3, 4.4. and 5.4) were promoted and used as examples for discussions during the training events and were presented during the Conferences. From the other hand, the seminars, workshops and meetings were used for collecting part of the baseline data for the evaluation of the new mobility measures in WP8.

A.2.4 Interactions outside ECCENTRIC

There was an interaction and important synergy with the TDP project TRANSDANUBE pearls aiming to introduce regional SUMPs in Danube tourism regions. The training and awareness raising activities in both projects aim to change the public perceptions about the use of public transport (PT) instead of private cars and taxis and to promote the sustainable modes of transportation in the region.

A.3 Target groups and/or affected part of the city or region

Target groups			Affected area		
	Type	comment		Type	comment
1	Druzhba citizens	27 000	0	Ruse citizens	140 000
3	Public transport users (49%)	13 720		Ruse PT users (60%)	84 000
8	PT-companies, municipal transport department	30	8	Transport professionals	300

10	Professors and doctoral students of Ruse University – Transport Faculty; Varna Free University and Sofia Technical University	50	10	Academia	300
10	School children (Druzhba secondary schools, Leonardo da Vinci School)	70	10	Schools	300

Table 60. Target groups or affected parties

A.4 Stakeholders: ECCENTRIC project partners and other important actors

Main stakeholders are participants from the target group. In the following table, the stakeholders are summarized by function.

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
1	Municipality of Ruse	P	C	P	Project partner
2	Cycling and environmental NGOs	S	NG	P	Contribute to the surveys; Participate in the workshops and measure discussions
3	Nature park “Rusenski Lom”	S	NG	O	Contributes to the surveys; Participate in the workshops and measure discussions
4	Ruse Chamber of Commerce	S	NG	O	Contributes to the surveys; Participate in the workshops and measure discussions
5	Ruse, Varna and Sofia Universities	S	KI	P	Contribute to the surveys; Participate in the Conferences, workshops and measure discussions
6	Ruse schools	S	KI	P	Contribute to the surveys; Participate in the workshops and measure discussions
7	Association of Disabled people – Ruse Branch		NG	P	Contributes to the surveys; Participate in the workshops and measure discussions
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

Table 61. Measure stakeholders

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Low interest from the part of the local community to participate in the training activities	Process	Preliminary face-to-face meetings with the leaders of the different target groups; Disseminating on-time the invitations with an agenda containing topics of interest; Giving participants possibility to express themselves and to share their opinion; Attractive place for conducting the events, materials and catering.	Lucia Ilieva (ML)
Low interest from the part of the academia to participate in the training activities	Process	Preliminary face-to-face meetings with the Universities' rectors; Disseminating on-time the invitations with an agenda containing topics of interest; Giving participants possibility to make presentations and publications; Using universities' conference facilities for conducting the events, providing good materials and catering.	Lucia Ilieva (ML)
Stakeholders are not ready to take part in interviews or surveys.	Process	Explaining by media publications and by direct talks the importance of their participation in the evaluation activities; Applying different methods of primary data collection (direct interviews, letters to home address, written questionnaires, common discussions, observations, etc.)	Lucia Ilieva (ML)

Table 62. Risks

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

The measure was implemented following the 4 stages adopted by the project management, but because of its specifics we were implementing the four phases together for each event (before, during and after its implementation).

The main activities on the ”Research and planning” phase were conducted in the period 01.12.2016 – 28.02.2017 when the initial preparation for the training and awareness raising activities was held. We established the main stakeholders and target groups for training, selected lecturers and prepared the main project presentation and several specific curricula. Later on, before each specific event we used to adapt the agenda, the materials provided and the presentations and discussion topics according to the specific interests and needs of the target auditory. This was the key for successful implementation of the 2.11 measure and kept the interest of the stakeholders high till the end of the project.

The “Procurement and implementation” phase started on 01.03.2017. We subcontracted with the company “Communication 1” the tasks related to the technical organization of the events and their promotion in media. As this stage was developing in parallel with the Stage 3 “Demonstration and monitoring”, we included in our training materials the implementation of the ECCENTRIC measures and disseminated evaluation questionnaires to the participants after each event. The questionnaires were collected on site thus ensuring 100% of feedback and were processed later by our marketing experts.
The obtained results from the evaluation allowed us to perform the 4th stage “Conclusions and recommendations” after each training and to permanently improve our performances. By the end of the measure we were able to summarize the results of the evaluations and to reach the final results.

In 2017 we performed 4 training events: for transport professionals – 26 p.; for the “living lab” Druzhba citizens – 43 p.; for environmental NGOs – 17 p. and for school children – 30 p. In 2018 we organized a seminar for professors and doctoral students from the Ruse University. In 2019 we conducted a workshop for the members of the Association of Disabled people in Ruse - 20 p. The total number of trained people is 165. In 2020 we will organize one more

seminar with the Druzhba citizens and the new elected (in Nov.2019) municipal staff. We expect to reach the total number of 200 participants in our seminars.
The First Conference was organized in Oct.2018 in Ruse (in the Ruse University A. Kanchev" with the main theme "Social aspects of mobility" and 45 participants). The second was held in Sofia in May 2019 at the Conference hall of the "Federation of Scientific and Technical Unions in Bulgaria" with the active participation of the Sofia Technical University, the Ministry of Transport and Road Agency). Its main theme was "The mobility and the youth" and we had 75 p. The third took place in the Varna Free University "T. Hrabar" in November 2019 with the topic "E-mobility and urban planning". We registered 45 p.

As we are witnessing a rising interest in the academic circles to mobility and SUMP, we are planning to organize one more final 4th Conference in spring 2020. It will be conducted in the Capital with the participation of many universities and ministries. The total number of participants in the first three conferences was 175 and we expect to reach 250 people after the 4th Conference.

We co-organized and presented the project at two important transport forums: the Automotive Forum in Sofia (Sept.2019) and the Danube Forum in Ruse (Oct.2019), both with more than 100 participants each. In 2020 we are presenting ECCENTRIC at a Discussion forum during the Ruse Tourism Fair in May.

The Mobility as a Right (MaaR) concept was raised as a result of the measure 2.11 and till present works very well – people are ready to control the implementation and are in permanent contact with the project team of the Ruse municipality.

B.2 Process evaluation activities

Evaluation of the preparation for the measure

A comprehensive stakeholders' list has been prepared, which was updated when there were some political changes in the country. The list comprised all the relevant stakeholders shaping the public opinion in the target region Druzhba and on the whole territory of the city.
Training needs of Ruse's transport professionals have been assessed through telephone interviews and the review of activities and documents of previous projects like TRANSDANUBE and BUMP. CSDCS is National Mobility and SUMP coordinator for Bulgaria and maintains the EPOMM/ENDURANCE network. Therefore, CSDCS collaborated closely

with transport actors and stakeholders at all levels and had a good overview of the current training needs.

Evaluation of the conducted training events

Every training event (workshop, seminar, roundtable discussion or conference) used to end with a participants' survey. The organizers disseminated questionnaires on paper that were prepared according to the specific target auditory (local citizens, disabled, students and minor, civil servants, transport experts, academics, etc.) and asked the participants to complete them on site. In such a way CSDCS ensured nearly 100% of feedback that was difficult to reach if the questionnaires were disseminated virtually after the events.

The analyses of the questionnaires for all conducted events have shown that people were at 100% satisfied with the organization and the content of the events, the trainers and the materials disseminated. 90% estimated that the trainings were very useful and 75% declared they would share the acquired knowledge with friends and colleagues.
80% fully approved the planned measures of ECCENTRIC for Ruse and 20% estimated that their scope is too small and the city should implement much more measures than planned in the ECCENTRIC project.

Evaluation of the accompanying information and promotion campaign

The methodology for analysis was the same as above (via questionnaires disseminated, fulfilled and collected on site). More than 70% of the auditory have never heard before ECCENTRIC about mobility and SUMP, but thanks to the large information and training and promotional campaign deployed they were well informed (awareness nearly 100%) and were supporting the new measures.

B.3 Barriers

No.	Barrier field	Description	Action to overcome the barrier
1.	**Social/cultural**	The main problem was to involve the participants in the events and to establish a dialogue with them. There were so many projects in Ruse (mainly funded by the Operational and CBC-Programs) accompanied with so many trainings that Ruse people were	For overcome this barrier we decided to involve different target group and to provide tailor-made training programs for each of them and it has worked successfully. We have used the workshops for collecting the opinions of the participants not only about the event but for the ECCENTRIC measures in

		already bored and tired from all these events with limited positive results. People have seen many plans and strategies for improving the living conditions of citizens that were only written on paper and had no any follow up after the end of the projects. Citizens first asked shall they see some real results from our current project.	Ruse in general. Finally, after the deployment of the measure everybody in the city was informed about the project and was supportive. People became aware of their responsibilities and started calling the Mayor asking how the project was progressing.
2.	**Organizational**	Another barrier was to involve media that used to ask for scandals and bad news. Successful events were not of great interest for them.	We asked for support the municipality and the Ruse Governor. We launched a large media campaign, participated in the main Ruse international event (as The Tourism Fair under the auspice of the Minister of Tourism), often appeared at the regional TV channel and finally achieved to provoke a large discussion about mobility, sustainability and climate change in the city.

Table 63. Identified barriers and planned/taken actions

B.4 Drivers

No.	Driver field	Description	Action to make use of the driver
1.	**Planning**	Technical planning of the measure was carried out meticulously and with strong stakeholders' involvement.	Each event meets the needs and requirements of the specific target group thus contributing to the awareness raising and support of the Ruse ECCENTRIC measures
2.	**Organizational**	The key personnel involved in planning the measure were highly committed to achieving the measure objectives.	The project team and the subcontractor prepare the events in a high professional way in order to keep the interest of the target groups and to ensure many participants.

3.	**Financial**	Funding from the ECCENTRIC project	The funding from the project allows to carry out the events at high level with excellent training conditions (conference rooms, catering, materials provided) and to engage as lecturers high professionals
4.	**Positional**	The measure concerned is part of the awareness raising campaign of Ruse in the frames of their SUMP	Ruse is implementing its SUMP and the measure 2.11 contributes to the awareness rising of the citizens about the mobility measures implemented.

Table 64. Identified drivers and planned/taken actions.

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Low interest from the part of the potential auditory to participate	Social/organizational	Providing tailored events meeting the interests and needs of the concrete target group that is previously well defined.	ML (L.Ilieva)
Lack of support from the LG	Political / strategic	Explaining to the decision-makers (LG) the benefits of the project and its information campaign. Inviting representatives of the local and regional government for the events, media coverage of the events promoting their participation	ML (L.Ilieva)

Table 65. Reported period risk assessment

C.Conclusions

C.1 Main process findings

To perform training among different target groups was a real challenge for the project team, because it was difficult to motivate the people to participate and to establish a dialogue with them. In Ruse the people are ofteh invited to project events because the city uses to perform a lot of projects mainly funded by the Operational and CBC-Programs. They are always accompanied with trainings.

In our case we had to maintain the process of training very interesting and to announce something new during every event. Moreover, we had to prepare the content according to the target auditory – sometimes it was a large discussion, sometimes we used short movies, sometimes we invited participants to make proposals or to evaluate the implemented measures in their city. In general, we achieved to keep their interest high till the end of the project and performed more seminars, round table discussions and meetings than planned.

C.2 Process lessons learned

The main lesson was to adapt the training to the auditory, to keep vibrant contact with the participants and to speak about issues that are interesting to locals. Thanks to the training events, everybody in Ruse was informed about the ECCENTRIC Project and about the sustainable mobility in general.

Another lesson is to conduct the events in appropriate rooms with all the necessary facilities and to prepare and disseminate a lot of printed materials thus allowing people to use the information presented afterwards and to share it with others.

Catering was also important, people appreciated well organized coffee-breaks and lunches, as well as the small gifts remembering about ECCENTRIC.

C.3 Process recommendations

We have recommended to the Ruse municipality to continue with the training events after the end of the project in order to make people keeping the acquired mobility habits.

We proposed to the Technical University-Ruse to use our ECCENTRIC materials and training curricula in their education of students.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

TUR 3.1. & 3.2.

Smart Multimodal Mobility Services: Applying Mobility as a Service concept

Integrated Ticketing and Information System for Mobility

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

Partner nº	Organization	Country	Abbrev.
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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List of Co-authors

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Measure code	**Measure name**		
3.1. & 3.2.	Smart Multimodal Mobility Services: Applying Mobility as a Service concept Integrated Ticketing and Information System for Mobility		
Last update	**Responsible**	**e-mail**	**telephone**
30/7/2020	Stella Aaltonen	stella.aaltonen@turku.fi	+358 44 9075983

A. Introduction

A.1 Expected results of the measure

The measure objectives were:

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

- To promote sustainable, clean and efficient urban traffic and car-independent lifestyles
- To implement integrated packages of technology to allow for transport behaviour change and subsequent change in the modal split

(5) Strategic level:

- Setting up a MaaS ecosystem to enable a variety of services to the citizens and to have a variety of services linked to the open platform of public transportation, e.g. several type of bikes and electric vehicles
- Promote creation of business models enable cooperation with different existing service providers and attract new MaaS operators to come to the city

(6) Measure level:

- To bring first MaaS services available to the citizens
- To create co-operation models between different parties
- The have the ticketing system of public transport working also as a ticketing system for the bike sharing system
- To have open interfaces available to the MaaS operators and also to the mobility service providers that want to bring their service visible together with public transportation

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Liveability	Competitiveness	Efficiency of urban freight	Local economy
1	At least three MaaS operators operating in the Kupittaa laboratory area	x							x		
2	Car ownership: the number of cars per residents starts to fall	x			x						
3	The number of customers/tickets sold using services through the integrated ticketing system	x									

Table 66: Quantifiable impacts

A.2 Measure description

The aim of measures 3.1. and 3.2. was to have a functioning Maas ecosystem in place with at least three Maas operators running in the city of Turku by the end of the project. In the previous model, the user was either able to buy a means (a car or a bike) or tickets for transport (bus ticket, train ticket etc.). In these measures, the development of MaaS system and services in

the city of Turku were to be piloted. This included the creation of business models that would enable cooperation with different existing service providers and attracting new Maas operators to come to the city by creating different service packages and marketing them through a variety of communication channels. A new open data interface and platform into which the ticketing system of the public transport system is incorporated was also to be developed. This would enable the integration of other local service providers into the Maas ecosystem, such as taxis, parking houses etc. The ticketing system for the bike sharing system was also to be integrated into the data interface as a demonstration of how the new information system and open integration enables new business opportunities and models. All this was to result in easy and accessible multimodal services to citizens and tourists. .

A.2.1 Measure outputs

In these measures, a new open data interface and platform into which the ticketing system of the public transport system is incorporated were to be created. This would enable a functioning MaaS ecosystem into which at least three MaaS operators were to be integrated.

A.2.2 Supporting activities

No supporting activities have been identified for this measure.

A.2.3 Interactions with other ECCENTRIC measures

Measures 3.1. and 3.2. were to have interactions with the following measures within ECCENTRIC:

- STO 3.5. “Develop smart choice of mobility services”: comparing the measures was been discussed, since the cities had different ways of doing the platform. Also the measures would work together try to sell each other’s PT (bus and shared bikes) tickets to travellers from STO to TUR via the shipping lines.
- MUC 3.4. “Beacon based indoor routing as a mobility service app”: the results of this measure were to be compared with the beacon based cultural path.
- TUR 5.5. “Bike-sharing and Car-Sharing Schemes”: the bike share system was to be integrated into the Turku city PT platform “Föli”.

A.2.4 Interactions outside ECCENTRIC

No interactions were identified for these measures.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
1	Residents	City of Turku	MaaS services should be made known to all Turku residents
3	Public transport users	City of Turku	PT users are one of the main target groups for MaaS services connected to the PT platform
6	Commuters	Turku region	Commuters from around the Turku region will benefit from development of mobility services

10	MaaS operators	Region	MaaS operators are able to offer services via the Föli API

Table 67: Target groups or affected parties of the measures

A.4 Stakeholders: ECCENTRIC 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
1	Turku Region Traffic Föli	P	PT	P	Provider of the platform for MaaS services development
2	City of Turku	P	C	L	Lead partner
3	VR Group	S	PT	O	Railway operator
4	Tuup Ltd.	S	PR	O	MaaS operator
5	MaaS Global	S	PR	O	MaaS operator
6	Reittikioski	S	PR	O	A software developer and an essential MaaS operator
7	Western Systems Ltd.	P	PR	P	A Finnish software vendor specializing in travel card applications. Responsible for software development in the MaaS process
8	Region of South-West Finland, Lounaispaikka	P	Other (regional authority)	O	Region of South-West Finland maintains the open data of the region and develops the use of it.
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					

Table 68: Stakeholders of measures

A.5 Identified risks

Identified risk	Impact	Likelihood	Score	Mitigation actions	Responsible
Surveys to households/businesses may fail to reach enough respondents	1	2	2	pre- information about the shortcoming survey, increase of awareness, small incentives	ML, LEM
MaaS operators may not be willing to answer to the survey	2	2	4	Informing operators about the necessity to answer	ML
Lack of economic data from private companies	1	1	2	The operators should be well informed about the economic data needed	ML, SC
Turku is not appealing for MaaS operators	2	1	3	Larger cooperation with the Region, creating larger market possibilities	ML, SC
MaaS system failure; integrated ticketing system cannot be established	2	1	3	Sufficient preparation pre-implementation for possible technical obstacles and challenges. Administration is well informed about the technical solutions and alternatives.	ML

Identified risk	Impact	Likelihood	Score	Mitigation actions	Responsible
Change in attitudes in public policy towards the integrated ticketing system	2	2	4	Sufficient preparation pre-implementation for possible technical obstacles and challenges. Administration is well informed about the technical solutions and alternatives.	ML

Table 69: Identified risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Some changes occurred during both measures' implementation. Both measure's leadership was in the hands of the same ML from the start and this leadership underwent several changes during the project. The first ML, Jari Paasikivi, left his position in spring 2017 and was replaced by Päivi Kynkäänniemi. Then the following spring, Roope Virta took over the measure leadership. After a year, measure leadership was taken over by SC Stella Aaltonen. All these changes naturally caused some delays. In addition, the fact that the second measure leader temporarily had to place more emphasis on another, effort-consuming measure she was leading (TUR 5.5.) lead to less emphasis being placed on MaaS development.

In TUR 3.2., phase 2 "Procurement and implementation" was prolonged with three months as the first integration to the platform was for the bike sharing system, and the system was launched in May 2018.

The proceeding of both 3.1. and 3.2. is presented below.

Phase 1: Research and measure planning (100 % completed)

TUR 3.1.

Research and planning of the measure commenced in September 2016 and was completed in April 2017. The following activities were carried out during this phase:

- Identifying the MaaS situation in Turku and clarifying the stakeholder situation. This included identifying the existing stakeholders and finding out the potential actions in the city of Turku. (M1-M12)
- Creating a MaaS identity in the city of Turku with visual elements. Visual materials were created explaining MaaS and they were included in the future communication packages in measure 2.2. (M1-M12)
- Planning the MaaS readiness level Indicators and identifying the situation in Turku. (M1-M12)
- Negotiations with new MaaS Operators in Turku. Negotiations took place with the MaaS operators. A new MaaS operator started providing its service in Turku as the company Tuup's Kyyti service started officially in June 2017 after a test period in year 2016. (M1-M12)
- Compiling baseline data for the measure. This included planning and executing the Kupittaa mobility questionnaire, as well as analyzing data on car ownership in Turku from the data acquired from the national car registry Trafi. Instructing data collection activities in regards with the baseline and BaU also took place with TUAS. (M7-M12)

TUR 3.2.

Research and planning of the measure commenced in September 2016 and was completed in April 2017. The following activities were carried out during this phase:

- Choosing FÖLI PT system as the platform. The FÖLI PT system was chosen to become the platform that will be developed in the measure. The role of the public party was therefore bigger than if the platform was in private hands. (M1-M10)
- Guiding and planning the needed changes to FÖLI ticket sales and public transportation (PT) system with Westerns Systems Ltd. Developing API:s for FÖLI backend. Developing databases and functionalities for transaction handling. (M1-M12)
- PT ticket sales agreement with different companies. The PTA of the city of Turku, FÖLI, made agreements with four MaaS operators to enable them to sell PT tickets and to create travel chains as well as combining transportation services. The companies were: VR - Public Railways, Kyyti, Reittikioski, and Whim (MaaS Global). In doings so, the main measure goal for the CIVITAS ECCENTRIC project was already fulfilled. (M1-M6)
- MaaS readiness level Indicators planned. Taking part in creating the MaaS readiness level indicators and clarifying the situation in Turku. (M1-M12)
- Baseline data collection for evaluation with TUAS. (M1-M11)

Phase 2: Procurement and implementation (100% completed)

TUR 3.1.

Procurement and implementation of the measure began in September 2017 and was completed in May 2018. The following activities were carried out during this phase:

- Changing and influencing city policy and strategy making. This encompassed influencing the update of the parking policies in the city of Turku in order to increase car-sharing friendly parking policies and temporary subventions; incorporating park-and-ride (a bus or a city bike) hubs into the plans; and incorporating MaaS as a topic into the strategies of the city of Turku. (M10-M20)
- MaaS questionnaire for MaaS operators: planning and executing a MaaS questionnaire for MaaS Operators to acquire more detailed information and in particular feasible ideas on how the city could help MaaS companies create MaaS markets in Turku. (M15-M20)
- Establishing internal coordination and information exchange on MaaS issues within the city administration was another ongoing process during this phase. This involved e.g. meeting officials from different branches of city administration to check the status of current MaaS related activities and discussing the possibilities of incorporating a MaaS-friendly approach. (M12-M20)
- Creating a plan for the next steps in MaaS in Turku. The company and household survey under measure 2.2. were analysed from the MaaS perspective and the next steps to take in MaaS readiness level indicators were clarified. M16-M20
- Negotiations with new MaaS operators in Turku took place. In spring 2018, OP Kulku started operations in Turku. (M13-M20)

- A liaison and cooperation group representing municipal, regional and state administration was set up to find solutions for multimodal door-to-door intercity travel. The focus was on the first/last mile transfer between local and long distance modes of mobility. The gaps in the beginning and ending chains of long distance travel chains were also analysed. (M15-M20)
- The regional administration, the company Valmet Automotive and the city of Turku piloted a regional bus service on route Turku-Uusikaupunki, mainly targeted for commuters to the Valmet factory in Uusikaupunki. The local PTA contributed by making its mobile ticketing platform available to facilitate special commuter tickets aimed exclusively for the automotive workers. For trips starting and/or ending in the PTA's area of operation, this also enabled integrated ticketing for first/last mile trips in the PTA's local traffic. One of the aims of the pilot was to test applying and targeting the MaaS service for a limited group of customers in intercity travel. It also provided valuable experiences in multi-party ticketing cooperation between carriers, the platform provider and ticketing operators.(M10-M20)

TUR 3.2.

Procurement and implementation of the measure began in September 2017 and were completed in May 2018. The following activities were carried out during this phase:

- Planning changes to FÖLI Ticket sales system. FÖLI and IT architects planned the changes needed for FÖLI ticket sales and public transportation (PT) systems, additional servers, as well as the mobile app. (M13-M18)
- Implementation of changes to the FÖLI Ticket sales system (adding bikes and API's). Leading the implementation process and synchronizing it with the IT architecture of the city of Turku. Western systems Ltd. focused on planning and researching requirements for Maas the platform, including the following aspects: (M13-M21)
    - Planning APIs for FÖLI system
    - Planning specifications for system registration
    - Planning specifications for customer profiles
    - Planning specifications to payment transactions
    - Planning specifications to transactions
- Planning and tendering a beacon based information and cultural pathway to the city. A beacon based digital information and cultural path was planned in connection with the bike sharing system. This was to partially fund the bike sharing system and also to create a new communication channel in the city. The cultural path was to provide information on the PT and air quality, educate users on local biology, geography and history, and provide information on local events and festivals. The provider of this service was procured and first implementations of the path started in May 2018. (M12-M21)
- Finding out and using MyData in the future: creating the basis for using MyData and taking into account the GDPR requirements in the city bike system. (M16-M21)

- Improving the open data interfaces for biking and walking. A real-time map to follow buses and city bike availability on stations was implemented. A digitransit map and real-time info on buses and shared bike availability was to be used. The gaps of existing open source datasets were also identified, finding ways to improve the situation and to improve the use of existing data. PT ticket sales contracts with MaaS operators were expanded. FÖLIX, a first/last mile service in nearby town Raisio combining taxi rides with the bus trip was launched. (M17-M21)
- Expanding PT ticket sales contracts with MaaS operators. Discussions were started with MaaS Global to expand their PT ticket sales contract to shared bikes as well. Negotiations were also ongoing with Nextbike to use their selling channel for the bike sharing system. (M18-M21)
- National survey on cycling and walking route planning (Digitransit). Results were received from a national survey (by Digitransit, Turku city participated in it) realised on the cycling and walking route planning needs that cities had. The survey was to be used to develop a national platform for route planning which already had information on local and long-distant buses, trains, trams, metros, airplanes etc. and was already used by many cities, including Turku. (M15-M16)

Phase 3: Demonstration and monitoring (90% completed)

TUR 3.1.

Demonstration and monitoring of the measure commenced in March 2018 and were completed in June 2019. The following activities were carried out during this phase:

- Carrying out the actions in the implementation plan created in phase 2. (M21-M36)
- Clarifying possibilities to survey MaaS paths of the youth and taking part in National Travel chain work. (M21-25)
- Negotiations with New MaaS operators in Turku, starting with Über, which was to start its services in the fall of 2018 when the taxi regulation was to be freed. (M20-M36)
- Incorporation of MaaS actions into the Turku strategies. Finding synergies, creating a long term plan for MaaS and finding out co-operations to create a MaaS ecosystem that takes Turku to the next levels on the MaaS readiness indicators. Acceptance of the new parking policies and their impact on the market. Identifying the gaps in travel chains and making an action plan to address them. (M21-M36)
- Development of instructions for e-scooter operators and taking care of gathering feedback on these new services. (M30-M42)
- Creating a MaaS development plan for Turku. (M40-46)
- Leading the MaaS development process on the Finnish national level. (M32-M46)
- Creating a better understanding of MaaS business models and their potential impact in Turku. (M40-M46)

TUR 3.2.

Demonstration and monitoring of the measure commenced in June 2018 and were completed in April 2020. The following activities were carried out during this phase:

- Expanding MaaS operators' PT ticket sales and the shared bike system ticket sales to other MaaS operators and selling channels. Negotiations were to take place with MaaS companies and other service providers about co-operation and co-ordinating the services through our FÖLI platform and also giving our partners a chance to sell our PT tickets. (M21-M44)
- Incorporation of the bike share system into the Föli app. (M21-M44)
- Negotiating new PT ticket sales agreements with different companies and expanding the co-operation. Turku negotiated with shipping lines and hotels on selling Turku PT tickets to travellers. The aim was to try to expand the ticket sales. The city theatre ticket co-operation started in September 2018. A theatre ticket could also be used as a bus ticket that was valid for three hours before and two hours after the show. After the city theatre, similar contracts were made with the TFO at the Shipyard! festival, the Turku Music Festival and the city orchestra. First tests with the hotel cooperation were also carried out. (M21-M42)
- Implementing new layers on the digital information and cultural pathway of the city. The aim was to create layers to the digital cultural and information pathway that gives customers information on PT and educates them about the history, geography and biology in the area as well as brings income from sponsors to the system. Extensive co-operation with local businesses that were to sponsor the pathway took place. (M21-M36)
- Improving the API interfaces and ticket sales channels (mobile app) of Föli. Increasing the use of API interfaces by different service providers. Improving the use of data by visualizing data for the planning and decision-making. (M22-M44)

Phase 4: Conclusions & Recommendations (50% completed)

TUR 3.1.

Some preliminary conclusions and recommendations based on experiences gathered could be highlighted at the time of writing.

Conclusions

- MaaS as a term is not understood yet. The entire concept of MaaS needs to be opened on many levels and through practical examples.
- The MaaS readiness level indicators developed in WP 3 have turned out to be a good way to explain MaaS. There is very little research (or any form of proven data) available that could be used to form a framework when attempting to e.g. give policy recommendations and guidelines on MaaS issues. This presents a challenge to developing a model for applying the concept in the context of local administration and policymaking. It relates to several key issues:
    - Evaluating the state of the market and business environment

  - Setting goals for developing the market and business environment
  - Evaluating the progress made in developing the market and business environment

- The development of MaaS requires holistic thinking and different skill sets than traffic planning. This is important to take into account.
- The market demand can change very rapidly with the new services coming to the market. A good example of this are the e-scooters entering the city of Turku in spring 2019.

Stakeholder involvement

- The overall approach of this project, including the choice and application of research methods has been effective and is very replicable. It is strongly recommend to pay special attention to the careful planning and execution of the research phase.
- A key factor in this type of a project is continuous involvement of external and internal stakeholders. Without this, it is not possible to understand all the different types of drivers and constraints that come into play or anticipate the multiple technical, financial and administrative issues that require attention.
- Discussions with all stakeholders have been on a very positive, enthusiastic and encouraging. There is clear indication that it is possible to contribute positively to the development of the local mobility market with this type of measure. However, it is more realistic to expect for a slow overall progress instead of immediate results in the form of e.g. rapid increase in the availability of new services.
- In the long term view, perhaps the most important achievement is that contact with stakeholders and a continuous discourse of cooperation is established. It is vital to create an environment of open communication and interaction where knowledge and ideas are shared for mutual benefit.

Communicating MaaS to the customers and beyond

- The customer needs to be seen from a broad perspective instead of focusing only on the end user. The customer is more and more often a group/community of potential end-users such as a family, a company (as e.g. an employer), a housing community etc.
- Queries are a good method for providing an overall view or a cross section of a situation, but generally require a good basic understanding of the subject. With a new and/or less researched subject, it is necessary to combine queries with other methods, such as direct interviews and/or more informal face-to-face discussions. This allows for forming a preliminary idea of relevant issues and then testing and expanding that with queries.
- Innovative service offers generate public awareness and interest and eventually translate to expectations and demand. Visibility increases the appeal of any service and is vital to a new concept such as MaaS. Pilots and launches of new services, features etc. at regular intervals is a good strategy to keep the customers interested and expecting more.

- A role for which the city is well suited is networking and facilitating networking on different levels (project, city, national) to involve potential partners, to create awareness and to bring together parties who share a common interest.
- The city is in a good position to reach the public and in most cases has skilled communication personnel at its disposal and a good coverage of different channels of communication. Also, organizing and coordinating different kinds of promotional events is something cities usually have a lot of experience and good knowledge of.

Recommendations

- Involve internal stakeholders as early as possible and ensure firm ownership of development duties. MaaS issues relate to a number of municipal activities and departments. It is essential to identify common goals as well as potential legal, administrative, technical and financial restraints.
- Identify and contact external stakeholders to find out what they can provide, what they need and expect. Prepare for a lot of legwork.
- Read available research and if necessary do your own by e.g. recruiting suitable students doing their thesis/diploma work. This applies particularly to understanding the customer when attempting to promote a customer oriented approach.
- Any attempt to develop markets and/or business environments requires at the very least basic data about demand and supply. Measure 3.1 dealt with a textbook case of potential demand and supply, with ambitions of transforming them into a thriving market. Fortunately there were proven methods for researching market potential.
- A very efficient solution to this type of research is cooperation with e.g. the local business or polytechnic college. The staff can advise on the choice of research methods and graduate students are available to perform the research as their thesis work.
- In the R&P phase three queries and numerous interviews and meetings were conducted. Two of the queries were targeted at potential customers (people living and working in the target area and their housing communities and employers). One query was targeted at the Finnish mobility operators. The results were analyzed in the thesis of Tiiu Tuomainen from Turku University of Applied Sciences. Some of the most significant conclusions from the thesis were:
    - There is interest in (new modes of) sustainable mobility, but mobility choices are largely determined by ease of use and long-term, firmly established habits.
    - Awareness of available mobility offers is a key barrier to the change of mobility patterns.
    - Continuous innovation and piloting of mobility concepts is a key driver in development of the mobility market.

TUR 3.2.

Some preliminary conclusions based on experiences gathered could be highlighted at the time of writing.

Research & Planning:

- It was found that there is not necessarily a need for an app since web pages can be made scalable and progressive enough to be able to use it with a mobile device. An app was still created since many people will want to use one.
- There is a need to create open API's to be able to publish open data.
- The APIs need to be made as standardized as possible to enable access. True openness of API interfaces is important.
- One update on the operator side can affect all the other companies connected to it. Good and up-to-date information is needed from all the different actors. This is a learning process especially when a new service, such as a bike system is brought into an established PTA and all parts of the process need to be integrated.

Procurement & Implementation

- It was found out that the city can get income from advertising and sponsorship.
- The beacon-based digital cultural and information pathway opens a new way of communicating with citizens and tourists. Different technologies, games, study materials for schools and new ideas on how to guide people to where they want to go can be tested in conjunction with the pathway.
- Scalable and progressive web pages eliminate the need for mobile apps, but not the demand for them. The development of mobile apps is both money and time consuming and might not be worth the use.
- The large number of parties involved in the ticketing system slows down the development work. Especially if the partners are foreign companies, there is usually also many communication barriers as none of the actors are native English speakers.

Demonstration and monitoring

- Although the PT has an open API, this does not necessarily lead to its use. Even a contract with the company does not automatically lead to the use of it, as each of the companies work with their own logic and determine their timetable based on the market situation.
- It takes a long time for the users to find new ticket options.
- Interdependency of different actors. If one actor fails – all the actors connected also fail to keep the timetable. The development work needs to be agile, open and well-coordinated.
- Satisfying the demand for new ticket options so that they generate enough income to cover the development cost. This needs to include marketing actions and constant communication to users.
- Turku is not a market big enough for operators to prioritize it. This can lead to delays in launch and can stop the process entirely.
- Continuous development of ticketing options is necessary to attract customers and generate income.

The measure leader was changed in May 2017 from Jari Paasikivi into Päivi Kynkäänniemi.

The changes are relevant for measure implementation and the new questionnaire will give us more baseline information.

B.2 Process evaluation activities

Due to the strong overlap and shared objectives, measures TUR 3.1. and 3.2. were combined both for impact and process evaluation. The measure leader and other staff have carefully recorded and analysed the measure design, implementation and demonstration of both measure's processes.

To evaluate the measure process and to gain an understanding of the relevant barriers, drivers and risks related the following activities were undertaken.

An online survey was sent to TUR 3.1. and 3.2. stakeholders, requesting them to identify supporting thematic areas / sectors for the measure among the following categories:

- Political / strategic
- Institutional
- Laws and regulations
- Cultural
- Problem-related
- Involvement / Communication
- Planning
- Organisation
- Financial
- Technological
- Spatial

The stakeholder survey was part of the basic process evaluation and was directed at a large selection of key stakeholders as listed in cooperation with the Turku Site Coordinator. The purpose of the online survey was thus to establish power, interest, and impact of stakeholders in relation to each respective measure. The survey questions were centred around the most significant barriers, drivers and risks related to catalysing and piloting the development of the MaaS system and services in the city.

Eight stakeholders responded to the survey for **TUR 3.1**.: a senior inspector at the Finnish Tax Administration, a transport consultant, a Western Systems system engineer, a representative of MaaS Global, a transport planning engineer from the city of Turku, the CEO of Rolan Ltd., a representative of a sharing economy platform, and the CFO of Linkker Ltd. Only one of the respondents is an ECCENTRIC partner (Western Systems Ltd) and it hence can be stated that the variety of respondents in terms of professional background is somewhat satisfactory. More responses would have been welcomed from MaaS operators and they will be personally addressed at PER 2 stage as this measure has been selected for detailed evaluation. The weak involvement may be explained by the personnel changes within the measure and the subsequent delays and temporary loss of momentum. Also it is worth noting that the first ML

already had good networks to MaaS operators, whereas the following two MLs, coming from different professional backgrounds, have had to rebuild the cooperation to the main stakeholders.

When inquired about the main potential benefits of the measure, the reduction of emissions/noise/energy consumption was considered somewhat important by three respondents and very important by four respondents. The reduction of congestion was also regarded somewhat important by most (6/8) respondents and very important by two respondents. Four respondents considered the increased satisfaction of the citizens in the transport system as somewhat important and four as very important. Seven out of eight stakeholders rated the increase of liveability as somewhat important and one as very important. In addition, four respondents considered the decreased user costs potentially resulting from the measure as somewhat important and three respondents as very important.

Five out of the eight stakeholders rated the impact of the measure on their organisation to be potentially very positive and the remaining three respondents as somewhat positive.

When asked about the potential influence of each respondent's company or organisation on the measure objective, five out of the eight respondents viewed their influence as great. One respondent considered they had great influence on the objective and one respondent considered they has some influence on the measure. When considering the influence of each respondent from an objective perspective, some discrepancies arise when compared to the subjective evaluation of influence – particularly in terms overestimation of one's influence. Among the stakeholders, the subjective perception of influence was often higher than the objective perception.

The transport consultant who has certainly had a high influence on measure TUR 4.8, for example, estimated his influence to be high in this measure as well, although in reality the influence is low. The same applies to the representative of a sharing economy platform (a consultant too, then), who had rated his perception of influence as very great. In addition, the stakeholders from Linkker Ltd and Rolan Ltd rated their influence as great, although in reality they only have little influence on this particular measure.

Three respondents expressed an interest in the planning stage of the measure and three respondents an interest to be involved in the implementation phase. One respondent was interested in the operation phase. Unfortunately, one respondent left this part blank.

For measure **TUR 3.2.**, also eight stakeholders responded to the survey: a senior inspector at the Finnish Tax Administration, a sustainable mobility expert from the Regional Council of Southwest Finland, a Western Systems system engineer, a representative of MaaS Global, a transport planning engineer from the city of Turku, the CEO of Rolan Ltd., a representative of a sharing economy platform, and the Sales and Customer Experience Director at VR Group. Only one of the respondents is an ECCENTRIC partner (Western Systems Ltd). Hence it can be stated that the variety of respondents in terms of relevant stakeholders is rather satisfactory, although more responses would have been welcomed from the MaaS operators in particular.

When inquired about the main potential benefits of the measure, five out of eight respondents considered the increased satisfaction of the citizens in the transport system as somewhat important or very important. The increase of transport efficiency was also regarded somewhat

important or very important by most (5/8) respondents. The reduction of costs for users was considered somewhat important by four respondents and very important by one respondent.

Three out of the eight stakeholders rated the impact of the measure on their organisation to be potentially very positive and three respondents as somewhat positive. Two respondents regarded the impact on their organisation as neither positive nor negative.

When asked about the potential influence of each respondent's company or organisation on the measure objective, three out of the eight respondents viewed their influence as great. Three respondents considered they had some influence on the objective and one respondent considered they had very little influence on the measure. When considering the influence of each respondent from an objective perspective, some discrepancies arise when compared to the subjective evaluation of influence – both in terms overestimation and underestimation of one's influence.

The representative of a sharing economy platform (a consultant) who has actively participated in the planning and implementation events of some of the Turku measures, estimated his influence to be high in this measure as well, although in reality the influence is low. The same applies to the CEO of Rolan Ltd, responsible for the upkeep of the bike share system (subcontractor for the bike share operator Nextbike Polska), who also estimated his influence on the measure as very great, although their current role is purely technical and they have not been involved in the planning stage of the measure. On the other hand, the representative of VR Group (the state-owned railway company) had a lower self-assessment of influence than the objective assessment points to – the company has, after all, been actively involved in MaaS development both locally and nationally.

Two respondents expressed an interest in the planning stage of the measure and three respondents an interest to be involved in the implementation phase. One respondent was interested in the operation phase. One respondent was not interested to be involved.

Although the participation rate from stakeholders could have been higher for both measures, it is worth underlining that several **in-depth interviews** with the MLs (as well as the SC, before she became ML too) of the measure have been conducted throughout the project and therefore a thorough understanding of the measure processes has been obtained. These measures were indeed subject to several personnel changes, which clearly affected their process, particularly for 3.1. The effects of these changes will be reviewed in more detail under B.3 "Barriers. In addition to the stakeholder survey and measure staff interviews**, measure reports and theses** conducted on the bike share system (which was connected to TUR 3.2.) were utilized in the process evaluation.

Measure TUR 3.1. was selected for detailed process evaluation and was hence subject to a **Learning History workshop.** The workshop is a method realized ex-post by which the process of a measure can be evaluated, including all the relevant phases: planning, implementation and demonstration. The main stakeholders of the measure are invited to share their views on the success factors, or lack of thereof, of the measure and to recount their experiences of the measure approach, internal dynamics, realization and results achieved, via recounting the main barriers and drivers of the process. The main aim of the workshop is thus on learning about and understand the reasons behind measure success or failures.

The workshop proceeded in the following manner:[12]

1. Reconstructing the measure timeline and discussion of main measure milestones
2. Explanation of workshop goals and process
3. Inventory of measure process **barriers** and actions to overcome them, followed by moderator clustering and joint discussion
4. Inventory of measure process **drivers** and actions to overcome them, followed by moderator clustering and joint discussion
5. Reflective discussion on lessons learned

Efforts were made to organize the Learning History workshop in a similar manner to the other Turku measure selected for detailed evaluation. However, it turned impossible to get MaaS companied to participate in the workshop as none of them were based in Turku at that time. Hence, a workshop was conducted with just the ML/SC and the development manager of the public transport office Föli in November 2019, and a MaaS company representative was interviewed separately online by the LEMs later in the same month. The workshop and interview learnings are added to the previously collected measure process drivers and barriers and the main learnings are summarized in section C. It is worth noting that since measure 3.2. overlaps significantly with measure 5.5. “Bike-sharing and Car-sharing Schemes”, it is worth investigating the detailed evaluation of that measure to get a better view of TUR 3.2. drivers and barriers, particularly related to the technical data/platform related issues experienced in the implementation of the city bike system.

B.3 Barriers

The main barriers identified for the two measures by the measure staff and stakeholders are identified in the table below.

No.	Barrier field	Description	Action to overcome the barrier
8	Organizational	Recurrent measure leader changes caused delays in the measure implementation.	The SC actively transferred knowledge to the new measure leaders, which helped keep momentum in measure realization. Eventually the SC took over measure leadership from the third ML. It should be noted here that due to the complex nature of the measure, finding expertise was difficult after the first ML left his position.
4	Problem related	The complexity of MaaS, as well as the fact that there are no established models for MaaS ecosystems due to the novelty of the concept have caused some challenges for the measure.	There are no established roles for private and public actors and especially at the beginning of the measure there was uncertainty as to what can be expected from different stakeholders. Models of operation between different parties are being reframed continuously. It is also obvious that private and public parties have

[12] Structured after Dziekan et al. (2013) Evaluation matters – A practitioner’s guide to sound evaluation for urban mobility measures. p. 87-91.

			very differing views on who should be the one taking risks in MaaS implementation, for example. It is also a fact that Turku might not automatically be a big enough city to attract MaaS operators, at least not from the volume of revenue point of view. Different MaaS parties need to be lured to the city. During the project there were also issues with lack of clear parking policies – stronger alignments of those would have been needed already at the beginning of the measure.
7	Planning	Lack of sub-objectives in the project plan.	According to the third ML, the measure could have used more precise objectives and sub-objectives. Having clearer objectives could have helped the transitioning from one measure leader to another. This should be taken into account when planning similar endeavors.
8	Problem related	The MaaS ecosystem and the actors within it are in constant flux.	MaaS as a concept is challenging and as a business volatile and unstable, and prone to external influences and flux. Improved dialogue between cities, MaaS operators and other stakeholders is needed to overcome this barrier, as well as regulatory frameworks where those do not exist yet.
1	Political / strategic	Many of the issues related to MaaS are governed by different city departments. Some of these issues, such as parking policies, are also politically sensitive.	Improved dialogue is needed between different city departments in order to ease MaaS ecosystem development. It should also be reviewed where the most dynamic points fo development are in a city in terms of MaaS development.
5	Communication (external)	MaaS terminology in Finland is often falsely connected to just one operator.	MaaS Global is a private company offering MaaS services in Finland. The name of the company has led to many people assigning all MaaS advancements to this company alone. In other words, whole MaaS development has been framed too strongly to the development of this single company, despite the fact that it is by no means the only one in the market.
	Economic	Viable business models are yet to be defined	The issue of whether MaaS is economically viable and profitable in the first place is still an issue to be solved. Business models should be critically evaluated to gain a better understanding of their profitability. According to the company stakeholder interviewed, for a private MaaS operator, these days it is hard to do business when the current operations are not even enough to cover for the expenses, let alone to gain profit. Selling public transport ticket by third parties is considered too difficult, for which reason not may operators are willing to do this. Continuing this would require investments and risk taking for a longer period

			of time, and there are not many companies who are able to do this. The evaluation of business models is also crucial from the user's point of view – what type of MaaS services are attractive to users? In Finland, the general attitude seems to be that the market will take care of MaaS development but at the same time there is not much trust that MaaS would bring added value to mobility services. The consumers simply do not see the value in paying extra for their PT tickets, at least according to the company stakeholder.
	Communication	Lack of coordination of joint vision on MaaS in the city.	The visibility of MaaS, or how it's e.g. marketed, has not been centrally coordinated in the city. This is a barrier to communicational efforts to promote MaaS. It is recommendable that a joint vision is formed in the relevant city departments on how MaaS is marketed to the citizens, who are the main target groups and who should do the marketing.
	Legislative	The Act on Transport Services from 2017 is not considered to promote the commercial side of MaaS.	According to the Act on Transport Services from 2017, regardless of the mode of transport, a provider of passenger mobility services shall ensure that essential, up-to-date data on its services is freely available from an information system (open interface) in a standard, easy to edit, and computer-readable format. The Act provides thus a good starting point for the technical realization of MaaS. However, according to the company stakeholder, the Act does not address the business side of MaaS with enough detail. No commercial preconditions are defined for mobility services, which was considered problematic from the point of view of this stakeholder.
4	Problem related	Roles, rules and responsibilities	From the point of view of the company stakeholder, an evident barrier for MaaS has to do with the roles, rules and responsibilities of providing MaaS services. According to the stakeholder, cities should act as MaaS operators if they do not want companies – the market – to be able to offer MaaS services completely in their own terms in the fear of losing clients from public transport. This is not happening at the moment to the most part. In other words: if cities really believe in the opportunities to sustainable transport MaaS offers, they really should operate MaaS services themselves. So, in essence, the responsibility for arranging MaaS services should lay upon the city. It should be borne in mind that here the views of city and private

			company representatives differ greatly, as explained also in the next section on drivers.
	Organizational	Lack of knowhow and courage	From the point of view of a MaaS business development, cities do not usually have enough expertise to produce viable MaaS services. The company stakeholder interviewed also felt that cities in general (not Turku though) are too focused on being wary of potential risks in MaaS services before those risks have even come about. The stakeholder felt that cities need more courage to try out different services instead of ruling out certain types of MaaS pilots for the sheer anticipation of potential risks.
2	Institutional	Having chosen Western Systems Ltd. (a project partner) for the joint development project without an official tendering process caused some issues.	Conversations on the matter were conducted with the city legal department. Originally, the justifications for the joint development process and lack of tendering should have been justified more clearly with the legal department. In the end this did not end up causing a major issue and no further actions needed to be taken. It is however worth taking note of issues related to legislation on restrictive business practices when conduction similar measures with project funding.

Table 70: Identified barriers and planned/taken actions.

In TUR 3.1., dealing with a complex whole such as a MaaS ecosystem, it is clear that its promotion requires a deep understanding of the subject matter, the operational field and the whole political and legal context surrounding it. The first Measure Leader succeeded in catalyzing the MaaS development in Turku and creating a dialogue with the main stakeholders and had a deep understanding of this multi-faceted topic. It does not comes as a surprise, then, that when the Measure Leader left his position six months after the project started all the know-how was not to be easily replaced. The SC took over for a while and successfully managed to produce the MaaS Readiness Indicators. In August 2017 the second ML stepped in. The second ML was a lawyer and did provide the legal expertise needed for the complicated legal issues related to MaaS development. However, she was also in charge of Measure TUR 5.5 and the implementation of the city bike system and understandably had less time to deal with Measures TUR 3.1 and TUR 3.2. In spring 2018, the second ML left the project and was only replaced with a new ML in August 2018. This Ml however left his position after a year and the SC thus took over measure leadership in summer 2019. The novelty of the subject matter has made finding expertise challenging, and the visions of MaaS development have not been easily transferred to the new Measure Leaders. According to the SC, the problems caused by ML changes could have been alleviated at least to some extent by having had more precise objectives and sub-objectives in the measure description. As it was, the measure was slightly too intangible to provide for easy access for a person with little in-depth experience with the subject matter.

The complexity of MaaS, as well as the fact that there are no established models for MaaS ecosystems due to the novelty of the concept caused some challenges particularly for measure 3.1. For example, there are no established roles for private and public actors and especially at the beginning of the measure there was uncertainty as to what can be expected from different stakeholders. Interests vary between the actors, as well as the amount of risk these actors are willing to take. Business models are still taking shape. The whole MaaS ecosystem and the actors within it are in constant flux and the determination of roles and responsibilities is ongoing. Suffice to say that the private and public parties have somewhat differing views on these, a challenge that will have to be solved within the coming years to allow for functioning MaaS ecosystems to flourish. Naturally, this conundrum is not for Measure TUR 3.1. to solve alone, yet will still quite likely impact whether all the objectives in this measure are reached or not.

All in all, the political climate in Turku has been favorable to MaaS. Still, many of the issues related to MaaS are governed by different city departments, which has brought challenges to finding a common ground for the needed co-operation models. Some of these issues, such as parking policies, are also politically sensitive. In the words of the second ML, it seems that "*the world is not quite ready for MaaS yet, although Turku city itself has created a fertile ground for its further development*." On national level, though, the 2017 Act on Transport Services contributed to the measure development as the creation of new service models and their market access is now part of Finnish legislation, better enabling the implementation of MaaS.

According to the stakeholder survey, half of the respondents saw political and strategic barriers as a potential hindrance the realisation of measure objectives. Financial barriers, such as price discrimination on tickets sold through the interface were considered a barrier by two respondents. One respondent expressed the concern that if tickets are more expensive sold via the interface than when bought through regular channels, the market would close entirely. Connecting the city bikes to a MaaS interface was considered a potential barrier as to use them one needs to be registered with the public transport operator Föli.

For measure **3.2.,** although not an issue during implementation, it is worth mentioning that an institutional barrier regarding tendering issues – or a lack of thereof with project partner Western Systems Ltd. – have since posed some hindrances to later measure process. The city legal department has considered the lack of official tendering for the data interface and platform an issue and discussions on the matter took place during the second reporting period.

According to the stakeholder survey, three out of the eight respondents considered technological and organizational barriers a potential hindrance for the realisation of measure objectives. One stakeholder mentioned that the data interface on part of the city bikes had not been fully thought through in the planning phase. Two respondents, respectively, considered political/strategic, institutional, problem or planning related issues as potential hindrances.

The above table demonstrates the variety of process barriers that occurred during the measure planning, implementation and demonstration To sum up, probably more so than any of the other Turku measures, TUR 3.1 was centered around a novel and highly complex issue, the processing of which was somewhat hampered by repetitive changes in measure leadership, an **organizational** barrier. **Problem related barriers** also prevailed for both measures due to the complexity of the issue at hand and the lack of joint view on roles, rules and responsibilities between public and private actors. It is worth noting here that views on these issues vary

greatly between the public and private MaaS parties. **Economic** barriers arose repeatedly throughout the project when talking with either party, however, as both accentuated that viable business models are yet to be defined for MaaS in cities. This is clearly the main barrier for the development of MaaS services and ecosystems, as well as the fact that private and public parties have differing views on who should be the one taking risks in business model development.

B.4 Drivers

The main drivers identified for this measure by the measure staff and stakeholders are identified in the table below.

No.	Driver field	Description	Action to make use of the driver
9	Financial	External (CIVITAS) funding	Some progress would probably have taken place without project impact in terms of MaaS development. However, project funding brought significant impetus to this work in Turku, particularly the stakeholder engagement that was realized with the scope of ECCENRTRIC.
7	Planning	Design of the measure and delineation of its contents: Strong leadership of SC.	Despite personnel changes measure has proceeded from the planning to implementation and demonstration phase.
7	Planning	Systematic nature of measure development	Regular meetings were held between parties to keep the issue under constant development. The fact that the public transport office has developed its own MaaS services instead of just offering a platform for them has served this development work well. In this way, offering MaaS services is part of the PT office's day-to-day work, which creates continuity for these issues.
6	Positional	MaaS is embedded in city spearhead projects.	Other projects in the city have supported the realization of the measure. MaaS problematics are thus continuously kept under discussion. The development of the laboratory area as a city spearhead project has created a positive background for MaaS development. During the project the MaaS concept, being a part of mobility development in the city, was also embedded in the new city spearhead project, Smart & Wise. The focus of MaaS development will thereby have a good base in the scope Smart & Wise.
	Legislative	Changes in national legislation came just at the right time to support MaaS development.	A strong driver for the measure has been the national legislative changes that were enforced in 2017. According to the Act on Transport Services, regardless of the mode of transport, a provider of passenger mobility services shall ensure that essential, up-to-date data on its services is freely available from an information system (open interface) in a standard, easy to edit, and computer-readable format. The Act brings together transport market legislation and creates the preconditions for digitalisation of

			transport and new business models. The Act thus provides an essential ground for setting up MaaS services and it is fair to say that MaaS development in Turku, or in Finland overall, would not have been possible without this legislative improvement. In many other countries, the MaaS actors define interface requirements case by case and there is no common requirements for e.g. data openness.
5	Communication & involvement	Promoting dialogue between relevant stakeholders	An important part of MaaS development has been the promotion of dialogue between relevant stakeholders throughout the project. This has clearly acted as a driver for the development of a MaaS ecosystem in the city.
8	Organizational	The readiness of the PT office to promote Maas	The public transport office in Turku had adequate resources, willingness and skill to develop MaaS in the city. These existed already prior to project start, which created good grounds for development. The staff remained the same throughout the project, which in its part served to ease long-term development. Also the fact that bureaucracy at the public transport office is rather moderate has made development work easier. This is in comparison to other city departments where, according to the ML and the PT office development manager, more complicated bureaucracy prevails. Being a complex issue to develop to begin with, it does help not to have many organizational or bureaucratic structures making it even more complicated.
10	Technological	Creating the data interface and platform for the city bikes enables integration of other services.	The MaaS data interface and platform developed to integrate the city bikes to PT will allow for other service to be integrated even if city bikes will no longer be available in the city – which is a possibility due to the fact that the current system will be set out to tendering once the three-year contract period with the current operator has ended. This is a highly valuable quality for the future development that the MaaS in the city and thus a strong driver for the measure.
10	Technological	Technological maturity	The implementation of changes to FÖLI Ticket sales system (adding bikes and API's) with open interfaces proceeded without technological hindrances.
10	Technological	Open data interface	The impact of the open data interface and platform developed in the measure has been nationally significant. The city of Turku has been a forerunner in the standardization of the system. The Turku model of has already been copied to other cities in Finland.

4	Problem related	The project served to alleviate risks related to MaaS implementation	The issue of risk-taking came up repeatedly both when discussing MaaS with public and private partners. The issue boils down to who should really be the one taking the risk in MaaS development – the private companies or the public actors? What sort of risks should be taken and who should bear them? There really were differing views about this, depending who you were talking with. It is clear that public transport cannot be built upon risk taking. Basic services need to be guaranteed. The project (external funding) served well to alleviate these risks for the public actor (PT office) and simultaneously brought visibility to mobility services as a concept.

Table 71: Identified drivers and planned/taken actions.

All in all, despite the hindrances caused by personnel changes and the consequent gaps in knowhow the measures proceeded with only minor delays. The strong leadership of the SC was certainly a significant driver throughout the process. In addition, there is a positive drive for MaaS development in various city departments. The measure is also supported by a city spearhead project focusing in the development of the laboratory area.

In accordance with the measure staff, four out of the eight the stakeholders identified political and strategic drivers as the most important facilitating factors for reaching measure 3.1. objectives. It was recognised that there is a clear ambition for MaaS development in the city. Three stakeholders also viewed technological developments as potential drivers for the measure.

According to the stakeholder survey for TUR 3.2., three out of the eight respondents considered technological drivers most significant for reaching the objectives of the measure. This was corroborated by the measure staff interviews, which showed that the planning and implementation of changes to FÖLI Ticket sales system has proceeded smoothly. Two out of the eight stakeholders also identified political/strategic issues as a potential drivers for reaching measure objectives. This was again reflected in measure staff interviews where a positive drive for the open data interface and platform development was recognised in the city organization (including the PT operator).

The above table demonstrates the variety of process drivers that served to facilitate planning, implementation and demonstration for both the measures. To sum up, it is clear that the **financial** driver of having CIVITAS funding brought significant impetus to MaaS promotion in Turku. Also the promotion of dialogue between relevant stakeholders is a process strongly driven by ECCENTRIC and thus an important **communication/involvement** related driver. **Organizational** drivers also promoted both measures particularly due to the readiness of the PT office to promote Maas – there were adequate resources, willingness and skill to develop MaaS in the city. The influence of the national **legislative** changes that were enforced in 2017 cannot be emphasized enough – the Act created an essential ground or preconditions for setting up MaaS services, a legislative framework that is nonexistent in most countries. **Technological** maturity and particular qualities of the data interface were a strong driver for TUR 3.2. – the way that the data interface and platform for the city bikes were created enables

integration of other services, setting a fertile technological ground for future MaaS endeavours in the city.

B5 Influence on risks

Out of the risks identified at the start of the project, the risk related to gaining a common view for further MaaS ecosystem development between public and private actors, including the assignment of roles and responsibilities of different operators, was still relevant at the end of the project. Although during project implementation there were several MaaS operators in Turku, it was still a risk that in the end, Turku is not appealing enough for MaaS operators, mainly due to the size of the city. The questionnaire to MaaS operators ended up reaching a sufficient number of respondents and enough economic data was gained. Although the measure reached its objective of having three MaaS operators in the laboratory area, the actual success of MaaS services remains to be seen. Overall, the novelty of the whole MaaS concept increased unforeseen risks for measure implementation. These risks would naturally be best mitigated with careful planning – however, in cases such as MaaS development where knowhow on the subject matter is scarce even on national level, careful planning has been easier said than done. All these are mostly beyond a single measure's influence in any case, which makes risk mitigation naturally somewhat challenging.

The stakeholders considered political/strategic (4/6 respondents) and planning-related issues (3/6 respondents) as most significant risks for reaching the measure objectives. No specifications were, however, given by the stakeholders on what these risks might entail.

Identified risk	Category	Mitigation actions	Responsible
Surveys to households/businesses may fail to reach enough respondents	7	Pre- information about the shortcoming survey, increase of awareness, small incentives	ML, LEM
MaaS operators may not be willing to answer to the survey	7	informing operators about the necessity to answer	ML
Lack of economic data	7	City council and operators should be well informed about the economic data needed	ML, SC
Turku is not appealing for MaaS operators	5	Larger cooperation with the Region, creating larger market possibilities	ML, SC
A common view for further MaaS ecosystem development is not reached between public and private actors.	1	Continuous attempts to find a common ground between different stakeholders is needed.	ML, SC
Legislation does not support MaaS development.	2	Careful planning of actions in order to best mitigate legislative pitfalls.	ML, SC
Lack of knowhow for MaaS development in the city.	7	Mitigating actions are difficult to find for this risk as there are not many MaaS experts even on national level.	ML, SC
MaaS system failure; integrated ticketing system cannot be established	7	Sufficient preparation pre-implementation for possible technical obstacles and challenges. Administration is well informed about the technical solutions and alternatives.	ML

Table 72: Reported period risk assessment.

C.Conclusions

The following section summarizes the main process findings and lessons learnt for measures TUR 3.1. and 3.2. Some process recommendations are also presented.

C.1 Main process findings

The measures succeeded in bringing about their main goals – the creation of a MaaS ecosystem and offering MaaS services in Turku, and the creation of a new open data interface and platform into which the ticketing system of the public transport system is incorporated, including the bike share system. Both measures' processes were, however, fraught with challenges ranging from differing views of development between the stakeholders, the lack of viable business models for MaaS, and the problems experienced with the technical integration of the city bikes to the PT system. It is however without question that both measure's efforts were highly valuable for MaaS promotion in the city and that without project impact similar developments would hardly have taken place. Based on the process evaluation, it however seems that the city and private MaaS operators do have ratker differing view son who should take risks in developing MaaS, and who should be responsible for operating MaaS services – and under which conditions.

C.2 Process lessons learnt

- One should actively try to alleviate the continued suspicion between public and private MaaS actors.
- As there are not many established models for MaaS ecosystems due to the novelty of the concept, continued emphasis needs to be placed on development and testing of cooperation models, in addition to mere technical development
- The complexity of MaaS calls for the continuous involvement of external and internal stakeholders. This is vital for the understanding of differing motivations, drivers and barriers that surround the issue and the various actors involved. Without continuous efforts on stakeholder involvement, it is unlikely that the technical, financial and governance-related issues surrounding MaaS can be solved satisfactorily to all parties relevant.
- The success of MaaS endeavours at this point seems to culminate in the public actor vs. private actor role/responsibility conundrum. This is an issue in most need of further research in addition to the business-case aspect from the consumer's point of view. It is critical that these two seemingly opposing sides do not see each other as having opposing interests. Therefore, emphasis needs to be placed on creating an environment of open communication and interaction where knowledge and ideas are shared for mutual benefit between all relevant parties.
- Further focus and strong efforts needs to be placed on creation and testing of MaaS business models in different contexts.

- TECH??

C.3 Process recommendations

Pilot business models and seek for funding

Be brave to try out different MaaS business models. Seek for external funding to alleviate risks. Combine pilots and launches of new services with efficient communicative measures.

Create regular and open communication between stakeholders

Cooperation between and involvement of different MaaS actors is crucial for making these services part of a city's mobility selection. Continued emphasis needs to be placed on development and testing of cooperation models, in addition to mere technical development.

Have a back-up plan in case of personnel changes

In a complex measure dealing with a multi-faceted issue such as MaaS, it is important that changes in measure leadership do not halt the development process. It is thereby important that a team of several persons leads such measures, or that at least the site coordinator is well aware of all relevant measure aspects to avoid loss of information, contacts or established cooperation models. This is a risk management strategy more than anything else – when dealing with complex issues placing too much emphasis on the role of one person is just too risky for continuity.

Try and find a common ground for the division of roles and responsibilities

Currently there are no established models for MaaS ecosystems and there are differing views on the roles for private and public actors – mostly depending on whether you ask the public or the private actor. This discussion, however controversial, on responsibilities and risks related is still very much necessary in order to develop a common understanding and a subsequent creation of commonly accepted business models. This aspect will be subject to more thorough discussion in the process evaluation report of these measures.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MUC 3.4

Beacon based indoor routing as a mobility service app

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
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	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

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29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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ECCENTRIC	Munich		
Measure code	**Measure name**		
03.04	**Beacon based indoor routing as a mobility service app**		
Last update	**Responsible**	**e-mail**	**telephone**
30.10.2019	Ruth Schawohl	schawohl.ruth@swm.de	+49 (0)89 / 2191-2017

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- Increased accessibility for all
- Better social inclusion and equal opportunity
- Increase in liveability

(2) Strategic level:

- Mode shift towards PT and away from private cars
- Increased convenience of using PT from target groups

(3) Measure level:

- Acceptance of the indoor routing app of the target groups
- Satisfaction with the indoor routing app of the target groups

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Acceptance of the indoor routing app of the target groups					X	X	X			
2	Satisfaction with the indoor routing app of the target groups					X	X	X			
3	Mode shift towards PT and away from private cars					X					
4	Increased convenience of using PT from target groups					X	X	X			

Table 73: Quantifiable impacts.

A.2 Measure description

This measure consists of developing a routing application for blind persons based on existing services of the local public transport corporation. This will be done by installing Bluetooth beacons that interact with users' handheld devices, providing needed information to facilitate the mobility of this target group within public transport stations.

The ultimate goal of this measure is to provide an inclusive, location-based application for navigation and information at a metro station (mezzanine floor) for all public transport users with focus on blind and visually impaired people. Moreover, the knowledge of processes of IoT at the public transport station and of accessible applications (Voice Over and handling) are seen as a main achievement. The expected effects with the development of the routing application are an increased awareness and acceptance of the tool. Based on the feedback from test persons and the experiences on the technical side, the application will be developed further for its wide use.

If successful, the wide use of this application by this target group could have an impact on the mode choice, and the corresponding reduction of VKT by car. More importantly the access to this option, gives blind people the opportunity of being mobile on their own (without assistance) and without necessarily using a car (or being driven).

A.2.1 Measure outputs

The measure will:

- Develop a smartphone application for indoor routing, targeted at blind people
- Equip the subway station *Münchner Freiheit* in Munich with the necessary Bluetooth hardware (~70 beacons in total)
- Test the app in situ with test participants recruited through respective associations of the target group

A.2.2 Supporting activities

There is a round table for technology by visually impaired people in Munich. It takes place on a monthly basis. Some stakeholders, which are involved in the measure MUC 3.4, took part at these meetings to better understand the needs of this target group. Attending the round table was a supporting activity in all respects.

A.2.3 Interactions with other ECCENTRIC measures

None

A.2.4 Interactions outside ECCENTRIC

None

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Name**	**Description**
Blind persons (5 – mobility impaired people)	The measure aims at persons with certain disabilities (blind).	"Münchner Freiheit"	Subway station in Munich

Table 74: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC project partners and other important actors

Main stakeholders are various departments of the public transport operator MVG, local authorities, and participants from the target group. In the following table, the stakeholders are summarized by function. See Evaluation Plan for all details.

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
1	MVG	P	PT	L	Measure Leader
2	Technical Authorities ("Technische Aufsichtsbehörde")	S	C	O	Responsible for permit to install beacons
3	Various MVG-departments (see Evaluation Plan for details)	S	PT	P/O	Many involved departments (planning, construction, marketing, IT, controlling, buildings, legal advice)
4	Test persons	S	Other	O	Test persons (blind/passengers)
5	Associations for people with disabilities (BBSB, Pfennig Parade)	S	NG	O	Consulting; recruitment of test persons
6	Retailers	S	PR	O	Local retailers in the demonstration area
7	Subway Advertising Agency	S	PR	O	broadcast advertisement to passengers
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					

Table 75: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Measure Progress Reports are not delivered on time	Planning	Standardized forms should be filled in instead	ML
Standardized forms are not filled in by the relevant stakeholders	Involvement	Measures leaders encourage stakeholders to do it	ML
Stakeholders are not ready to take part in interviews and/or workshops.	Involvement	Measure Leaders can send a letter or talk to them directly to explain the importance of their participation in the evaluation activities.	ML

Table 76: Risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning

Test installation of Bluetooth beacons was done and the basic functionality was shown through a test application on site (04/2017). The first Bluetooth beacons were installed at the mezzanine floor of the metro station *Münchner Freiheit* (Munich). The research and measure planning phase took about half a year (04/2017-09/2017).

Phase 2: Procurement and implementation

The selected beacons were procured and there was a total of 98 battery beacons installed at the mezzanine floor of the subway station *Münchner Freiheit*. The application prototype was finished in late 09/2017. There were mainly three important stakeholders part of the implementation phase: the ML (MVG), the subcontractor delivering the beacons soft- and hardware and the technical supervising authority which has to certificate the implementation.

Phase 3: Demonstration and monitoring

A first user test took place in the beginning of 2018. About 5 blind people were interviewed about their experience using the app to navigate through the subway station. After that first test, the application was adjusted and completed.

The beacon-based technology is set up with a communication to smartphone via Bluetooth. The Bluetooth beacons could not be precise enough with routing blind people for two reasons: the battery beacons were not reliable, because they discharge relatively quickly and the Bluetooth-technology in combination with the compass function on smartphones does not work accurate enough from the moment it is switched on. Hence, another technology had to be used to make the usage safer and more reliable. Because of the tests ran on the beacons, the 98 Bluetooth battery beacons were replaced by 70 power-based beacons that run on electricity. At the moment, the measure is on hold due to a technical problem: The compass-functionality of the smartphones, needed for the navigation, is not accurate. As a result, users have to walk a few meters first before the app can give correct directions. This is a non-tolerable safety issue for the target population. As long as no solution is found, the measure and all further testing is on hold.

However, new power-line-enabled beacons are installed. The measure leader is clarifying how the developed system can be re-used for other purposes, as it has been concluded that the existing technology is not suitable for the desired application for blind and visually impaired people. Furthermore, the possibility of integrating location based services for this target group in existing MVG Apps is under discussion.

B.2 Process evaluation activities

From the first users test, the LEM was invited to join the update meetings on site and was able to speak to the test users from the target population as well as the app developer. A close contact was held with the ML to exchange about the latest encountered barriers and drivers.

Standardized form surveys were used to get information about the roles, tasks and backgrounds of the various stakeholders, as well as their view on barriers, drivers, and risks of the measure. The online survey was spread to all applicable stakeholders with the help of the ML and reminders were used to maximise the response rate.

In a joint effort with other LEMs, a common survey framework was developed and operationalized with the open source survey tool "Limesurvey" (in the case of Munich).

After collecting general information about the stakeholder and its role in the project (job, tasks, contact information, and engagement in which phases (planning / implementation / operation / maintenance / others), we asked for opinions about barriers and drivers in a two-level-approach:

In a multiple choice set, stakeholders were asked to identify supporting thematic areas / sectors for the measure:

- Political / strategic
- Institutional
- Laws and regulations
- Cultural
- Problem-related
- Involvement / Communication
- Planning
- Organisation
- Financial
- Technological
- Spatial

In the next level, we asked for a detailed description of the drivers in detail as well as how these drivers were used to maximise the measure's impact.

Through this approach, we are able to identify both general supporting sectors, but also detailed, measure-specific information about drivers with a high level of information. Showing the full list of sectors first did also 'inspire' stakeholders to include all possible drivers they could find.

The same methodology was used to collect information about barriers.

The last block in the survey asked about risks of the measure. For each risk, we asked for an assessment about the likelihood as well as about the risk's potential to endanger the measure's success.

In total, five stakeholders from various involved parties participated in the survey. With the help of the new ML the sample was brought together, but there were only answers by employees of MVG. None of the associations or testers could be motivated to take part in the stakeholder survey. For that reason, the Detailed Process Evaluation (for PER 2) engaged in conducting interviews with other relevant stakeholders and conducting a workshop to find out more details about barriers and drivers.

To complement the information which is given through the stakeholder online survey, an emerging pattern of all stakeholders is mapped in a three-dimensional chart. All ML were asked about the perception where to locate themselves and other relevant stakeholders within the **stakeholder analysis matrix**. The objective of the stakeholder analysis is to engage

stakeholders in order to improve process and maximise impact. Each stakeholder is given a coordinate within the chart. The coordinate depends on the stakeholder's power potential (the bigger the bubble the higher the power potential), the interest (between low and high) and the ability to impact the measure (from low to high).

Figure 1 (p.372) shows the stakeholder analysis of the measure MUC 3.4. As the ML MVG - Münchner Verkehrsgesellschaft mbH (MVG) has the highest interest and ability to impact the measure, it is coordinated as the biggest bubble in the highest right corner. Another important stakeholder is the technical supervisory authority which is to be found with a medium power potential in the high left corner of the matrix. The technical supervisory authority takes care of the security in Munich's train / underground stations and verifies projects to be undertaken in their field of supervision. They have not the biggest interest in the project itself but want to fulfil general security obligations. Therefore, they have quite a high ability to impact the measure and can cause delays to the implementation of the project and its testing phase.

In the centre of the stakeholder matrix, likely on the upper area of impact ability and interest, there is the service supplier coordinated as being a subcontractor of MVG. They deliver hardware and software for the beacons and the wire. They play a central role in the developing process of the beacon based indoor navigation.

On the high-interest side of the matrix there are testers of the beacon app which give feedback to the ML MVG and there are associations such as the Pfennigparade foundation (association for persons with or without physical disabilities to facilitate an integrated life). They are informed by MVG about the program itself and presents a solid pool of testers for the beacon app. They do not have too much ability to influence the measure but their opinion is very important for the testing phase and the further development of the beacon indoor navigation.

Other methods added to the above described stakeholder online survey and stakeholder analysis to assess a more Detailed Process Evaluation, are:

- **Review of measure reports** as well as some informal observations from the Living Lab.
- Carrying out a **guided (expert-)interviews** with one representative of the measure's target group.
- Carrying out a **learning history workshop** with the ML and other relevant stakeholders.

Another method added to the online stakeholder survey and the stakeholder analysis is the **review of measure reports** taken into account for process evaluation.

Especially the **guided interview** with one of the visually impaired persons which took part at the testing of the installed beacons and the indoor navigation app helped to look deeper into the process and gives a helpful overview for the lessons-learnt part from user experience perspective. The interview questions are developed in cooperation with the ML and contain the following matters:

- General information about the current status of the measure status
- Thinking about the indoor navigation concept: positive thoughts and worries
- Explaining the whole process and developments from his/ her own viewpoint: drivers and barriers
- Lessons learnt through the process
- General thoughts on transport, mobility and environment

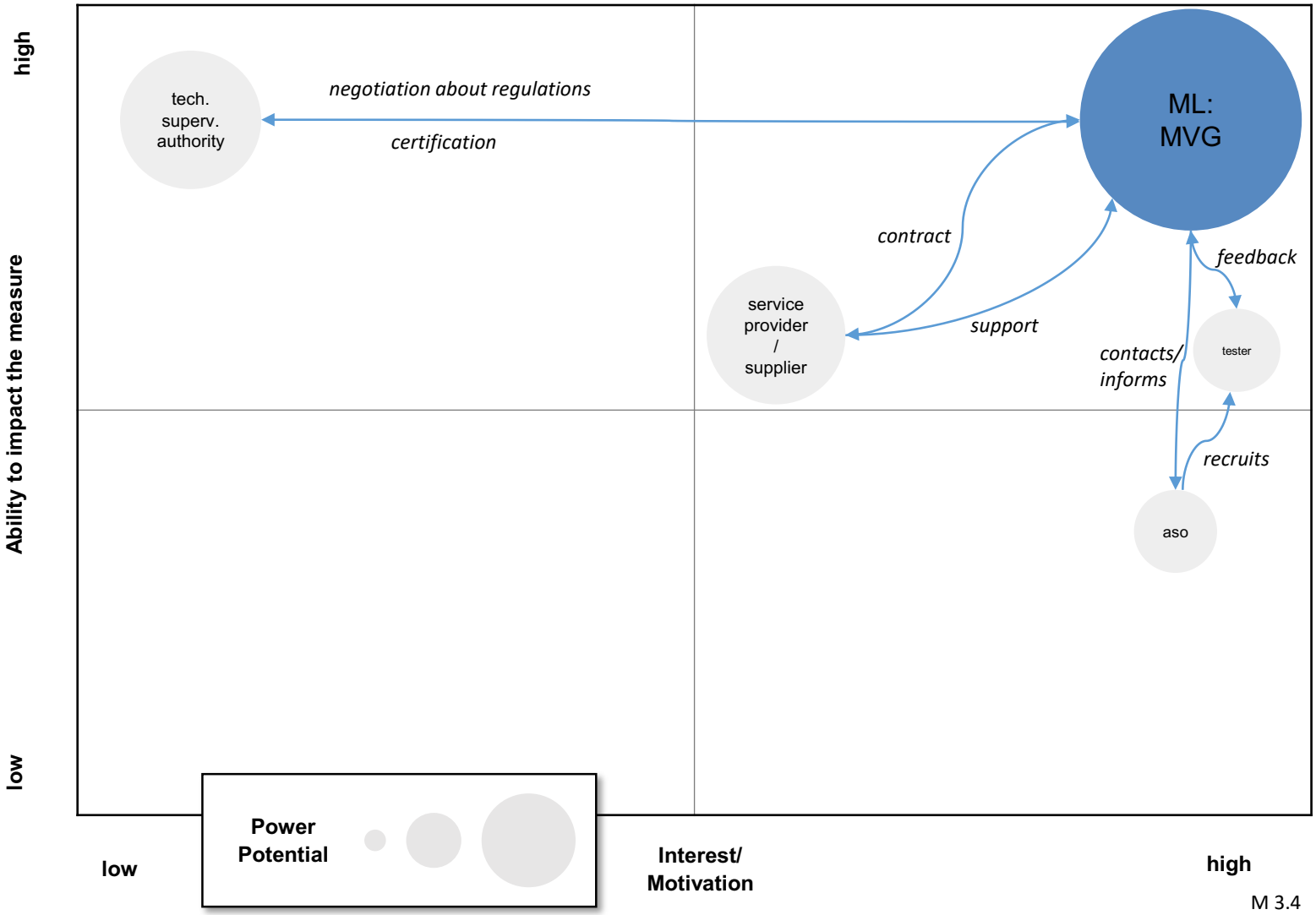

Figure 79: Stakeholder Analysis

The choice for executing a guided telephone interview was made because it is a simple method to gain deeper insights from an important stakeholder and to keep the time expenditure of the residents and the LEM on a low level. The results of the interview are to be found in section B.3 Barriers and B.4 Drivers.

The **Learning History workshop** is a method for evaluating the whole process of a measure ex post regarding its planning, implementation and operation performance. For this purpose, the stakeholders involved in the measure are invited to explain their experiences, regarding the applied strategies, the achieved results and what happened why, in chronological order. The aim is to learn from the actions and experiences of those involved and to draw conclusions that will be of added value for the planning of future projects.

The workshop was structured in the following steps[13]:

- Reconstruction of the measure process with timeline and milestones
- Milestone evaluation with defining barriers and drivers of the process
- Definition of “actions to overcome” the corresponding barriers and possibilities to make use out of the drivers
- Reflection of the results and concluding the experiences of the participants under “lessons learnt”

For this measure, the Learning History workshop was organized by the ML and LEM and conducted in a Skype for Business online meeting due to the nationwide restrictions for social distancing due to the COVDID-19 crisis. In total six persons were attending the online meeting. Besides the ML and LEM there were other stakeholders from the ML’s institution, the MVG: The firm’s representative for people with reduced mobility, two project engineers and someone working in the field of mobility research, especially responsible for the internal evaluation of the beacon-based indoor navigation. One of the employees had two roles in the project: he changed from a central supplier to the SWM/MVG. Therefore, he has a good inside of both point of views.

After introducing a rough timeline to the attendees, the ML started to go through the entire process while asking precise questions to get to the barriers and drivers, which occurred during the project lifetime. The most important barriers (see chapter 0) and drivers (see chapter **0**) of the process were identified and discussed. Also, the experiences, how barriers were overcome und drivers were used to foster the measure were discussed. Finally, the experiences of the participants were concluded under “lessons learnt”.

[13] Learning History Workshop was designed after “Refined CIVITAS process and impact evaluation framework”, 08/2017, see ANNEX 7 LEARNING HISTORY SESSIONS.

B.3 Barriers

The barriers are retrieved from several sources (source description see above):

- Stakeholder online survey (11/2018)
- Guided interview with a visually impaired person who tested the app (02/2020)
- Learning history workshop (03/2020)

The measure is a very technical one with an ambitious goal of enabling true indoor-navigation for visually impaired or blind persons. Thus, the safety standards are very high, so that problem-related barriers and technological ones can have a crucial impact on the measure's success. Also, the test environment, a subway station, is a highly complex building with lots of regulations, laws and involved parties, so coordination of the installation is a complex issue. This is reflected in institutional barriers as well as in laws and regulations. The measure team seems to have worked very well, as no organisational or planning-related barriers were reported.

Thus, the following multiple barrier fields have been identified (see Table 77):

No.	Barrier field	Description	Action to overcome the barrier
1	Institutional	Technical authorities did not permit the installation of beacons on the platform.	This decision had to be accepted, the focus was on providing routing in the other areas of the station building.
2	Institutional	Internal structures and hierarchies in the ML-institution are complex and a ML change took place.	Give the ML more power of decision or involve someone within a higher hierarchical position into the project right from the beginning.
3	Institutional	A change of ML took place in the middle of the project lifetime.	Those personnel changes often cannot be predicted. At the same time, it shows again, how important a transparent and good (digital) structure is.
4	Organisational	Manufacturers' promises could not be kept.	Further research for other best practices in field of beacon technology were made. Actual there is no other promising technology for an indoor navigation for blind people in such an area (mezzanine floor of metro station).
5	Planning	Preparing the requirement catalogue for the subcontractor was very time-consuming.	Take some time to write a comprehensive and detailed requirements catalogue to prevent too many reviews.
6	Cultural	Target group older than 60 years very critical towards new technologies.	Involve them into the process right from the beginning.
7	Technological	Battery-based beacons turned out to be not efficient to maintain.	The measure made a switch to cable-based power supply.
8	Technological	The compass functionality of the system is not working accurate enough.	The measure had to be suspended for further testing with the target population. The safety problem could not be solved.

Table 77: Identified barriers and planned/taken actions.

One **institutional** barrier was discovered rather soon, when the technical authorities did not permit to install Bluetooth beacons in the platform area. The reason can be found in impeding laws and regulations. Bluetooth beacons are prohibited in the track area, because of potential interference with railway operations and other technologies being available in the platform area. This discussion with the technical authorities was quiet time-consuming and

unfortunately, this was a final decision, which could not be challenged within the project lifetime. However, this does not affect indoor navigations in other areas of the station building. Another institutional barrier occurred on the side of the ML as he had to overcome complex structures and hierarchies in the own institution. Decision-making and approval processes were sometimes more difficult and protracted than expected (#2). To overcome this barrier, the ML could be given more power to make decision or to involve someone within a higher hierarchical position into the project right from the beginning. Another internal barrier occurred with the abrupt withdrawal of the first measure leader without having any overlap with the new one to guarantee a god induction phase (#3). Tacit knowledge about the process got lost and there was some time needed to process the latest tasks and problems together with all involved stakeholders.

From the **organizational** point of view, another barrier turned up on the part of the ML, especially when it comes to profound decision-making in the field of beacon technology. Furthermore, the ML had problems with the commitments of the technical subcontractor in technological questions (#4). Manufacturer promises could not be kept, because the beacon technology is not yet practiced a lot or even market-ready. The tests were needed to find this out.

From a **planning** point of view, involved stakeholders could have written down the system requirements for the subcontractor more detailed (#5). Rather write down requirements properly and create an extensive catalogue of requirements than having too many processing loops, which can be very time-consuming.

Whereas the motivation and engagement of the target group is rated as being very high in section 0 Drivers, there is still one obstacle to overcome when it is about Disabled Persons Advisory Committee (Behindertenbeirat) which mainly consists of people from older age and not having too much affinity for new technologies (#6). An early involvement of this group into the process could help to overcome this **cultural** barrier. On the other hand, there is a round table of blind and visually impaired people, which have more affinity to technology and therefore are a supportive group for the development of this measure MUC 3.4 (see driver #6).

In the following, the most fundamental barriers are presented which are all to be found in the field of **technological** aspects: First, the IT experts from the ML's institution could install battery beacons, which they already tested internally. These facilitated the initial implementation process as they could start attaching 15 of them in the mezzanine floor or Münchner Freiheit right away. When attaching them, they thought ahead by attaching them always close to a power supply (because battery beacons are to be switched to power beacons sooner or later). It turned out quiet quickly that this change from battery to power supply should be made because the maintenance and swapping of batteries caused high workload and malfunction of one beacon could cause severe security risks for the target group (#7). As of March 2019, this problem has been solved and new beacons are about to be installed. However, due to severe problems with the compass function of the app, testing of the app has been suspended for safety reasons (#8): The app is not able to identify the direction the user is looking at through the implemented technology. The actual compass in the device does not work indoors, as there are too many other influences on the measurement, e.g. masses of people moving in the station building. Only after a few meters of walking the app can use the real-time vector to predict the direction in which the user is walking. In the narrow surrounding

of a subway station, these few meters impose a high risk for blind or visually impaired users. They could be walking straight towards stairs, escalators, signposts, ticket machines, and many more barriers that are dangerous, so that the ML has decided that the testing of the app results in the conclusion that this attempt is not suitable for this specific use case. ML will build upon the high interest in the target group as well as on the well-working parts of the app and re-evaluate how these valuable findings can be made useful in other ways.

B.4 Drivers

The drivers are retrieved from the same sources as for the barriers (source description see above).

The most widely identified driver fields are *technological, financial, and organisational*. While we learned in the *barrier* section that the technology has some major problems, it is on the other hand the most important driver, as technological progress is enabling innovative concepts like this measure. *Involvement and Communication* has also had a positive impact on the beacon-project. From a political point of view, the measure seems to be in a neutral position, as this field was mentioned neither as a barrier, nor as a driver.

The drivers in detail are described in the following table:

No.	Driver field	Description	Action to make use of the driver
1	Institutional	The existing network in the ML's institution has helped to implement the measure.	The ML was able to contact and integrate the in-house technician and the MVG commissioner for mobility impaired persons in case of corresponding questions.
2	Institutional and spatial	Previous experience in testing beacons physically within the ML's institution.	Bluetooth beacons could be tested in an over ground environment to gain experience for an underground testing environment.
3	Institutional	Structures within the ML's institution facilitate the first step of beacon testing.	Attaching the beacons in the mezzanine floor of Münchner Freiheit was very easily and unbureaucratically.
4	Involvement / Communication	The measure team has been working together really well in order to make the most out of the measure.	A close cooperation was maintained, also between various departments within the PT provider.
5	Involvement / Communication	The target population is highly interested and supportive.	From the start, representatives e.g. from an association for blind people were involved in the measure's design and testing.
6	Involvement/ Communication	Close cooperation with a round table for technology led by blind and visually impaired people.	Close cooperation and being involved in several meetings brought up relevant topics and made more clear the requirements regarding a suitable beacon based indoor navigation.
7	Cultural	Impaired people with disabilities are really willed to adapt modern technologies	Use this target group as active test users of new implementations.
8	Planning	The in-house technician supported the measure from the beginning.	An own internal online Wiki has been set up, so information and knowledge about the project is shared
9	Technological	A new technology (Bluetooth based indoor navigation) could be tested in the field.	A lesson learnt: the susceptibility to errors and especially the accuracy of new technologies is a decisive factor for such a project.
10	Technological	Existing software could be used to set up the app.	No need to spend money or time on finding new solutions.

11	Spatial	The subway station *Münchner Freiheit* was equipped as test area.	Can serve as an test field for similar projects.
12	Financial	ECCENTRIC Funding	Without the help of ECCENTRIC, such an innovative measure would not have been implemented.

Table 78: Identified drivers and planned/taken actions.

The already existing network of the ML worked as an **institutional** driver for the implementation of the measure (#1). The ML was not only supported by experts working in the same company, but was also able to use the already existing network with contacts to the target group. Another big institutional driver can be found in fact that the MVG had some previous experience in testing this beacon technique. There were beacons installed and tested in the building (at one particular floor). This can also be seen as a **spatial** driver (#2) because the ML's institution resembles a very good experimentation zone. This over ground experiment is a very good starting point for the underground testing environment, which was build up for MUC 3.4. Furthermore, the installation and implementation of the beacons in the mezzanine floor of the station Münchner Freiheit was facilitated by the institutional structures and could be done without problems.

A good **communication** and working atmosphere within the institution of the ML led to a supportive and close cooperation of the different departments (#3). Furthermore, the target group was highly motivated and **communicative**, so that the ML had no problems with the cooperation (#5). To use the good contact to the target group of this measure MUC 3.4 right from the beginning was highly important to find out and to test several approaches. Especially developing the app accompanying the beacon technology and its functions were made in close cooperation with members of the Bavarian association for the blind and visually impaired (BBSB e.V.). During the testing phase, it became more and more important to rely on the experiences of the visually impaired, especially when it came to the accurate location finding function of the app. The visually impaired appreciated to be part of the testing phase and stated a total benefit for their daily life because they got to know the surroundings in the mezzanine floor at the station Münchner Freiheit even better. A round table of blind and visually impaired which meets on a monthly basis, was open to invite and give more information about necessary requirements such navigation projects should have and how such requirements could best be met (#6). This round table consists mainly of different age groups (but mainly young) and very technology affine people which made it relatively easy to find motivated testers for the beacon-test which took place in 05/2018. From MVG perspective, this close cooperation was not only beneficial for the beacon measure but also for other (future) projects, which address the needs of this target group.

Information about a big **cultural** driver was retrieved from one of the conducted interviews. A blind impaired test user of the indoor beacon navigation stated that guidance lines fixed to the floor of underground stations does not always help to the extent help would be needed because it does not tell what is to be expected at the end of the line. The app which is accompanying the indoor navigation via beacons would be a helpful addition to those fixed lines and the white stick. The interview showed that the target group of this measure MUC 3.4 is actually very keen on trying out new things and get more information through these kind of guidance apps, digital devices and technical innovations.

Regarding a smooth **planning** the in-house technician (IT Demand Manager) was very supportive as he created an own internal Wiki from the beginning. With this help, gained knowledge is documented and shared within the institution (#8). This is especially crucial if there are personnel changes during the project lifetime.

The testing of new **technology** in practice is always an opportunity for the corresponding stakeholders to see whether their developed solutions are working or not. In this case, unfortunately, the technology did not work as planned, but important conclusions can be learned as for which cases the technology can be applied (#9). A second helpful technological aspect is the fact that the navigation app did not have to be developed from scratch, though. One of the involved IT experts stated during the LHW that the beacon protocol is a standard one and it is easy to program an app. There was no need to buy another expensive software package and the app development could happen without any bigger barriers (#10). Another reasons for that can be found in the several other app examples which are already existing on the market, e.g. Blind Square, HERE or Google Indoor Maps.

Regarding one crucial **spatial** driver, the subway station Münchner Freiheit can be taken into account. The mezzanine floor of this station was equipped with the described beacons, thus it cannot only serve as a test field for MUC 3.4 but also for future projects with similar requirements (#11).

Regarding all ECCENTRIC measures, the EU **funding** is one of the biggest drivers because it allows the development of the app and the whole research process, including workshops with residents.

B.5 Influence on risks

Regarding the identified risks in section 0 (p.368), none of those occurred during the process. The target group was highly supportive at all times, right from the beginning. The group of blind and visually impaired was providing requirements for the app development and was very motivated to be part of the testing of the app in the station of Münchner Freiheit.

One other, more technical risk, which mainly influenced the measure, was not depicted beforehand.

At the moment, the measure's actual implementation for the public and further testing is on hold – the risk of being stuck with the existing technology is very high. On the other hand, the measure's goal of developing the app and testing the technology concept has been completed and the results can be re-used in other contexts.

C.Specific observations on the supporting activities in this reporting period

In section 0 (p.367) one main supporting activity is mentioned:

- The regular round table for technology by visually impaired people in Munich.

Looking back at the measures' development this supporting action had a positive impact on the process.

C.1 Quality of the Supporting Activities

No.	Supporting activity	Target group	Level of penetration	Score
1	Round table for technology by visually impaired people	Representatives of the group of visually impaired people in Munich, especially those who have a higher affinity towards (new) technology topics.	The round table takes place on a regular basis and every interested person can attend. The group of visually impaired people is happy and motivated to help introducing new technologies of routing and navigation in their daily life.	★★★
Score: ★ = Poor ★★ =Satisfactory ★★★ = Excellent				

Table 79: Quality of supporting activities

There is a round table existing run by blind and visually impaired people in Munich, which particularly deal with technology topics. This round table meets on a monthly basis and other interested citizens are welcome to join if there is any help or guidance needed regarding special project by this handicapped target group. This group consists of different age groups, but mostly young people, which show a high affinity towards this topic of innovative technology solutions. This makes it a excellent supporting activity for measure MUC 3.4 which targets this group of citizens working on the technology topic. The number of member of this round table is unknown.

C.2 Influence of the Supporting Activities on the implementation process

This round table being interested in technology measures has a high influence on the implementation process of the beacon-based indoor navigation at Münchner Freiheit because they give lots of information about their special requirements and how such a navigation app should be set up to meet the needs of blind and visually impaired. Their suggestions were directly included in the development process of the app. Therefore, this supporting activity can be rated with "★★★= Excellent".

C.3 Influence of the Supporting Activities on the impact of the measures

As there cannot be any bigger impact of MUC 3.4 be measured, there is no influence of the cooperative work with the round table to be observed on the impact. Therefore, there is no score for this supporting activity ("Score=O (None)).

C.4 Lessons learnt on the Supporting Activities

It was very helpful to have such good contact to the target group right from the beginning. Especially when it is about requirements and special needs, which should be met when developing a beacon-based indoor navigation system that is accompanied by an app. The round table was a good place to find a sufficient number of test users for the actual testing of the indoor routing app. This group of blind and visually impaired persons and their affinity towards new innovative technologies was motivated and likely to engage at different phases throughout the process. Other involved stakeholders, especially the ones responsible for the app set up felt welcome at this round table at any time.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

RUS 3.6

Mobile App and Internet portal for PT Process Evaluation Report

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Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
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13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
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21	**City of Turku**	Finland	TUR
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22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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List of Tables

Project	City		
ECCENTRIC	Ruse		
Measure code	**Measure name**		
3.6	Mobile App and Internet portal for PT		
Last update	**Responsible**	**e-mail**	**telephone**
25.02.2020	Lucia Ilieva	mail@csdcs.org	+359888871208

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- Increase the use of public transport.
- Decreased use of private cars. Encourage the different actors to embrace sustainable mobility habits leaving their cars on the peripheral parking and using PT.

(2) Strategic level:

- Decrease emissions from cars;
- Contribute to the social inclusion.

(3) Measure level:

- Mode shift towards PT and away from private cars;
- Satisfaction with the implemented measure.

A.1.1 Quantifiable impacts

Expected Impacts	Increase the use of PT Decrease the use of private cars and taxis Reduce the air pollution	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	20% decreased use of private cars in Druzhba	X									
2	20% increased use of PT in Druzhba	X					X	X			
3	10% decreased emissions from private cars and taxis		X								

Table 80. Quantifiable impacts

A.2 Measure description

The Mobility as a Service (MaaS) concept is very new to the City of Ruse. Currently, the only service related to MaaS is the developed internet portal and mobile app providing information about the public transport services in the city (such as timetables and route information of bus and trolleybus lines).

In this measure, the City of Ruse will develop an app that will support people in buying and validating public transport tickets, and also support them to navigate through the system, in general via mobile devices (smart phone/tablet). The mobile app shall be available for more than one smart operating system (Andriod or iOS, as a minimum), and shall ensure the distribution, sale, validation and checking of tickets in the PT vehicles operating across Ruse.

The electronic charging system shall be a combination of technical devices, a software application and a link to the PT Control and Management Centre in Ruse. The app's interface will provide information in Bulgarian and English.

Payment shall be made available through debit and/or credit cards. Cashless payment options shall also be available (Paypal, as a minimum). The mobile app will also enable the collection of user feedback in the form of a Passenger Assessment of the service 'charging and/or self-scanning via a mobile device'.

This measure is expected to increase the use of public transport by 10% and its reliability 15% in Ruse.

A.2.1 Measure outputs

- **Output 1** – Downloadable Mobile App
- **Output 2** – Increased use and reliability of PT

A.2.2 Supporting activities

	Type of supporting activity	Activity	Target group	Main objectives
1.	Promotion	Media publications, Municipal site announcements, outdoor advertising (tables and posters in the PT vehicles)	Druzhba citizens, youth, visitors, people working in the Ruse suburbs	• To raise the awareness about the new PT lines • To support the use of the new PT lines • To decrease the use of cars/taxis in Druzhba
2.	Promotion	Direct advertising (via dissemination of ECCENTRIC materials, direct meetings and discussions) – about 27 000 people.	PT-commuters – Druzhba citizens, youth, school students (aged 15-18)	• To persuade Druzhba citizens that they are not isolated and to popularize the MaaR (Mobility as a Right) concept among them; • To raise the awareness about the new PT lines • To support the use of the new PT lines

3.	Training	Seminars, workshops, mobility conferences, festivals and other events	Druzhba citizens, school children, disabled people, academia – auditory of 350-400 participants	• To persuade Druzhba citizens that they are not isolated and to popularize the MaaR (Mobility as a Right) concept among them; • To raise the awareness about the new PT lines • To support the use of the new PT lines
4.	Information	Media and non-media campaign (via social media, municipal site, the site of the National Coordinator on mobility and the SUMP focal point CSDCS, as well as via the Bulgarian SUMP network maintained by CSDCS	Large public of 140 000 Ruse citizens, transport professionals in Ruse and other cities, visitors of Ruse	• To raise the awareness about the night line as a component of sustainable mobility • To support the use of the new PT night service

Table 81. Supporting activities

A.2.3 Interactions with other ECCENTRIC measures

The implementation of this measure has interactions with all the CIVITAS ECCENTRIC measures Ruse:

- RUS 2.11 which aims at informing and promoting the new measure through training events and well targeted information campaign
- RUS 2.6 because visitors could leave their cars at the P&R station and travel to the city centre using the improved PT services.
- RUS 4.3 and 4.4, which envisage the construction of safe pedestrian infrastructure (enlightened safe crosswalks and sidewalks) thus facilitating the access to the PT stops in Druzhba.
- RUS 5.3: The mobile app shall provide information about the new PT scheme in Ruse when implemented.
- RUS 5.4: Achieving the goals of the new facility is also strongly reliant on the realisation of the measure 5.4 under which the public transport is enriched with a night line. The new night line will be included in the whole transport scheme of Ruse and in the future its timetable and itinerary might be extended.

A.2.4 Interactions outside ECCENTRIC

There will be an important interaction with the Ruse SUMP implemented in the moment outside of ECCENTRIC. The new mobile app will become a part of the Ruse transport system having

as a main goal to better serve the Ruse citizens with PT for decreasing the use of cars for short trips, as well as to achieve better social equity and inclusion.

A.3 Target groups and/or affected part of the city or region

Target groups			Affected area		
Type		comment	Type		comment
1	Ruse (including Druzhba residents)	140 000 (28 000 in Druzhba)	1	Ruse (including Druzhba residents)	140 000 (28 000 in Druzhba)
7	Visitors	10 000	7	Visitors	10 000
3	PT users	55 000	3	PT users	55 000
10	School-children and students	20 000	10	School-childrens and students	20 000

Table 82. Target groups or affected parties

A.4 Stakeholders: ECCENTRIC project partners and other important actors

In the following table, the stakeholders are summarized by function.

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
1	Municipality of Ruse	P	C	L	Project partner
2	Ruse PT Company	S	PT	P	PT provider
3	Ruse citizens	S	other	P	beneficiaries
4	Visitors of Ruse	S	other	P	beneficiaries

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

Table 83. Measure stakeholders

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Delay caused by problems with the legislation (approval needed by the State Agency for e-Government	Process	High-level communication with the state authority (from the part of the Mayor)	ECCENTRIC PM for Ruse Municipality
Lack of information and promotion of the mobile app	Process	Close cooperation with the communication manager	Nikolay Simeonov (ML) Lucia Ilieva (LEM)
App too complicated to be used by disadvantaged groups	Process	Results of the preliminary study of the target groups and adaptation of the software	Nikolay Simeonov (ML)

Table 84. Risks

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

So far, we have completed the following tasks related to the implementation of the measure:

Phase 1: Research and measure planning (100% implemented)

- Planning and research activities;
- Meetings with experts in the field;
- Defining the functionalities of the Mobile app (the app will provide functionalities for buying and validating PT tickets).

Initially, according to the ECCENTRIC GA Ruse had to develop a mobile app that would provide information about PT. However, Ruse Municipality received financing by another EU funded project and developed and implemented a mobile app and internet portal providing information about the existing public transport service in the city – timetables, routes, journey planning, etc. As a result, there was an amendment to the GA and the functionalities of the mobile app under ECCENTRIC were changed. In this context, the proposal of the Municipality was to provide a new mobile app offering functions for buying and validating tickets. Thus, the Municipality of Ruse would provide a very innovative service (new for the whole country) which is highly demanded by the citizens and will greatly improve the public transport service in the city.

- Disseminating the idea for the app among the local population during the training seminars and information events carried out in WP2 (measure 2.11) by CSDCS;
- Development of technical specifications.

Phase 2: Procurement and implementation (50% implemented)

This phase was delayed due to the legal requirements of the Bulgarian State agency for e-government. The measure is behind schedule due to several reasons:

- the amendment procedure of the GA for changing the functionalities of the mobile app took a lot of time;
- the procedure for coordinating the developed technical specifications for the procurement procedure with the State Agency for e-government is very slow;
- the new elected Local Government of Ruse wants to review the ToR of the measure and eventually update it.

The **Phase 3: Demonstration and monitoring** and the **Phase 4: Conclusions and recommendations** have not yet started.

B.2 Process evaluation activities

Evaluating the main study of the need for the mobile app and virtual information about the PT

To evaluate the measure process and to gain an understanding of the relevant barriers, drivers and risks related to the implementation of this measure, the study named "Collection and analysis of basic Information about the current stage of PT system in Ruse" was used by the evaluation team. This study was a part of the measure 5.3 performed in the period October-November 2018 by a subcontractor of the Ruse Municipality in close cooperation with CSDCS. In the frames of this analysis, the following activities were undertaken:

- Stakeholders' needs analysis;
- Review of the transport system's current situation.

The stakeholder survey was part of the basic process evaluation and was directed at a large selection of key stakeholders. The purpose of the survey was to establish power, interest, and impact of stakeholders in relation to each respective measure. The survey questions were focused on the most significant barriers, drivers and risks related to the development of new planning approaches and testing the possibilities brought by new technologies for interactive and participatory planning.

The stakeholders' survey was directed at a large selection of key stakeholders. The stakeholders' needs analysis was done by a desk research using:

- Qualitative methods - focus groups with totally 17 participants (10 representatives of NGOs and 7 of business entities), in-depth interviews with 4 public servants;
- Quantitative methods – public opinion poll of 700 respondents and experts' opinion.

The results of the study concerning this measure were as follows:

- Improvement the way PT passengers are served – 95%;
- Need for introduction of updated mobile app providing information for the timetables and routes of the PT and allowing purchasing and validating tickets in Bulgarian and English – 75%;
- Need for integrated monthly cards and daily tickets for both trolley and bus lines with possibility to purchasing them via smart phones and internet – 75%;
- Opening of urban Mobility centre – 41%

Evaluating of the process of coordination with the State Agency for e-Government

The administrative bodies in Bulgaria are obliged to provide the State Agency for e-Government with technical and functional specifications for conducting public procurement for development, upgrading or implementation of information systems or electronic services in order to receive verification of their compliance with the Bulgarian legislation. This process is very long and cumbersome.

The technical specifications should be drawn up in accordance with the statutory model and include specific technical parameters. There is a very complicated template for the technical specifications that the Agency obliges administrative bodies to use when applying for approval. The template alone (with no additional text for answers to the questions stated in it) consists of over 50 pages of questions concerning administrative, legal, financial and strictly technical aspects for the future development and integration of the app. Very often the municipal staff don't have enough capacity to fulfil it and have to use the support of external experts.

The Agency uses to take a long term to approve the technical specifications. If they contain any inconsistencies, the Agency should prescribe their removal. The administrative body should resubmit the revised ToR. In the event that the Agency determines that there are again inconsistencies, it shall issue a reasoned decision with refusal of approval.

B.3 Barriers

No.	Barrier field	Description	Action to overcome the barrier
1.	**Technical / Financial**	In order to develop correct technical specifications for such an application, the capacity of the public administration is not sufficient.	Work with external experts in the field is required. This consulting service requires supplementary funding that has to be included in the measure's budget.
2.	**Problem related**	It is necessary to obtain approval from the State authority regarding the idea for the development of a mobile app.	Public authorities should expect and include in their timetables longer periods for coordination and receiving acceptance of their technical specifications from the specific State Agency dealing with e-government before starting public procurement procedures.

Table 85. Identified barriers and planned/taken actions

B.4 Drivers

No.	Driver field	Description	Action to make use of the driver
1.	**Social/cultural**	It is very important to gather feedback from the citizens regarding the idea for the development of such an app	We have been working for better understanding and acceptance by the population for the need of such an application. Thus, we have the full support of the community, which would later lead to successful implementation of the measure.
2.	**Positional**	The measure concerned is part of the mobility measures in Ruse in the frames of their SUMP	Ruse is implementing its SUMP and the measure 3.6 contributes to the introduction of new soft mobility measures for locals and visitors.

Table 86. Identified drivers and planned/taken actions

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Lack of information from the State Agency	Process	Asking for support at ministerial level	ECCENTRIC PM in Ruse

Identified risk	Category	Mitigation actions	Responsible
App too complicated to be used by disadvantaged groups	Process	Elaboration of user-friendly application in close cooperation with stakeholders	Nikolay Simeonov (ML)

Table 87. Reported period risk assessment

C. Specific observations on the supporting activities in this reporting period

C.1 Quality of the Supporting Activities.

As supporting activities, we consider the provided information and promotion among the stakeholders. Their quality was high enough, because the research results have shown that 75% of the local population were informed about the measure and gave feedback with proposals for the new app.

C.2 Influence of the Supporting Activities on the implementation process

Ruse citizens were very active in sharing opinions about the new mobile app directly or via the municipal site. Many letters on paper were received by the Municipality. In general, the Bulgarian people are quite apathetic and disinterested in municipal initiative and rarely participate when the local government asks for their opinion. Luckily, it was not the case with the ECCENTRIC measures mainly thanks to the well-conceived information and advertising campaign.

C.3 Influence of the Supporting Activities on the impact of the measures

The measure was not implemented till present mainly due to political and problem related reasons (described above).

C.4 Lessons learnt on the Supporting Activities

Comprehensive Information and relevant promotion is always necessary when there is an introduction of new measures/concepts in the cities. For the new mobile app Ruse citizens had some experience with the existing virtual system but expected radical improvement and strongly supported the new initiative.

D. Conclusions

D.1 Main process findings

This measure was never implemented and probably will be a part of the new SUMP of Ruse that will be completed after the end of the project.

The promotion performed has shown that this mobile app is necessary and the people want it and need it, but due to political problems the process was very slow and lies beyond the project limits.

D.2 Process lesson learned

The main lesson learned was that even if the project team has the best experience and desire to implement the measures, finally everything is up to the national and local decision-makers.

D.3 Process recommendations

The only recommendation is before planning the measures to study the legal frame and when it is heavy to overcome, no need to plan such activities.

ECCENTRIC

RUS 4.3

Providing Secure Pedestrian Crosswalks

Process Evaluation Report

Deliverable No.:	8.2
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Full Title:	
Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistics in urban centres	
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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
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14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
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24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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Project	City		
ECCENTRIC	Ruse		
Measure code	**Measure name**		
4.3	Providing Secure Pedestrian Crosswalks		
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A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- Increase the share of walking in the modal split;
- Decrease the cases of accidents leading to injuries and fatalities;
- Increase the use of public transport from people with disabilities living in the district.

(2) Strategic level:

- Reduce road accidents with pedestrians.

(3) Measure level:

- Acceptance of the implemented measure in Ruse;
- Satisfaction with the implemented measure;
- Mode shift towards walking and cycling.

A.1.1 Quantifiable impacts

Expected Impacts	Decrease the number of road accidents involving pedestrians; Increase the share of walking and cycling in the modal split; Decreas the use of private cars and taxis in the region.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	10% decreased the number of road incidents with pedestrian in Druzhba			X				X			
2	10% increased share of walking in the modal split				X	X		X			
3	15% increased cycling in Druzhba		X			X		X			
4											
5											

Table 88. Quantifiable impacts

A.2 Measure description

The existing pedestrian crossings in Druzhba were not secure enough and presented a high risk for accidents, leading to injuries and fatalities. Most people with disabilities and elderly people did not walk on the streets or travel by PT around the city due to the lack of convenient infrastructure.

The key challenge for the implementation of this measure was to identify the most suitable locations for the new pedestrian crossings and to obtain the acceptance of the community for this. This has been achieved by carrying out an exhaustive analysis of the pedestrian infrastructure in Druzhba district and of the citizens' behaviour – their walking habits, preferred paths of movement around the district, points of interest, etc.

Finally, two crossings were selected. The first was situated at one of the main stops on "Gotse Delchev" boulevard, at the main entrance in Druzhba. The second pilot crosswalk connected the shopping area at the central Druzhba square with the biggest secondary school in Ruse.

Fig. 1. Chosen spot for new crosswalk at the Druzhba entrance

Fig. 2. Old crosswalk in front of the school

A.2.1 Measure outputs

- **Output 1** – Safe pilot infrastructure for pedestrians created in Druzhba at the two crossroads – at "Gotse Delchev" boulevard and at the main Druzhba square in front of the school "V. Levski";
- **Output 2** – Access to PT facilitated for disabled and elderly people

A.2.2 Supporting activities

	Type of supporting activity	Activity	Target group	Main objectives
1.	Promotion	Media and non-media campaign	Large public of 140 000 Ruse citizens via social media, municipal site), transport professionals (via the site of the National Coordinator on mobility and the SUMP focal point CSDCS, as well as via the SUMP BG network maintained by CSDCS)	• To raise the awareness about the safe walking infrastructure as a component of sustainable mobility • To support the use of the new crosswalks
2.	Promotion	Direct advertising (non-media campaign)	PT-commuters – Druzhba citizens, disabled people and school children (via dissemination of ECCENTRIC materials, direct meetings and discussions) – about 27 000 people.	• To raise the awareness about the safe walking infrastructure as a component of sustainable mobility • To support the use of the new crosswalks
3.	Training	Seminars and workshops	Druzhba citizens, school children, disabled people – auditory of about 200 participants	• To raise the awareness about the safe walking infrastructure as a component of sustainable mobility • To promote the road safety by using the new crosswalks

Table 89. Supporting activities

A.2.3 Interactions with other ECCENTRIC measures

Being situated in Druzhba, the successful implementation of this measure has interactions with the following CIVITAS ECCENTRIC measures in Ruse:

- RUS 2.11 which aims at informing and promoting the new measure through training events and well targeted information campaign;
- RUS 4.4, which envisages the construction of safe pavements leading to the city centre thus facilitating the walking in Druzhba together with the new crosswalks;
- RUS 5.3: Achieving the goals of the new facility is also strongly reliant on the realisation of the measure 5.3 under which the public transport (bus and trolleybus) lines in Druzhba will be reorganised in order to better serve the needs of residents, commuters and visitors of the city. The new safe crosswalks will facilitate the access of the disadvantaged groups (disabled, elderly people, mothers with children) to the PT stops;

- RUS 5.4: The safe access to the new PT-night line servicing Druzhba will be provided by the new enlightened crosswalks.

A.2.4 Interactions outside ECCENTRIC

There will be an important interaction with the Ruse SUMP implemented in the moment outside of ECCENTRIC. The pilot crosswalks in Druzhba are a part of the new Ruse transport and mobility infrastructure having as a main goal to increase the road safety and the share of walking in the Ruse modal split, as well as to facilitate the access to PT.

A.3 Target groups and/or affected part of the city or region

Target groups			Affected area		
Type		comment	Type		comment
1	Druzhba citizens	28 000	0	Ruse citizens	140 000
10	School children (Druzhba secondary schools, Leonardo da Vinci School)	1 000	10	Schools in Ruse	5 000
5	Disabled people	5 000	5	Disabled and elderly persons	5000

Table 90. Target groups or affected parties

A.4 Stakeholders: ECCENTRIC project partners and other important actors

Main stakeholders are participants from the target group. In the following table, the stakeholders are summarized by function.

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
1	Municipality of Ruse	P	C	L	Project partner
3	Druzhba citizens	S	other	P	beneficiaries
4	Schools in Druzhba	S	other	P	beneficiaries
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					

Table 91. Measure stakeholders

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Measure Progress Reports are not delivered on time	Process	Standardized forms should be filled in instead	Nikolay Simeonov(ML)
Delay in the construction due to the long process of public procurement	Process	The municipality makes efforts to speed up the process	Nikolay Simeonov(ML)
The quality of the enlightening elements is not good enough (easy to brake)	Process	The municipal Construction Control Unit asks the subcontractor to change the elements	Nikolay Simeonov(ML)

Table 92. Risks

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

The measure was delayed due to the long process of the public procurement required by the Bulgarian legislation. Two public procurements were prepared and launched – the first for the design of the safe crosswalks and the second – for the construction of the two pilot crosswalks in Druzhba. They were opened for use in October 2019 following the four project's stages of implementation.

During the "Research and planning phase" (01.12.2016 – 28.02.2018) the following activities were implemented:

- Planning and research activities on innovative solutions for securing pedestrian crossings.
- Meetings with experts in the field.
- Analysis of the crossings available in the district and research into best practice for improved designs with safety and security in mind.
- Identifying the best locations for implementation of the new pedestrian crossings – close to focal points of pedestrian traffic – shopping areas, schools, main roads and streets leading to the city centre.
- Dissemination of the measure idea in order to appraise citizens' reaction.
- Development of technical specifications (ToR) for the public procurement.

During the 2nd phase "Procurement and implementation" (01.03.2018 – 30.09.2019) the procurement procedure was launched and the subcontractor was selected. The construction of the infrastructure was completed by the end of September 2019.
The third phase "Demonstration and monitoring" started in October 2019. In several days it became evident that the durability of the ground lamps was not sufficient and some of them were broken by heavy vehicles. The subcontractor was asked to change the lighting with lamps of higher quality. It was performed in the night in order not to disturb the usage of the crosswalks.
Actually we are implementing the last Phase 4 "Conclusions and recommendations" by studying the impact of these safe crosswalks in Druzhba.

B.2 Process evaluation activities

Process of finding the most suitable locations:
The key challenge for the implementation of this measure was to identify the most suitable locations for the new pedestrian crossings and to obtain the acceptance of the community for this. To evaluate the measure process and to gain an understanding of the stakeholders' opinion about the measure, results from the study named "Collection and analysis of basic Information about the current stage of PT system in Ruse" was used. This study was performed in the period October-November 2018 by a subcontractor of the Ruse Municipality.

The stakeholders' survey was part of the basic process evaluation and was directed to a large selection of key stakeholders. The purpose of the survey was to establish power, interest, and impact of stakeholders in relation to each respective measure. The survey questions were focused on the most significant barriers, drivers and risks related to the development of new planning approaches and testing the possibilities brought by new technologies for interactive and participatory planning.

The stakeholders' needs analysis was done by a desk research; qualitative methods - focus groups with totally 17 participants (10 representatives of NGOs and 7 of business entities), in-depth interviews with 4 public servants; and quantitative methods – public opinion poll of 700 respondents and experts' opinion.
The results of the study concerning this measure are as follows:

- video control in vehicles and on streets – 75% approved

- increasing the number of safe crosswalks - 95% approved

Evaluating the process for obtaining the acceptance and approval by the local community:

This task was performed by CSDCS which has made several studies of citizens' opinion using different formats - face-to-face discussions during seminars, workshops, and other information events, phone interviews, dissemination of questionnaires, via social media, etc.

For the initial evaluation, we made a research in May/June 2017. The methodology for the selection of respondents was quota-based, with a sample size of 215 people randomly selected and evenly distributed in the three parts of Druzhba district (Druzhba 1, Druzhba 2 and Druzhba 3), which guaranteed its representativeness. Subjects of the survey were individuals from all age groups of 15 and over, i.e. people who actually use public transport services and could give an objective assessment of both the advantages and disadvantages they face in their daily lives. For this purpose, the following methods of registration of the information were used:

- direct group poll (participants in the citizens trainings) - 65 people;
- standard face-to-face interview - 150 people random selected in the three Druzhba neighbourhoods (respondents' panel).
- A supplementary group of 10 local leaders were interviewed orally by extended questionnaires (audio-registered conversations).

The final evaluation was made during the 4th phase of the measure by a survey made in the period 20.11.2019 - 20.12.2019 in Druzhba with the established 150 panel respondents. They were contacted by our interviewers face-to-face or by phone and answered to similar questions as in the initial survey made in May 2017 concerning their travel mode, their opinion and use of the new measures, implemented in Ruse, etc. For obtaining the same number of 215 respondents as for the baseline study, we conducted oral interviews (registered by smart phones) with 30 school children from "V.Levski" school in Druzhba, 20 pedestrians using the new crosswalks and 15 participants from Ruse during the 3rd ECCENTRIC Conference.

The results obtained from the 215 respondents have shown that only 14% (mainly young people) were aware about the sustainable mobility and the planned ECCENTRIC measures in Druzhba. In general, people were complaining of the quality of the crosswalks and didn't feel safe on the streets. The satisfaction with the existing crosswalks was very low (20%) according to the results from the initial survey made in May 2017. The survey made in Dec.2018 in the

Ruse schools among 70 children aged 11-13 has shown the same results - 73% of school children didn't feel safe when crossing the streets.

The results of the direct interviews of 20 participants in the seminar for the Union of Disabled People conducted in May 2019 clearly demonstrated the problem of the disadvantaged groups with the bad pedestrian infrastructure - 95% of the respondents were not satisfied with the existing crosswalks and didn't feel safe when crossing the streets or reaching the PT.

As a final result by the end of the 2nd phase of the project, CSDCS calculated the average satisfaction with the existing crosswalks of only 22% (78% dissatisfied). That is why **the acceptance** of the new measure (safe crosswalks) was high from the beginning and 75% of the interviewed people would accept them thinking that the new crosswalks will improve their safety and accessibility.

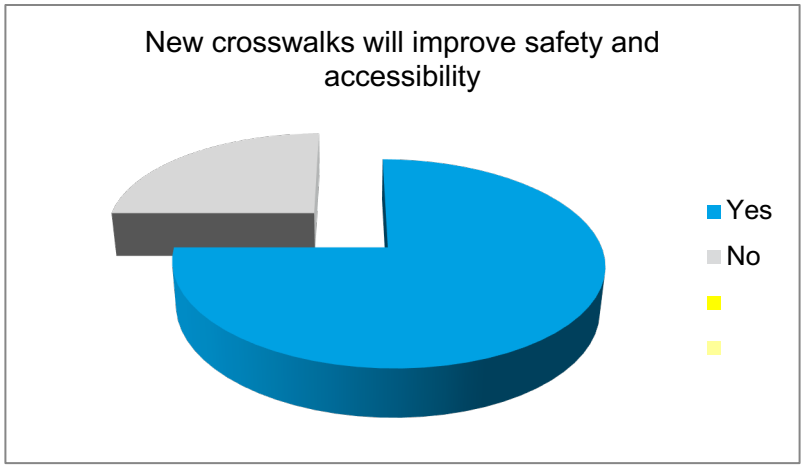

Fig. 3. New crosswalks will improve safety and accessibility

For evaluating the **Awareness, Acceptance, and Satisfaction of the measure after the 3rd phase**, CSDCS processed the data obtained from the 215 respondents from the panel and the results of the direct oral interviews. The awareness about the new crosswalks increased from 14% to 100%. The system usage was estimated to be 100% according to the observation of the usage of both new crosswalks (every pedestrian used them for crossing the streets).

The acceptance was 95%, because 5% wanted to have more similar crosswalks in Druzhba and didn't accept to have only two. We obtained the same results for the level of satisfaction. The group of disabled people estimated that with the new crosswalks the physical barriers for them decreased from 95% to only 30% and for them it would be easier to move outside, to cross the streets and to reach the PT stops in the district.

Evaluation of the process of design and construction

The designed pedestrian safety system was highly evaluated by the municipal transport experts because it would help reduce road traffic accidents on major boulevards and streets in Druzhba that were not regulated by traffic lights. The proposed pedestrian safety system consisted of the following essential elements: Light modules; Controller; Detection equipment; and Traffic signs. Three types of devices were used to activate the system: buttons, IR sensors and microwave sensors. At a certain distance before the crosswalk in both directions, road signs D17 "Pedestrian walkway" were installed and LEDs were added along the contour of the standard signs. These LEDs operated continuously in flashing mode.

The evaluation of the crosswalks' construction was made by the Construction supervision body. Several days after launching the crosswalks it became evident that the durability of the ground lamps was not sufficient and some of them were broken by heavy vehicles. The subcontractor was asked to change the lighting with lamps of higher quality. It was performed in the night in order not to disturb the usage of the crosswalks.

Evaluation of the promotion of the crosswalks

The measure was promoted by common efforts of the Ruse municipality and CSDCS. The Druzhba citizens, school children, disabled people (auditory of about 200 participants) were informed during the workshops and seminars conducted by CSDCS implementing measure 2.11. Locals were also informed by dissemination of the ECCENTRIC materials in their post boxes inviting them to use the new facilities, as well as via media publications, interviews and discussions with experts. The measure was promoted to all Ruse citizens via local media, social media and publication on the municipal site. The Mayor received a lot of letters asking to spread this measure all over the city.

B.3 Barriers

No.	Barrier field	Description	Action to overcome the barrier
1.	**Spatial**	To find the most convenient places in Druzhba for building the pilot crosswalks	Involving local citizens and infrastructure experts in the discussions. During the meetings with stakeholders many potential users participated - teachers, students, shoppers, civil society, disabled people, etc.
2.	**Financial**	The budget of the project is limited and the population	The project team together with the financial experts of the municipality prepared some

		wants to have much more safe crosswalks.	proposals for crosswalks to be implemented in the frames of the new Ruse SUMP.
3.	**Technologic**	Ground lamps installed on the crosswalk have to withstand the pressure of heavy vehicles.	The subcontractor was asked to change the initially installed lamps with more durable.

Table 93. Identified barriers and planned/taken actions

B.4 Drivers

No.	Driver field	Description	Action to make use of the driver
1.	Planning	Technical planning of the measure was carried out meticulously and with strong stakeholder involvement.	The crosswalks were designed using new technologies in order to increase the level of safety of pedestrians
2.	Organizational	The key personnel for planning the measure were highly committed to achieving the measure objectives.	The project team and the subcontractor prepared the design in a high professional way in order to keep the interest of the target groups and to provide best value for money.
3.	Positional	The measure concerned is part of the mobility measures in Ruse in the frames of their SUMP. Local population became very sensitive to transport and mobility issues and require accountability from the part of the municipality.	Ruse is implementing its SUMP and the measure 4.3 contributes to the introduction of new soft mobility measures for citizens. The Mayor and the project team permanently inform citizens about the measure progress and its benefits.

Table 94.Identified drivers and planned/taken actions

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Measure Progress Reports are not delivered on time	Process	Standardized forms should be filled in instead	Nikolay Simeonov (ML)
Delay in the construction due to the long PP-process and the winter period	Process	The municipality makes efforts to speed up the process and prepare the crosswalks by the end of the first semester of 2019.	Nikolay Simeonov (ML)
The facility not used by all the stakeholders	Process	Intensive awareness raising campaign, including short video-spots. Close cooperation with the communication manager	Nikolay Simeonov (ML)

Table 95. Reported period risk assessment

C. Conclusions

C.1 Main process findings

Local population became very sensitive to measure 4.3 and required permanent accountability from the part of the municipality concerning the construction of the new pedestrian infrastructure. The key personnel involved in planning the measure were highly committed to achieving the measure objectives. The project team and the subcontractor prepared the design in a high professional way in order to keep the interest of the target groups and to provide best value for money.

C.2 Process lessons learned

The technical planning of the measure was carried out meticulously and with strong stakeholder involvement which was crucial for the success. The crosswalks were designed using new technologies in order to increase the level of safety of pedestrians.

C.3 Process recommendations

We recommend on the further implementation of the safe crosswalks to use only materials and equipment of relevant quality in order to ensure the sustainability of the safe pedestrian system.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

RUS 4.4

Safe Sidewalks with cycling facilities towards the city centre

Process Evaluation Report

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Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistics in urban centres	
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Safe Sidewalks with cycling facilities towards the city centre	
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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
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	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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Project	City		
ECCENTRIC	Ruse		
Measure code	**Measure name**		
4.4	Safe Sidewalks with cycling facilities towards the city centre		
Last update	**Responsible**	**e-mail**	**telephone**
25.02.2020	Lucia Ilieva	mail@csdcs.org	+359888871208

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- Increase the share of walking/cycling in the modal split;
- Promote and implement sustainable, clean and energy efficient transport measures.

(2) Strategic level:

- Reduce road accidents with pedestrians and cyclists.

(3) Measure level:

- Acceptance of the implemented measure;
- Satisfaction with the implemented measure;
- Mode shift towards walking and cycling.

A.1.1 Quantifiable impacts

Expected Impacts	Increase the share of walking and cycling in the modal split; Decrease the number of accidents with pedestrians; Increase the use of PT by disabled people living in Druzhba	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	10% decreased the number of road incidents with pedestrian in Druzhba			X				X			
2	10% increased share of walking in the modal split				X	X		X			
3	15% increased cycling in Druzhba		X			X		X			
4	10% increase the use of PT by disabled people					X	X				

Table 96. Quantifiable impacts

A.2 Measure description

The poor state of the pavements (or footpaths) and cycling lanes in Ruse's Druzhba district generated a high risk of road accidents involving pedestrians and cyclists, as these often resulted in people opting for using roads when they headed towards the city centre. In the beginning of the project, the footpaths on both sides of the main roads, connecting Druzhba with the central areas of the city, were either incomplete or in a very bad state of disrepair, and were unsafe for walking or cycling.

After a research of good practice and innovative solutions on design of safe pavements (shared with cyclists), the project team decided to implement the measure in the central part of Druzhba. Pavements were constructed along parts of the main roads only, as this was a pilot case. The design of the safe sidewalks envisaged the introduction of tactile paving between the walking paths and the cycling lanes of the sidewalks so that conflicts between pedestrians (including blind people) and cyclists were prevented.

Special LED alley lighting was used along the pathway and the bicycle path of the new sidewalks. There is an intelligent system for monitoring and management of the lighting that allows the control of the intensity of the luminous flux during the different hours of the day. This energy efficient solution will decrease the electricity costs for the municipality and will ensure that all pedestrians and cyclists are clearly visible when walking/cycling on the sidewalks throughout the whole day.

A.2.1 Measure outputs

- **Output 1** – New sidewalks with facilities for disabled
- **Output 2** – New cycling paths on the sidewalks strengthening the use of bicycles in Druzhba

A.2.2 Supporting activities

	Type of supporting activity	Activity	Target group	Main objectives
1.	Promotion	Media and non-media campaign	Large public of 140 000 Ruse citizens (via social media and municipal site), transport professionals (via the site of the National Coordinator on mobility and the SUMP focal point CSDCS, as well as via the SUMP BG network maintained by CSDCS)	• To raise the awareness about the safe walking and cycling infrastructure as a component of sustainable mobility • To promote the cycling in Druzhba • To support the use of the new sidewalks
2.	Promotion	Direct advertising (non-media campaign	PT-commuters – Druzhba citizens, disabled people and school children (via dissemination of ECCENTRIC materials, direct meetings and discussions) – about 28 000 people.	• To raise the awareness about the safe walking and cycling infrastructure as a component of sustainable mobility • To promote the cycling in Druzhba • To support the use of the new sidewalks
3.	Training	Seminars and workshops	Druzhba citizens, school children, disabled people – auditory of 150-200 participants	• To promote the road safety by using the new sidewalks • To raise the awareness about the safe walking and cycling infrastructure as a component of sustainable mobility

Table 97. Supporting activities

A.2.3 Interactions with other ECCENTRIC measures

Being situated in Druzhba, the successful implementation of this measure has interactions with the following CIVITAS ECCENTRIC measures Ruse:

- RUS 2.11 which aims at informing and promoting the new measure through training events and well targeted information campaign
- RUS 4.3, which envisages the construction of safe crosswalks at the strategic crossing points in the district thus facilitating the walking and cycling in Druzhba
- RUS 5.3: Achieving the goals of the new facility is also strongly reliant on the realisation of the measure 5.3 under which the public transport (bus and trolleybus) lines in Druzhba will be reorganised in order to better serve the needs of residents, commuters and visitors of the city. The new safe sidewalks will facilitate the access of the disadvantaged groups (disabled, elderly people, mothers with children) to the PT stops
- RUS 5.4: The safe access to the new PT night line servicing Druzhba will be provided by the new enlightened sidewalks.

A.2.4 Interactions outside ECCENTRIC

There will be an important interaction with the Ruse SUMP implemented in the moment outside of ECCENTRIC. The pilot sidewalks in Druzhba are a part of the new Ruse transport and mobility infrastructure having as a main goal to increase the road safety and the share of walking and cycling in the Ruse modal split, as well as to facilitate the access to PT.

A.3 Target groups and/or affected part of the city or region

Target groups			Affected area		
Type		comment	Type		comment
1	Druzhba citizens	28 000	0	Ruse citizens	140 000
10	School children (Druzhba secondary schools, Leonardo da Vinci School)	1 000	10	Schools in Ruse	5 000
4	Cyclists	1500	4	Ruse cycling group	7000
5	Disabled people	5 000	5	Disabled and elderly persons	5000

Table 98. Target groups or affected parties

A.4 Stakeholders: ECCENTRIC project partners and other important actors

Main stakeholders are participants from the target group. In the following table, the stakeholders are summarized by function.

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
1	Municipality of Ruse	P	C	L	Project partner
3	Druzhba citizens	S	other	P	beneficiaries
4	Schools in Druzhba	S	other	P	beneficiaries
10	Cyclists' NGO	S	NG	P	beneficiaries
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					

Table 99. Measure stakeholders

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Measure Progress Reports are not delivered on time	Process	Standardized forms should be filled in instead	Nikola Kibritev (ML)
Delay in the construction due to the long public procurement process	Process	The municipality makes efforts for speed up the process	Nikola Kibritev (ML)
The facility not used by all the stakeholders	Process	Close cooperation with the communication manager	Nikola Kibritev (ML)

Table 100. Risks

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

The total length of the sidewalks designed under ECCENTRIC and planned to be constructed in Druzhba was of 1500 m. The implementation has been separated into 4 stages shown on the picture below. The first segment of 300 m was constructed in the frames of the ECCENTRIC project. The three remaining segments will be constructed in the frames of the Ruse SUMP.

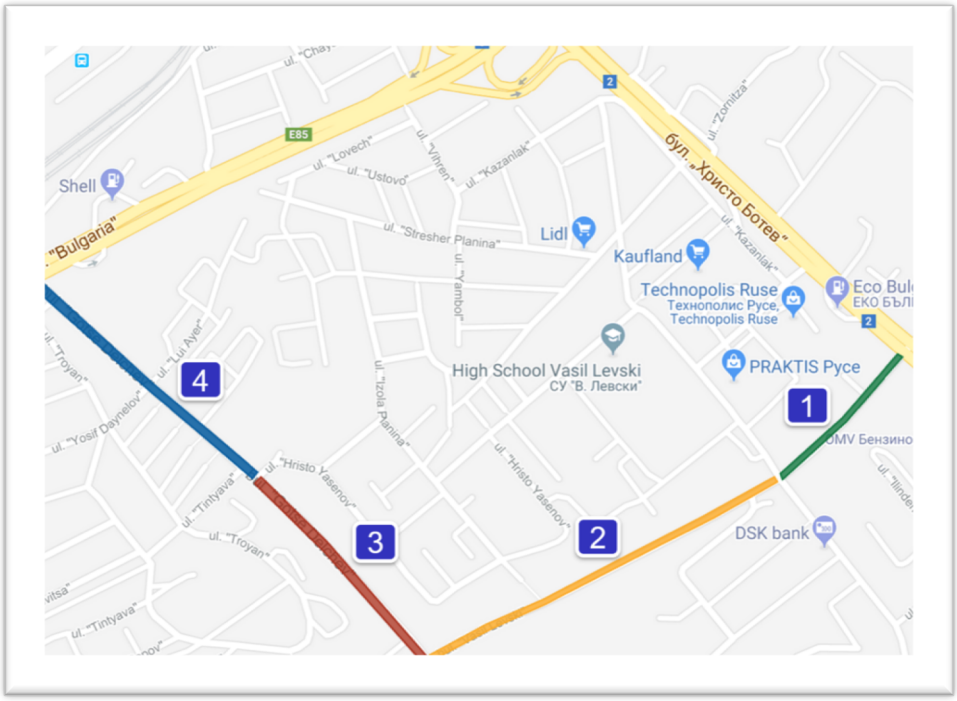

Fig. 4. Design of the sidewalks in Druzhba

The 300-meter pilot segment of the new sidewalk was opened in November 2019 following the four project's stages of implementation.

During the "Research and planning" phase (01.12.2016 – 28.02.2018) the following activities were implemented:

- Planning and research activities on innovative solutions for sidewalks with bike lanes.
- Meetings with experts in the field.
- Analysing the streets in the district for selecting the most convenient one leading from Druzhba to the city centre. Boul. "V.Levski" was selected as the most convenient way

used by the local population for reaching the city centre, the Druzhba commercial area and the secondary school “V.Levski” – the biggest in the country.

- Dissemination of the measure idea in order to appraise citizens’ reaction.
- Development of technical specifications (ToR) for the public procurement.

During the 2nd phase “Procurement and implementation” (01.03.2018 – 31.10.2019) the procurement procedures were launched and the subcontractors were selected. The construction of the first segment of the infrastructure was completed by the end of October 2019.

The third phase “Demonstration and monitoring” started in November 2019.

In January 2020 we are implementing the last Phase 4 “Conclusions and recommendations” by studying the impact of these sidewalks in Druzhba.

Fig. 5. The new sidewalk along “V.Levski” Boulevard

B.2 Process evaluation activities

Evaluation of the process of finding the most suitable locations:

The key challenge for the implementation of the measure was to identify the segments of pavements that would first be constructed as pilots in the district and to receive the acceptance of the community for this. To evaluate the measure process and to gain an understanding of the stakeholders' opinion about the measure, results from the study named "Collection and analysis of basic Information about the current stage of PT system in Ruse" was used. This study was performed in the period October-November 2018 by a subcontractor of the Ruse Municipality.

The stakeholders' survey was part of the basic process evaluation and was directed to a large selection of key stakeholders. The purpose of the survey was to establish power, interest, and impact of stakeholders in relation to each respective measure. The survey questions were focused on the most significant barriers, drivers and risks related to the development of new planning approaches and testing the possibilities brought by new technologies for interactive and participatory planning.

The stakeholders' needs analysis was done by: qualitative methods - focus groups with totally 17 participants (10 representatives of NGOs and 7 of business entities); in-depth interviews with 4 public servants; and quantitative methods – public opinion poll of 700 respondents and experts' opinion.

The results of the study concerning this measure are as follows:

- video control in vehicles and on streets – 75% approved
- renovating and building safe sidewalks – 95% approved
- enhancing the bicycle lanes' network and integrated it with the public transport - 45% approved

Evaluation of the process for obtaining the acceptance and approval by the local community:

This task was performed by CSDCS which has made several studies of citizens' opinion using different formats - face-to-face discussions during seminars, workshops, and other information events, phone interviews, dissemination of questionnaires, via social media, etc.

For the initial evaluation, we made a research in May/June 2017. The methodology for the selection of respondents was quota-based, with a sample size of 215 people randomly selected and evenly distributed in the three parts of Druzhba district (Druzhba 1, Druzhba 2 and Druzhba 3), which guaranteed its representativeness. Subjects of the survey were individuals from all age groups of 15 and over, i.e. people who actually use public transport services and could give an objective assessment of both the advantages and disadvantages

they face in their daily lives. For this purpose the following methods of registration of the information were used:

- direct group poll (participants in the citizens trainings) - 65 people;
- standard face-to-face interview - 150 people random selected in the three Druzhba neighbourhoods (respondents' panel).
- A supplementary group of 10 local leaders were interviewed orally by extended questionnaires (audio-registered conversations).

The final evaluation was made during the 4th phase of the measure by a survey made in the period 20.11.2019 - 20.12.2019 in Druzhba with the established 150 panel respondents. They were contacted by our interviewers face-to-face or by phone and answered to similar questions as in the initial survey made in May 2017 concerning their travel mode, their opinion and use of the new measures, implemented in Ruse, etc. For obtaining the same number of 215 respondents as for the baseline study, we conducted oral interviews (registered by smart phones) with 30 school children from "V.Levski" school in Druzhba, 20 pedestrians using the new sidewalks and 15 participants from Ruse during the 3rd ECCENTRIC Conference.

The results obtained from the 215 respondents show that already 76% of the local population use for their every-day trips PT, walking or cycling. It means that there is a shift to more sustainable way of moving. The initial percent of 73.5% increased with 2.5% and now the sustainable commuters are already 76%.

For evaluating the **Awareness, Acceptance, and Satisfaction**, we processed the data obtained from the 215 respondents from the panel and the results of the direct oral interviews. The awareness about the mobility measures implemented under ECCENTRIC and in particular about the new sidewalks increased from 14% to 100%. People were interested and followed strictly how the municipality was implementing the measures. Often the Mayor received calls from citizens asking about the development of the implementation process and resources spent. The acceptance was 95%, because 5% wanted to have more similar sidewalks in Druzhba and didn't accept to have only 300 m. We obtained the same results for the level of satisfaction.

The PT use increased also with 2% - from 49% to 51%. The walking increased with 1% from 19% to 20%. In general the trend is positive, although due to the late implementation of the technical measures in Ruse, they were in use only for a few months and couldn't influence

much the travel behaviour of the citizens although they were well informed about them and persuaded that they will increase their safety when moving.

Evaluation of the process of design and construction

The designed sidewalks were highly appreciated by the municipal transport experts because it would help reduce road traffic accidents on major boulevards and streets in Druzhba that didn't have pavements. The sidewalks were designed and constructed including modern elements that were not in use in Ruse till present. The pedestrian paths and the bike paths were separated by tactile paving. Special LED alley lighting was used along the pathway for pedestrians and the bicycle path of the new sidewalks. There was an intelligent system for monitoring and management of the lighting that allowed the control of the intensity of the luminous flux during the different hours of the day. This energy efficient solution would decrease the electricity costs for the municipality and would ensure that all pedestrians and cyclists were clearly visible when walking/cycling on the sidewalks throughout the whole day.

The new sidewalks were designed to be with smooth asphalt covering instead of tiles and to be wide enough to allow machine-based maintenance during winter. The evaluation of the sidewalks' construction was made by the Construction supervision body. They were approved and opened for use in the beginning of November.

Evaluation of the promotion of the sidewalks

The measure was promoted by common efforts of the Ruse municipality and CSDCS. The Druzhba citizens, school children, disabled people (auditory of about 200 participants) were informed during the workshops and seminars conducted by CSDCS implementing measure 2.11. Locals were also informed by dissemination of the ECCENTRIC materials in their post boxes inviting them to use the new facilities, as well as via media publications, interviews and discussions with experts. The measure was promoted to all Ruse citizens via local media, social media and publication on the municipal site. The Mayor received a lot of letters asking to spread this measure all over the city.

B.3 Barriers

No.	Barrier field	Description	Action to overcome the barrier
1.	**Spatial**	To find the most convenient places in Druzhba for building the pilot segment of sidewalks	Involving local citizens and infrastructure experts in the discussions. During the meetings with stakeholders many potential users participated - teachers, students, shoppers, civil society, disabled people, etc.

2.	**Financial**	The budget of the project is limited and the population wants to have much more similar sidewalks.	The project team together with the financial experts of the municipality prepared some proposals for sidewalks to be implemented in the frames of the new Ruse SUMP.

Table 101. Identified barriers and planned/taken actions

B.4 Drivers

No.	Driver field	Description	Action to make use of the driver
1.	Planning	Technical planning of the measure was carried out meticulously and with strong stakeholder involvement.	The crosswalks were designed at the most convenient places in the living lab, where there were the biggest flow of pedestrians including children and elderly people.
2.	Organizational	The key personnel in planning the measure were highly committed to achieving the measure objectives.	The project team and the subcontractor prepare the design in a high professional way in order to keep the interest of the target groups and to provide best value for money.
3.	Positional	The measure concerned is part of the mobility measures in Ruse in the frames of their SUMP	Ruse is implementing its SUMP and the measure 4.4 contributes to the introduction of new soft mobility measures for citizens.

Table 102. Identified drivers and planned/taken actions

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Measure Progress Reports are not delivered on time	Process	Standardized forms should be filled in instead	Nikolay Simeonov (ML)
Delay in the construction due to the long PP-process and the winter period	Process	The municipality makes efforts for speed up the process and prepare the sidewalks by May 2019.	Nikolay Simeonov (ML)
The facility is not used by all the stakeholders	Process	Intensive awareness raising campaign, including short video-spots. Close cooperation with the communication manager	Nikolay Simeonov (ML), Lucia Ilieva (LEM)

Table 103. Reported period risk assessment

C. Conclusions

C.1 Main process findings

Local population became very sensitive to measure 4.4 and required permanent accountability from the part of the municipality concerning the construction of the new pedestrian infrastructure. The key personnel involved in planning the measure were highly committed to achieving the measure objectives. The project team and the subcontractor prepared the design in a high professional way in order to keep the interest of the target groups and to provide best value for money.

C.2 Process lessons learned

The implementation of the measure was performed step-by-step. The pilot segment of the designed safe sidewalks in Druzhba is only the first phase of the transformation of the existing depreciated pedestrian infrastructure into safe facilities allowing the enlargement of the share of walking and cycling in the modal split of Druzhba / Ruse. This measure will be completed with 3 more segments in Druzhba. As a part of the SUMP it should be replicated all over the city.

C.3 Process recommendations

We recommend on the further implementation of the safe sidewalks to combine them with the safe crosswalks, as well as to continue using the covering material and equipment for the lights of relevant quality in order to ensure the sustainability of the safe pedestrian system.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

TUR 4.8

Easy, safe and comfortable cycling and walking round the year

Process Evaluation Report

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Full Title:	
Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistics in urban centres	
Grant Agreement No.:	690699
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Responsible Author(s):	
Annika Kunnasvirta	
Responsible Co-Author(s):	
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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
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19	Green City Projekt GmbH	Germany	GCP
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	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
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List of Co-authors

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Juha Jokela	

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Project	City		
ECCENTRIC	Turku		
Measure code	**Measure name**		
TUR 4.8.	**Easy, safe and comfortable cycling and walking around the year**		
Last update	**Responsible**	**e-mail**	**telephone**
28.8.2020	Juha Jokela	juha.jokela@turku.fi	+35840838 9014

A. Introduction

A.1 Expected results of the measure

The measure objectives were:

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

In long term, the goal of the measure was to promote cycling and walking as a lifestyle and thereby increase the modal split of sustainable travel modes. Improving the safety of walking and cycling in the wintertime was one of the main methods to increase the modal share of both modes of transport.

(2) Strategic level:

On the strategic level, the measure aimed to develop the city's winter maintenance methods and to use the funds available more cost-efficiently with prioritized network and efficient methods.

(3) Measure level:

The objective of this measure was to increase the year-round traffic flows of cycling and walking by making the current infrastructure easier, safer and more comfortable to use. The measure piloted an alternative winter maintenance method on a 12-kilometer pilot route during winters 2017/2018 and 2018/2019.

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Liveability	Competitiveness	Efficiency of urban freight	Local economy
1	The number of winter cyclist rises by 30% and full year cyclist amounts rise by 15% by 2020 compared to 2016	x			x	x					

Table 104: Quantifiable impacts.

A.2 Measure description

During the winter months, cycling in Turku drops significantly. It only reaches about 20-25% of the cycling levels during the summer months. Increasing winter cycling rates through better maintenance of cycling routes/paths, combined with information campaigns, was to offer good potential for improving the modal split.

The objective of this measure was to increase the year-round traffic flows of cycling and walking by making the current infrastructure easier, safer and more comfortable to use. Especially the winter provides great potential for increasing cycling. Therefore, a study on available winter maintenance methods was to be performed. After the study, the winter

method(s) that show the greatest potential were to be piloted. Also, a study of the condition of the main cycle network was to be performed, leading to a renewal plan and infrastructure improvements.

A.2.1 Measure outputs

During ECCENTRIC, a winter cycling pilot route testing an alternative winter maintenance method was to be realised.

A.2.2 Supporting activities

No supporting activities were identified for this measure.

A.2.3 Interactions with other ECCENTRIC measures

The measure was to entail a replication task of STO 4.5. “Policy for re-routing cyclists during construction work”, i.e. testing different safety measure in bicycle and pedestrian routes by construction sites. Measures TUR 2.2 “City District / Urban Corridor Case as a Pilot for Sustainable Urban Mobility” and TUR 5.5. “Bike-sharing and Car-sharing Schemes” both were to benefit from the information derived from the cycling barometer. The winter cycling pilot route was also to be promoted within the laboratory area in TUR 2.2.

A.2.4 Interactions outside ECCENTRIC

References from Best Practices gathered from Helsinki, Stockholm and Linköping.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
1	Residents		Turku city
4	Cycle / walking groups		Turku city
6	Commuters		Turku city
9	General public		Turku city

Table 105: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
1	City of Turku	P	C	L	Measure coordinator
2	Regional Council of Southwest Finland	P	Other	O	Partner
3	Tampere University of Technology	S	KI	O	Info provider

4	City of Helsinki	S	C	O	Advisory stakeholder
5	Swedish National Road and Transport Research Institute	S	KI	O	Info provider
6	WSP Finland	S	PR	O	Advisory stakeholder
7	Kuntec Ltd	S	PR	O	Developer
8	Kekkilä Ltd	S	PR	O	Manufacturer
9	Seab	S	PR	O	Manufacturer
10	City of Oulu	S	C	O	Advisory stakeholder
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					

Table 106: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Risks related to the technical realisation of automatic data calculators	Planning	The proper functioning of automatic traffic calculators should be verified via control calculations by hand.	ML
Data for number of incidents/fatalities/seriously injured may be subject to bias as not all incidents are reported.	Planning	The quality of data should be guaranteed via triangulation of methods to ensure reliability. Information will therefore be gathered from various sources.	ML/LEM

Table 107: Identified risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning milestones (100 % completed)

Research and planning of the measure began in September 2016 and were completed in April 2017. The following activities were carried out:

- A Master of Science graduate was recruited to the project to study and contribute to the winter cycling conditions. A master's thesis was to be published in May 2018 concerning the winter cycling test route in Turku. M1-M2
- A cycling barometer study was planned, carried out and analyzed. The goal of the barometer was to review the attitudes of the residents of Turku regarding the promotion of cycling and the opinions of residents who cycle regarding winter cycling conditions and the quality of cycling in Turku. M1-M8
- Gathering of best practices took place by the thesis worker. This included meetings with relevant parties in the city, technical visits to other cities, interviews with experts and a literary review to investigate winter maintenance methods to be tested. Based on this process, sweep salting was chosen as the maintenance method for the winter cycling test route. Detailed planning, verifying the test route and preparing the tendering started. M3-M8
- Study tour to the city of Helsinki, VTI Linköping and the city of Stockholm took place. The purpose was to become acquainted with the cities' winter maintenance methods and hear about their important practical experiences and to get advice for the Turku pilot. M5

Phases 2: Procurement and implementation (100 % completed)

Procurement and implementation of the measure began in May 2017 and were completed in September 2017. It was decided that the pilot route maintenance would be tendered separately from the area-based business-as-usual street maintenance tenders. The method chosen for the pilot, sweep salting, is a method based on first brushing the snow off the route with special machinery and then salting the route to prevent slipperiness. The method prevents packed snow from forming to the surface, which is one of its greatest benefits as the softening, rutting and re-freezing of packed snow can lead to dangerous road conditions.

The following main activities were carried out during this phase:

- A tender was made for subcontracting the maintenance for a pilot in a 12 km cycle lane for 2 + 2 years. This process included market discussions with contractors, route check-ups and repairing, procurement documentations and tendering of the route. The agreement was concluded for 2 + 2 years and it applies to the test route that has been separated from the other contract areas. M9-M13

- Kuntec Ltd. was chose as the contractor. Contract documents were prepared and plans for the implementation of the seep salting were made with the contactor. M12
- Procurement of friction measurement for the winter route. M13
- Co-operation with the local cyclists' association TURPO was established for the purpose of gathering systematic feedback on the test route for the winter 2017/2018. The Turku city Cyclists` Association (Turun Polkupyöräilijät ry, TURPO) is an NGO whose main objective is to promote and support cycling and cycling culture in Turku and its surrounding areas. A contract was made with TURPO to provide regular and systematic feedback on the pilot route. As experts of Turku winter cycling conditions, TURPO members possess information on alternative road maintenance methods to make informed judgments on the feasibility of the selected pilot method. For the purpose of identifying the feedback to specific parts of the route, the route was divided into 17 parts. The quality of the route was to be estimated using a scale from 1 to 5. The assessment was to be based on the sense of security. The test group received a personalized link to the city feedback portal. Altogether 24 persons were recruited to give feedback. A guidance session was arranged for the TURPO members prior to the pilot phase.
- The pilot route was first sketched out even before the method was chosen. The 12km route was eventually chosen based on cyclist numbers, certain locations and densely populated areas along the route (e.g. the universities), its potential for the maintenance method and also the fact that it would reach the ECCENTRIC laboratory area in parts. It was discovered in the cycling barometer that Turku residents mostly cycle to work or study – hence the test route was to connect some of the main work or studying locations. The route condition was mapped prior to the pilot and some repairs made e.g. to the pavement surface in parts to allow for successful prevention of slipperiness. The route is presented below.

Phase 3: Demonstration and monitoring (100% completed)

The demonstration and monitoring phase started in October 2017 and ran until the end of May 2019. During this phase the winter maintenance pilot was repeated twice (winters 2017/2018 and 2018/2019). Regular communication took place between the contractor and the Turku city staff on the proceeding of the pilot. The following main activities were carried out during this phase:

- Planning the communication of the test route and implementation of the plans M14-M20
    - Information campaign with sign posts on the streets (between 15.10.-15.5. on both test winters), news, media coverage and event on winter cycling (2.11.2017).
- Feedback process M14-M32
    - Collection of experiences from the route both through specific feedback givers and through general city feedback. This included planning of the feedback collection, co-operation with TURPO and replies to the feedback.
    - Examination and measuring cycle paths' condition through the pilot process. Friction measurements were carried out on the pilot route during the first test winter. A report was devised on the first year and second year experiences.

    - Keeping track of the feedback given from the winter cycling test route and communicating with the contractor if changes needed to be done.
- Temporary traffic arrangement on pavements and cycle paths (replication of STO 4.5.) M16-M26
    - Gathering of information on guiding pedestrians and cyclists during temporary construction works.
    - Collection of best practices, documenting current usage, discussions with construction companies, gathering of the experiences from measure STO 4.5.
    - Summarizing the best practices and methods regarding temporary traffic arrangements on pavements and cycle paths for the contractors, subscribers and supervisors. A bachelor's thesis summarizes the lessons learnt.
    - A short test period with temporary light fences was carried out during Spring 2019. It was based on the idea that the construction site takes care of moving the fences to the new site. This turned out to be too time consuming and was not well taken by the providers.
- Plan for the improvement of the pedestrian and cyclists measurement points in Turku M20-M38
    - Mapping the current situation, existing gaps, a plan for testing new measurement equipment, procurements.
    - The focus was put on opening the data on the existing measuring points and improving the use of it. This led to the development of a holistic mobility data platform into which existing and new measurement points will be incorporated in the future.

Phases 4: Conclusions and recommendations (90% completed)

Conclusions and recommendations of this measure commenced in June 2019 and were to be completed in August 2020. At the time of writing the winter cycling pilot was in its third year of operation as the option for two extra years was realized. At this point, some preliminary conclusions could be made about measure learnings, divided into measure phases:

Research & planning:

- The costs of sweep salting and different de-icing chemicals are multiple compared with traditional winter maintenance methods. This naturally has an impact on decision making.
- The cycle paths' physical circumstances, such as the surfacing material and the condition of it, have an impact on the choice of the method and planning of the test route.
- With sweep salting, the first years are always a learning process as the planning is demanding and surprisingly many details need to be taken into account.

- Successful use of sweep salting requires good cooperation between many quarters. Fluent and frequent communication and a smooth flow of information within the team and with the city is important.
- The analysis of the current temporary traffic arrangement on pavements and cycle paths resulted in the conclusion that further work is needed for developing guidance during temporary construction works and events.
- The analysis of the pedestrian and cyclist data led to a larger process that will lead to an online data platform development.

Procurement & Implementation

- Fluent flow of the information is a key to the efficient working of a maintenance pilot.
- Enough time should be left for preparing between tendering and implementation.
- Enough room for development should be ensured in the contract, and the parties should be prepared to do so also during the contract period.
- Real-time data is needed on the route and the method used in the procurement, enabling route maintenance information to be shown for the users.

Demonstration & Monitoring

- The developed method works in practice in Turku.
- Exceptionally positive feedback was received from stakeholders, cyclists and pedestrians on the pilot

B.2 Process evaluation activities

The measure leader and other staff have carefully recorded and analysed the measure design, implementation and demonstration processes.

To evaluate the measure process and to gain an understanding of the relevant barriers, drivers and risks related the following activities were undertaken.

An online survey was sent to TUR 4.8. stakeholders, requesting them to identify supporting thematic areas / sectors for the measure among the following categories:

- Political / strategic
- Institutional
- Laws and regulations
- Cultural
- Problem-related
- Involvement / Communication
- Planning
- Organisation
- Financial
- Technological
- Spatial

The stakeholder survey was part of the basic process evaluation and was directed at a large selection of key stakeholders as listed in cooperation with the Turku Site Coordinator. The purpose of the online survey was thus to establish power, interest, and impact of stakeholders in relation to each respective measure. The survey questions were centred around the most significant barriers, drivers and risks related to increasing the year-round flows of cycling and walking in the city of Turku.

Thirteen stakeholders responded to the survey: a senior inspector at the Finnish Tax Administration, a transport consultant, a sustainable mobility specialist at Valonia (RCSWF), the Chief Specialist at the Finnish Cyclists' Federation, a traffic planning engineer from the city of Turku, a representative of a sharing economy platform, the chief of maintenance at the city of Oulu, a transport systems expert at the Centre for Economic Development, Transport and the Environment, the chief of traffic systems at Centre for Economic Development, Transport and the Environment, a project worker at the city of Turku, a senior planner at the Regional Council of Southwest Finland, a project manager at Turku University of Applied Sciences and the ML himself.

Overall, the response rate was rather satisfactory and the variety of respondents in terms of professional background adequate. More responses would have been welcomed from knowledge institutions that were consulted during the preparation of the winter cycling pilot, as well as companies in the field of the infrastructure maintenance. These companies will however be personally addressed at PER 2 stage as this measure has been selected for detailed evaluation.

When inquired about the main potential benefits of the measure, the reduction of emissions/noise/energy consumption was considered very important by 11 respondents and somewhat important by two respondents. The increase of transport safety was also regarded very important by 12 respondents and somewhat important by one respondent. Another clear

potential benefit from the measure according to the stakeholders was the increase of liveability, as 11 respondents rated it very important and two as somewhat important. In addition, nine respondents considered the increased satisfaction of the citizens in the transport system as very important and four respondents as somewhat important.

Six out of twelve stakeholders rated the impact of the measure on their organisation to be potentially somewhat positive and four respondents as very positive. One respondent rated the impact as somewhat negative and one as neither negative nor positive.

When asked about the potential influence of each respondent's company or organisation on the measure objective, four out of the twelve respondents viewed their influence as great. Three respondents considered they had a very great influence on the objective and three respondents that they had some influence on the measure. One respondent considered they had little influence on the measure, and one that they had very little influence. When considering the influence of each respondent from an objective perspective, hardly any discrepancies arise when compared to the subjective evaluation of influence – it seems that the subjective and objective assessments of influence concur to a great extent. Quite interestingly, the only underestimations of influence are found within the project staff as two out of the three people employed in the measure (the ML included) have assessed their influence to be lower than the objective estimation of influence.

One stakeholder, the representative of a sharing economy platform, estimated he had very great influence on the measure (along with many of the other Turku measures). This was an interesting observation and was discussed with the Site Coordinator, who stated that this stakeholder has actively participated in the planning and implementation events of some of the measures, however not in ones related to this measure. Without further investigation, it is difficult to estimate the reasons behind this clear overestimation of influence.

Nine respondents expressed an interest in the planning phase of the measure, one respondent in the implementation, one in operation and on in the maintenance phase.

Although the participation rate from stakeholders was somewhat adequate and most of the key stakeholders were reached, one can always hope for a better response rate and representativeness. It should however be emphasized that **in-depth interviews** were conducted with the ML, the SC and the project worker who designed the winter cycling pilot route and was responsible for its implementation throughout the project to obtain a thorough understanding of the process. The measure has clearly benefitted from having adequate personnel as the project worker, a Master of Sciences graduate, was employed to do her **thesis** on the winter cycling pilot and was thus able to focus fully on the detailed planning, benchmarking and implementation of the pilot. Measure staff has thoroughly analysed and recorded measure progress and user experiences, which facilitated process evaluation efforts greatly.

This measure was selected for detailed process evaluation and was hence subject to a **Learning History workshop.** The workshop is a method realized ex-post by which the process of a measure can be evaluated, including all the relevant phases: planning, implementation and demonstration. The main stakeholders of the measure are invited to share their views on the success factors, or lack of thereof, of the measure and to recount their experiences of the measure approach, internal dynamics, realization and results achieved, via

recounting the main barriers and drivers of the process. The main aim of the workshop is thus on learning about and understand the reasons behind measure success or failures.

The Learning History workshop was arranged by the LEMs in October 2019 at the LEMs' institution with the following participants: the SC, the ML, the maintenance subcontractor at Kuntec Ltd., a street engineer who was involved in the planning and realization of the pilot, and two members of the local cyclist's association TURPO.

Picture 80. The workshop participants.

The workshop proceeded in the following manner:[14]

6. Reconstructing the measure **timeline** and discussion of main measure milestones
7. Explanation of workshop goals and process
8. Inventory of measure process **barriers** and actions to overcome them, followed by moderator clustering and joint discussion
9. Inventory of measure process **drivers** and actions to overcome them, followed by moderator clustering and joint discussion
10. Reflective discussion on **lessons learned**

[14] Structured after Dziekan et al. (2013) Evaluation matters – A practitioner's guide to sound evaluation for urban mobility measures. p. 87-91.

Picture 81. TUR 4.8. drivers and barriers

As the thesis worker responsible for planning the maintenance pilot was no longer working for the city, a separate **online interview** was held with her mapping the drivers, barriers and actions in the same manner as in the workshop. The thesis in question was also of great use when mapping measure process as it entailed detailed information about the pilot planning process as well as experiences from the first winter, including a thorough analysis of relevant drivers and barriers. The workshop learnings are added to the previously collected measure process drivers and barriers and the main learnings are summarized in section C.

B.3 Barriers

The main barriers identified for this measure by the measure staff and stakeholders are identified in the table below.

No.	Barrier field	Description	Action to overcome the barrier
1	Financial	The operating costs of the piloted sweep salting method are 2-3 times more expensive than the customary winter maintenance method	Although the measure proceeded smoothly and overall experiences have been largely positive, it was recognized early on in the measure that the higher cost of the piloted winter maintenance method might entail the risk of discontinuation once the project funding ends. For the maintenance method to become a regular procedure, it would entail strong political will to gain the extra funding needed. At the end project, some funding has already been guaranteed for improved winter maintenance on a longer route in Turku, expanding prioritized winter maintenance to some the most popular cycling routes. However, in order to justify the higher investment in the years to come, it is

			recommendable to focus on a thorough analysis of safety related impacts of the maintenance method, as well as the possible mode shift occurring due to improved maintenance.
7	Technological	The negative effects of the maintenance method used for bikes/premises (e.g.corrosion)	Some complaints were received about the corrosive effects of the chosen method for winter maintenance (sweep salting) particularly during the beginning of the demonstration period. A store owner, for example, complained that the salt was causing damage to the floors at the shop. These issues were discussed with the property owners along the pilot route. Some complaints were also received about corrosion to bikes as well. This barrier was partly anticipated based on the benchmarking of the planning phase in other cities, which facilitated addressing the issue.
11	Spatial	Barriers related to urban space and infrastructure	The fact that the quality of the cycling infrastructure in Turku is somewhat poorly at places complicated the pilot at times. Due to the narrowness of the cycling lanes on some parts of the city, for example, the maintenance was more challenging. Improvements are continuously made to the city cycling infrastructure, however naturally it is not something that can be fixed overnight.
4	Problem related	Tight schedule for carrying out the pilot	The tight schedule of the pilot particularly at the planning phase sometimes posed some challenges to the process, particularly for the thesis worker as the method was novel and the maintenance route quite long, posing a lot of issues to be solved and sorted out before implementation. A great deal of benchmarking needed to be made in order to be able to tender for the process, for example. Although the pilot was backed up politically and organizationally, there perhaps was a shortage of a clear vision of the whole process. Having a clearer vision on the would have somewhat facilitated the process at the beginning as the thesis worker felt that instructions on what was to be done were a bit unclear.
4	Problem related	A complicated tendering process	The tendering of the pilot was rather challenging and time consuming as the method being tendered differed significantly from the day-to-day maintenance method. The method was novel, so at the same time the contract needed to have enough leeway for later adjustments and be detailed enough for the tendering to be set out in the first place. Tendering is thus an issue that needs to be adequately resourced with competent staff and

			contracting experts and enough time when carrying out similar pilots.
4	Problem related	Placing the prioritized maintenance route on the field	The pilot route had to be fixed quite early on in the whole process due to needing to have enough details on the route before the method was set out to tendering. This caused some issues with the process later on. In essence, when the route was chosen not all relevant details were known about it that later were found to affect the actual piloting method in practice. There were different types of surface materials along the route, for example, which complicated the maintenance process. Due to the complexity of tendering in such pilots this is a difficult issue to overcome – however here, again, helps if enough time and resources are reserved for the planning process.
4	Problem related	Lack of information on accidents and incidents on the route	There simply was not enough data available along the pilot route of accidents or incidents caused by cycling infrastructure in particular. This made it difficult to compare the impact of the maintenance method to the business-as-usual method.
5	Communication	Issues with the flow of information	Throughout measure process there were some issues with flow of information between all parties concerned – the subcontractor, the city street engineers involved, and project staff. The thesis worker responsible for planning and implementation of the pilot did not always receive information from the subcontractor about alterations made to the method, for example. As she was responsible for replying to feedback from citizens and the expert group, there was sometimes confusion as to what was the actual situation with method implementation on the field. This was caused by not having received up-to-date information on these issues at times. In retrospect, a joint communication channel (a workspace or similar) would have been needed to make communication between the partied involved more fluent.

Table 108: Identified barriers and planned/taken actions.

Overall, the measure encountered no major barriers that would have hindered reaching the stated goals. When the demonstration phase started, some complaints were received about the corrosive effects of the chosen method for winter maintenance (sweep salting). The complaints were rather minor though and did not lead into further actions. Not so much as a barrier to reaching the measure objectives, but a concern on the long-term effects of the measure, it was mentioned by the ML that it would entail strong political will to gain the extra

funding needed for the maintenance method to become a regular procedure. Some funding has been already guaranteed for improved winter maintenance but not enough to expand the maintenance routes to the extent needed. The higher cost of the piloted winter maintenance method therefore presents the risk of discontinuation once the project funding ends.

According to the **stakeholder survey**, political or strategic issues posed the most significant potential barriers to measure realisation (7/10 respondents). It was mentioned by one stakeholder that there is a lack of common political will for object realisation in the city. Positional barriers, such as occasional shortcomings in the flow of information, and planning related barriers such as the lack of user-driven planning and unclear division of responsibilities were considered significant by five respondents each. Four respondents considered institutional and cultural barriers potentially hampering measure realisation. It was mentioned, for instance, that there are many cultural factors that hamper the promotion of year-round cycling. Some established winter maintenance methods for cycling routes were deemed unsuitable and even unsafe, yet it seems that streets are always cleared for car traffic according to best possible standards. In addition, some problem-related barriers were identified, such as the differing views of maintenance key personnel on the best options of winter maintenance of cycling routes and, more importantly, the differing views on what is the user experience of these methods. An interesting point was the view posed by one respondent on how cycling route maintenance is a kind of a chicken and egg dilemma – as long as cycling routes are not used much during the winter, limited funds of maintenance will not be spent on their upkeep, which will naturally not lead into increased winter cycling but quite the opposite.

One respondent also noted that during the demonstration phase the cooperation between the maintenance contractor and the city departments involved could have been even closer. From a spatial point of view it was mentioned that the pilot route realisation was somewhat challenging, however these challenges were mostly overcome via active cooperation and planning.

At the **learning histories workshop**, the stakeholders rated the main barrier categories with the following weightings**:**

- Technological 11
- Financial 9
- Problem related 7
- Spatial 3

The **thesis student** who was responsible for planning and implementation of the pilot cited the following aspects as the most significant barriers that caused some friction to measure realization:

- Communication between subcontractor, the city and project staff
- A complicated tendering process

It is interesting to note here that the stakeholders and staff present at the workshop did not bring out communicational issues as a major barrier to measure process, although they were briefly mentioned during construction of the measure timeline in the beginning of the workshop. The fact that the thesis student found this one of the main barriers is likely caused by the fact that she was responsible for replying to feedback from citizens and the expert group. Due to not always receiving up-to-date information there was sometimes confusion as to what was

the actual situation with method implementation on the field – which made replying to feedback more difficult. She also only worked for the project during planning, implementation and first part of the demonstration, which surely accentuated the issues experienced at the beginning of the pilot, such as the complicated tendering process.

The above table demonstrates the variety of process barriers that occurred during the measure planning, implementation and demonstration as stated by both staff and stakeholders alike. To sum up, there were many **technological** and **problem related** barriers along the process that were, however, successfully solved with the help of adequate resourcing and expertise. **Communicational** issues also occurred that caused some friction especially during the start of the demonstration. In pilots such as this one where one must work with the existinf infrastructure, **spatial** issues are also bound to occur, with interconnections to the technological issues experienced with such a novel maintenance method. Although to the most part **financial** issues in this measure were experienced as a strong driver, as demonstrated in the next chapter, the higher costs of the piloted winter maintenance method might entail the risk of discontinuation once the project funding ends. This was experienced as a major long term barrier for the measure. It should be noted that at the time of writing this report, summer 2020, some city funding had however been guaranteed for improved winter maintenance on a longer route in Turku, significantly expanding prioritized winter maintenance from the 12 km pilot route.

B.4 Drivers

The main drivers identified for this measure by the measure staff and stakeholders are identified in the table below.

No.	Driver field	Description	Action to make use of the driver
8	Organizational	The pilot was run by highly committed and motivated people who had time and resources to focus on the pilot properly.	The key personnel involved in planning and realization of the measure were highly committed to achieving the measure objectives. In addition, there was continuity as the main measure staff remained the same during planning and implementation, which facilitated the process greatly. It is worth noting here that resources were placed particularly on responding to feedback from the citizens and the expert group recruited to give specific feedback – the thesis student dedicated a lot of her working time to answering the comments, complaints and recommendations received. What is even more important is the fact that this feedback lead to adjustments being made along the route – one time, for example, feedback was received on the route being too narrow in some parts. The next piloting year, the route was then widened. This is something that is likely to have also contributed to creating a positive atmosphere towards the pilot among the citizens. All in all, throughout the process the method was improved when needed according to staff experiences and feedback.

6	Political/ strategic	The measure concerned is part of the cycling development programme of the city.	There is a consensus on the need to develop cycling conditions in the city. This has created a positive atmosphere towards cycling and walking improvements, including maintenance development. Overall, the favourable political climate acted as a strong driver for the measure
9	Financial	External funding (CIVITAS) received	It is highly likely that without CIVITAS funding the winter cycling pilot would not have been realised in the extent it was and in the same time frame it now was. There was already a budget reserve for maintenance improvements but for initiating a novel maintenance pilot project external funding was essential. The external budget also brought some positive pressure to keep to the schedule. On another positive note, it was accentuated by the stakeholders that having external funding really gave the opportunity to innovate and carry through even somewhat bolder ideas. Within the conventional framework of maintenance and budgeting, it is unlikely this type of an experiment would have happened.
7	Planning	Thorough benchmarking of different maintenance methods and collection of information and feedback	The measure planning entailed a very thorough review of possible options for the winter maintenance method. Experiences with sweep salting from Helsinki and Sweden were particularly helpful for the planning process and for justifying the chosen method in the decision-making ladder in the city. These cooperation partners also helped along the process with the technical realization of the pilot particularly when challenges with the method occurred. Adjustments to the method were then made according to advice received. A cycling barometer to map out the most pressing needs of cycling development was performed prior to the first pilot winter. The survey was planned to support the pilot planning by mapping out relevant views about the cycling conditions and safety issues related to cycling infrastructure in Turku. The information gained from the first survey in 2016 was utilized in pilot planning. When the survey was repeated in 2019, information was also gained on user experiences on the pilot route, which in its part served the pilot evaluation.
7	Planning	Technical planning of the measure was carried out meticulously and with strong stakeholder involvement. External expertise was also utilized in pilot planning.	The staff also recognized the need to get expertise on pilot planning as it was recognized there was not enough knowhow within the city organization. Hence a consultant was hired to assist with the planning process and to supervise the thesis work. One person, the thesis student, from Turku city was employed solely to plan and implement the pilot, which allowed for thorough

			planning. The local cyclists' association was also involved in the planning of the winter cycling pilot and data gathering on its success.
5	Communication (internal)	Active and good cooperation between subcontractor for the maintenance and city staff	Fluent cooperation between all relevant parties involved in implementing the pilot eased the whole process and allowed for changes to be made to the maintenance process whenever needed. When problems occurred on the route, they could be responded to in due time.
5	Involvement/ communication (external)	Efficient involvement of an expert group on giving feedback and communication to citizens	For the purpose of gathering feedback on the route, 24 active members of the local cyclist's association TURPO were recruited during the first pilot winter of 2017-2018. A variety of specific comments on the condition of the route were received throughout the winter as the volunteers were advised to give feedback both on their daily trips and particularly when there were changes in the weather conditions. In addition to the avid cyclists' feedback, citizens were able to give feedback online via the city's official feedback channel. This opportunity was popular, with much more feedback being received compared to business-as-usual maintenance, and the feedback was not limited to cyclists as comments came from pedestrians and runners too. There was also quite a bit of discussion in the social media about the pilot and it was visible in the local press throughout implementation and demonstration. In this measure, the ample feedback given was duly taken into account, with some adjustments being made to the method based on the feedback.

Table 109: Identified drivers and planned/taken actions.

In this measure the driving force of meticulous planning, adequate resourcing and key personnel commitment was clearly demonstrated. According to the ML and SC, technical planning of the measure was carried out meticulously and with strong stakeholder involvement. The local cyclists' association was involved in the planning of the winter cycling pilot and especially in gathering feedback. One person from Turku city, the thesis student, was employed solely to the measure, thereby being able to concentrate fully on planning and implementing the pilot. Overall, the key personnel in planning the measure were highly committed to achieving the measure objectives and the measure included some thorough preparations, such as a cycling barometer and very thorough study of possible options for the winter maintenance method in order to guide planning and get a good view of user needs. From a positional point of view there was the apparent driver of the measure being a part the cycling development programme of the city. There is thus a strong consensus on the need to develop cycling conditions in the city. This has created a positive atmosphere towards cycling and walking improvements. The impact of the financial driver of the funding provided by the project also cannot be underestimated – as stated by the ML and SC, is is highly likely that

without ECCENTRIC funding the winter cycling pilot would not have been realised in the extent that it was and in the same time frame it now was.

According to the stakeholder survey, planning related drivers (7/10 respondents) and cultural drivers (6/10 respondents) were most significant for reaching measure objectives. The chosen piloted maintenance method was regarded well chosen and one that should be adopted to all the main cycling routes. Political and strategic drivers were also seen as important (4/10 respondents), particularly the connection to regional traffic system work and the overall consensus on the need to develop cycling and walking conditions in the city.

At **the learning history workshop**, the stakeholders were given stickers to rate the main driver categories. The following weightings resulted:

- Organizational 10
- Planning 10
- Communication/involvement 7
- Political 3

The **thesis student** who was responsible for planning and implementation of the pilot cited the following aspects as the most significant drivers to measure realization:

1) External funding and subsequent (positive) pressure on the schedule (financial)
2) Resourcing in planning and realization (organizational)
3) Pilot-like nature which enabled innovating and bold ideas (financial)
4) Overall positive attitudes toward the pilot from all partied – the city, subcontractor, citizens

The above table demonstrates the variety of process drivers that served to facilitate measure planning, implementation and demonstration. To sum up, **organizational** commitment and attitudes were crucial to measure success, as well as the meticulous **planning** of the pilot. These issues are naturally strongly interconnected – without adequate resourcing it is unlikely the pilot would have been planned as thoroughly as it was. This issue on its part was enabled by project funding in the first place, a strong **financial** driver. In addition to having a positive attitude among city staff and citizens on pilot realization, it was also crucial for measure success – or bringing the measure about in the first place – to have **political** support for improving cycling conditions in the city. In this measure the **communication** to and **involvement** of citizens and stakeholders also succeeded to the most part, the measure gaining also visibility in the media. Again, this was an issue that was enabled by adequate resourcing.

B.5 Influence on risks

The risks identified at the start of the project were related to the evaluation, namely data gathering. These risks were still relevant in the follow-up phase of impact evaluation. During the discussions with the ML and the SC, some additional risks were also identified. On the technical side, despite thorough planning there was the risk that some of the effects of the sweep salting method would be not be taken into account in advance. Some issues related to corrosion did spring up and were dealt with by measure staff. Potential problems with the chosen subcontractor were also identified as a potential risk as the subcontractor for the pilot

had an important role in the success of the practical realisation of the maintenance. As mentioned by the thesis worker, some issues did occur with flow of information between measure staff, city staff and the subcontractor.

The ML emphasized the risk of discontinuation of the chosen maintenance method if the city politicians are not convinced of the need to increase the budget for winter maintenance. This was seen as a risk as one of the measure long-term objectives is increasing walking and cycling round the year. Active communication of the benefits of improved winter maintenance therefore needs to be maintained to city politicians.

The measure stakeholders also identified some additional risks, particularly related to political or strategic issues (7/11 respondents), cultural and financial issues (both 5/11 respondents), and also planning-related issues such as division of work and inadequate personnel resources (3/11 respondents). One stakeholder emphasized the risk of the car-oriented culture and subsequent political opposition to allocating funding for the development of better cycling routes.

Identified risk	Category	Mitigation actions	Responsible
Risks related to the technical realisation of automatic data calculators'	Planning	The proper functioning of automatic traffic calculators should be verified via control calculations by hand.	ML
Data for number of incidents/fatalities/seriously injured may be subject to bias as not all incidents are reported.	Planning	The quality of data should be guaranteed via triangulation of methods to ensure reliability. Information will therefore be gathered from various sources.	ML/LEM
There is a risk of discontinuation of the chosen maintenance method if the city politicians are not convinced of the need to increase the budget for winter maintenance. This was one of the measure objectives.	Political / strategic	Active communication of the benefits of improved winter maintenance.	ML/SC/LEM via evaluation
Despite thorough planning, there was the risk that some of the effects of the sweep salting method would be unaccounted for.	Planning	The measure had sufficient personnel to make as thorough an assessment of all the impacts of the chosen method.	ML
Potential problems with the chosen subcontractor.	Organizational	The subcontractor for the pilot is in an important role in the success of the practical realisation of the maintenance pilot. The ML worked in close cooperation with the subcontractor to ensure good quality of the pilot.	ML

Table 110: Reported period risk assessment.

C.Conclusions

The following section summarizes the main process findings and lessons learnt for measure TUR 4.8. Some process recommendations are also presented.

C.1 Main process findings

This measure overall can be considered one of the main success among the Turku measures – it was implemented successfully, gained political and citizen acceptance, and has resulted

in upscaling in the city. The key personnel in planning the measure were highly committed to achieving the measure objectives and the measure included some thorough preparations, such as a cycling barometer and very thorough study of possible options for the winter maintenance method in order to guide planning and get a good view of user needs. This organizational driver facilitated measure planning greatly. The fact that the technical planning of the measure was carried out meticulously and with strong stakeholder involvement cannot be underestimated as a driver for measure success. External project funding was decisive in bringing the pilot about, making it an essential financial driver. It is highly unlikely that the winter cycling pilot would have been realised without CIVITAS funding in the extent and timeframe it now was. Project funding thus provided an opportunity to test different methods and, by collecting and showcasing data on its success, to convince the decision makers on making future investments in improved winter maintenance.

Process lessons learnt

- An open and productive attitude is vital for a successful pilot.
- Nothing replaces good planning. To do this, a measure needs to be adequately resourced..
- Placing the pilot route on the field before all details of the method are known can be tricky. One should be prepared for some infrastructure related obstacles once the pilot starts running.
- It is important to assure that any novel piloting effort is communicated to the public widely. This creates a sense of involvement and a fertile ground for gaining enough of user experiences.

C.2 Process recommendations

Proper planning is key

In order to assure both quality of implementation and ease of process, thorough planning and benchmarking is essential.

Feedback on pilot quality is essential

To be able to adjust the chosen method for winter maintenance and assure its quality, feedback needs to be collected both from the users and via sensors.

Communicate!

Running a pilot applying a novel method such as sweep salting needs to be accompanied by both effective communicative measures. This naturally also requires adequate resourcing.

Plan for internal processes and communication as well

Combining an external process with the established processes of a city organisation could sometimes be challenging. In similar endeavours, added attention needs to be placed on a clear division of roles and responsibilities and, most importantly, on proper communication between different parties, e.g. the maintenance contractor and project staff.

Pay attention to tendering and contracting

Preparation of the tendering needs to be done thoroughly to allow for enough detail but at the same time leave room for improvement during the pilot period. It's worthwhile to seek for external expertise to assist with the tendering if needed.

Seek for external funding when piloting novel issues

External funding brings a positive driver to piloting novel methods and creates positive pressure to keep with the planned schedule.

Gather data on pilot success

When it comes to maintenance methods that are more expensive than the business-as-usual method, to justify further investments in the method adequate data is needed to demonstrate success.

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Cleaner and better transport in cities

ECCENTRIC

RUS 5.3

Analysis of PT demand and reorganization of PT network in Druzhba district

Process Evaluation Report

Deliverable No.:	8.2
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Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistics in urban centres	
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Analysis of PT demand and reorganization of PT network in Druzhba district	
Responsible Author(s):	
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Responsible Co-Author(s):	
Zdravka Yakimova, Pepa Rizova	
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ECCENTRIC

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	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
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ECCENTRIC	Ruse		
Measure code	**Measure name**		
5.3	Analysis of PT demand and reorganization of PT network in Druzhba district		
Last update	**Responsible**	**e-mail**	**telephone**
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A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- Increase the use of public transport. To encourage the different actors to embrace sustainable mobility habits leaving their cars on the peripheral parking and using PT;
- Create awareness of the need for and benefits of sustainable mobility in the City of Ruse and its importance for increasing the quality of life.

(2) Strategic level:

- Mode shift towards PT and away from private cars;
- Decrease emissions from cars.

(3) Measure level:

- Acceptance of the new transport scheme of Ruse;
- Satisfaction with the implemented transport scheme.

A.1.1 Quantifiable impacts

Expected Impacts	Increased use of PT Decreased use of private cars Decreased emissions and energy consumption by PT Decreased use of private cars and taxi services at night	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	20% decreased use of private cars in Druzhba	X									
2	20% increased use of PT in Druzhba	X					X	X			
3	10% decreased emissions from private cars and taxis		X								
4	20% decreased the use of private cars and taxis by night	X	X			X		X			

Table 111. Quantifiable impacts

A.2 Measure description

The public transport service connecting the peripheral district Druzhba with the centre of Ruse and its industrial zones (around the city centre) is rather slow and unreliable. A large share of people living in the peripheral districts, like Druzhba use their own cars or taxi services to travel to the city centre or to work.

This measure aims at providing demand-oriented, fast, regular and reliable public transport services to and from the city centre to the district of Druzhba. The implementation of the

measure should include redefining and reorganizing the existing bus and trolleybus lines in order to improve the balance between demand and supply of public transport services.

The analysis of public transport demand would provide data for passenger flows and would enable local transport planners to establish a new transport scheme for the targeted area with appropriate timetables in order to meet the needs of more passengers. When ready and approved, the new transport scheme would be promoted by media and non-media campaigns.

A.2.1 Measure outputs

- **Output 1** – New public transport scheme for Druzhba that will contribute to the increase of PT use with 20%
- **Output 2** – Better transport connections that will decrease the use of private cars with 20%

A.2.2 Supporting activities

	Type of supporting activity	Activity	Target group	Main objectives
1.	Promotion	Media publications, Municipal site announcements, outdoor advertising (tables and posters in the PT vehicles)	Druzhba citizens, youth, visitors, people working in the Ruse suburbs	• To raise the awareness about the new PT lines • To support the use of the new PT lines • To decrease the use of cars/taxis in Druzhba
2.	Promotion	Direct advertising (via dissemination of ECCENTRIC materials, direct meetings and discussions) – about 27 000 people.	PT-commuters – Druzhba citizens, youth, school students (aged 15-18)	• To persuade Druzhba citizens that they are not isolated and to popularize the MaaR (Mobility as a Right) concept among them; • To raise the awareness about the new PT lines • To support the use of the new PT lines
3.	Training	Seminars, workshops, mobility conferences, festivals and other events	Druzhba citizens, school children, disabled people, academia – auditory of 350-400 participants	• To persuade Druzhba citizens that they are not isolated and to popularize the MaaR (Mobility as a Right) concept among them; • To raise the awareness about the new PT lines • To support the use of the new PT lines
4.	Information	Media and non-media campaign (via social media, municipal site, the site of the National Coordinator on mobility and the SUMP focal point CSDCS, as well as via the Bulgarian SUMP network maintained by CSDCS	Large public of 140 000 Ruse citizens, transport professionals in Ruse and other cities, visitors of Ruse	• To raise the awareness about the night line as a component of sustainable mobility • To support the use of the new PT night service

Table 112. Supporting activities

A.2.3 Interactions with other ECCENTRIC measures

The implementation of this measure has interactions with all the CIVITAS ECCENTRIC measures Ruse:

- RUS 2.11 which aims at informing and promoting the new measure through training events and well targeted information campaign
- RUS 2.6 because visitors could leave their cars at the P&R station and travel to the city centre using the improved PT services.
- RUS 3.6 because the new mobile application will provide information about the PT network and will allow the purchasing of tickets
- RUS 4.3 and 4.4, which envisage the construction of safe pedestrian infrastructure (enlightened safe crosswalks and sidewalks) thus facilitating the access to the PT stops in Druzhba.
- RUS 5.4: Achieving the goals of the new transport scheme is also strongly reliant on the realisation of the measure 5.4 under which the public transport is enriched with a night line. The new night line will be included in the whole transport scheme of Ruse and in the future its timetable and itinerary might be extended.

A.2.4 Interactions outside ECCENTRIC

There will be an important interaction with the Ruse SUMP implemented in the moment outside of ECCENTRIC. The new Druzhba transport scheme will become a part of the Ruse transport scheme having as a main goal to better serve the Ruse citizens with PT for decreasing the use of cars for short trips, as well as to achieve better social equity and inclusion.

A.3 Target groups and/or affected part of the city or region

Target groups			Affected area		
Type		comment	Type		comment
1	Ruse (including Druzhba residents)	140 000 (27 000 in Druzhba)	1	Ruse (including Druzhba residents)	140 000 (27 000 in Druzhba)
7	Visitors	10 000	7	Visitors	10 000
3	PT users	55 000	3	PT users	55 000
10	School-childrens and students	20 000	10	School-childrens and students	20 000

Table 113. Target groups or affected parties

A.4 Stakeholders: ECCENTRIC project partners and other important actors

In the following table, the stakeholders are summarized by function.

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
1	Municipality of Ruse	P	C	L	Project partner
2	Ruse PT Company	S	PT	P	PT provider
3	Ruse citizens	S	other	P	beneficiaries
4	Visitors of Ruse	S	other	P	beneficiaries
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					

Table 114. Measure stakeholders

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Measure Progress Reports are not delivered on time	Process	Standardized forms should be filled in instead	Nikolay Simeonov (ML)
Lack of support for providing the study of PT demand	Process	The municipality is supporting the study in the frames of the Ruse SUMP	Nikolay Simeonov (ML)
People are not informed about the new transport scheme	Process	Close cooperation with the communication manager	Nikolay Simeonov (ML)

Table 115. Risks

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning (January-August 2017)

The following activities have been implemented during the measure's research and planning phase:

- Meetings with experts in the field;
- Thorough analyses of the transport demand and transport flows in Ruse and in particular – in the living lab.

As a result of this phase the technical specifications were developed as a base for the ToR of the public procurement to be launched. The analysis made by the Ruse implementation team led to the decision of upscaling the measure to encompass the whole territory of the municipality. Only this way the Druzhba district could be better connected by public transport to the rest of the city. Thus, reorganisation of the public transport lines in Druzhba was financed by the CIVITAS ECCENTRIC project, while the Municipality decided to finance with its own budget the work being carried out for the rest of the territory.

Phase 2: Procurement and implementation (50% implemented)

The long process of the public procurement (required by the Bulgarian legislation) caused a delay of its implementation. The procedure took more time than planned, so the 2nd phase was delayed with nearly 12 months. Following a process of public procurement (launched in August 2017), Ruse contracted an external company to update the Municipal Transport Scheme. The contract had a maximum of 12 months to deliver the final results of the service, including:

- Collection and analysis of baseline information on the current state of play;
- Preparation of an updated transport scheme for Ruse;
- Organising and conducting discussions with relevant stakeholders and public discussion of the proposal for updating and approving the final version of the new the transport scheme. The proposal was published at the municipal site for collecting public opinions.

The **Phase 3: Demonstration and monitoring** and the **Phase 4: Conclusions and recommendations** have not yet started because of political reasons. After the local elections in October 2019 a new Mayor of Ruse was elected and the Project manager of the

ECCENTRIC project (a former vice-Mayor) dismissed. A new ECCENTRIC PM for Ruse was appointed.

B.2 Process evaluation activities

Evaluating the main study of the current public transport scheme

To evaluate the measure process and to gain an understanding of the relevant barriers, drivers and risks related to the implementation of this measure, the evaluation team focussed on the study named "Collection and analysis of basic Information about the current stage of PT system in Ruse". The purpose of the survey was to establish power, interest, and impact of stakeholders in relation to each mobility measure. The survey questions were focused on the most significant barriers, drivers and risks related to the development of new planning approaches and testing the possibilities brought by new technologies for interactive and participatory planning. The study was performed in the period October-November 2018 by a subcontractor of the Ruse Municipality in close cooperation with CSDCS. The following activities were undertaken:

- Stakeholders' needs analysis;
- Review of the transport system's current situation.

The stakeholders' survey was directed at a large selection of key stakeholders. The stakeholders' needs analysis was done by a desk research using:

- Qualitative methods - focus groups with totally 17 participants (10 representatives of NGOs and 7 of business entities), in-depth interviews with 4 public servants;
- Quantitative methods – public opinion poll of 700 respondents and experts' opinion.

The review of the transport system's current situation used a data analysis on urban transport current status, ownership, infrastructure, and institutions involved. It was done using the municipal electronic monitoring system for the PT vehicles at the *Municipal Centre for control and management of public transport.* It used information from the installed GPS in every vehicle and provided real time data for tracking the performance of the PT routes, the arrival and departure times from every stop, the delays, etc.

In order to get more accurate data for the usage of PT, part of the analysis included the collection of information for the number of passengers that got in/out of the busses and

trolleybuses on every stop of each PT route. This was done by controllers that counted the number of passengers in the vehicles on every stop.

Evaluating the pedestrian infrastructure

It was evident that it was not possible to plan the bus routes in isolation from all the other modes of mobility. Therefore while planning it was important to evaluate the infrastructure needs so that the PT customers had safe crossroads and pedestrian lanes to reach the transport stops. The project team has considered this point as it was of crucial importance to provide the necessary safe pedestrian infrastructure in order to stimulate the use of PT. This was done on the one hand in measures 4.3 and 4.4 of ECCENTRIC and on the other hand with own financial resources of Ruse Municipality for the rest of the territory of the municipality. A thorough analysis of the pedestrian infrastructure in the city was made and the municipality decided to rehabilitate 150 streets and sidewalks throughout the city. This would further facilitate the use of PT in Ruse.

Evaluating the other modes of transportation in Ruse

Other modes of transportation have been also considered when planning of the new public transport routes such as interurban buses, railway transport and taxi services, Strong connections to PT services were planned when implementing also measure 2.6 for introducing P&R service in the laboratory area. Offering integrated ticketing for other modes of transport including the new bus offers was foreseen.

Main conclusions and recommendations

The above-mentioned analyses and surveys provided comprehensive and reliable information about the current situation of the Ruse PT and the needs of the citizens. The main conclusions and recommendations for the further actions can be summarized as follows:

- public transport modernization, including mobile app and night bus;
- measures for reducing the harmful impact on environment;
- improving the PT service by introducing flexible way of ticketing – “green tickets” in days with air pollution, combined tickets for PT and cultural events, tourist cards for PT, flexible ways to change the pre-paid cards, etc.;
- video control in PT vehicles and streets;
- launching green lines with electric buses;
- increasing the number of safe crosswalks;
- renovating and building safe sidewalks;
- enhancing the bicycle lanes’ network and integrate it with the public transport;

- developing a new public transport scheme including south-eastern peripheral districts and connecting the villages of Ruse municipality.

In November 2019 the new City Council approved the proposed transport scheme. The implementation of the new scheme is related to purchasing of new PT vehicles. The Ruse Municipality won a project funded by the OP "Regions in Growth" of the MRDPW and is intended to buy new trolleybuses and buses. A new PT operator will be selected after a public procurement procedure. This is a long process and will probably happen after the end of the ECCENTRIC Project.

B.3 Barriers

No.	Barrier field	Description	Action to overcome the barrier
1.	**Organizational**	This measure works closely with infrastructure and PT services, changes in PT services, relocating or building of new transport infrastructure and coordination and integration of the new transport scheme with the existing lines. All these problems create an organizational barrier that is time consuming.	Strong interface between all the mobility measures introduced by ECCENTRIC and the Ruse SUMP; Coordination of the work of different departments in the Municipality (Transport, Social affairs and Construction; land use; Ecology).
2.	**Political**	The measure became highly political when new land/parking space is involved for the new scheme. Moreover the new elected local government rarely agrees with the decisions of the previous team from the opposite political party.	Cooperation of the project team with the new decision-makers, explaining the benefits of the ECCENTRIC measures. Integration of transport and land-use policy.
3.	**Social/Cultural**	The main barrier was to meet the requirements of the different stakeholders' groups	We decided to involve different target groups of local citizens and infrastructure experts in the discussions. During the meetings they were trying to find a consensus.

4.	**Problem related**	No methodology for counting passengers of the PT and using questionnaires gives good results in a short time.	The subcontractor used several months for the analyses of the results and made some estimations on the final results.
5.	**Technological**	Getting eTickets on the market, installation issues, charging interface for cards, etc.	Including more room for flexibility of introduction of new facilities; large information and promotional campaign among commuters.

Table 116. Identified barriers and planned/taken actions.

B.4 Drivers

No.	Driver field	Description	Action to make use of the driver
1.	Organizational	The key personnel in planning the measure were highly committed to achieving the measure objectives.	The project team and the subcontractor prepared the design of the new PT scheme in a high professional way in order to keep the interest of the target groups and to provide best value for money.
2.	Political	The measure was aligned with the city strategy launched by the former local government. It was crucial for the implementation of the Ruse SUMP because the results obtained were important as a base for planning of the new transport scheme of the city.	The funding from the ECCENTRIC Project and the municipal budget for SUMP were used together for obtaining the final results.
3.	Involvement and communication	Good communication among the partners and strong organizational skills from the key stakeholders	The results from the analyses are comprehensive and reliable. Several types of analyses have been used in order to check their reliability.

Table 117. Identified drivers and planned/taken actions

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Lack of support for providing the study of PT demand	Process	The municipality and CSDCS were permanently supporting the subcontractor when making the studies.	Nikolay Simeonov (ML) Lucia Ilieva (LEM)

Identified risk	Category	Mitigation actions	Responsible
People are not informed about the new transport plan and there is no public commitment	Process	Intensive media campaign. The study was announced during the First ECCENTRIC Conference and replicated in local media.	Nikolay Simeonov (ML) Lucia Ilieva (LEM), Lachezar Rossenov (CM)

Table 118. Reported period risk assessment

C.Specific observations on the supporting activities in this reporting period

C.1 Quality of the Supporting Activities.

As supporting activities, we consider the provided information and promotion among the stakeholders. Their quality was high enough, because the research results have shown that 100% of the local population were informed about the measure and were interested in the new Ruse transport scheme.

C.2 Influence of the Supporting Activities on the implementation process

Ruse citizens were very active in sharing opinions about the new PT scheme directly or via the municipal site. Many letters on paper were received by the Municipality. In general, the Bulgarian people are quite apathetic and disinterested in municipal initiative and rarely participate when the local government asks for their opinion. Luckily it was not the case with the ECCENTRIC measures mainly thanks to the well-conceived information and advertising campaign.

C.3 Influence of the Supporting Activities on the impact of the measures

The measure was not implemented till present mainly due to political and organizational reasons.

C.4 Lessons learnt on the Supporting Activities

The good promotion is always necessary when there is an introduction of new measures/concepts in the cities. By definition people don't like changes and don't accept things they don't understand. Citizens need to be persuaded that the changes will improve their quality of life.

D. Conclusions

D.1 Main process findings

The night bus was used by the Ruse citizens and was considered as an improvement of their living conditions. The measure strongly contributed to the social inclusion and livability in Druzhba. 90% of the citizens accept it and estimate that it will improve their living conditions. 90% are satisfied with the “Good night” line because it gives them possibilities to move in the night and to have access to the Ruse evening attractions thus decreasing the social inequality and improving the quality of life in the peripheral district.

D.2 Process lessons learned

Although the number of passengers increased 5 times since the beginning of the night service, their total number of users remained small and was not sufficient to support the service after the end of the project. The night bus was launched too late during the ECCENTRIC implementation and we didn’t have enough time to educate people to use the bus by the night instead of taxis.

D.3 Process recommendations

We have recommended to the Ruse municipality to include the night public transport service in their SUMP and to put more resources in the support of this line. Step-by-step the citizens will become familiar with the service and will use it more and more in the future.

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Cleaner and better transport in cities

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TUR 5.5

Bike-sharing and Car-sharing Schemes

Process Evaluation Report

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4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
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	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

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Stella Aaltonen	Katariina Salokannel

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CIVITAS ECCENTRIC	Turku		
Measure code	**Measure name**		
TUR5.5	**Bike-sharing and Car-sharing Schemes**		
Last update	**Responsible**	**e-mail**	**telephone**
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A. Introduction

A.1 Expected results of the measure

The measure objectives were the following:

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

The measure aimed to promote car independent lifestyles and to implement integrated packages of technology in the city of Turku by complementing PT services by providing the first bike sharing system in Turku. Promoting car share was expected to decrease car ownership in the long run.

(2) Strategic level:

This measure was expected to increase the usage of public transportation in Turku by offering different alternatives suitable for various purposes. The measure was also to increase the popularity and attractiveness of cycling by introducing a bike share system. The bike share system was also expected to make cycling easier in both the city centre and the Kupittaa laboratory area. Renting or sharing a car was to become a more attractive alternative instead of car ownership via the introduction of car sharing schemes in the city area.

(3) Measure level:

The measure aimed to implement a bike share system of at least 100 bikes. The bike share system was to consist of at least two different key components:

- The city bikes
- Other bikes and vehicles available on the same platform (e.g. library and university bikes, bicycles from private rental companies, other types of electric vehicles)

The aim was that the system became so attractive that the amount of rentals would rise above the bike share system average, with the common average number of rentals per bike being one rent per day. There was to be a technical framework ready for car rental and first demos planned with car sharing providers or with existing car fleet owners, such as the city or the universities.

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Liveability	Competitiveness	Efficiency of urban freight	Local economy
1	The city bike system is in use	x			x			x	x		
2	Car sharing companies have tested their services in Turku				x			x	x		

Table 119: Quantifiable impacts.

A.2 Measure description

Bike share schemes offering affordable short-term rentals on a predefined geographical area have sprung up in many cities during the recent years. In Finland, Helsinki was the first city to implement a bike share system in 2016 and Turku was to follow suit with the system implemented in TUR 5.5. The system was to complement Turku's public transport services and be integrated to the IT-platform of the public transport office Föli, providing a quick and easy way of getting around the city centre. The bikes were to be available all year round and in the wintertime they were to be equipped with winter tyres.

The bike share system was to consist of bikes for public use and bike stations that would serve as pick-up and drop-off points. The user would be able to pick up and drop off a bike at any station. The station network was to extend from the Kupittaa laboratory area along the city centre to the port of Turku.

Another objective of the measure was to encourage and enable car sharing systems to be offered in Turku. Demos were to be planned with private car sharing providers or with existing car fleet owners like the city, the universities and other big car fleet owners.

A.2.1 Measure outputs

As a result of the measure, Turku aimed to have a bike sharing system of at least 100 bikes (the number was later increased to 300 bikes). In addition, car sharing companies were to have tested their services in Turku.

A.2.2 Supporting activities

No supporting activities have been identified for this measure.

A.2.3 Interactions with other ECCENTRIC measures

The measure was to interact with measure STO 3.5. "Develop smart choice mobility services" regarding car sharing company UBIGO. There had been discussions about the possible cooperation with UbiGo in Turku. The bike share system was to be year-round and therefore it had interactions with measure TUR 4.8., where year-round cycling is promoted. The measure was also to be promoted in measure TUR 2.2. "City District / Urban Corridor Case as a Pilot for Sustainable Urban Mobility". This measure was also to be directly linked with measure TUR 3.2. "Integrated Ticketing and Information System for Mobility", in which a new open data interface and platform were to be developed into which the ticketing system of the public transport system would be incorporated. This was to enable the integration of the bike share system to the PT.

A.2.4 Interactions outside ECCENTRIC

For the bike share procurement, several lessons learnt from other systems world-wide were gathered.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
1	Bike share system users	Turku	The service targets all Turku residents
3	PT users as the bike share system is connected to the PT system	Turku region	Season ticket users of PT
7	Visitors to Turku	Turku	The bike share has a day ticket which is hoped to attracted also short-term visitors
6	Commuters	Turku region	The bike share system may serve those commuting to Turku from the surrounding municipalities.

Table 120: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
1	The City of Turku	P	C	L	Lead partner
2	Föli, Turku Region Traffic	S	PT	P	Provider of regional public transport services, partner
3	Helsinki Region Transport	S	PT	O	Provider of the Helsinki bike share system
4	Regional Council of Southwest Finland	S	Other	P	Partner, bike share promotion
5	Tampere University of Technology	S	KI	O	Diploma workers for the project will be recruited from TUT
6	City bike providers	S	PR	P	To be approached when tendering for the bike share system
7	Car-sharing providers	S	PR	P	Negotiations to be held in relation to car share demos in Turku
8	VR Group, State Railways	S	PT	O	The two railway stations in Turku are prime locations for bike share stations
9	Outdoor advertisement operators	S	PR	O	Different outdoor advertisement operators for the City bikes and illuminated advertisements have been identified for the implementation and operation of the measure
10	City of Helsinki	S	C	O	An important peer in measure as the first bike share system in Finland was established in Helsinki
11	Turku Cyclist's association TURPO	S	NG	O	The association is affiliated with the cycling development within ECCENTRIC, providing expertise on city bike sharing systems
12	Media	S	Other	O	Provides visibility for the bike share system
13	Shops located around the bike stations	S	PR	O	Targeted marketing for the shops.
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

Table 121: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Risks related to the technical realisation of city bike system, misuse of the system and subsequent effects on availability of user data	4	Flexibility of the budget, proper communication plan to launch and inform about the usage, positive examples	ML, SC
Lack of respondents to the targeted web-based survey questionnaire	4	Thorough marketing of the survey; possible “carrots” to survey respondents	ML
GPS data malfunction	3	Pre-testing and regular quality control	ML
The BSS is currently facing a rapid change with free floating BSS systems becoming a viable option in the market.	7	It was decided to procure a BSS that combines stations with the possibility to offer also free-floating bikes at the later stage. Also the it-platform is developed to incorporate other service providers in.	ML
Low system usage for the bike share	5	In-depth analysis of reasons behind potential low system usage	ML

Table 122: Identified risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Some significant changes were made to the original measure plan along the inception time. The number of the bikes raised from 100 to 300 during the planning phase. The Turku city executive board accepted the proposal for the bike share system (henceforth BSS) procurement in April 2017. The procurement was to consist of 300 bikes and 37 stations (34 stations at fixed locations and three portable pop-up stations). These numbers were higher than originally planned in CIVITAS ECCENTRIC as it soon became apparent that the original number of bikes was too low. After approval from the executive board, the procurement phase began.

It should also be noted that the research, planning, procurement and implementation of the bike share system was a complex task that took more time than originally estimated and included some heavy-weight political arm wrestling especially on the issue of ensuring suitable locations for the bike share stations. As the measure proved rather overwhelming in terms of the amount of work required for planning and implementation of the bike share, car sharing received less attention to begin with.

The measure leader was changed as Jari Paasikivi left the project and Stella Aaltonen took over measure leadership in May 2017.

Phase 1: Research and measure planning (100% completed)

The research and planning of the BSS in Turku started officially in September 2016 and was finalized in February 2017. During this phase, the following activities were carried out:

- Internal dialogues with stakeholders and politicians, market dialogue with potential providers, operators and maintenance companies were conducted. M1-M6
- Benchmarking of existing bike sharing systems, literature and reports took place. M1-M6
- Marketing analyses of the car sharing companies in Turku area: the existing car sharing companies and their needs for market penetration in Turku were analysed. M3-M6
- Baseline data collection: gathering of baseline data from different sources and creation of starting maps for the bike sharing system, meetings with LEM and instructing with data collection activities regarding the baseline and BaU, instructing with the gathering of stakeholder feedback. M1-M6

Phase 2: Procurement and implementation (100% completed)

The procurement and implementation of this measure commenced in March 2017 and was completed in April 2018. The Turku city board accepted the proposal for the bike share procurement in April 2017.This was an arduous phase centred around the tendering for the bike share system and planning and setting of the station locations, as well as brand and marketing development. Based on the planning phase a proposal to the city board was made that included annual financing of 150,000 euros for the system of 300 bikes and 37 stations. This was accepted. The proposal also included an income plan from sponsoring and

marketing. Based on this, the procurement for the marketing and sponsoring part was carried out separately from the actual BSS.

During this phase, the following activities were carried out:

- Preparations for the procurement of the BSS, planning of the income and cost model for the system, market discussions. M7-M9
- Tendering of the system and drawing up the contract with the chosen supplier. The tender was won by Nextbike Polska Ab for a contract of 3+3 years. M10-M13
- Tendering of the marketing and digital side of the bike sharing system: the physical marketing side of the bike sharing system was won by Clear Channel Suomi Oy, the digital side by Laulava Ovipumppu Oy. M13-M18
- Planning of the station locations (34 locations + three pop-up stations, app. 8-9 bikes per station). This included an internal process regarding the station plan and an external process regarding the other locations. After these processes, the locations were debated and decided by the politicians and all of the citizens living around the immediate location of a future bike sharing station were contacted by post. After the location places were decided, physical improvements of five station locations were made. M7-M18
- Creating a brand for the bike sharing system: creating the identity of the system with graphical elements, website plan, marketing plan, information materials, user videos, PR-videos, news, stakeholder involvement through local sparring group meetings. This phase also included pre-marketing for the companies located around the future bike sharing locations. The system was dubbed “Föli-fillarit” and it is brand protected. M13-M18
- Creating the pricing, ticketing system, registration system and IT-interphases in cooperation with the operator and the project partner Western Systems under measure 3.2. M17-M18
- Creating the bike sharing system from the operational side of the system together with Nextbike Polska Ab. Enabling the local maintenance to be in place. M14-M18
- Planning of the customer service and the process for informing faults in the bike system. Trainings for the customer service employees. M18-M20
- Planning process for the implementation of the physical marketing side of the BSS and the digital side of the system with the chosen operators. M15-M20
- A Masters of Science thesis was published called “The procurement of a mobility service – case bike sharing system of Turku” by Mikko Vallbacka. M20

The development of a BSS that is procured in a new way ended up causing more work than originally planned. Due to this, actions regarding the car-sharing were not prioritized before the launch of the bike share system. Therefore, this part of the measure did not proceeed as quickly as was hoped.

Phase 3: Demonstration and monitoring (80% completed)

Demonstration and monitoring of this measure commenced in March 2018 and were to be completed in April 2020. The bike share system was launched on the 1st of May 2018. During this phase, adjustments have been made to the pricing of the system and some of the station

locations. There have been various technical difficulties with the bikes. This has caused extra work to both the technical staff and the customer service.

During this phase, the following activities were carried out:

- Planning of the launch of the BSS together with third parties. Recruitment of the volunteers for the launch event. PR plans for the launch event. M19-M21
- Creating communication and marketing elements for the bike sharing system: FAQs, information tables, marketing brochures and campaigns, videos for the system, developing social media and print campaigns. M19-M38
- Stakeholder involvement and integration: involvement of different stakeholders into the bike sharing system, political discussions, integration of the topic into strategic documents. Group of key stakeholders meet regularly to develop different sides of the system. M19-M31
- Practical arrangements with the service providers: arrangements with service providers of the physical system, physical marketing and digital marketing, organizing the permissions, security issues, neighbourhood letters etc. M19-M44
- Constant meetings with the service providers to agree on the practical arrangements, contract details etc. M19-M44
- Implementation and evaluation of the system: further development of the system, collection and evaluation of customer feedback, service provider feedback and planning of the establishment of the system within the public transport operators services. Survey for users and its analysis. TUAS input on stakeholder feedback, instructions for other evaluation data collection. M20-M31
- Development of the ground for the car sharing companies to establish their operations in Turku: influencing the parking policies of the city, market discussions with operators, marketing of the operators to companies in connection with measure 2.1., sending the MaaS questionnaire (by TUR 3.1.) to car sharing operators. M19-M31

Phases 4: Conclusions and recommendations (75 % completed)

Conclusions and recommendations of this measure commenced in January 2019 and are to be completed in April 2020. The bike share system performance has been closely monitored throughout the period and adjustments have been made when needed. At this point, some preliminary conclusions can be made on measure success:

Time and resources required

- The procurement and implementation of the bike share system commenced in May 2017 and was completed in April 2018. In retrospect, the timeframe was very short for such an arduous undertaking. It is recommended that a minimum of 1.5 years be reserved to a similar effort.
- It should be ensured that there is enough time for piloting the bikes and the sharing system before the launch. In Turku, the operator was only able to deliver the stations and bikes in Turku two weeks prior to the launch. This reduced the testing time significantly. Some of the technical problems associated with the system could possibly have been prevented with better testing.
- Launching a completely new system required more staff resources than expected, particularly as in the Turku case the system is maintained in three languages.

- Due to the time/resource/effort-consuming nature of implementing the bike share, the promotion of car share received far less attention than originally planned. Turku city did, however, carry out market discussions with several operators and invited them to show their offers in the mobility package presentation that is part of measure 2.2. Several car sharing companies have also presented their offers at events organised by the project. Currently one new company has established services in the Kupittaa area. In retrospect, it could be concluded that it would have been wiser to focus just on the bike share in this measure.

Marketing and brand management

- Integration with city public transport adds value to the system, especially in terms with co-operation with customer service, marketing and IT. This aspect needs a new way of thinking and efforts towards a common understanding should be highlighted.
- Creating a bigger vision for new mobility services and daring to set the ambition level higher than before is especially important when talking about actions with high visibility, such as city bikes, that will change the city in many ways.
- It is important to plan for the communication and media exposure in advance and involve celebrities in marketing actions. In Turku, launch videos were created in co-operation with the city theatre and local tv-celebrities. This created the base for good media exposure.

Risk taking

- There is always a risk entailed in launching a new system and the risk is multiplied when it is done differently from other systems in many ways. In the Turku case, the bike share is a year-round system, which even increases the risk as it creates an extra layer of issues to consider in addition to all the other new parts of the procurement. It is important that there is financial leeway and trust in the project manager of such a measure.

B.2 Process evaluation activities

The measure leader and other staff have carefully recorded and analysed the measure design, implementation and demonstration processes.

To evaluate the measure process and to gain an understanding of the relevant barriers, drivers and risks related the following activities were undertaken.

An online survey was sent to TUR 5.5. stakeholders, requesting them to identify supporting thematic areas / sectors for the measure among the following categories:

- Political / strategic
- Institutional
- Laws and regulations
- Cultural
- Problem-related
- Involvement / Communication
- Planning
- Organisation

- Financial
- Technological
- Spatial

The stakeholder survey was part of the basic process evaluation and was directed at a large selection of key stakeholders as listed in cooperation with the Turku Site Coordinator. The purpose of the online survey was thus to establish power, interest, and impact of stakeholders in relation to each respective measure. The survey questions were centred around the most significant barriers, drivers and risks related to the piloting of the first bike share system in Turku.

Eight stakeholders responded to the survey: a senior inspector at the Finnish Tax Administration, a transport consultant, a Western Systems system engineer, a transport planning engineer from the city of Turku, the CEO of Rolan Ltd., a mobility specialist at the Finnish Cyclist's Association, the chief transport planning at the city of Turku, and the chief of maintenance at the city of Oulu. Three of the respondents are ECCENTRIC partners. Unfortunately the share of respondents does not represent the main stakeholder groups satisfactorily. Especially responses from city bike providers, car-sharing providers and bike-sharing providers would have been welcomed, as well as from e.g. the city of Helsinki, where a bike share system is already in operation. These stakeholders will however be addressed at PER 2 stage as this measure has been selected for detailed evaluation.

When inquired about the main potential benefits of the measure, the reduction of emissions/noise/energy consumption was considered very important by three respondents and somewhat important by one respondent. The increase of traffic safety was also rated very important by six respondents. The reduction of congestion and increase of transport efficiency were both deemed somewhat important by four respondents and very important by four respondents. Seven respondents also considered the increased satisfaction of the citizens in the transport system as very important, as well as the increase of liveability. In addition, five respondents considered the the decreased user costs potentially resulting from the measure as very important and two respondents as somewhat important.

Three out of the seven stakeholders that answered this part rated the impact of the measure on their organisation to be very positive and the remaining four respondents as very positive.

When inquired about the potential influence of each respondent's company or organisation on the measure objective, three out of the seven respondents viewed their influence as very great. One respondent considered they had great influence on the objective and three respondents considered they had some influence on the measure. When considering the influence of each respondent from an objective perspective, the self-perceptions of influence largely concur with the objective perception, the only major exception being the transport consultant who estimated he had high influence on the measure. This particular consultant had an important role in measure TUR 4.8. and his company participated in measure TUR 2.2, however in this measure their/his influence is low. Some underestimation of influence occurred in this measure as well, namely within the stakeholders from the city of Turku, whose influence is objectively higher that what their self-assessment suggests. The stakeholders with the highest influence on the measure, both subjectively and objectively judging, were the Western Systems system engineer, the CEO of Rolan Ltd (the bike share system subcontractor), and the mobility specialist at the Finnish Cyclist's Association, in addition to Turku city representatives.

Four respondents expressed an interest in the planning stage of the measure, one had an interest to be involved in the implementation phase, one in the operation phase and one in the maintenance phase.

Although the participation rate from stakeholders could certainly have been higher, as well as its representativeness, it is worth underlining that several **in-depth interviews** with the ML/SC and the former ML of the measure were conducted throughout the project and therefore a thorough understanding of the measure process was obtained.

In addition to the stakeholder survey and measure staff interviews**, measure reports and theses** conducted on the bike share system were utilized in the process evaluation. It is also worth noting that user surveys were conducted during the measure, the results of which accentuated particularly the significance of technical mishaps to the measure process. Measure staff has thoroughly analysed and recorded measure progress and user experiences, which facilitated process evaluation efforts greatly.

This measure was selected for detailed process evaluation and was hence subject to a **Learning History workshop.** The workshop is a method realized ex-post by which the process of a measure can be evaluated, including all the relevant phases: planning, implementation and demonstration. The main stakeholders of the measure are invited to share their views on the success factors, or lack of thereof, of the measure and to recount their experiences of the measure approach, internal dynamics, realization and results achieved, via recounting the main barriers and drivers of the process. The main aim of the workshop is thus on learning about and understand the reasons behind measure success or failures.

The workshop proceeded in the following manner:[15]

11. Reconstructing the measure timeline and discussion of main measure milestones
12. Explanation of workshop goals and process
13. Inventory of measure process **barriers** and actions to overcome them, followed by moderator clustering and joint discussion
14. Inventory of measure process **drivers** and actions to overcome them, followed by moderator clustering and joint discussion
15. Reflective discussion on lessons learned

The Learning History workshop was arranged by the LEMs in October 2019 at the LEMs' institution with the following participants: the SC, the project worker responsible for running the day-to-day operation of the bike share system, a project worker who dealt with the reclamations during the first summer after the bikes were launched, measure 4.8. ML who was involved in the planning phase of TUR 5.5., and a representative from Rolan Ltd, the bike share system subcontractor responsible for city bike maintenance and station balancing. The workshop learnings are added to the previously collected measure process drivers and barriers and the main learnings are summarized in section C.

[15] Structured after Dziekan et al. (2013) Evaluation matters – A practitioner's guide to sound evaluation for urban mobility measures. p. 87-91.

B.3 Barriers

The main barriers identified for this measure by the measure staff and stakeholders are identified in the table below.

No.	Barrier field	Description	Action to overcome the barrier
8	Organisational	Personnel changes at the beginning of the measure caused some delays to the preparation phase. The measure staff should have been more experienced in the technical system aspects.	New recruitments were made before the system was launched and the SC took over measure leadership. Despite these replacements, it is fair to say that the measure would also have benefited from better know-how on the technical side of measure realization. In short, staff knowhow has not been high enough to question some of the issues posed by the system operator or the IT-operator. It is thus recommendable that staff be recruited with the technical know-how in mind, or that staff are trained on them already at the planning phase of the measure.
4	Problem related	The measure proved rather overwhelming in contents, which resulted in car sharing receiving less attention than originally planned. In retrospect, it would have been wise to just focus on bike sharing in this measure and leave car sharing out. The research, planning, procurement and implementation of a bike share system was a complex task that took more time than originally estimated.	It was decided that car share would be focused on later once the bike share system was up and running. Another reason for this delay was the need for improved parking policies in the city to better support car sharing services. The renewal of parking policies was delayed, but ended up being finalized in 2019, thus allowing for better prerequisite for car share promotion.
7	Planning	Originally the city bike system was planned for 100-150 bikes. This was soon found too small a number.	The city board decided that the system would be implemented with 300 bikes.
7	Planning	The bikes were delivered to Turku very late which caused the testing phase to be minimal, or virtually non-existing. The service provider did not fulfil the system IT requirements as agreed. By the time it became clear that the bike delivery would be late, it was already too late to cancel the launch event.	The lack of testing and a novel way to carry out the IT side presented perhaps the greatest singular barrier for the measure which has had long-term consequences for the popularity of the system. At the same time, there were some staff changes that clearly affected the measure. It is absolutely vital that in similar measures adequate testing period is reserved and proper sanctions are asserted if the service provider fails to deliver the bikes well in advance for testing.
7	Planning	Unfinished service processes	There are service processes that have not been finalized within the bike share system. Service processes have been planned but not brought to action. This is a barrier that was mostly likely due to the technical difficulties and the resourcing issues related.
2	Institutional	As the bike share system was realized with project funding it did not have an administrational ”home” in the start. Therefore, their ownership within the city	This issue boils down to the project-like nature of the system – the system was not integrated into the city PT system administrationally to begin with, which resulted in a lack of full commitment for a certain city department. Although the system was

		departments required some discussion.	branded to the PT office there was no decision about ownership being allotted to it. Discussions on which city department would take over the bike share system after the project did take place throughout the project and finally it was placed under the PT office administration. It is advisable, however, that ownership is defined already at the time when the procurement decision is made for the system.
1	Political / strategic	The issue of finding the locations for the bike share stations became increasingly political. There was a lot of opposition from e.g. land-owners particularly when the placement of the stations would mean losing some parking spaces. Some of the strategically important station locations were only ensured a couple of days before the launch.	After lengthy discussions and several alternative proposals on bike share station placements the city board finally reached a decision on the number and approximate placement of the stations. After that, lengthy negotiations were conducted by project staff on the specific locations with property owners etc. Having a clear city-level strategic guideline or limitations on the placement of the stations – e.g. how many parking spaces can be spared for the stations – would have helped this process as naturally some actors opposed having a station on or next to their property. It is worth noting that in a station-based system this is a time and resource consuming phase that should be adequately resourced.
	Contractual	In retrospect, contractual sanctions were too weak.	It was found likely that the BSS process would have benefited from stronger contractual sanctions for the service provider. Several reclamations have been made throughout the process and this has consumed a lot of resources. This is something that was not anticipated well enough when tendering for the system and planning for its day-today running resource-wise. This evident barrier is something that serves as a valuable learning for all cities implementing similar systems – contracts need to be specific enough in terms of what is required and what can be demanded when those requirements are not met.
	Technological	The system was riddled with technical issues from the start and some of them have persisted throughout the demonstration phase.	The technical issues with the system have persisted and users were likely been lost due to system problems. Only little income from the system has been received due to its recurring malfunctioning and technical issues. There have, for example, been tens of failure reports and reclamations made monthly, e.g. related to issues with returning the bike. It is clear that a longer testing period could have served to avoid some of these problems – however, the SC estimated that some of these issues were inherent to the system and particularly related to the IT interface issues – integrating the bikes to the PT interface.
4	Problem related	Lack of IT knowhow	The complex IT-side of the system would clearly have needed more knowhow both on the supplier and customer side, particularly in the early phases of implementation and demonstration. This had

			apparent negative impacts on measure success. Dealing with these issues did teach a lot and learnings facilitated running the system later in the process. it was mentioned by one stakeholder that the IT side of the measure was perhaps just too ambitious – a lot of the problems would have been avoided had the system not been integrated to the PT office's Föli app but instead the Nextbike app had been used.
4	Problem-related	Customer service arrangements	The customer service arrangements are likely to have created a barrier to system approval for some users. The customer service was divided to different parties (the PT office, the project staff, the subcontractor) depending on the nature of the service – whether the issue be with the user interface, the bikes themselves or some other issue. From the customer point of view, this has been confusing and has resulted in dissatisfaction with the whole system. In retrospect, the customer service should have organized in a simpler manner and longer opening hours for the service should have been provided. As described by one stakeholder, the service offered "has not been easy to buy".
5	Communication	Communication between stakeholders has not always been very successful.	Communication with the service provider, for example was sometimes challenging. The service provider even sometimes conveyed false information, e.g. the information received on the bike deployment was initially incorrect. This lead to some of the user guidance materials already devised having to be rewritten entirely. The service provider also sometimes seemed to say what the project staff wanted to hear instead of addressing problems expressed with enough conviction. These problems persisted throughout demonstration and it is difficult to suggest corrective actions apart from the need to issue stronger sanctions, mentioned already as a separate barrier.
3	Cultural	Car sharing encountered some cultural issues that are bound to act as a barrier for its development.	It was estimated by stakeholders that for car share to gain popularity, using one's own car is still too cheap. In addition, cities are still essentially planned for cars. These issues result in car sharing not being socially or financially viable, making its promotion and marketing challenging. this is clearly a barrier of sorts that cannot be addressed solely by a singular project. Nevertheless is something that should be borne in mind when planning for similar measures.
	Involvement	Somewhat negative attitudes from some of the companies and actors in the city.	An involvement-related barrier was observed in the attitudes of some of the companies and actors in the city towards the bike share system. Some actors did not view the system as service but merely as a bike rack of sorts. There was a lot of controversy about losing parking spaces

			especially with the pop-up stations. in short, the value of the system was perhaps not recognized well enough by some stakeholders. This is an involvement-related barrier that would have benefited from better communicative actions already at the planning stage of the system.
9	Financial	Too much dependency on EU funds	Although the CIVITAS funding was crucial for the implementation of the system in the first place, it was clear from the beginning that city would need to fund the system from its own budget. Already at the beginning limitations were however placed on this amount as it was the intention that the system should soon start funding itself in user fees. Due to the fact that the system did not gain as many users as expected – which was at least to some extent due to the technical difficulties – system income did not reach desired levels. This on its part created pressure on running the system in form of a stalemate of sorts – to gain more users, the system would need to function better and the system would need to be expanded, both in terms of number of bikes and geographically. But to do that, more initial city funding would have been needed.

Table 123: Identified barriers and planned/taken actions.

Personnel changes at the beginning of the measure caused some delays to the preparation phase. This barrier was, however, overcome rather soon as the SC replaced the former ML and took over strong leadership in the measure. According to the discussions with the SC/ML, the measure proved rather overwhelming in contents and ,in retrospect, it would have been wise to just focus on bike share in this measure and to leave car sharing out. The research, planning, procurement and implementation of a bike share system was a complex task that took more time than originally estimated and included some heavy-weight political arm wrestling especially on the issue of finding the locations for the bike share stations.

Some heavy opposition (and thereby lobbying) was met from e.g. landowners, particularly when the placement of the stations would mean losing some parking spaces – or even just one. However, after lengthy discussions back and forth and several alternative proposals on bike share station placements the city board finally reached a decision on the number and placement of the stations. The measure actually faced some planning related barriers already at the start as originally the bike share system was planned for 100-150 bikes only. This was found too small a number to begin with and, with city board approval, the number of bikes to be procured was increased to 300. Unlike with the number of stations and their placement, getting approval increasing the amount of the bikes was a surprisingly light effort according to the former ML. This fact reflects interestingly the barriers related to land ownership, in particular the problematics related to placing city-run functions on privately owned land.

The part on barriers in the stakeholder survey unfortunately only gained responses from four of the stakeholders. Hence no far-reaching conclusions can be made from it. Political, cultural and financial barriers were respectively named as significant for reaching the measure objectives by two respondents each. One respondent emphasized the potential financial barriers posed by not placing enough financial resources on expanding the bike share system.

To function properly, it needs to be understood that the system has to be relatively wide-spanning and include a sufficient number of bikes. Such a system will eventually return on investment.

At the learning histories workshop, the stakeholders rated the main barrier categories with the following weightings**:**

- Financial 8
- Technical 8
- Political/strategic 4
- Resourcing/organizational 3
- Planning/realisation 3
- Communication/involvement 2
- Cultural 2

The above table demonstrates the variety of process barriers that occurred during the measure planning, implementation and demonstration. Many of the **planning** related barriers were overcome successfully during measure realisation. However, as accentuated by stakeholders at the learning histories workshop, **financial** and **technological** issues arose as the main barriers hindering measure success, with strong interdependencies to **resourcing/organizational** issues and **political** or **strategic** agendas, partially affected by failures **in involvement** of stakeholders and **communicative** issues. In essence, the technical issues were largely due to the complexity of the IT system, lack of relevant knowhow, lack of proper contractual sanctions and strongly made more difficult by the lack of a proper testing period. Sorting out the IT issues took a lot of resources, which in its part resulted in less attention being placed on car sharing issues and some failure in involvement and comunication. Although the measure was backed up politically on city-level, issues arose on station placements among many stakeholders.

B.4 Drivers

The main drivers identified for this measure by the measure staff and stakeholders are identified in the table below.

No.	Driver field	Description	Action to make use of the driver
1	Political/ strategic	The BSS had strong political support from the city council	Without a strong drive and will implementing such a system would not be possible.
1	Political / Strategic	There was courage to place the bikes even in such locations that were initially opposed by some parties and landowners. All in all, although the issue of station placement became highly political and sensitive, in the end there was enough momentum and will to push through the city bike station placements.	Discussions with key stakeholders were conducted and various rounds of consultations held. Due to these efforts, stations were placed at desirable locations.

1	Political/ strategic	Originally only 100 bikes were budgeted but when this number was found to be way too small extra funding had to be sought from the city	The additional funding was guaranteed rather easily in the end from the city board. The political support for the objective was a clear driver in this process. Having a system that is too narrow geographically would have been a major barrier to its popularity – hence it was crucial to start with a bigger number of bikes.
5	Involvement, communication	Building the brand for the city bikes has succeeded well. The citizens seemed to own the city bikes very quickly and soon there were even nicknames for the bikes.	The brand was utilised in marketing the system. Successful premarketing of the system managed to create a lot of interest among the citizens.
	Cooperation arrangements	Good cooperation between the project personnel	Good cooperation between the project personnel created a strong driver for internal system development. Internal communication between implementing partners and between different city departments worked well. Staff was motivated to improve the system despite many difficulties. The cooperation arrangement with the bike maintenance subcontractor also worked well. The complexity of the system was such that well-functioning cooperation arrangements are crucial for success.
5	(External) communication	A new approach to implementing a bike share system	Novel elements to implementing a BSS has brought visibility to the system and also backed it up financially. This includes, for example, private companies being able to buy pop-up BSS stations for their premises.
8	Organizational	Open tendering criteria and competent staff at the city to assist with the tendering process	As the tendering included some novel elements for a bike share system, expertise was needed for the process. This was already available in the city. The tendering criteria was open for anyone to view and many external parties have utilized the experiences from the Turku tendering process since, serving as a clear driver for replication.
10	Technological	The running of the bike stations worked well	Despite the many difficulties related to the bike's IT side, the bike stations were relatively care free and no major issues have occurred with the station maintenance. In the wintertime during heavy snowfall there has been some extra work as snow has often been ploughed to the stations, blocking entrance to the bikes, but even this issue could be solved with the city street maintenance subcontractor.
7	Planning	The measure relied on meticulous planning and benchmarking of existing bike share systems. There was a strong overall vision on its realization.	Measure planning utilized the right kind of expertise needed at each particular phase of planning and implementation (e.g. on tendering and procurements). The cooperation with the Turku Region Public Transport office has been tight and there has been a strong will to break traditional operating models in setting up the bike share system.

7	Planning	Good timing and strong vision on the system aspects	There was a strong shared overall vision of the system and its unique components in the city. The technical approach of the system was not criticized in the planning stage and the novel elements – e.g. having a year-round system, having separate digital and physical marketing – were bravely embraced. the surrounding municipalities were also involved in the tendering process, having the option of expanding outside Turku city center.
3	Cultural	There was a clear social demand for the bike share system.	Cycling culture has been thriving in Turku in the recent years, a fact which created a fruitful atmosphere for the bike share implementation. This has been backed by long standing citizen and city-steered activities to promote cycling.
9	Financial	The fact that project funding was received for setting up the bike share system facilitated the process remarkably. Without external funding, it was estimated that the system would have been realised years later.	The project funding assured that funding would be allocated to the bike share system in the city budget. Also the fact that the system was linked to the Föli travel card was a driving issue that probably brought more users to the system.

Table 124: Identified drivers and planned/taken actions.

The importance of project funding as a driver for a pilot such as a bike share system cannot be underestimated. The fact that project funding was received for setting up the bike share system facilitated the process remarkably. Without external funding, it was estimated that the system would have been realised possibly years later. Political acceptance and subsequent budget allocation was gained somewhat easily for expanding the system from the original plan of 100-150 bikes to 300 bikes. The strong political support for the objective has thereby been a clear driver for the measure. Ultimately there was even political courage to place the bike share stations even in such locations that were initially opposed by some parties and landowners. All in all, although the issue of station placement became highly political and sensitive, in the end there was enough momentum and will as to push through with even the most challenging station placements.

In addition to political support and will, there was a strong overall vision on its realization among the project partners. The measure relied on meticulous planning and benchmarking of existing bike share systems. The measure staff succeeded in utilizing the right kind of expertise needed at each particular phase of planning and implementation (e.g. on tendering and procurements). The cooperation with the city and the Turku Region Public Transport office has been tight all along and there has been a strong will to break traditional operating models in setting up the bike share system. It is also worth mentioning here that building the brand for the city bikes has also been a significant driver for the demonstration phase. The citizens have seemed to own the city bikes very quickly and soon even nicknames had been invented for the bikes.

The part on drivers in **the stakeholder survey** unfortunately only gained responses from three of the stakeholders, despite the fact that eight stakeholders commenced the survey for this measure. Hence no far-reaching conclusions can be made from it. One respondent stressed the importance of the financial driver of having a bike share system and considered them an

excellent investment in the sense that in long term, bike share systems will become fully or almost fully funded by the users. The respondent stated that with some relatively minor investments from the city, the system could eventually be expanded to include 1500-2000 bikes and then truly be able to return the investment. The failure to reach the stakeholders for this measure was compensated by hosting a learning histories workshop at the PER2 phase.

At **the learning history workshop**, the stakeholders were given stickers to rate the main driver categories. The following weightings resulted:

- Planning 7
- Political/strategic 5
- Cultural 5
- Organizational 5
- Communication 4
- Financial 4

The above table demonstrates the variety of process drivers that served to facilitate measure planning, implementation and demonstration. The importance of **planning** as a driver was clearly accentuated by the stakeholders, as well as the **political will** to implement the system. **Organizational** issues also clearly drove the measure forward – the staff worked hard to accomplish measure goals and the cooperation between measure partners and different relevant city departments as well as with the maintenance subcontractor worked well. As shown in the previous chapter, technological issues with the system created numerous barriers for the measure process – however without the strong **commitment** of measure staff to solve these issues their impact on the system could even have been more severe. Naturally the **financial** support provided by ECCENTRIC was crucial for the implementation of the system in the first place.

B.5 Influence on risks

Out of the risks identified at the start of the project, the ones related to the technical realisation did end up posing a risk to system realisation. Misuse of the system and subsequent effects on availability of user data were not relevant in the end. GPS data was not received from the beginning of demonstration but once it started functioning, only minor data malfunction was experienced.

The financial profitability, or lack of thereof, in the later stage after project funding has ended was mentioned as a potential risk by both the SC/ML and the former ML. This was not a risk to reaching the short term objectives of the measure but certainly was one for the long term objectives of possible expanding of the bike share system. At the time of writing, it has been decided by the city council that the system will be retendered with budgetary limitations once the current contract expires.

A risk that was not anticipated by the SC or LEMs was the time and resource consuming nature of the bike share implementation and demonstration. Due to this, car-sharing promotion received less attention than originally planned.

Identified risk	Category	Mitigation actions	Responsible
Risks related to the technical realisation of city bike system, misuse of the system and subsequent effects on availability of user data	4	Flexibility of the budget, proper communication plan to launch and inform about the usage, positive examples	ML, SC
Lack of respondents to the targeted web-based survey questionnaire	4	Thorough marketing of the survey; possible "carrots" to survey respondents	ML
GPS data malfunction	3	Pre-testing and regular quality control	ML
The BSS is currently facing a rapid change with free floating BSS systems becoming a viable option in the market.	7	It was decided to procure a BSS that combines stations with the possibility to offer also free-floating bikes at the later stage. Also the it-platform is developed to incorporate other service providers in.	ML
Financial profitability or lack of thereof in the later stage, after project funding has ended.	9	No actions have been so far taken.	SC
It is unclear at this stage whether the goals for car share will be reached in full extent.	7	The SC is working on acquiring more service providers to offer car share services.	SC

Table 125: Reported period risk assessment.

C.Conclusions

The following section summarizes the main process findings and lessons learnt for measure TUR 5.5. Some process recommendations are also presented.

C.1 Main process findings

The measure succeeded in bringing about its main goal – the launch of the first bike share system in Turku. Many elements of the system were realized in an innovative and novel manner, serving as an example for many cities in Finland and abroad. Good planning, political will and communicational and organizational strengths drove this process. Measure process was, however, fraught with mainly technological and contract related challenges throughout the planning, implementation and demonstration phases. It is clear that the arduous nature of the measure consumed resources from the other Turku measures as well. It was decided by the city council in spring 2020 that the system would be retendered once the current contract expires. This naturally presents an opportunity to avoid the mistakes, mishaps, of the current system process. This measure overall was filled with process learnings and it can be even stated that these were one of the main outcomes of the measure. – an outcome which has already been utilized by other cities.

C.2 Process lessons learnt

- Setting up a bike sharing system is a huge undertaking that needs to be properly resourced both in terms of personnel, time and money. At least a minimum of 1.5 years should be reserved to a similar effort.
- Proper testing of the system is crucial in order to avoid (technical) problems in the first months of system launch. This is possibly the most important project lesson needed to ensure a well-functioning system from the start. In Turku, not having a proper test period lead to unnecessary technical hassle and demanded a significant amount of

personnel resources. It is likely that the recurring technical issues – widely reported in the media as well – in their part caused negative attitudes among the citizens and a subsequent loss of potential users.

- One clear learning was that one should perhaps not be too optimistic when it comes to system malfunctions. The attitude of measure staff on system issues was perhaps too optimistic in the beginning as the staff thought the problems would be solved rather quickly. Then, however, the problems persisted. To tackle the issues more sternly with the system provider would have been advisable to begin with. This is also related to the need of having stricter sanctions in the contract.
- The value of marketing should not be underestimated. Established professionals should be utilized in marketing – it might be worthwhile to subcontract system marketing entirely.
- The relevant service processes should be prepared well in advance to the system launch in case everything does not go as planned. In the Turku case, for example, no one had prepared for the arduous nature of the reclamations related to the malfunctioning of the system – e.g. returning money to users who had returned a bike but who were charged for a longer use period due to problems with the user interface. Again, this issue boils down to the necessity of having a proper test period – without one it is difficult or even impossible to anticipate the most likely problems that may occur along the process, or the resources or knowhow needed to fix them.
- It needs to be ensured that the customer service is well functioning and customer-friendly.
- It was unfortunate but necessary due to the massive amount of resources needed for implementation of the bike share that car sharing received less attention in this measure. In retrospect, it could be concluded that it would have been wiser to focus just on the bike share in this measure.
- It should be properly acknowledged that there are risks entailed in launching a system with some unique characteristics and that dealing with this risk needs some financial leeway and trust in the project manager. In the Turku case, the bike share is a year-round system – the first of its kind – an issue that even increases the risk as it creates an extra layer of issues to consider. Also integration of the system to the PT ticketing system was something that had not been done everywhere and was not without its problems – however it was necessary to enable the concurrent MaaS development in the city.

C.3 Process recommendations

It's all in the planning!

In order to assure both quality of implementation and ease of process, attention must be paid to both technical testing of the system prior to launch and preparation of the tender.

Political will and commitment is essential

In order to implement a system such as bike share, political agreement and will is needed both for assuring the continuation of the system and some strategically important decisions, such

as the placement of the stations. Station locations are vital for the usability of the system and often political leverage is needed to ensure that the best locations are secured.

Communication and involvement of stakeholders should drive planning

To assure that the placement of bike stations goes smoothly, adequate resources should be placed on stakeholder communication and involvement already in the planning phase of the system.

Contractual issues are crucial

Strong enough sanctions are needed to assure a functioning system with the service provider. That being said, carrots are also a good element to steer cooperation with the system provider. All in all, tendering issues and subsequent contracting need to be meticulously planned.

Pay attention on fluent customer service from the beginning

Customer service really needs to be customer-friendly to avoid loss of users.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MUC 5.6

Conception and development of an integrated e-bike sharing system

Process Evaluation Report

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Partner nº	Organization	Country	Abbrev.
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3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

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29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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ECCENTRIC	Munich		
Measure code	**Measure name**		
5.6	**Conception and development of an integrated e-bike sharing system**		
Last update	**Responsible**	**e-mail**	**telephone**
30.10.2019	Ruth Schawohl	Schawohl.Ruth@swm.de	+49 (0)89 / 2191-2017

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- Reduced energy use/CO_2/emissions
- Reduced air pollution
- Reduced road congestion
- Increased accessibility for all
- Better social inclusion and equal opportunity
- Increased liveability

(2) Strategic level:

- Strengthen the role of public transport companies as backbone of sustainable urban mobility
- Foster e-mobility and public multimodal transport systems

(3) Measure level:

Long term:
- To increase knowledge of public pedelec / e-bike sharing schemes
- To evaluate and adopt potential users
- To create a replicable and profound concept on a e-mobility solution (public eTrike-sharing)

Short term:
- To test the prototype
- To develop it further based on the tests
- To reduce the individual car use
- To reduce transport-related emissions

A.1.1 Quantifiable impacts

Expected Impacts	The expected effects with the development of the prototype are an increased awareness and acceptance of E-Trikes. More importantly the access to this option, gives elderly and physically impaired the opportunity of being mobile on their own (without assistance) and without necessarily using a car. If successful, a city-wide integration of the E-Trike in the MVG Rad bike sharing system could have an impact on the mode choice of elderly and physically impaired people, and the corresponding reduction of VKT by car.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Increased awareness / knowledge of public pedelec / e-bike sharing schemes					X	X				
2	Acceptance of the e-trike					X	X	X			
3	Satisfaction among e-trike users	X	X		X						
4	Mode shift towards less car use							X			
5	Reduction of private car kilometers by e-trike users	X	X								
6	Increased access to mobility services for mobility impaired groups	X				X	X	X			
7	Contribution to integration of the E-Trike into sustainable urban mobility plans in Munich					X	X	X			

Table 126: Quantifiable impacts.

A.2 Measure description

The reduction of individual car use and the availability of multimodal mobility for everybody is a challenge for the future and a key objective of the public transport operator in Munich. This measure will develop and test an electrically powered trike ("eTrike") with sharing capabilities, as a possible extension of the existing *MVG Rad* public bike sharing system in Munich as part of a multimodal public transport system and solution for medium distances in a city as well as its surrounding area.

The measure includes the development of the actual vehicle, charging infrastructure, an app to enable sharing of the trike, and the testing of the resulting prototype in the Living Lab.

Within this measure, the barriers, drivers, key indicators and the best framework for the deployment of e-mobility for bike sharing systems are analyzed. A particular focus will be on the integration of an eTrike in the bike sharing scheme (MVG Rad).

A.2.1 Measure outputs

The measure will produce an eTrike prototype, including charging infrastructure and a corresponding app. Further, the system will be tested in the Living Lab.

A.2.2 Supporting activities

None

A.2.3 Interactions with other ECCENTRIC measures

For the testing of the prototype in the Living Lab, a potential involvement of the Concierge (MUC 7.5) was planned. The Concierge could serve as a registration and information point for testers and at the same time make sure that the corresponding evaluation actions can be conducted. However, due to technical problems with the MVG eTrike prototype, the test could not take place yet.

A.2.4 Interactions outside ECCENTRIC

After the successful vehicle development in ECCENTRIC, up to 20 prototypes were built for large-scale public testing within the Horizon 2020 project *Smarter Together* in Munich's Neuaubing-Westkreuz/Freiham neighbourhood.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
1	Domagkpark Residents	Domagkpark	Residents able to test the eTrike and who want to carry heavy loads
5	Test persons with impairments	Domagkpark	Residents with impairments to test the eTrike

Table 127: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC project partners and other important actors

Main stakeholders are various departments of the public transport operator MVG, local authorities, and participants from the test group. In the following table, the stakeholders are summarized by function. See Evaluation Plan for all details.

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
1	MVG	P	PT	L	Measure Leader
2	MVG Rad Customers	S	Other	O	Test/Feedback
3	Disabled Advisory Committee	S	NG	O	Consulting on special needs of target group
5	City of Munich	S	C	O	City Policy
6	UnternehmerTUM	S	KI	P	Conception and construction of the prototype
7	Other subcontractors	S	PR	P	Production of the different vehicle components
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					

Table 128: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Low level of citizen and stakeholders' involvement	Involvement	Permanent report to stakeholders and target groups organizations	ML
Delays in local measures are detected too late	Problem-related	Permanent check of the milestones and the progress of the measure	ML
Delay in implementation of measure	Problem-related / Planning	Permanent check of the milestones and in case of delay implement alternatives for action	ML
Low level acceptance of new mobility services and transport solutions	Involvement / Acceptance	Make the service as accessible as possible.	ML

Table 129: Risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning milestones

To meet the objectives, an extensive analysis and a plan for the further steps was developed together with TUM, MakerSpace and UnternehmerTUM. In September 2017 the collection of data for the ex-ante evaluation were completed.

Phases 2: Procurement & Implementation

The first eTrike prototype was ready in October 2017 and one month later also the concept for the eTrike was finalised. Based on this, the procurement for the needed components was made and a second prototype was finished.

Phase 3: Demonstration and monitoring

Some improvements of the eTrike prototype had to be made and in July 2018 the final prototype (incl. charging stand and app) was ready for testing. In order to meet security requirements (concerning the app and IT processes), penetration test took place before the app was launched.

A test in the Living Lab together with interested stakeholders is planned in cooperation with the Domagkpark Association and the new Concierge System (MUC 7.5, see section A.2.3). Due to existing technical problems with the eTrike and now the Corona crisis, the date of the test is not clear yet.

NOTE: In cooperation with the EU project *Smarther Together* (see section A.2.4*)* 19 eTrikes (05/2019) were implemented in the area of Neuaubing-Westkreuz. During two weeks of testing they became targets of vandalism: four eTrikes completely disappeared and batteries were stolen from five others. As a result, the eTrikes were called back and a new prototype with a safer installation of the batteries was commissioned.

B.2 Process evaluation activities

The ML and LEM held a close contact to exchange information about the latest encountered barriers and drivers during the development phase of the measure.

Standardized form surveys were used to get information about the roles, tasks and backgrounds of the various stakeholders, as well as their view on barriers, drivers, and risks of the measure. The online survey was spread to all applicable stakeholders with the help of the ML and reminders were used to maximise the response rate.

In a joint effort with other LEMs, a common survey framework was developed and operationalized with the open source survey tool "Limesurvey" (in the case of Munich).

After collecting general information about the stakeholder and its role in the project (job, tasks, contact information, and engagement in which phases (planning / implementation / operation

/ maintenance / others), we asked for opinions about barriers and drivers in a two-level-approach:

In a multiple choice set, stakeholders were asked to identify supporting thematic areas / sectors for the measure:

- Political / strategic
- Institutional
- Laws and regulations
- Cultural
- Problem-related
- Involvement / Communication
- Planning
- Organisation
- Financial
- Technological
- Spatial

In the next level, we asked for a detailed description of the drivers in detail as well as how these drivers were used to maximise the measure's impact.

Through this approach, we are able to identify both general supporting sectors, but also detailed, measure-specific information about drivers with a high level of information. Showing the full list of sectors first did also 'inspire' stakeholders to include all possible drivers they could find.

The same methodology was used to collect information about barriers.

The last block in the survey asked about risks of the measure. For each risk, we asked for an assessment about the likelihood as well as about the risk's potential to endanger the measure's success.

In total, seven stakeholders from various involved parties participated in the survey. With the help of the new ML, we are sending some targeted reminders in order to increase the sample further.

To complement the information which is given through the stakeholder online survey, an emerging pattern of all stakeholders is mapped in a three-dimensional chart. All ML were asked about the perception where to locate themselves and other relevant stakeholders within the stakeholder analysis matrix. The objective of the stakeholder analysis is to engage stakeholders in order to improve process and maximise impact. Each stakeholder is given a coordinate within the chart. The coordinate depends on the stakeholder’s power potential (the bigger the bubble the higher the power potential), the interest (between low and high) and the ability to impact the measure (from low to high).

Figure 82 (p.518) shows the stakeholder analysis of the measure 5.6. As ML, the MVG - Münchner Verkehrsgesellschaft mbH (MVG) - has the highest interest and ability to impact the measure, it is coordinated as the biggest bubble in the highest right corner.

Other important stakeholders are the technical subcontractors who are to be found with a medium power potential and medium interest on top end of the matrix with a high ability to impact the measure. There are several institutions and firms that work together to set up the

eTrike technical wise and regarding the hardware components. This collaboration between different firms is coordinated and contracted with MVG.

On the high-interest side of the matrix is the international and interdisciplinary student team of the UnternehmerTUM. They were highly motivated and interested in the solution. Two master theses and several seminar papers were written. At the same time, the ML made the final decisions, so their possibility to influence the measure were medium.

The testers of the eTrike were also very interested and motivated a gave feedback to the ML MVG as well as associations such as the Pfennigparade foundation (association for persons with or without physical disabilities to facilitate an integrated life). They were contacted and informed by MVG about the program itself and presented a solid pool of testers for the eTrike. They do not have too much ability to impact the measure but are still important for the testing phase. In addition to that, there are residents of the Domagkpark testing the vehicle.

The city council can also be seen as a stakeholder with high power potential and quiet high interest in the measure. They could facilitate a project like this politically as well as financially. Important for this measure was, for example, a city council request in the field of sustainable mobility, in which a test of a bike (trike) for people with physical impairments in a public rental system was demanded.

Other methods added to the above described analysis which were assessed for PER-1, are:

Review of measure reports as well as some informal observations from the Living Lab
Carrying out guided (expert-) interviews with relevant stakeholders.
Carrying out a **learning history workshop** with relevant stakeholders (12/03/2020).

Another method added to the online stakeholder survey and the stakeholder analysis is the **review of measure reports** as well as some informal observations from the Living Lab and its residents taken into account for process evaluation. In order to get a complete picture, both the opinions from the former ML as well as from the current ML were included in this report.

Especially the **guided interviews** help to look deeper into the process and its main barriers and give a helpful overview for the lessons-learnt part. The interview questions are developed in cooperation with the ML and contain the following matters:

General information about the current status of the measure implementation
Personal reaction when asked for the sensor installation: positive thoughts and worries
Explaining the whole procedure of first contact to usage
Potential usage of the eTrikes when they are finally launched
General thoughts on transport, mobility and environment

One of the interview partners is former students who was part of the UnternehmerTUM and MakerSpace and contributed with his Master Thesis to the conception of the eTrike. Furthermore, there was one of the subcontractors interviewed, which delivered components to build the eTrike and offered the MVG eTrike App as a White Label solution.

The choice for executing guided telephone interviews was made because it is a simple method to gain deeper insights from an important stakeholder and to keep the time expenditure of the residents and the LEM on a low level. The interviews were guided with the same questions so that there can be a valid comparison of the answers in the end. In total there were 2 telephone

interviews carried out. The interviews lasted about 30 minutes and were recorded in key sentences on paper. The results of the interviews are to be found in section B.3 Barriers.

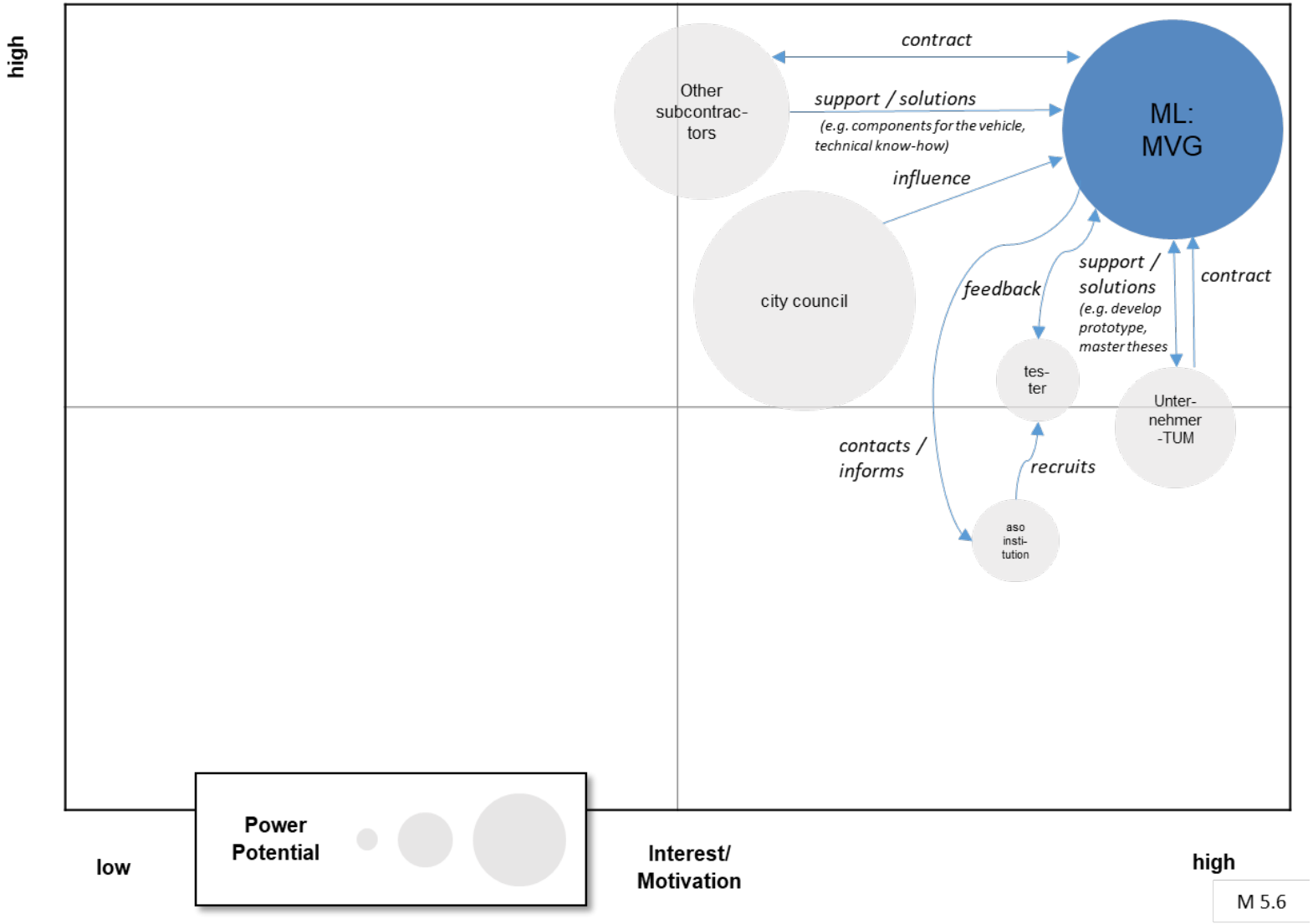

Figure 82: Stakeholder Analysis

The **Learning History workshop** is a method for evaluating the whole process of a measure ex post regarding its planning, implementation and operation performance. For this purpose, the stakeholders involved in the measure are invited to explain their experiences, regarding the applied strategies, the achieved results and what happened why, in chronological order. The aim is to learn from the actions and experiences of those involved and to draw conclusions that will be of added value for the planning of future projects.

The workshop was structured in the following steps[16]:

- Reconstruction of the measure process with timeline and milestones.
- Milestone evaluation with defining barriers and drivers of the process.
- Definition of “actions to overcome” the corresponding barriers and possibilities to make use out of the drivers.
- Reflection of the results and concluding the experiences of the participants under “lessons learnt”.

For this measure, the learning history workshop was organized by the ML and was conducted on 12/03/2020 at the ML’s institution together with relevant stakeholders which accompanied (parts of) the measure process. In total, 2 stakeholders joined the one-and-a-half-hour workshop session, which was led by the ML and supported by a student, who is involved in the MVG eTrike project. Due to the process itself and several changes of personnel, not all participants accompanied the entire measure development (see section 0 Barrier) and could take part at the Workshop.

During the workshop, a measure timeline (see Figure 83) including the most important processes and milestones was developed and analysed. For a more detailed description of the important milestones, see chapter B.1 (p.514).

As a second step, the most important barriers (see chapter 0) and drivers (see section 0) of the process were identified and discussed. Also, the experiences, how barriers could be overcome und drivers were used to foster the measure were discussed. Finally, the experiences of the participants were concluded under “lessons learnt”.

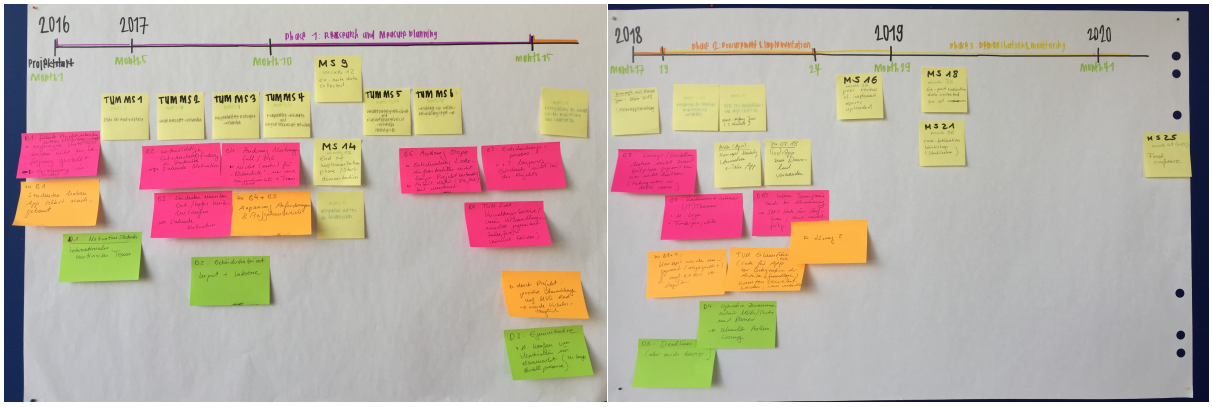

Figure 83: Measure timeline of the learning history Workshop (was finalised afterwards)

[16] Learning History Workshop was designed after “Refined CIVITAS process and impact evaluation framework”, 08/2017, see ANNEX 7 LEARNING HISTORY SESSIONS.

B.3 Barriers

Institutional barriers as well as technological ones were the most prevalent barrier fields in this measure. The details are given in the table below:

No.	Barrier field	Description	Action to overcome the barrier
1	Technological	No rental-enabled eTrikes available on the market.	The eTrike was developed within ECCENTRIC.
2	Technological	Procurement and installation of components was complicated.	Specialized sub-contractors to solve the problem, regular exchange between sub-contractors under lead of the ML.
3	Technological	Charging interface had to be developed from scratch.	Specialized sub-contractors to solve the problem.
4	Technological / Institutional	Integration into the MVG Rad system is complicated or rather takes a lot of time.	White label App was built; integration is possible, if the MVG eTrike will be replicated in the city (after the project, with more time)
5	Institutional	Contracts between ML and sub-contractors were partly highly complicated to establish.	Increased negotiations were successful in the end. If there is just a commissioning, special agreements in add in addition.
6	Laws and regulations	Strict regulations for offering a public rental service regarding privacy policy.	Early check of the requirements due to the strict regulations and transparent communications from the beginning.
7	Problem-related	For producing the eTrike many different subcontractors are necessary which means additional coordination effort and deeper technical expertise to make decisions.	Regular exchange between sub-contractors under lead of the ML were organised. Advisable: Establish a dual management system, one project manager and one technical project lead or have an advisory board of experts consulting the project. Define a more precise schedule, responsibilities and expectations and reach an agreement about the requirements in the early project phase.
8	Planning	There were delays in the delivery of several components. In addition, the pool of possible suppliers is rather small.	Stay flexible and proof concept/scope regularly with the whole team, but do not change the scope too often.
9	Planning	Slight change of eTrike concept during the running manufacturing process.	Hand out a comprehensive and complete set of (detailed) requirements to the developers and manufacturer.
10	Planning	Decisions had to be made under pressure regarding the tight ECCENTRIC project schedule, and sometimes not due to the best possible technical point of view.	Search for additional financial resources, creative alternatives or accept the situation and try to keep the motivation high.
11	Financial	Decisions had to be made: not due to the best technical solution, but due to the financial framework.	Include a higher risk surcharge from the beginning or look for other financial supporting alternatives.
12	Communication / Involvement	Opaque communication made it sometimes difficult to understand crucial decisions, influencing the process.	Communication between the organizational and the technical team should be more transparent. Take more time for exchange and a joint discussion and make decisions as transparent as possible, so that the motivation maintain high.

			Clarify responsibilities and expectations and reach an agreement about the requirements in the early project phase.

Table 130: Identified barriers and planned/taken actions.

The measure is very ambitious both from a **technological** as well as from an **institutional** point of view. As no rental-enabled eTrikes are on the market, yet, a new prototype had to be developed and built from scratch (#1). This leads to an endeavour the ML could not do alone, various sub-contractors with certain specializations were needed. Especially the procurement and installation of the electric components and the development of the charging interface from scratch are complex aspects for which experts are necessary (#2 and #3). One of the subcontractors who is a long existing firm in the sector of e-bike motorization stated in an interview with them LEM that the need to build this eTrike from scratch was underestimated. After the prototype was built, it came out that this solution is not suitable for outdoor usage because the cable duct on the bike frame is not weather resistant in the long term. The interview person added that more money should have been invested if the entire eTrike should have been built up with the needed components actually coming from one or two suppliers and not multiple ones.

Related to this issue (various sub-conctractors), the contracts or rather further conditions in addition to the commissioning with the sub-contractors were partly highly complicated to establish (#5). Increased negotiations were successful in the end. The main point was, that due to common procurement procedures mostly commissioning were the basis of the work with the sub-contractors. Special agreements in addition to a commissioning are advisable, if companies are responsible for task like in this project. Another barrier from an **institutional** point of view is the integration of the eTrike into the existing MVG Rad bikesharing system. This existing commercial solution (based on technology from nextbike) has only limited open interfaces. Moreover, other existing priorities for the IT as well as the MVG more App and the “time factor” for this project lead to an own App for the MVG eTrike (a white label solution).

A barrier regarding **laws and regulations** were the strict regulations for offering a public rental service regarding privacy policy, which were not clear to all stakeholders. An early check of the requirements due to the strict regulations and transparent communications from the beginning are advisable.

The large number of different components and the small number of market providers leads to a **problem-related** barrier: many subcontractors are necessary to produce the eTrike. The large number of different companies causes planning and coordination issues (#7). Hierarchical structures within the whole eTrike consortium also made it difficult to communicate and took time in particular. This was stated in an interview with one of the component manufacturers. It would have been a smoother process if all components come from less manufacturers. As this was not possible, a regular exchange between sub-contractors under the lead of the ML was the solution, which was feasible in context of this project. For a measure like this and within this framework conditions, a deeper technical knowledge basis of the decisions-maker(s) is needed (e.g. of the ML). To overcome this barrier an idea could be the establishment of a dual management system. That means there is one project manager and one technical project lead. This dual management approach could help to develop more transparent and well-founded decisions (also important for #12). An alternative could be an advisory board of experts to consult the ML. Moreover, it is advisable to define a more precise

schedule, responsibilities and expectations and reach an agreement about the requirements in the early project phase.

Regarding the **legal** part of the process there is one barrier to depict: Strict regulations for offering a public rental service regarding privacy policy (#6). In addition, the security rules within the SWM/MVG changed during the project. For this reason, penetration tests took place (effect on costs and timeline). This barrier could be overcome by an early check of the requirements due to those strict regulations and transparent communications among all relevant stakeholders from the beginning.

Furthermore, the whole process is more prone to delays of individual component suppliers, which leads to another **planning** barrier. There were delays in the delivery of several components (#8). In addition, the pool of possible suppliers for this very new eTrike idea is rather small. Therefore, it is important to stay flexible and proof the concept/scope regularly with the whole team, but do not change the scope too often at the same time. Another bigger milestone which stepped in during the running process of manufacturing the eTrike prototype is the change of concept (#9). Before the aim was to build a eTrike prototype only for completely handicapped people but the concept broadened as this vehicle should be available in public space for less handicapped people and to transport heavy load (so for all residents as well). Technical adjustments had to be done and this brought another delay into the process. This could have been prevented with a more precise description of requirements regarding the eTrike concept. Another planning barrier, which was stated during the interviews with the involved stakeholders, is about decisions. They had to be made under pressure regarding the tight ECCENTRIC project schedule, and therefore sometimes not from the best possible technical point of view (#10). To search for additional financial resources could have helped to support the existing structures and make decisions not just for the sake of limited finances and time. Other possibilities are to look for creative alternatives or just to accept the situation and try to keep the motivation high.

A **financial** barrier was mainly caused because there were no known exemplary eTrikes for a rental system on the market at that time. The budget (and time) for developing and actually building the prototype was limited (#11). When the prototype was finished there was not much money and time left for technical integration into other existing systems or error search. Decisions had to be made but mostly not due to the best technical solution, but due to the available financial framework. This could have been prevented by including a higher risk surcharge right from the beginning or by looking for other financial supporting alternatives. The high costs which were caused by building a prototype from scratch were a bit underestimated.

A very important **communicative** barrier was stated by one of the technicians who was closely involved in the prototype-building process. It is about the cooperation between the manufacturing team and the product owner on sides of the ML's institution. Opaque communication fostered the fact that decisions was not always understood (#12). Communication that would have been more transparent between the organizational and the technical team would have helped. It is important to take enough time for exchange and a joint discussion to make decisions as transparent as possible, so that the motivation stays high. Therefore, to clarify the responsibilities and expectations and to define an agreement about the requirements in the early project phase is highly recommended.

B.4 Drivers

In detail, the following drivers were identified:

No.	Driver field	Description	Action to make use of the driver
1	Institutional	Cooperation with UnternehmerTUM and existing structures within the ML's institution.	Master's Theses were written for the project. The "MakerSpace" could be used. Existing networks and contacts could be used to develop the project.
2	Involvement and Communication	Intensive and good collaboration with target group's associations, MVG and UnternehmerTUM	The measure could be designed in a way that fits perfectly the needs of the target population
3	Political	City council decision on MVG bike	Political support was helpful in general
4	Planning	Early market analysis	ML noticed very early, that a new-development of the vehicle is needed.
5	Organisational	Good cooperation between MVG and other partners	Stakeholders emphasize the constructive and goal-oriented atmosphere in the measure's team
6	Financial	ECCENTRIC Funding	Only the project funds allowed the development of the prototype

Table 131: Identified drivers and planned/taken actions.

From the **institutional** point of view there were many structures facilitating the process: on one hand the cooperation with the UnternehmerTUM which offered a place with their MakerSpace to develop the eTrike prototype. This scientific environment facilitated a more detailed development approach as an entire team was working on the project and in addition, Master's Theses and seminar papers were written for the project. The "MakerSpace", a prototype workshop and subsidiary of the UnternehmerTUM, could be used. On the other hand, there were several facilitating structures within the ML's institution regarding an existing network of experts which could be used and a simpler implementation of the app because of a technical environment which already existed (e.g. MVG more app).

The ongoing support both **politically** but also the **involvement** of target group associations was important to design the prototype in a way that it fits the actual needs of the potential users. In addition, the motivation from the stakeholders (especially of the people of the Disabled Advisory Committee as well as of the students) was very high and therefore important for the project and the motivated ML. The local politics also had this topic on their agenda, as there was a city council decision that had a positive influence on the development of the eTrike prototype.

The **planning** was successful in a way that very early in the planning phase, the market analysis revealed that no suitable vehicle is available and thus, the planning to build a prototype could get started. To support the planning process, the university's "MakerSpace" conducted a prototyping workshop. The results could be used for building the eTrike (#4). This cooperation with UnternehmerTUM was the core of the entire prototype development.

Regarding the **organisational** part of the process there is a general driver to be observed induced by the constructive partnership arrangements between the various stakeholders involved in the prototype development. This was mostly very good, as emphasized by many partners. This lead to a solution-oriented cooperation that was helpful to find constructive solutions for tough technical challenges.

Finally yet importantly, the European **funding** made this ambitious project possible after all.

B.5 Influence on risks

The prototype development is finalized. Current risks are more related to the question of how exactly the testing in Domagkpark can take place, in order to evaluate potential impacts for the measure. In the moment, it looks very good that the tests can take place.

However, the actual impacts on the Living Lab remain low, as this measure has been developed as a prototype.

Identified risk	Category	Mitigation actions	Responsible
Delay in implementation of measures makes a complete impact evaluation impossible	Problem-related / Planning	Permanent check of the milestones and in case of delay implement alternatives for action	ML
Low level acceptance of new mobility services and transport solutions	Involvement / Acceptance	Permanent report to stakeholders and target groups organizations.	ML

Table 132: Reported period risk assessment.

C. Specific observations on the supporting activities in this reporting period

There are no relevant supporting activities to be reported.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MUC 5.9

Intermodal (E-)Mobility Stations Process Evaluation Report

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Responsible Co-Author(s):	
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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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EUROPEAN UNION

Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS

Partner nº	Organization	Country	Abbrev.
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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List of Co-authors

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Project	City		
ECCENTRIC	Munich		
Measure code	**Measure name**		
MUC 5.9	**Intermodal (E-)Mobility Stations**		
Last update	**Responsible**	**e-mail**	**telephone**
15.10.2019	Stefan Synek	stefan.synek@muenchen.de	+49-(0)89-233-39821

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

(1) City policy level in perspective of CIVITAS goals/ longer term:
Promote sustainable, clean and efficient urban transport measures
Testing new innovative measures in the Living Lab
(2) Strategic level:
Mobility stations become part of a new urban mobility lifestyle.
Very integrated approach: car-free housing / lower car ownership rate / lower housing costs by innovative mobility concept / synergy effects by cooperation with neighbouring commercial zone
Acceleration of the area, parking problems at the surface, attractive urban space, housing costs, life quality, legal and operational questions, participation
Standardized planning and implementation process for new development and housing areas within Munich´s urban planning
Mobility stations as a proven concept for city wide up scaling in order to shift modal share towards more sustainable mobility
(3) Measure level:
Increased awareness of residents about the multimodal variety of mobility services within the Living Lab but also in the entire city
Positive acceptance and active usage of the mobility station services by inhabitants and customers at the project area
Mobility stations as a new bundled supply of all modes of transport for all mobility needs
Two different types of mobility stations at the same development area adapted to the local spatial and socioeconomic situation
Provide different vehicles to use and share (i.e. (electric) car sharing, bikes, cargo bikes, etc.)
Test of newly developed electric vehicles within a public mobility service concept
Introduction courses and events for using new vehicles and ways of mobility

Directly observable and measurable goals:

Overall goal: To provide many mobility services allowing residents to live a “private-car-free-life-style” or at least to have significant lower mobility costs.
To reduce mobility costs
To change mobility behaviour towards less car use
To maintain current low levels of car ownership (reduce even further?)

A.1.1 Quantifiable impacts

Expected Impacts	Reduced car ownership, lower housing costs, increased awareness and acceptance of new (shared) mobility services, development of attractive urban space, public participation in planning process, foundation for legal and operation planning standards for Munich's urban planning. Sustainable mobility behaviour among residents.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Awareness and acceptance of the mobility stations and the different mobility services					X	X	X			
2	Satisfaction with the mobility stations and mobility services among users					X	X				
3	Mode shift towards more sustainable modes by the users	X	X		X						
4	Reduction of car ownership by the users							X			
5	Reduction of VKT by app users	X	X								
6	Reductions of CO2 emissions	X									
7	Reductions of NOx and PM emissions		X								
8	Increased access to mobility services					X	X				
9	Increased social equity, affordability of mobility services					X	X	X			
10											

Table 133: Quantifiable impacts.

Facilitate a car ownership rate of less than city average (cars per household) within the project area, resulting in less parking demand and public space usage
Increased social equity: low income households are able to use cars through sharing
50% of all potential users are users of the mobility stations and their services (Baseline: 4.000 Inhabitants live at the development area (3.000 Inhabitants (over 18) are potential users of the mobility stations and their services)
Reduction of car kilometers of 1,96 million/year, modal shift to public transport and bicycle usage
Reduction of CO2 emissions of 400 tons within the project lifetime
Reduction of NOx and PM emissions

A.2 Measure description

In order to promote a more sustainable mode of mobility and to create a real alternative to private car ownership, the City of Munich will develop a new multimodal mobility services for all citizens: mobility stations. Correlating to Munich's tremendous growth of population and traffic, the project area Domagkpark and Parkstadt Schwabing aims to build less than (the normally obligatory) 1.0 parking lots per household as well as to prove the functionality of this approach through the integration of attractive alternatives for more sustainable mobility modes.

In order to achieve a well-working parking situation at the surface as well as an attractive mobility service offer within public space, new innovative concepts for public and individual mobility needs are essential. Consequently, easily accessible and user-friendly services for mobility have to be implemented as a real alternative to individual car ownership. Part of this approach is the development and implementation of mobility stations.

These mobility hubs will combine and provide different types of mobility services and ensure that suitable means of transport are available for any purpose at any time in order to reduce private car ownership of residents and customers. The new and innovative aspect is to combine several sharing mobility technologies (car-sharing (stationary, free floating, electric), (e-) scooters, cargo- and normal bikes) in connection and complementation with the use of

public transport like trams and buses. The provision of multimodal mobility service is allowing the residents to live a private-car-free-lifestyle or at least have significant lower mobility costs.

The selection of services provided at the different mobility stations follows the local spatial and socio-economic situation. But in general the following mobility services are planned to be available at each mobility station:

1 information pillar
1 MVG bikesharing station
2-3 E-Trikes[17] (Gertrud-Grunow-Straße)
2 charging stations
Carsharing: stationary and free floating
1-2 cars e-carsharing
1-2 privileged e-parking spots
E-scooters[18]

The desired traffic impact of the new services and shared-mobility offers will only occur if they are offered to citizens in an attractive, easily accessible form. Consequently, next to a physical bundling, the digital interconnection of offers and integrated access are of particular importance in order to be able to transparently ensure accessibility in the future. Mobility information services make it easier for him to decide and plan his trip. On existing mobility apps (e.g. MVV, MVG, etc.) all mobility services provided at the station will be integrated and guarantee an easy mode of booking from anywhere online.

A.2.1 Measure outputs

Four mobility stations will be built in the Living Lab (see Figure 84):

[17] E-Trike is an electric driven tricycle with a cargo function. This is developed in ECCENTRIC measure MUC 5.6.
[18] E-scooters are electronic driven two wheelers for which a driver's licence (18+) is needed and not to be confused with e-kick-scooters by firms like Lime, Tier or Voi.

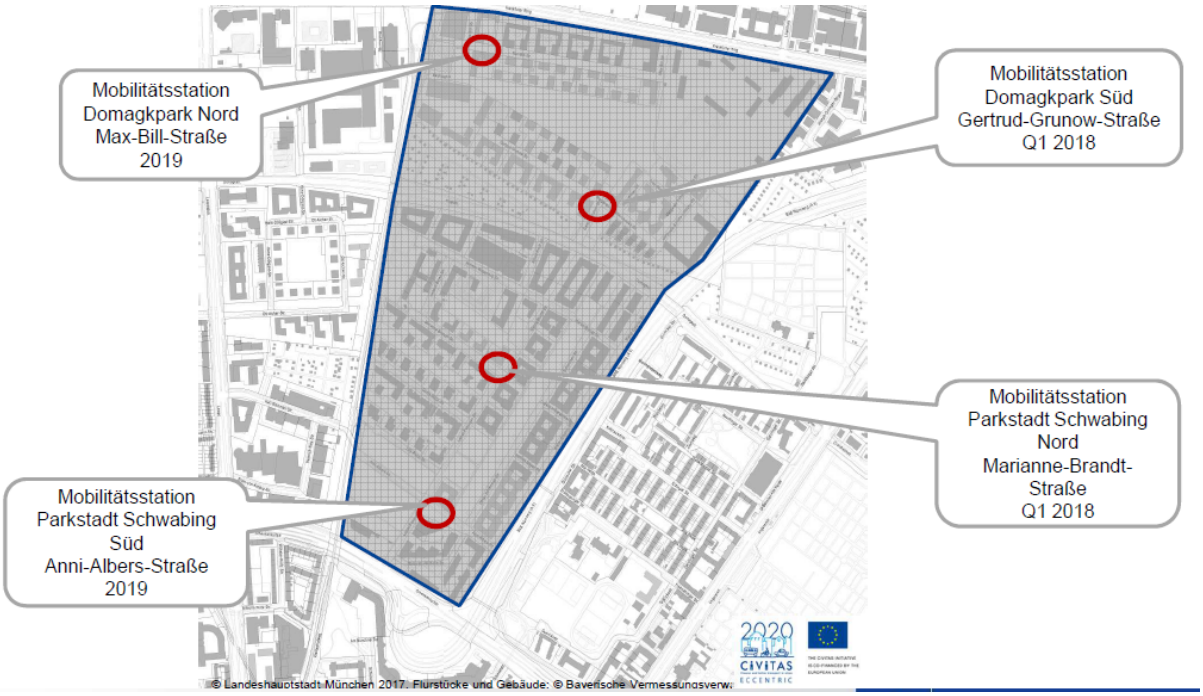

Figure 84: Mobility stations in the Living Lab (as of 11/2019)

Gertrud-Grunow-Straße (operational since 07/2018):

- Carsharing: 5 reserved places for free floating carsharing (ShareNow, Oply, SixtShare, Miles)
  - 1 car of STATTAUTO in public space
  - 1 e-van of STATTAUTO (Nissan n-EV) since 03/2019 in public space
  - 2 cars of STATTAUTO in the underground car park of the private housing association in the Fritz-Winter-Straße
- Bike sharing station of MVG Rad, with 10 bikes
- e-scooter sharing of emmy (free floating)
- 2 charging points for electric cars, with one reserved parking place for charging cars

Marianne-Brandt-Straße (operational since 07/2018):

- Carsharing: 10 reserved places for free floating carsharing (ShareNow, Oply, SixtShare, Miles),
  - 1 e-vehicle of STATTAUTO in public space
  - between 2 und 8 cars of STATTAUTO on private ground of a housing association in the Marianne-Brandt-Straße (number is depending on the month)
- Bike sharing station of MVG Rad, with 10 bikes
- e-scooter sharing of emmy (free floating)
- 4 charging points for electric cars with one reserved for E-carsharing

Max-Bill-Straße (operational since 10/2019)

- Carsharing: 6 reserved places for free floating carsharing (ShareNow, Oply, SixtShare, Miles),
- 1 car of STATTAUTO above ground in public space
- Bike sharing station of MVG Rad, with 10 bikes
- Space for free floating bike sharing providers (Donkey Republic, JUMP)
- e-scooter sharing of emmy (free floating)

- 4 charging points for electric cars (by SWM) with two reserved parking places for charging cars

Anni-Albers-Straße: planned for Q2/2020

- Due to changed traffic planning and new construction projects around the Anni-Albers-Straße, the mobility station cannot be implemented in the Anni-Albers-Straße (as of 11/2019). An alternative site for the mobility station in the Parkstadt Schwabing is planned. Implementation will be conducted in Q2/2020.

In addition to the infrastructure, a marketing campaign was launched to promote the mobility stations among the residents and employees (MUC 2.9a).

A.2.2 Supporting activities

The launch of the mobility stations will be accompanied by a marketing campaign to address all residents within the Domagkpark area (purely residential) but also companies and employees of neighbouring residential and business area Parkstadt Schwabing. The combination of an innovative direct and a dialogue marketing campaign for every household and as many companies as possible within the development area will improve the measure's effectiveness. It offers information and guidance and will thereby fortify the usage of the new offer (see ECCENTRIC measure MUC 2.9a).

The measure is also linked to parking management which has been implemented in the Domagkpark in March 2018 and is still discussed for the Parkstadt area. Even though a national carsharing law was approved in 2017, there is still no formal implementation of sanctions for illegal parking on reserved carsharing spots.

Media-effective opening event of the first two mobility stations in 07/2018. Local press, the major of the City of Munich, other local ECCENTRIC partners and the MSP were invited.

A.2.3 Interactions with other ECCENTRIC measures

For the first time two newly developed vehicles are planned to be part of a shared fleet: Electric light vehicle (see ECCENTRIC measure MUC 6.3a) and E-Trikes (see ECCENTRIC measure MUC 3.4). Also emmy, a scooter-sharing service (see ECCENTRIC measure MUC 6.3b), is now also part of the mobility offer at the stations. Awareness of mobility providers and their offers at the mobility stations was increased through a marketing campaign in the Living Lab area (MUC 2.9).

A.2.4 Interactions outside ECCENTRIC

None

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
1	Residents		Living Lab
0	All (everyone visiting the area is a potential user)		

Table 134: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
1	City of Munich (KVR)	P	C	L	ML
2	City of Munich (other depts.)	S	C	P	Coordination, Construction, …
3	SWM/MVG	P	PT	P	Construction of charging infrastructure and MVG Rad
4	Mobility service providers	S	PR	P	Integrating their services into the stations
5	District committee	S	C/NG	O	Planning Approval, cooperation, political communication and awareness rising
6	Housing Association	S	PR/NG	O	Mobility planning and housing development, customer and residential communication
7	Resident community (incl. businesses)	S	PR/NG	O	Target group and lobbying group
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					

Table 135: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
It may be difficult to achieve a good evaluation result, since there will be some delay in construction of the mobility stations caused by the general construction works in the Living Lab area.	Problem related	Focus on the first stations if necessary (the ones already implemented)	ML/LEM
For the usage and acceptance of the new services, there may be the risk that the number of residents willing to use is not sufficient in the beginning	Involvement	The marketing and dissemination activities will be extended within the Living Lab if this will be the case.	ML

Table 136: Risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning

Interdisciplinary working group for mobility stations are set up (stakeholders, city planners, Living Lab residents, district committee)
Locations for four mobility stations identified and approved based on holistic spatial analysis
Evaluation approach developed and embedded into Local Evaluation Plan
Station equipment and service elements identified
Detailed planning for four mobility stations initiated
Procurement process for four elements initiated
Construction plans for two mobility stations completed

Phase 2: Procurement and Implementation

Construction process for two mobility stations initiated and continuously accompanied
Procurement process for two mobility stations completed
Vehicles fully integrated in two mobility stations and partially in a third
Charging infrastructure for e-vehicles at three mobility stations constructed
Opening of first two stations in July 2018:

- Gertrud-Grunow-Straße (operational since 07/2018):
  - Carsharing (ShareNow, Oply, SixtShare, Miles, STATTAUTO),
  - Bike sharing (MVG Rad, Donkey Republic),
  - e-scooter sharing (emmy),
  - Two charging points for electric cars (by SWM),
  - Extension of mobility station finalized in Q3/2019,
  - Implementation of a parking management in the area around the mobility station in 2018,
  - Dialogue marketing campaign launched in 2019.
- Marianne-Brandt-Straße (operational since 07/2018):
  - Carsharing (ShareNow, Oply, SixtShare, Miles, STATTAUTO),
  - Bike sharing (MVG Rad),
  - e-scooter sharing (emmy),
  - Two charging points for electric cars (by SWM).

Marketing concept developed and materials ordered
Start marketing campaign in October 2018
Introduction of trial offers for the involved mobility services
Detailed planning for remaining stations finalized

Phase 3: Demonstration and monitoring

Opening of the third station Max-Bill-Straße in Q4/2019
Opening of the fourth station Anni-Albers-Straße in Q2/2020
Integration of further new mobility providers
Demonstration and testing activities of newly invented vehicles (Electric light vehicle measure MUC 6.3a and E-Trike measure MUC 3.4)
Intensification of marketing and communication activities (usage of social media channels)
Evaluation data query in Q1/2020 completed

Derivation of general conclusions and knowledge for further standardization
Derivation of recommendations for scale up
Integrate sharing mobility into the mobility planning of the city
Opening of fourth station in Q2 2020

Phase 4: Conclusions and Recommendations

Derivation of overall lessons learnt
Detailed process monitoring and evaluation
Measure evaluation and data query
Development of recommendations for action
Exchange with stakeholders
Exchange with other mobility hub approaches

B.2 Process evaluation activities

The ML and LEM held a close contact to exchange information about the latest encountered barriers and drivers during the development and implementation phases of the measure.

Standardized form surveys were used to get information about the roles, tasks and backgrounds of the various stakeholders, as well as their view on barriers, drivers, and risks of the measure. The online survey was spread to all applicable stakeholders with the help of the ML and reminders were used to maximise the response rate.

In a joint effort with other LEMs, a common survey framework was developed and operationalized with the open source survey tool "Limesurvey" (in the case of Munich).

After collecting general information about the stakeholder and its role in the project (job, tasks, contact information, and engagement in which phases (planning / implementation / operation / maintenance / others), we asked for opinions about barriers and drivers in a two-level-approach:

In a multiple choice set, stakeholders were asked to identify supporting thematic areas / sectors for the measure:

Political / strategic
Institutional
Laws and regulations
Cultural
Problem-related
Involvement / Communication
Planning
Organisational
Financial
Technological
Spatial

In the next level, we asked for a detailed description of the drivers in detail as well as how these drivers were used to maximise the measure's impact.

Through this approach, we can identify both general supporting sectors, but also detailed, measure-specific information about drivers with a high level of information. Showing the full list of sectors first did also 'inspire' stakeholders to include all possible drivers they could find.

The same methodology was used to collect information about barriers.

The last block in the survey asked about risks of the measure. For each risk, we asked for an assessment about the likelihood as well as about the risk's potential to endanger the measure's success.

As there was a change in the ML position, the stakeholder survey was answered and accompanied by both, the old and the new ML. Because the measure MUC 5.9 has many stakeholders involved which are not directly or actively involved in the process, the ML decided not to confront them with the stakeholder survey. But all relevant stakeholder information was collected through the ML. All stakeholders involved in sub-areas of the measure implementation were contacted. The ML are both very good connected with the other

stakeholders what makes it possible for them to answer the survey with their comprehensive knowledge.

To complement the information which is given through the stakeholder online survey, an emerging pattern of all stakeholders is mapped in a three-dimensional chart. All ML were asked about the perception where to locate themselves and other relevant stakeholders within the stakeholder analysis matrix. The objective of the stakeholder analysis is to engage stakeholders in order to improve process and maximise impact. Each stakeholder is given a coordinate within the chart. The coordinate depends on the stakeholder's power potential (the bigger the bubble the higher the power potential), the interest (between low and high) and the ability to impact the measure (from low to high).

Figure 86 shows the stakeholder analysis of the measure MUC 5.9. As the ML City of Munich (Department of Public Order, KVR) has the highest interest and ability to impact the measure, it is coordinated as the biggest bubble in the highest right corner. In addition to that, the Planning Department (PLAN) plays a similar role as being highly motivated and having a certain ability to impact the measure. The Planning Department is working closely together with the ML (KVR) and the Construction Department (BAU).

As the objective of the measure is to build up mobility stations in the Living Lab, it is essential to include the Construction Department (BAU) into the process. The KVR gives the instruction and traffic law orders to set up the stations to the BAU. Due to the process, BAU has an essential position and a high ability to impact the measure but quiet low interest in the project itself. BAU is a necessary but supporting stakeholder. The SWM/MVG can be settled as a stakeholder with higher interest and medium high ability to impact the measure. Generally, they provide mobility services to LHM/KVR and thus promote their products with participating in the measure.

Another important stakeholder to complete the offers of the mobility stations are the mobility service providers (MSP). They have a high interest in bringing in their vehicles and services (car-sharing, (e-) scooters, cargo- and normal bikes, in connection and complementation with the use of public transport like trams and buses). They make use of the good visibility of the measure and position themselves on the mobility market. Their ability to impact the measure is comparable to the MVG because they basically provide mobility services.

Three more stakeholders are part of the process which are not highly impacting the measure. There is the District committee (distr. com) which can be seen as medium motivated but with higher ability to impact the measure. The Housing Association (hous. aso) are highly interested but with low power potential. The Resident community (incl. businesses) has the same power potential but with likely higher interest because they are the biggest target group of the mobility stations and will be the main users. All three of them are delivering feedback to KVR.

Other methods added to the above described **stakeholder online survey** and **stakeholder analysis** (matrix) to assess a more Detailed Process Evaluation, are:

- **Review of measure reports** as well as some informal observations from the Living Lab.
- Carrying out **interviews** with all two Measure Leaders who participated during the project lifetime (two in total).
- Carrying out a **"lessons learnt"-workshop** with users and non-users of mobility stations (11/2019).

– Carrying out a **learning history workshop** with relevant stakeholders (02/2020).

The **review of measure reports** as well as some informal observations from the Living Lab and its residents are taken into account for process evaluation. In order to get a complete picture, all opinions from the former MLs as well as from the current ML were included in this report.

Especially the **interviews** help to look deeper into the process and its main barriers and drivers, hence give a helpful overview for the lessons-learnt part. The interview questions contain the following matters but were more conducted in an informal way:

General information about the current status of the measure status
Thinking about the mobility station set-up: positive thoughts and worries
Explaining the whole process and developments from his/ her own viewpoint: drivers and barriers
Lessons learnt through the process

The choice for executing interviews was made because it is a simple method to gain deeper insights from all MLs and to keep the time expenditure of the MLs and the LEM on a low level. The results of the interviews are to be found in section B.3 Barriers and B.4 Drivers.

The so called **"lessons learnt"/ user experience-workshop** was organized and conducted by the current ML and the LEM. All Living Lab residents were invited via different newsletters (organized by contacts of the local neighbourhood associations) and social media posts done by the local ECCENTRIC dissemination team. In total 9 residents participated. The resident sample was mixed with persons of different gender, age, mobility and technical affinity. There were users and non-users present during the 2-hour workshop which took place in the Living Lab. The workshop had a very communicative approach and asked the participants for their opinion about the following aspects:

Perception of the mobility stations.
General attitude towards mobility station.
Usage of the mobility station services.

With these three fields the KPIs awareness, acceptance and satisfaction could be elevated and used for the important lessons learnt part. The results of the resident-workshop are to be found in section B.3 Barriers and B.4 Drivers as long as they refer to the process itself. But not to leave out some important findings, a short overview about the main results is given after chapter B.4.

The **Learning History workshop** is a method for evaluating the whole process of a measure ex post regarding its planning, implementation and operation performance. For this purpose, the stakeholders involved in the measure are invited to explain their experiences, regarding the applied strategies, the achieved results and what happened why, in chronological order. The aim is to learn from the actions and experiences of those involved and to draw conclusions that will be of added value for the planning of future projects.

The workshop was structured in the following steps[19]:

- Reconstruction of the measure process with timeline and milestones.
- Milestone evaluation with defining barriers and drivers of the process.
- Definition of “actions to overcome” the corresponding barriers and possibilities to make use out of the drivers.
- Reflection of the results and concluding the experiences of the participants under “lessons learnt”.

For this measure, the learning history workshop was organized by the ML and LEM and was conducted in 02/2020 at the ML’s institution together with relevant stakeholders which accompanied (parts of) the measure process. In total 10 stakeholders joined the two-hour workshop session. Among them, the LEM, both MLs and representatives of the mobility service providers which offer their vehicles/ services at the mobility stations and representatives of two local neighbourhood associations (Domagkpark and Parkstadt Schwabing). Due to the process itself and several changes of personnel, not all participants accompanied the entire measure development (see section 0 Barrier). Some stakeholders accompanied particular milestones/ events or periods.

During the workshop, a measure timeline (see Figure 85) including the most important processes and milestones was developed and analysed. For a more detailed description of the important milestones see chapter B.1 (p.539).

As a second step, the most important barriers (see chapter 0) and drivers (see section 00) of the process were identified and discussed. Also, the experiences, how barriers could be overcome und drivers were used to foster the measure were discussed. Finally, the experiences of the participants were concluded under “lessons learnt”.

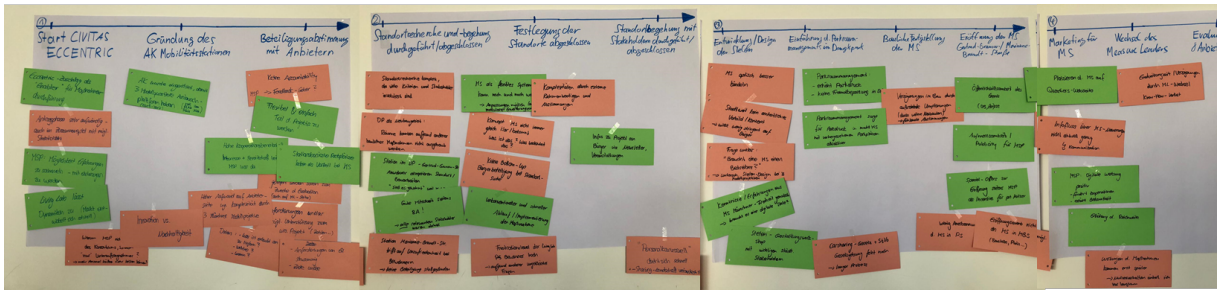

Figure 85: Timeline MUC 5.9 mobility stations

[19] Learning History Workshop was designed after “Refined CIVITAS process and impact evaluation framework”, 08/2017, see ANNEX 7 LEARNING HISTORY SESSIONS.

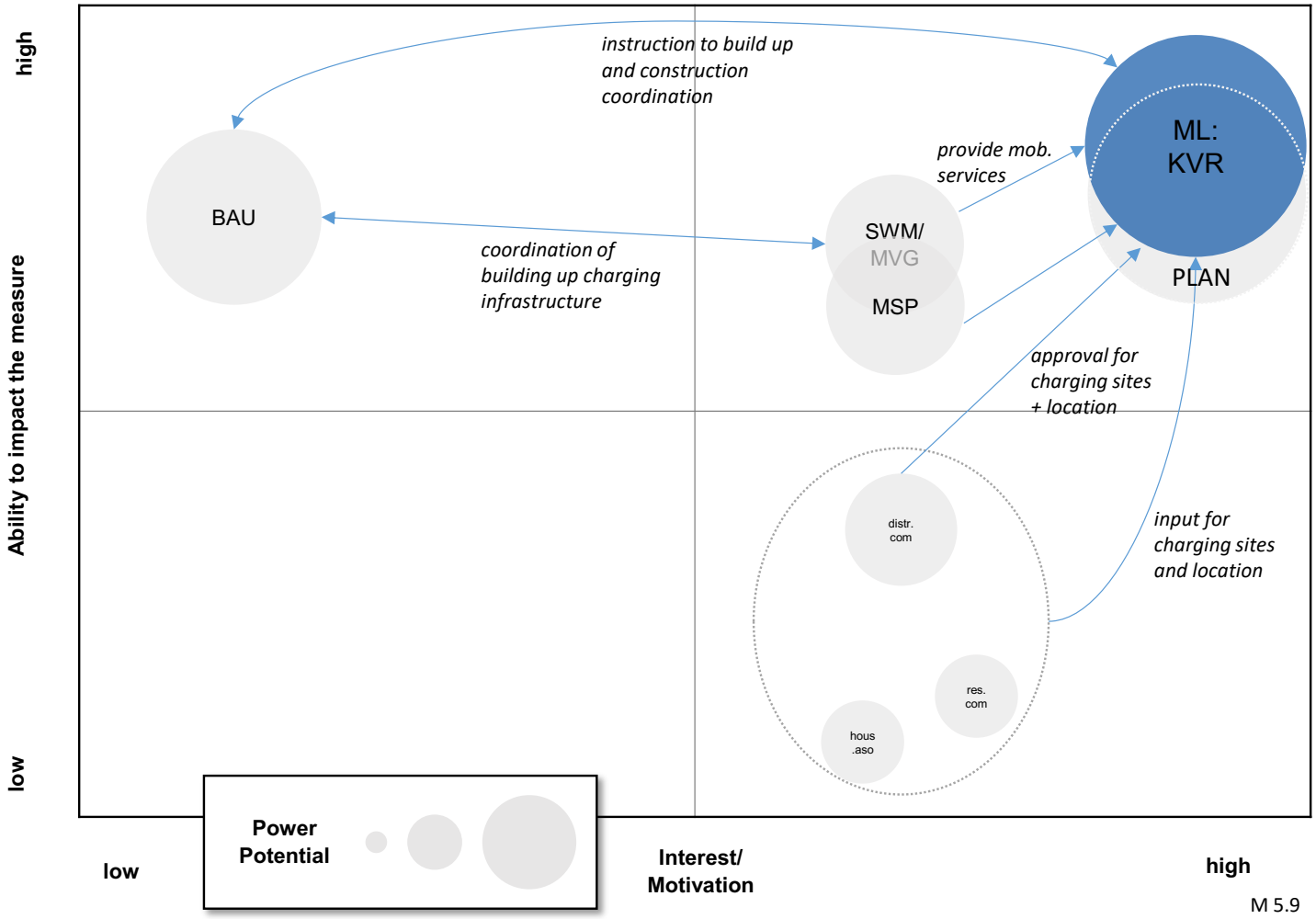

Figure 86: Stakeholder Analysis

B.3 Barriers

The barriers are retrieved from several sources (source description see above):

- Stakeholder online survey (11/2018)
- Continuous exchange with the Measure Leaders (ongoing)
- "Lessons-learnt"/ user experience workshop (11/2019)
- Learning history workshop (02/2020)

Multiple barrier fields have been selected, e.g. *law and regulations, cultural*, *involvement/ communicational* and *spatial*. In detail, the following barriers were identified so far:

No.	Barrier field	Description	Action to overcome the barrier
1	Political/ strategic	Limited surveillance possibility of car sharing parking.	Implement car sharing parking regulations in to the parking laws (national level).
2	Political/ strategic	No consistent approach within the city of Munich to develop and implement mobility stations yet.	Development of a city-wide mobility hub concept to ensure a standardized approach to develop mobility stations. Integrating common evaluation results of the different projects implementing mobility stations in Munich.
3	Institutional	Time- and resource consuming application phase for the ECCENTRIC project. Difficult to gain commitment of MSP before the project start.	Engage MSP as part of the ECCENTRIC consortium to have a stronger affiliation towards the project than just a cooperation.
4	Institutional	Administrative and hierarchical structures slowed down the process.	Identify relevant administrative processes well in advance in order to get a transparent time line in place at the beginning.
5	Cultural	Mobility habits are fundamentally difficult to break up.	Show the advantages of using mobility stations and make them easy to access for all people.
6	Involvement and Communication	No direct citizen participation during the location finding process. This can cause discontent among Living Lab residents.	Make sure that on various levels the communication process is transparent. The district committee needs to be open for citizens involvement for location finding process
7	Involvement and Communication	Lacking flow of information about new offers at the mobility stations towards the operator of the community portal www.domagkpark.de.	Keep the website operator in the loop of information about new features/ vehicles or offers regarding the mobility stations.
8	Involvement and Communication	Lack of knowledge about the term and concept of mobility stations and the role of the MSP.	Ensure communication about the idea and concept of mobility stations right from the start and on various channels
9	Involvement and Communication	MSP were unsure about the requirements and demands they have to meet in the project.	Hand over a set of requirements how MSP should support the project, especially regarding data delivery: When? Which data(format)? For what purpose? Evaluation and data monitoring on projects level has to be set up transparently and easy to understand for external parties.
10	Planning	Insufficient determination of requirements and involvement in all Munich H2020 projects causes lots of extra work for the MSP	Develop a common plan and requirements regarding all three EU model projects in Munich.

11	Organizational	Loss of know how through ML-change during the project lifetime and general changes in personnel.	It's not possible to predict those personnel changes. An extensive transition period could diminish the loss of knowledge, though. Transparent communication and updated information about personnel changes are needed.
12	Spatial	Implementation of the measure is dependent on the respective construction progress within the Living Lab.	Have a close and transparent communication with the local building authority and the constructors.
13	Spatial	Location finding not always easy due to many criteria and high stakeholder involvement.	Set up a joint field work and transparent location planning process with all relevant stakeholders. ML needs to be the driver.
14	Spatial	No uniform design of the mobility stations in the road space.	Development of a city-wide mobility hub concept to ensure a standardized approach to develop mobility stations. Integrating common evaluation results of the different projects implementing mobility stations in Munich.
15	Involvement and Communication	Difficult to include the interests of all mobility providers into the project development.	Try to establish a transparent communication to force cooperation between project partners.
16	Involvement and Communication	Lack of feedback from contracting authority and mobility station customers.	Evaluate and catch up on feedback on a regular basis. Have a transparent feedback culture.

Table 137: Identified barriers and planned/taken actions.

The first barrier in the field of **laws and regulations** is about the limited surveillance possibility of car sharing parking. Despite the introduction of the German Carsharing law on national level (CsgG), the implementation of the concrete privilege by means of an implementing ordinance in the StVO (i.e. the inclusion of additional signage in the traffic sign catalog) has been missing for over 2,5 years now. The parking spaces set up for car sharing may currently be signposted, but not formally ordered. As a result, it is currently not possible to control or sanction the correct usage of privileged carsharing parking according the CsgG. Third-party parkers use the parking spots which are dedicated for sharing vehicles for private or business parking. ML's are hoping for this change of regulation for about 2,5 years now. Another political/ structural barrier within the city of Munich is the innovation factor this measure MUC 5.9 symbolizes. There are not yet any basic framework conditions how to develop and implement mobility stations city-wide. Two others co-financed model projects in Munich (Smarter Together and City2Share) test different varieties of mobility station approaches. There is the aim to find a standardized approach. From an external point of view, this can lead to confusion for the target group of these mobility stations, the citizens. A standardized approach to develop further mobility stations should be ensured after the project lifetime. This is already approved by the city council's resolution of 07/2019, where the City of Munich is obliged to develop a shared-mobility strategy. Herewith a city-wide concept for the scale-up of mobility station is to be developed.

Institutional barriers which have been named during the learning history workshop by the MSP and the MLs can be found in the extensive application phase to become part of the ECCENTRIC project. It wasn't always easy to participate stakeholders in this very early phase because it was unclear whether the project will take place or not. Stakeholders had to show commitment to join the future project being unsure about the actual grant. To reach a stronger

commitment of the MSP they could have been associated as part of the ECCENTRIC consortium right from the beginning, not only in the role as cooperation partners. Besides this, there were several other impeding administrative and hierarchical structures which sometimes slowed down the process. External framework conditions and coordination processes made it difficult to speed up the development and implementation of the mobility stations. This barrier is difficult to overcome but in future similar processes decision makers could be better and more regular involved in the process to keep the complexity of issues on a low level.

The **cultural** barrier is mainly about the pattern of the target group – the local residents, businesses and visitors of the Living Lab. Mobility habits are fundamentally difficult to break up as residents or other mobility station users don't want to give up their customary right of a personal parking space and an own car. It's important to show the advantages of using mobility stations and make them easy to access for all people to increase the usage and therewith the acceptance of the measure MUC 5.9.

The most barriers can be found in the field of **involvement and communication**, though. Different perspectives have to be considered here. Regarding the participation of the *residents* into e.g. the process of finding the locations for the mobility stations no bottom-up citizen participation took place. Residents were informed via different channels (events, newsletters, etc.). Citizens only had a chance to express their opinion about the location choice via the district committee. Thus, the employee working for the neighbourhood association got to feel some dissatisfaction in the population. Not only regarding the location finding process but also after implementing the mobility stations, there are still unclarified issues among the residents (as stakeholders located within the Living Lab stated). Of course, the process of location finding is already very complex and many stakeholders are involved but the residents (potential mobility station users) could be more involved in that stage. The usage of the mobility stations is very closely linked to the amount of advertisement which is being done. An important platform is the community portal (www.domagkpark.de) which has a particular section about the mobility topic. The news section is giving relevant information about new developments regarding the mobility stations. This flow of information between the ML and the website operator has not been up to date. The website operator would wish to be in the communicational loop if new MSP or appear or disappear to be able to inform the residents in a good time.

From the *MSP perspective* some other barriers regarding the **involvement and communication** have been stated during the learning history workshop. Starting from the first approach to get MSP on board for the project, it was not clear to them what their role should be in the project and as part of the mobility station. A clear communication about the concept of mobility stations right from the start could help to overcome this barrier. Regarding the uncertainty of their individual role the MSP would have wished to get more precise information about the requirements they should regarding data query and the support of the scientific part of the project with respect to the evaluation data they had to deliver from time to time. Firstly, they didn't know which data(format) was required, at which times and for what purpose. The purpose is an important indicator when it comes to releasing user data with regard to the general data protection regulations. One MSP suggests to sign an official data transfer agreement at the project start where several regulations are set. That would eradicate uncertainties during the ongoing process and speed up particular actions. Another barrier

stated by one of the MSP is the lack of feedback by the contracting authority and also on part of the customers. The MSP wishes to get a more regular feedback to improve his offer.

This gets even more complex because several MSP which are joining the ECCENTRIC project, also join the two other Munich H2020 projects (Smarter Together and City2Share). The MSP criticize that there are no common requirements which as a result puts them in a situation with lots of extra work.

One big **organizational** problem can be found in the fact that many key stakeholders suffer from personnel changes. Know-how and tacit knowledge gets lost if there isn't any extensive transition period of the old and new stakeholder. One major key stakeholder change occurred in 02/2019 when the new ML entered the project. An intensive transition period helped to get him on board. Due to the fact that especially the sharing sector is a fast growing and changing market, personnel changes took place there as well. People leave the project without communicating about the new contact. This makes is difficult to build a constant circle of stakeholders. A transparent and up-to-date communication could help to ease these personnel changes and keep important stakeholders in the loop for upcoming actions. Another organizational difficulty is to include the interests of all mobility providers into the project development. A transparent communication could be an action to overcome this barrier to strengthen the cooperation between all project partners. These things had to be dealt with during the process which was not planned and turned out to be time-consuming because this decision is partly a question of laws and regulations.

As MUC 5.9 is a construction measure which has to be implemented in the streets of the Living Lab several **spatial** barriers occurred during the process. The implementation of the measure is highly dependent on the respective construction progress within the Living Lab. Due to the fact that Domagkpark and partly Parkstadt Schwabing are quiet recently developed housing areas there is lots of construction work going on. This directly interferes with the mobility stations as there are constant changes regarding other adjacent construction work, immediate changes of street courses or other coordination work which has to be dealt with. This barrier is difficult to overcome as the Domagkpark area is a recent housing area where additional infrastructure is still to come. The search for the exact locations of the mobility stations was influenced by spatial barriers as well. There are so many criteria to be considered, e.g. power supply, sufficient space, street layout, etc.

Regarding the construction aspect of the mobility station one MSP suggested to focus on a more uniform appearance of the different mobility offers at a station. There are too many different signs, colours and markings. A stringent design of the mobility station could probably attract more potential users. For those questions a customer survey and household survey is ongoing.

B.4 Drivers

The drivers are retrieved from the same sources as for the barriers (source description see above).

Multiple driver fields have been selected, e.g. *political / strategic, institutional*, *problem-related*, *involvement/ communicational* and *spatial*. In detail, the following drivers were identified so far:

No.	Driver field	Description	Action to make use of the driver
1	Political / strategic	The German Carsharing law gives organized carsharing as the mobility stations clear framework and more options for implementation.	It was possible to decide whether the mobility stations should have an operator or not. Enabled the marking of the nobility stations.
2	Political / strategic	Positive effects through regular involvement of politics.	Send this positive signal towards other participating project partners. Necessary approval processes.
3	Political / strategic	With CIVITAS ECCENTRIC another formal framework than for similar city-internal projects was given.	Actors could implement much faster and had more freedom of action.
4	Financial	Without the help of CIVITAS ECCENTRIC and investment of municipal funds from the IHFEM program, such an innovative measure would not have been implemented.	City of Munich must make sure to be part of future research and innovation projects in order to benefit from the positives.
5	Institutional	Establishment of a working group consisting of different stakeholders.	Spreading information about the project in-time with relevant stakeholders.
6	Problem related	In dense areas with commuters etc. high parking pressure occurs. The parking management of the city of Munich tries to attempt this by charging fees.	In areas with high parking pressure a reserved lot is an incentive for the sharing users. In areas with parking management users of carsharing are exempted from the parking fee.
7	Organizational	High motivation for cooperation of all stakeholders (authorities, mobility service providers).	High participation at important appointments as site selection for the mobility stations. Easy inclusion of new stakeholders.
8	Organizational	The mobility providers offered incentives for new users at the opening event.	By providing this additional incentive new users could be recruited. Awareness was risen.
9	Organizational	Discrimination-free handling of all relevant mobility service providers.	Establishment of an open culture of conversation, e.g. conducting workshops.
10	Involvement and Communication	In the course of the measure, an own marketing campaign was done to spread inform about the mobility stations via all channels.	The use of digital media increased the range of advertisement und thus fostered awareness of this new mobility concept and all participating stakeholders.
11	Involvement and Communication	The opening event of the mobility station attracted lots of media attention since the major of Munich was staged as he opened the station.	Such positive publicity is of the interest of all parties, since it is advertisement for the participating companies and rises the awareness and acceptance of the residents.
12	Positional	Experiences from the first mobility station of munich at Münchner Freiheit could be used.	Know-how and experiences helped by the implementation.
13	Planning	The quarter Domagkpark was still under construction when mobility stations were integrated	This ensures a natural acceptance by the residents
14	Planning	An advantage of the mobility stations within the Living Lab is the flexibility	Not only the Living Lab itself is flexible to the dynamics of the mobility market, but also the mobility stations are flexible in their physical appearance.
15	Spatial	The parking management of the city fosters people to pay for on-	People are more willing to use sharing options in areas with parking management, since the

		street parking and increases parking pressure in the area.	parking pressure is higher and they want to avoid paying for parking.

Table 138: Identified drivers and planned/taken actions.

The new German Carsharing Law, in force since 07/2017, is the **regulatoric** basis for the privileged carsharing parking at mobility stations the way they are implemented now in Domagkpark and Parkstadt Schwabing. It enables the operation of mobility stations without a certain operator in charge. The law also enables the on-street markings and signage of mobility stations to make them more visible.

The regular involvement of the district committee which functions as a multiplier towards residents and approval had a positive effect on the measure. This involvement on a regular basis sends a positive signal towards the participating project partners.

From a **strategic** point of view, Civitas ECCENTRIC was the enabler of the project. Beside the financial support, also the organizational structure of the project lead to more independency from political decisions. Thus, the executing actors had more freedom in their action and decision-making and cooperation-agreement processes could be done faster.

The **financial** support of Civitas ECCENTRIC and certain investment of municipal funds from the IHFEM program were essential to start and implement the measure. It is uncertain whether this measure could have been implemented without this support at all, but if so, it would not have been possible within this timeframe.

An **institutional** driver was the establishment of a working group consisting of different stakeholders. This group aims to participate residents of Domagkpark through residents' meetings and on-site appointments.

Related to the **problem** of parking in such dense neighbourhoods, the parking management program of the city of Munich was applied to the Living Lab. With fees and limited parking time for the provided parking lots, the parking pressure in the corresponding areas is tried to be reduced. In areas with high parking pressure mobility stations have the incentive to provide a reserved parking lot for carsharing and users are exempt from the parking fee.

An **Organizational** Driver was the high motivation for cooperation by the stakeholders. They were all interested in testing and learning in this field of mobility services. For external partners, it was easy to participate in meetings and other official appointments and the visibility, the mobility stations provide for the services and their companies is of high interest of mobility service providers. Another positive aspect for companies to participate in such a project is to create a good relationship with the local authorities. Thus; for example, a constructive workshop for creating the mobility station pillar was possible.

The mobility service providers support the mobility stations; they provided for example special offers for new users at the opening event. This was an additional incentive, provided by the partners on their own initiative, facilitating the joining of potential users. The cooperation atmosphere was good, in general. So, a discrimination-free handling of all relevant mobility service providers and an open culture of conversation was possible, e.g. conducting workshops could be established.

For good **communication** of the measure, an own marketing campaign was done. Newsletter, events and the quarter-websites were used to spread information of the mobility stations. The

use of digital channels increased the range of the marketing campaign. For the mobility service providers this was also a positive Driver, since this meant additional advertisement for their services and companies.

The opening event of the mobility stations, which took place in Domagkpark drew a lot of attention to the measure. The major of Munich himself opened the mobility station symbolically, which attracted the local media to report about the project and the mobility stations. The publicity was positive for the organizers and all stakeholders, since it was good advertisement for the measure and all participating parties. Furthermore, the population got informed about the measure and its background in this way, which rises its awareness and acceptance.

Before ECCENTRIC there already existed one mobility station in Munich, at Münchner Freiheit. Thus, experiences and know-how in this field already existed and were helpful for some upcoming questions, as if it's reasonable to have digital information pillar.

Planning the integration of the mobility station already during the construction phase of the quarter Domagkpark was an advantage in terms of the acceptance of the residents. Thus the mobility stations in Domagkpark are taken for granted, by most of the residents there, whereas the mobility stations in Parkstadt Schwabing, where they were implemented at a later stage, when people were already living there, are seen more critically (as a source of traffic) and have a lower acceptance. Since the mobility market is developing fast and the effects on people's behaviour is difficult to predict, it is necessary to provide flexibility within such an innovative project. The necessary flexibility is given on the one hand by the character of the Living Lab to integrate new stakeholders, services and products. On the other hand, by the mobility stations themselves, which can be expanded modularly (additional parking spaces, additional bike-sharing spaces).

One last **spatial** barrier occurred from the parking management which is implemented in parts of the Living Lab. It is assumed that people are more willing to use sharing offers, than in areas without. Since the parking management increases the parking pressure in its area and fosters the people to pay for parking, it is more convenient to use the mobility stations with a reserved parking lot and no parking fees. Until now (02/2020) the parking management is implemented in the area of Domagkpark, but not in Parkstadt Schwabing.

Lessons-learnt workshop with (potential) mobility station users:

A workshop with users and potential users of the mobility stations in the Living Lab was conducted for assessing their perception, attitude and usage of this new mobility station concept. The participants stated to have heard from the mobility stations via the community portal www.domagkpark.de, various ECCENTRIC events and simply by running by it and seeing the on-street markings as well as the yellow information pillar. Suggestions for improvement concern a clearer terminology (than mobility "station") and a more visible marking on the pavement (more striking design of the information pillar as well as the on-street markings). There is no need for a digital service within the information pillar. A point of criticism is the lack of reliability for having a mean of transport when needed. This is a very subjective perception of the workshop participants as the household survey #2 (10/2019) stated the opposite of this (see MER MUC 5.9). The impact evaluation (MER MUC 5.9) shows that this issue applies only for a small share of cases and the availability of transport means is in general rated "very good" at the mobility stations. Other points of

criticism results from the necessity to have a variety of apps of different MSP to actually make use of the offers, the lack of information how to use the different modes of transport and the lack of citizens' participation at an early stage of the process. Vouchers for free minutes works well as an incentive for using the different mobility offers and thus getting used to them. Other positive aspects can be found in the avoidance of searching for a parking space and the variety of transport means which is offered at the mobility stations. These findings can help to improve the (potential) upscaling of this measure or similar projects in the future.

B.5 Influence on risks

There are two main risks mentioned by the ML. The first risk is defined by the ongoing construction work in the Living Lab. The implementation of the measure is dependent on the respective construction progress. A close cooperation between the ML and the Building Department could help to make the process more transparent and predictable.

The second risk can also be traced back to the construction progress in the Domagkpark residential area. Due to ongoing construction work, the launch of the mobility stations was delayed. The evaluation period is now shorter than planned (only 12 months) due to delay of the launch. Since mobility behaviour changes are slow according to experience, there is little change in behaviour during the observation period.

Identified risk	Category	Mitigation actions	Responsible
Implementation of the measure is dependent on the respective construction progress.	Spatial	Close cooperation with Building Department	ML, BAU
The period to evaluate the mobility stations is shortened by the construction progress.	Organizational	Take the shorter testing phase into account when doing the final conclusion.	ML, LEM

Table 139: Reported period risk assessment.

Risk assessment

Risk #1, the dependence on the construction progress can be classified a high risk because this can be the reason for delayed launch of the other planned mobility stations. The shortened evaluation period of the mobility stations (#2) is classified as a medium risk. But taking this into account for the final evaluation, helps to eliminate this risk.

C Specific observations on the supporting activities in this reporting period

In section 0 (p.537) three main supporting activities are mentioned:

- The parking management scheme which is being implemented in the Living Lab where measure MUC 5.9 takes place.
- The media-effective opening event of the first two mobility stations and ongoing marketing campaign.
- The direct and dialogue mobility marketing campaign of measure MUC 2.9a.

Looking back at the measures' development these three supporting actions have had a positive impact on the process.

C.1 Quality of the Supporting Activities

No.	Supporting activity	Target group	Level of penetration	Score
1	Parking management scheme	All 3.100 households within the Living Lab owning at least one car and being dependant from on-street parking.	The parking management scheme for on-street parking was already introduced in Domagkpark south in 03/2018 and Domagkpark north in 05/2019. It is planned to be implemented in Parkstadt Schwabing as well in 2020. Mobility stations are a big help when it comes to private car ownership. Mobility stations reduce the need and therewith the number of cars on the streets. There is data available to quantify this political regulation from the local traffic monitoring department (see sections 0 and 0).	**
2	Mobility stations opening (event) and ongoing marketing campaign	Several local newspapers, all MSP, representatives of the City of Munich, among them the major, social media channels	About 60 participants, among them local press, all mobility service providers offering their services at the mobility stations and the major of the City of Munich joined the event. Furthermore, local press released articles and fostered the flow of information about the new mobility stations. A wide marketing and communication campaign with more than 800 posts more than 3 million reach and 5 million impressions	**
3	Direct dialogue mobility marketing campaign (of measure MUC 2.9a)	All households within the Living Lab, also including the ones which do not own a car and are therefore a suiting target group of the mobility stations.	2.950 households have been addressed by the campaign in 06/2019, 15,4% of all households replied to the Mobility-mail and 2.426 orders (in forms of information material) were done, 34% ordered more information about the mobility stations (as of 08/2019).	***
Score: * = Poor ** =Satisfactory *** = Excellent				

The parking management scheme (implemented almost city-wide) is subsequently addressing all 3.100 households of the Living Lab. It was first introduced in Domagkpark and will next be

implemented in Parkstadt Schwabing. The parking management regulates on-street parking and aims to limit car traffic within this area. The public parking space in the Living Lab is subject to considerable congestion and leads i.e. to illegal parking (also on parking spots dedicated for mobility stations) and furthermore creates dangerous situations for people walking or cycling (see online: Munich City Council resolution of 06.12.2017).

Another supporting activity was the media-effective event when the first two mobility stations were opened in 07/2018. About 60 participants, among them local press, all mobility service providers offering their services at the mobility stations and the major of the City of Munich joined the event. Local press released articles about the event and promoted the project city-wide. Residents walking by the event stopped and got attracted to the mobility station offers.

The direct dialogue marketing campaign of measure MUC 2.9a offered all kinds of information and voucher material about mobility option in the Living Lab and adjacent areas. All households were addressed by the campaign and could take the chance to get an individual consulting about suiting mobility offers. 34% of the households which ordered information material ordered especially information about the mobility stations (as of 08/2019).

C.2 Influence of the Supporting Activities on the implementation process

The parking management scheme didn't have a seemingly influence on the implementation process itself. Therefore, supporting activity #1 can be rated with one star (★ = Poor). However, it has significant impact on the effect of the measure (refer to drivers).

Supporting activities #2 and #3 can both be rated with "★★ = Satisfactory" due to the attempt to influence the process of implementing the mobility stations. Both activities helped to advertise the existence of the mobility stations among residents and in local media and therefore shows the importance of the project for the participating stakeholders. Due to the fact that all MSP were joining the opening event of the first two mobility stations, they had the chance to feel connected to the project and thus the further process of implementing the next mobility stations.

C.3 Influence of the Supporting Activities on the impact of the measures

The supporting activity #1 parking management was implemented in the Domagkpark south area in March 2018 and in Domagkpark north in Mai 2019. Initially it should have led to less illegal parking on reserved carsharing spots and in general less parking on-street. Statistics of Munich's official traffic control do not show a development towards this direction. The average number of "warnings with demand for payment" (bureaucratic term for German "Verwarnung mit Zahlungsaufforderung") didn't (continuously) decrease against all expectations, see Figure 87:

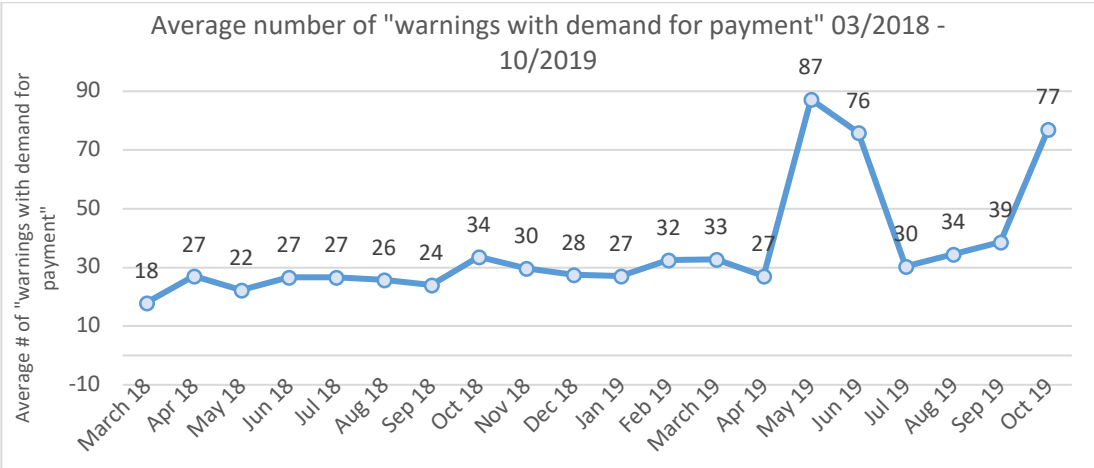

Figure 87: Average number of "warnings with demand for payment" 03/2018 - 10/2019

This statistical data is collected by the ML at Munich's traffic control department. The recording of the number of "warning with demand for payment" was first found from 03/2018 when the parking management was introduced in Domagkpark south. As expected the number of offences went up after introducing the parking management because people didn't know then about it. After knowing about the fact less people were fined the month after. Then the number almost constantly went up and had a peak when in 05/2019 the parking management was introduced in Domagkpark north. Same behavior occurred than after the implementation in 03/2018. However, quantitative data of the parking management must not be overestimated. First, parking monitoring has taken place only once a month on different days of the week. Second, the subjective impression of the representative of the local neighbourhood association is different than the numbers suggest and can measure. Local residents and their representatives say that in both, Domagkpark south and north, significantly more parking spaces have been vacant since parking management was introduced, and parking pressure has decreased. As a result, there is less illegal parking on reserved carsharing spots and in general less parking on-street than before the parking management was implemented. This cannot be proven with data, as no parking place controls were carried out before the implementation. Hence, due to the less advantageous development of the available data, supporting activity #1 can be rated with one star. Due to the less advantageous development of these numbers, supporting activity #1 can be rated with two stars ★★ = Satisfactory).

For supporting activity #2, the media-effective opening event, it cannot clearly be stated that this action had an influence on the impact of the mobility stations. It is to assume that there was a slight impact because local residents got attracted by the news about this new offer in their surroundings but numbers cannot tell about a significant high number of users right after the big opening event. The ongoing marketing campaign using social media channels and other materials was highly distributed. The range and impact on various target groups was high and resulted in rising acceptance of promoted offers. Therefore, a rating of two stars is to be placed "★★ = Satisfactory).

Measure MUC 2.9a Direct and dialogue mobility marketing promoted the mobility stations with several information materials. Evaluation data shows that there is an increase of the system usage in 06/2019, when the marketing campaign started. See Figure 88 and Figure 89 (see Measure Evaluation Report MUC 5.9 for more details):

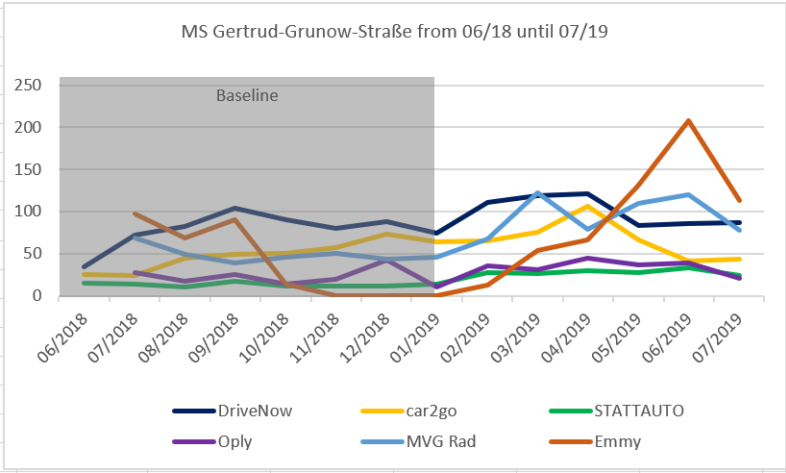

Figure 88: System usage of mobility station Gertrud-Grunow-Straße, data from MSP

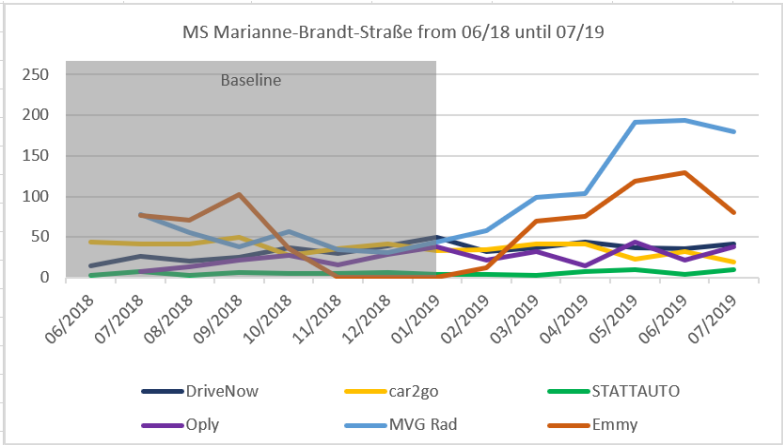

Figure 89: System usage of mobility station Marianne-Brandt-Straße, data from MSP

As the direct dialogue marketing campaign had a major influence on the impact of the mobility stations a score of three stars can be given (★★★= Excellent).

Lessons learnt on the Supporting Activities

The implementation of supporting activity #1 parking management can be crucial for the success of mobility stations. It can lead to less parking pressure, illegal parking on reserved carsharing spots and in general less parking on-street. Hence, frequent and regular monitoring not only at the start of the parking management seems to be important. The responsible local authority should therefore place a special focus on the monitoring of areas with mobility stations.

A media-effective opening event as supporting activity #2 can be an important driver for promoting the concept of mobility stations and the operating MSP. Especially the presence of recognized persons of high degree of popularity like a major can raise the awareness and acceptance of mobility stations. Thus, the local and regional press must be made aware of such events. For a sustainable promotion and awareness of the mobility offers, marketing and communication campaigns (supporting activity #3) can be an important driver. Marketing activities should be realized via different channels. Social media channels are one important medium but also dialogue mobility marketing campaigns can have a high impact on the awareness and use of mobility stations. Marketing activities should go hand in hand with the

implementation of mobility stations and include an individual consulting about suiting mobility offers among residents.

D. Conclusions

The following section sums up the main process findings and lessons learnt. Some process recommendations conclude the Detailed Process Evaluation Report of MUC 5.9.

D.1 Main process findings

Regarding the stakeholder composition, there were all kinds of relevant players covered in the project. Of course there are some stakeholders with a higher power potential and bigger ability to impact the measure but as all the others, the interest and motivation to bring the project to full success is for sure. Most important to name here, of course the ML's institution and furthermore the MSP- and of course the target group of MUC 5.9, the residents of the Living Lab.

The learning history workshop with the MSP and the user experience workshop in the Living Lab can be highlighted as two very important milestones within the process. Both had a major impact on the final evaluation outcome and the process evaluation results. The participating stakeholders gave very good feedback about conducting those formats and finally have a common platform to discuss the results and their personnel experiences during the project.

Nevertheless, regarding the residents as the main user group it is very important to involve them right from the beginning into the process, also when it's about location finding and how to sign and mark the mobility stations to make them more recognizable in the streets. Same goes for the MSP, which argued to be better involved and informed about all kinds of actions, e.g. such as expected data transfer towards the ML and the location finding for the mobility stations.

D.2 Process lessons learnt

Involving relevant stakeholders into the process can be seen as a big plus and it helps to increase the awareness and acceptance during the ongoing process. The ML major job is to communicate transparently and participate all stakeholders equally, of course depending on the process actions being done.
Advertising the mobility stations through a marketing campaign and information released on the Living Lab's own website, is a very recommendable action to do. The impact evaluation showed that the usage increased in the same month, the marketing campaign started.
Other supporting activities like the parking management scheme and media-effective events also helped to promote measure MUC 5.9.
One crucial factor during the process was the high motivation of the ML and the MSP to try out this new concept of mobility stations and adapt quickly to changes in this very fast moving branch of shared mobility.

D.3 Process recommendations

Due to several personnel changes within the project and especially among the MSP, a transparent and up-to-date communication could help to ease these personnel changes and keep important stakeholders in the loop for upcoming actions.

Otherwise it could have been helpful to involve the target group (the Living Lab residents) more into the location finding and mobility station design to increase their acceptance and awareness towards this new sharing options offered at the mobility stations. Having in mind

that there are already several other relevant stakeholders involved in these actions, there is a very good planning and transparent communication needed.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MUC 5.10

Sustainable mobility via E-scooter sharing

Process Evaluation Report

Deliverable No.:	8.5
Project Acronym:	CIVITAS ECCENTRIC
Full Title:	
Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistics in urban centres	
Grant Agreement No.:	690699
Workpackage/Measure No.:	WP 5 / 5.10
Workpackage/ Measure Title:	
Testing and operating clean and silent vehicles	
Responsible Author(s):	
Alexandra Bensler	
Responsible Co-Author(s):	
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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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EUROPEAN UNION

Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

Partner nº	Organization	Country	Abbrev.
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

Document History

Date	Person	Action	Status	Diss. Level
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27.03.20	Carolin Zimmer	PER-2 Submission	Final	EM

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

List of Co-authors

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Project	City		
ECCENTRIC	Munich		
Measure code	**Measure name**		
5.10	**Sustainable mobility via E-scooter sharing**		
Last update	**Responsible**	**Last update**	**Responsible**
30.11.2019	Alexandra Bensler	30.11.2019	Alexandra Bensler

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

(1) City policy level in perspective of CIVITAS goals/ longer term:
Cleaner and better transport in cities
To promote and implement sustainable, clean and (energy) efficient urban transport measures
To overcome barriers for implementing innovative and ambitious measures and policies through experimental testing and targeted research
(2) Strategic level:
Broadening the offer of clean and shared mobility options in eccentric spaces
Understanding usage patterns and motivations of said mobility options in order to develop demand management strategies to ensure sustainable mobility effects
(3) Measure level:

Short term objectives

Introducing an electric scooter sharing (ESS) service in the research area
Implementing an in-depth study to understand the usage, motivations and sustainability effects of ESS
Developing managing solutions to ensure ESS sustainability (e. g. strengthening favorable substitution effects, counterbalancing others)

Long term objectives

Contributing to the establishment of ESS in European eccentric spaces via the visibility of the local ESS as a best practice case
Contributing to the scaling and replication of ESS services by communicating the developed ESS solutions

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Awareness of ESS in Domagkpark	X	X		X	X					
2	Satisfaction of ESS in Domagkpark	X	X		X	X					
3	Developing/planning counterbalancing solutions to ensure ESS sustainability	X	X		X			X			
4	Mode shift among those using ESS	X	X		X			X			
5	ESS being used for a relevant no. of km by Domagkpark and Parkstadt Schwabing residents	X	X			X		X			
6	ESS system usage by Domagkpark residents	X	X		X	X		X			

Table 140: Quantifiable impacts.

A.2 Measure description

This measure focuses on introducing, understanding and optimizing the E-scooter sharing (ESS) service emmy in the research area in order to broaden the local sustainable mobility options (measure MUC 5.10). In this context, sustainable mobility is defined as an emission and space efficient mode of transportation. The goal of the sustainable optimization lies in identifying approaches to counterbalance possible surplus trips by ESS and substitution effects that can cause additional emissions and an increased road utilization. When identifying the effects to be counterbalanced, indirect positive effects of ESS on sustainable transportation will be taken into account. For instance, an additional road usage by ESS can decrease the use of public transportation running beyond maximum capacity during rush hour, thus contributing to mobility for all from short-term perspective.

INTRODUCING ESS: The measure introduces an ESS service in the research area, which was not part of the ESS business area before ECCENTRIC. As the foundation of the measure, the ESS business area has been expanded to include two of the mobility stations in the research area, thus allowing ESS trips to start and end there.[20] The ESS service aims at periodically placing three scooters on the premises of the mobility stations in Gertrud-Grunow-Straße and Marianne-Brandt-Straße for ESS to be accessible for local customers. Besides, scooters are placed there by customers ending trips within the research area. Introducing ESS in the research area was accompanied by putting up street signs that allow ESS parking on the mobility station premises. The measure was introduced on 07/10/2018 and is currently scheduled to continue indefinitely.

UNDERSTANDING ESS: An in-depth accompanying study ensures the ESS effects are sustainable by examining usage patterns and sustainability effects. As a groundwork, the study focuses on general ESS usage patterns such as system usage hubs and trip purposes as well as usage motivations. Then, it examines mode shifts to understand the substitution effects caused by the measure, since they affect emissions and road utilization rates. Finally, the study shows how ESS usage influences the users' image of and attitude towards electric mobility. Since attitude impacts behaviour according to the Theory of Planned Behaviour (cf. Ajzen 1991), this effect caused by ESS can optimize (sub-)urban transportation in the long run if it leads to trips being taken with EV instead of with ICE vehicles.

In general, the study compares the research area to the usage patterns and sustainability effects of the entire Munich ESS area to allow a result generalization, scaling and replication. The ESS sustainability challenges identified in the study will then lead to an applied governance process to find counterbalancing solutions.

OPTIMIZING ESS: Based on the study results on usage motivations and substitution effects, the measure aims at developing approaches to counterbalance unwanted substitution effects. Inspired by current governance research, a focus group with decision makers from the ESS service can be a means to find sustainably effective and economically acceptable solutions.

[20] The emmy ESS concept is free-floating sharing. However, within the research area, the two ECCENTRIC mobility stations in Gertrud-Grunow-Straße and Marianne-Brandt-Straße were chosen to be included into the emmy business area. Therefore, ESS in the research area can be considered a hybrid between a station-based and a free-floating carsharing. Its starting and/or ending point in the research area are station-based, while other starting points/destinations outside the research area are free-floating.

A.2.1 Measure outputs

The measure generates the following output:

The ESS business area includes parts of the research area, namely the mobility stations in Gertrud-Grunow-Straße and Marianne-Brandt-Straße as of 07/10/2018. Until further notice, the measure is planned to continue indefinitely.
By extending the business area, residents and employees within the research area have access to a free-floating ESS service. The ESS company employs Govecs electric scooters, which are designed to resemble the popular 'Schwalbe' scooters. The scooters are shared via an app.
At the beginning of the measure, three scooters are to be placed on the premises of each of the mobility stations periodically. In accordance with the Living Lab concept, the ESS company adapts their placing policy to best correspond to local demand during the course of the measure.
The measure will produce study results on ESS sustainability effects.
The measure will produce conceptual approaches to counterbalance unwanted ESS sustainability effects.

A.2.2 Supporting activities

No supporting activities have been identified.

A.2.3. Interactions with other ECCENTRIC measures

The measure MUC 5.9 ('Mobility Stations') can increase the use of ESS by contributing to a higher awareness of the ESS offer. Since the ESS parking areas within the Living Lab are part of the (E-)Mobility stations, potential customers using those stations can increase awareness of the ESS while using other mobility offers. This can enhance the potential usage group of ESS and contribute to obtaining a higher response rate.

A.2.4 Interactions outside ECCENTRIC

No external measures or influences interacting with the measure have been identified.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
Residents/ employees of research area	Potential users of the ESS within the research area.	Research Area	The research area in Domagkpark and Parkstadt Schwabing features access to ESS via the mobility stations in Gertrud-Grunow- and Marianne-Brandt-Straße.
ESS customers	Indirectly supply usage data via usage tracking[21]; those having agreed to be contacted for market research purposes belong to the potential sample for the user survey.	Munich	The comparison group for the ESS development in the research area is the entire business area (and the entire customer group) throughout Munich. The

[21] The data consists of automatically tracked trip variables such as usage time, trip length and distance. In order to understand spatial and temporal ESS usage, the trips were analysed collectively without drawing any conclusions about single trips.

			ESS business area currently involves spaces in the city center
Decision makers	Municipal and business (ESS) decision makers interested in optimizing ESS sustainability.	Munich	Municipal and business (ESS) decision makers interested in optimizing ESS sustainability.

Table 141: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
1	Green City Experience GmbH	P	PR	L	Measure leader
2	Emmy	S	PR	P	ESS operator expanding its operating area to the research area; supplies ESS usage data; enables access to survey participants
3	City of Munich/KVR	P	C	O	Responsible for Mobility Stations, supported the expansion of the ESS operating area to the research area, put up signs for ESS parking
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					

Table 142: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Company does not provide usage data.	Organizational	[Company provided usage data.]	ML
Company does not allow access to customers for customer survey.	Organizational	[Company provided access to customers for customer survey.]	ML
Survey response rate is low.	Involvement	[Survey response rate amounts to +500 participants.]	ML
Total number of survey respondents is low within the laboratory area, since area is relatively small.	Positional	Survey has been extended to include all Munich users to be able to compare results and assess them on a larger scale.	ML
The process to officially introduce the measure within ECCENTRIC requires an amendment of the Grant Agreement, which entails a complex procedure. So far, it has required more than year (cf. section B.3) and remains officially inconclusive. That has complicated the planning and impacted the scheduled project demonstration and monitoring.	Organizational	Continuously adapting the project schedule and acting accordingly has made it possible to advance the project.	ML

Table 143: Identified risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning milestones (M 20-22)

Relevant milestones accomplished:

1) Literature survey on ESS in cities shows that E-scooter sharing has mostly been examined from following points of view: business development, user experience of E-scooters and E-motorcycles (hardly in sharing service contexts), customer analysis and historical and techno-sociological development of E-scooter-sharing services. To the knowledge of GCX, three studies on E-scooter sharing have focused on the following aspects:
   (1) Usage patterns in the context of ESS sharing within a short-term, laboratory-like test within informal sharing groups in a large German city in 2016 (cf. Hardt und Bogenberger 2019)
   (2) Usage patterns in the context of ESS sharing within a commercial ESS sharing service in a large German city in 2017 (approx. 53.00 trips/year) (cf. Degele et al. 2018)
   (3) Key factors explaining ESS use, including socio-demographic aspects (like age and level of education) and trip-specific characteristics in Spanish cities in 2018 (cf. Aguilera-García et al. 2019)
   ➔ Research gaps:

Knowing and understanding usage patterns within well-established ESS businesses (+ 150.000 trips/year)
Understanding the impact that ESS can have on mobility patterns in (ec-)centric areas
Understanding sustainability effects of ESS business (concerning substitution effects and emission reduction as well as effects on space-efficient mobility)
Finding solutions to counterbalance unwanted substitution effects and other challenges to sustainability

2) Agreement to expand ESS service to the research area and to place E-scooters in the Mobility Stations: result of negotiations with the City of Munich as the responsible stakeholder for the Mobility Stations and the ESS business

Phase 2: Procurement and implementation (M 23-36)

Relevant milestones accomplished:

(4) Introduction of the ESS service within the ECCENTRIC research area by an expansion of the ESS business area
(5) Collection and analysis of the first batch of usage data (2018), the development of the user survey and the first evaluation measures.

Accomplished, the ESS usage dataset for 2018 contains 145.066 trips.
(4) Analysis of the 2018 usage data.
Overview of results communicated to the City of Munich and the ESS business.

Phase 3: Demonstration and monitoring (M 37-48)

Relevant milestones accomplished:

(6) data collection of the second usage survey (2019)
Accomplished in M37, the ESS usage dataset for 2019 contains 268.384 trips.
(5) data collection of the user survey (2019)
Accomplished in M37, the ESS user dataset for 2019 contains 553 users.

Relevant milestones in process:

(7) data analysis of the second usage survey (2019)
Due to the dense timeline of measure MUC 5.10, the data of the second usage survey is currently being analysed and will be finalized until M-42. This schedule is characterized by the amendment process to include E-scooter sharing (ESS) into measure MUC 5.10 being decided well-advanced into the ECCENTRIC project (Q4/2019).
As of end of February 2020 it is decided to include this measure "E-scooter sharing (ESS)" into work package number 5 as MUC 5.10.
(6) development of counterbalancing measures (2020)

The developing/planning of counterbalancing measures (cf. MUC 5.10 – KPI 4) is crucial for scaling, replication and recommendations. Thus, corresponding with the ECCENTRIC time schedule, we will not have achieved the KPI 4 by the end of 12/2019. The developing/planning of counterbalancing measures cannot be accelerated since it is based on the results of the data analysis, which are currently being produced

B.2 Process evaluation activities

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

Due to the late start of measure MUC 5.10 (cf. Chapter 0), a process evaluation was not possible early in the project. The consultations with the main ECCENTRIC project management and the European Commission have taken approx. a year so far (03/2020) and the status of the project has only been partially clear during certain discussion phases. That is why MUC 5.10 was implemented according to an adapted schedule but was not evaluated in the same way as other ECCENTRIC projects.[22] Instead, this present PER assesses the research process. It was drawn up by adapting the ECCENTRIC PER procedure to the given circumstances. The process follows the steps depicted in Figure 90, which will now be elaborated upon.

Figure 90: PER methodology for MUC 5.10 – separate application for barriers and drivers (b&d)

[22] For instance, MUC 5.10 was not included in the standardized survey process via Limesurvey (01/2018) that first collected barriers and drivers. Instead, a dense process evaluation schedule was drawn up (cf. Figure 90) that generated the key process evaluation results.

STEP 1) Collect general information about the stakeholders, their role in the project (job, tasks, contact information) and their engagement with the different project phases (planning / implementation / operation / maintenance / others)

STEP 2) Gain overview about barriers and drivers

STEP 3) In-depth focus on b&d: identify supporting thematic areas / sectors for the measure within the following categories: political / strategic, institutional, laws and regulations, cultural, problem-related, involvement / communication, planning, organisation, financial, technological and spatial.

STEP 4) In-depth focus on b&d: describe every b&d in a detailed way, including measures to overcome the barriers and how the drivers were used to maximise the measure's impact. The ML was shown the full list of categories to be prompted to include all possible d&b she could find.

STEP 5) Identifying risks to the measure: The risks of the measure were identified. For each risk, its likelihood as well as the risk's potential to endanger the measure's success were assessed.

The five steps were followed twice in order to first collect barriers and then identify drivers.

The main stakeholders questioned for the PER are the ECCENTRIC MUC 5.10 ML and the entire GCX team (Green City Experience, previously Green City Projekt (GCP)). The ECCENTRIC GCX team consists of two different groups: (1) team members mainly responsible for organization and measure implementation (implementation phases 1-2) and (2) team members responsible for data analysis and developing sustainability solutions (implementation phases 2-3). The insights of other relevant stakeholders such as emmy and the City of Munich (KVR) (cf. Chapter 0) were collected by interviewing the ML and obtaining her indirect assessment of the other stakeholders. Nevertheless, together with the ML, it was possible to create a stakeholder analysis to obtain in-depth information on the process.

To **visualize** the information obtained by steps 1 and 2, an emerging pattern of all stakeholders is mapped in a **two-dimensional chart**. As in the PER process for all ML, the ML of MUC 5.10 was asked about her perception of where to locate the ECCENTRIC MUC 5.10 team and other relevant stakeholders within the stakeholder analysis matrix. The objective of the stakeholder analysis is to engage stakeholders in order to improve process and maximise impact. Each stakeholder is given a coordinate within the chart. The coordinate depends on the stakeholder's power potential (the bigger the bubble the higher the power potential), the interest (between low and high) and the ability to impact the measure (from low to high).

Figure 91 shows the stakeholder analysis of the measure MUC 5.10.

GCX as an institution both is highly interested and has a high ability to impact the measure. Its high interest can be put down to the project insights it can include in its consulting and research activities. The high impact ability lies in the GCX responsibility to collect and analyse data as well as in the key role to develop counterbalancing measure suggestions.
The ESS company has a medium interest and a high ability to impact the measure. Its interest arises from generating more business and from the insights gained by the ECCENTRIC MUC 5.10 study. Its ability to impact the measure is high since it was responsible for expanding its business area to include the ECCENTRIC research area. Besides, it supplied (access to) data for Phase 2 and 3 by directly supplying tracked usage data[21] enabling the access to their customers to launch user survey.

The City of Munich (KVR) has a medium to high interest and a medium ability to impact the measure. Its medium to high interest is derived from the will to offer a broad choice of mobility options in the ECCENTRIC area in order to maximise its accessibility and further multimodality. The medium ability to impact the measure can be traced back to their effectiveness when finding solutions to the building and street regulations in the research area. Moreover, their knowledge of urban traffic planning, which is relevant when contributing to development of counterbalancing ideas as a last step of the project, contributes to the success of the project. The ESS customers have a low interest in the project succeeding, since they do not gain anything from the outcome. Their medium ability to impact the measure can be derived from the fact that they (not as an individual but as a group) generate the data necessary for the measure.

The following **sources** are used to obtain a more Detailed Process Evaluation:

- **Review of measure reports** as well as some informal observations from the Living Lab.
- Carrying out a (written) **guided interview** with the ML and its team

The **review of measure reports** as well as some informal observations from the Living Lab are taken into account for the process evaluation. In order to get a complete picture, the perspectives of different stakeholders were included in this report.

Especially the (written) **guided interview** helped to look deeper into the process and its main barriers and drivers, hence giving a helpful overview for the lessons-learnt part. The interview questions focus on the following matters:

General information about the current status of the measure
Thinking about the ESS set-up: positive thoughts and worries
Explaining the entire process and developments from the ML's own point of view: drivers and barriers
Lessons learnt through the process

The choice for executing guided interviews was made because it is a simple method to gain deeper insights from the ML and to keep the time expenditure of the key-stakeholders and the LEM on a low level. The results of the interview can be found in sections B.3 (Barriers) and B.4 (Drivers).

The ML and the ML's institution organized a **one-and-a-half-year (and running) field test**. Ever since the ESS service was introduced in the research area in July of 2018, there has been a designated sharing space for ESS both in Domagkpark and in Parkstadt Schwabing. The ESS company has pursued the goal to constantly provide several motor scooters in each sharing space. The next part of the measure focusing on studying and understanding ESS sustainability effects has been implemented by collecting and analysing usage and user data. While the usage data consists of tracked usage data of 2018 and 2019 (including variables such as usage time, trip length and distance)[21], the user survey data consists of 480 complete surveys (including 33 users that have started/ended at least one trip in the research area). As the final step of the demonstration and monitoring phase, the counterbalancing measure suggestions will briefly be conceptualized.

The results of the field tests are listed in the MUC 5.10 MER, while the barriers to the process are found in section B.3 and the drivers in section B.4.

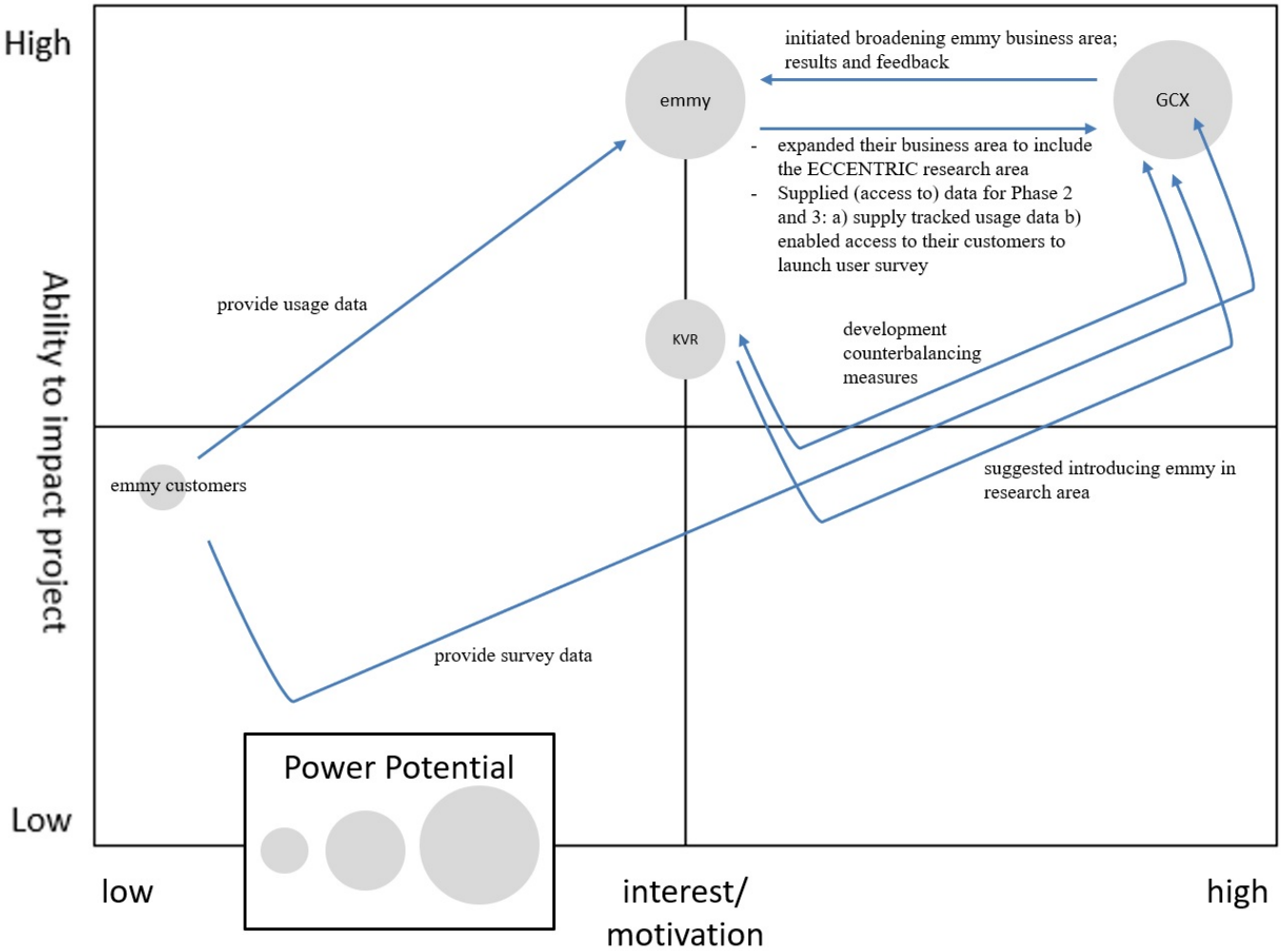

Figure 91: Process analysis as Stakeholder analysis matrix

B.3 Barriers

Five main barrier fields could be identified (see Table 144), of which the detailed barriers are described in the following table:

No.	Barrier field	Description	Action to overcome the barrier
1	Political/ strategic	ESS company interest to broaden their business area to include the ECCENTRIC research area was hesitant since the neighbourhood was still developing.	Demonstrating business potential based on the results of the first household survey (demographics, interest of population towards new mobility solutions).
2	Involvement and communication	Communication with the ESS company often required several steps (as the data being handled was sensitive), which had to be taken into account in the process of the project.	Partially solved by circumstances (new ESS team members responsible for ECCENTRIC communication), partially by scheduling enough time for communication and continuously inquiring and maintaining communication structures.
3	Planning/ organizational and financial challenge	The process to officially introduce the measure within ECCENTRIC requires an amendment of the Grant Agreement, which entails a complex procedure. So far, it has required more than year and remains officially inconclusive. That has complicated the planning and impacted the scheduled project implementation.	Continuously adapting the project schedule and acting accordingly has enabled to advance the project.
4	Technological	The ESS company's tracking[21] software produced partially questionable data concerning driven distances and usage time.	Systematic data cleaning.
5	Spatial	The ESS company's tracking[21] software produced partially questionable data including trips outside of the business area (and country).	Systematic data cleaning.

Table 144: Identified barriers and planned/taken actions.

The ECCENTRIC measure team dealt with **political** and strategical challenges at the beginning of the project. Since the research area was being developed at the time when the measure began, it only had a limited population density. Meanwhile, as a business stakeholder, the ESS company's core focus was profitability. At the time the project began, the ESS company was strongly focusing on expanding into highly populated areas with their then-limited number of fleet vehicles. The ECCENTRIC measure team demonstrated the business potential of the research area based on the results of first household survey (demographics, interest of population towards new mobility solutions). This convinced the ESS company to contribute to ECCENTRIC and expand their business area. Another **strategic** barrier consisted in that the ESS company was supplying potentially sensitive business data interesting to potential competitors. That is why the data and the results needed to be handled with extreme care. As an action to overcome this challenge, GCX strongly collaborated with the ESS company. Discussing adequate communication formats and content was a key to successfully implement, demonstrate and monitor the project.

The sensitivity of the data influenced the **involvement and communication** within the project. Since using and publishing data (be it in presentations or reports) required a close consultation

and discussion with different stakeholders within the ESS company, the communication processes tended to take time. Scheduling enough time for communication within the research process and reaching out to the responsible ESS team members was a key to success.

A **planning,** an **organizational and** a **financial barrier** consisted of the complex process to create the MUC 5.10 measure after the project had started. The process essentially requires an amendment of the Grant Agreement (a process which is currently officially inconclusive), which not only needed discussions with the local site manager, but with the main ECCENTRIC project management and with the European Commission. The number of steps necessary to apply for an amendment indicates the length of the process. So far, the process has taken a year and remains inconclusive. This uncertainty has put a strain on the implementation, the demonstration and the monitoring process. To overcome this challenge, the ECCENTRIC project team has continuously adapted the project schedule and has acted accordingly. Moreover, other ECCENTRIC partners, especially the City of Munich as the local site manager (cf. section 0), helped overcome the barrier by continuously furthering the amendment process.

Technologically, the measure met a challenge by the ESS company's tracking[21] software. At times, it produced inexplicable data, such as a number of trips with a relatively long distance lasting only one minute. This was solved by rigorously cleaning the data. Furthermore, another technological short-term barrier occurred when the ESS service was briefly interrupted for technical reasons in the winter of 2018/2019. However, the weather conditions would have impaired the service being used within that time span anyway. The ESS business found a solution to its technical challenge and the service began running anew.

A last (digital) **spatial** barrier also refers to the ESS usage data used for analysis. The driven distances raised questions as certain trips were significantly longer than what an ESS battery span would allow. This was equally solved by rigorously cleaning the data.

B.4 Drivers

Five main driver fields could be identified (see Table 145), of which the detailed drivers are described in the following table:

No.	Driver field	Description	Action to make use of the driver
1	Political/ strategic	The City of Munich (KVR) pushed the idea to introduce ESS in the research area.	The KVR impetus started the process to introduce the ESS service in the research area.
2	Laws and regulations	The support of the City of Munich (KVR) made it possible to quickly introduce a parking and sharing space for the ESS scooters in the research area.	A branded ESS parking area and an ESS street sign were put up to advertise the ESS service.
3	Cultural	The societal trends of sharing instead of owning and the general interest in electric mobility contributed to an extensive ESS use.	That increases not only the measure implementation but improves the potential data quality since the basic population that is included in the 'understand' and the 'optimize' phases of the project is enlarged.
4	Problem-related and involvement	The willingness of the ESS company to supply the (access to) data enabled the demonstration and the monitoring phase of the project.	The usage data was analysed while the user data was collected and analysed to understand ESS sustainability effects.

5	Planning and organization	Planning and organization were successful due to the limited number of stakeholders needed for the project and their clearly defined expertise and responsibilities within the project.	The different project phases were implemented smoothly.

Table 145: Identified drivers and planned/taken actions.

Politically and **strategically**, the project was driven by the City of Munich (KVR) pushing the idea to introduce ESS in the research area. This impetus initiated the process of introducing the ESS service in the research area.

Laws and **regulations** also furthered the project. Since the City of Munich (KVR) was very interested in the ESS service being present in the research area, it made it possible to quickly and unbureaucratically create a parking and sharing space for the ESS vehicles within the Mobility Stations (cf. section 0) in the research area. The areas were branded with a street sign specifically developed for electric (motor) scooter sharing and by marking the ground of the sharing space accordingly. Referring to the residents' start and ending points outside the research area, a federal regulation (rather: a regulatory tolerance) fuelled the project: While it is officially forbidden to park electric scooters on a sidewalk, cities often tolerate it, thus simplifying the use of ESS.[23]

Culturally, the measure was driven by several societal trends including an openness to sharing instead of owning and a curiosity towards both new (and fun) mobility solutions and electric mobility in general. This interest in new mobility solutions (combined with the opportunity to participate in a raffle to win free ESS minutes) contributed to a high response rate in the ESS survey (amounting to 480 complete surveys throughout Munich).

Problem-related drivers relate to the willingness of the ESS company to supply the (access to) data enabling the demonstration and the monitoring phase of the project. The usage data was analysed whereas the user data was collected and analysed to understand ESS sustainability effects. Another problem-related driver consisted in the high response rate of the user survey also influenced by cultural drivers.

The **involvement** of both the ESS company and the City of Munich enabled the successful measure implementation when introducing the ESS service and analysing/understanding it. Special **communication** measures driving the ECCENTRIC measure 5.10 can be traced back to both the ESS business and the City of Munich. Since they pursue a sound communication strategy for the ESS business and the local ECCENTRIC measures respectively, the ESS measure was well-advertised.

Project **planning** and **organization** was successful for several reasons. Firstly, the project only required a limited number of stakeholders (cf. section 0), which made it simple to coordinate and manage. This was reinforced by the fact that every project stakeholder (and sub-team within an organization) had a clearly defined area of expertise and responsibility within the project (cf. section 0, 'project stakeholders'). This enabled a smooth project implementation and demonstration.

[23] Weidner, Ingrid (2017): Wohin mit der Vespa?; https://www.zeit.de/mobilitaet/2017-01/motorroller-stadtverkehr-parken-parkplaetze, 26/03/2020.

The EU funding for measure MUC 5.10 allowed for ESS to be implemented, understood and optimized. Thus, it served as a **financial** driver. Last but not least, the project concept to compare the ESS usage within the research area to patterns in Munich overall worked as a **spatial** driver. It enabled a scientifically responsible approach to deal with the limited case numbers within the research area.

B.5 Influence on risks

After having overcome and/or mitigated several risks (cf. section 0), Table 146 shows the current main risk. Implementing, demonstrating and monitoring the measure has entailed certain time planning challenges since the official framework for the measure is not entirely clear. The process to officially introduce the measure within ECCENTRIC requires an amendment of the Grant Agreement, which entails a complex procedure. So far, it has required more than year (cf. section B.3) and remains officially inconclusive. That has complicated the planning and impacted the scheduled project implementation. However, especially ever since the Grant Agreement was handed to the ECCENTRIC project management in the summer of 2019, GCX has re-adapted its project schedule and has acted correspondingly. Therefore, GCX is working according to schedule and plans to continue to do so within the next months. In a nutshell, the risk is improbable to impact the project's success.

Identified risk	Category	Mitigation actions	Responsible
The process to officially introduce the measure within ECCENTRIC requires a Grant Amendment, which entails a complex procedure. So far, it has required more than year (cf. section B.3) and remains officially inconclusive. That has complicated the planning and impacted the scheduled project implementation.	Organizational	Continuously adapting the project schedule and acting accordingly had enabled to advance the project.	ML

Table 146: Reported period risk assessment.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MAD 6.2

Test fleets, policy incentives and campaigns for the uptake of electric vehicles

Process Evaluation Report

Deliverable No.:	8.2
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Mariana Guerra, Enrique García Cuerdo	
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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático SL.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V.formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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ECCENTRIC	Madrid		
Measure code	**Measure name**		
6.2	Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistics in urban centres		
Last update	**Responsible**	**e-mail**	**telephone**
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A. Introduction

A.1 Expected results of the measure

The measure's objectives can be described as follows:

(1) At the city policy level (and in perspective of CIVITAS longer term goals), the measure is expected to contribute to the following objectives:

- Improvement in the environmental performance of both, municipal and private fleets.
- Emission reductions from road traffic.
- Improved energy efficiency of road traffic.

(2) At the strategic level, the measure will contribute to achieve the following objectives:

- Reducing the energy consumption and emissions of companies´ fleets.
- Promoting the uptake of clean vehicles.
- Optimization of the city charging infrastructure.

(3) At the measure level, the following targets should be achieved:

- An increase in the number of electric vehicles in the municipal fleet (at least 20 vehicles).
- Deployment of the City Fast Charging Network, increasing the current number of fast charging stations (at least 3 new charging points).
- An increase in the number of electric vehicles in private companies´ fleets: agreement with 5 companies to support the introduction of electric vehicles.

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Liveability	Competitiveness	Efficiency of urban freight	Local economy
1	At least 20 electric vehicles in the municipality fleet (to be translated into energy, emission reduction)	X	X								
2	Deployment of at least 3 new fast charging stations										
3	Agreement with 5 companies to procure electric vehicles for their fleets	X	X								

Table 147: Quantifiable impacts.

A.2 Measure description

The municipality of Madrid will liaise with at least 5 key private companies (such as supermarket chains, shopping malls, car sharing services, taxi fleets and freight operators) in order to develop pilot projects concerning the use of electric vehicles, namely the launch of a

“test fleet scheme”, including the potential implementation of electric charging facilities associated to their premises.

In addition, strategies to promote the wide uptake of clean vehicles for freight delivery companies and private citizens will be designed and put in place. Finally, aiming to showcase its benefits, as well as to play an exemplary role, Madrid´s municipal departments and public companies will introduce at least 20 electric vehicles in the municipal fleet.

The development of this measure will be done in cooperation with EMT, the public transport operator, whose fleet is expected to be an ideal showcase for this kind of technology. EMT will help the City Council to reach out to different companies and stakeholders in order to involve them for a wider uptake of e-mobility, cooperating with the City Council and easing the access to EMT’s charging infrastructure, located in public underground parking facilities, targeting specially car sharing services, taxi fleet and freight operators. EMT, as the public transport operator of Madrid, intends also to increase its fleet of electric vehicles for auxiliary services.

A.2.1 Measure outputs

Expected outputs at the planning and research stage:

- A City Electric Mobility Strategy, including (1) the deployment of a (fast) charging network in Madrid for electric vehicles, (2) the renewal of the municipal fleet, including the replacement of conventional vehicles with electric vehicles as well as the identification of charging solutions for the municipal fleets, (3) the renewal of the city fleet, with a focus on professional users and other commercial fleets (taxis, car sharing, urban freight, etc.).

Expected outputs at the procurement and implementation stages:

- Procurement and operation of at least 20 electric vehicles for the municipal fleets, and at least 3 fast charging stations in the city.
- Identification of at least 5 private partners interested in the inclusion of electric vehicles within their fleets.
- A Plan to engage stakeholders in the use of electric vehicles, including campaigns and incentives.

A.2.2 Supporting activities

No supporting activities have been identified at this stage.

A.2.1 Interactions with other ECCENTRIC measures

No interactions have been foreseen at this stage.

A.2.4 Interactions outside ECCENTRIC

There could be some relevant actions outside ECCENTRIC, resulting in the procurement of additional electric vehicles for the municipal fleet or in further expansion of the number of fast charging stations, beyond the initial targets for this measure. However, these actions have not materialised yet.

In October 2018, the national government removed some existing regulatory barriers to the expansion of charging points. This could interact with ECCENTRIC, facilitating a quicker deployment of the public charging network envisaged in the municipality's strategy.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
10	Companies and institutions with car fleets		Vallecas and other Eastern districts
9	General public		City at large

Table 148: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC project partners and other important actors

The table below shows the main stakeholders involved in the measure. At this stage, the 5 private companies expected to participate in the measures have not confirmed their agreement yet.

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
	Director of Planning and Operations CRTM	P	Other (PTA)	O	
	Head of Planning CRTM	P	Other (PTA)	O	
	City councillor. Environment and Mobility	P	C	O	
	City councillor. Sustainable urban development	P	C	O	
	Director. Sustainability and Environmental control	P	C	O	
	EMT CEO	P	PT	P	
	EMT. Director of transport services	P	PT	P	
	Ayuntamiento de Madrid. Measure leader	P	C	L	
	EMT. Measure participant	P	PT	L	
	Contacted companies (5 at least)	S	PR	O	

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

Table 149: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Difficulties in engaging private sector in the electric mobility uptake	9 (Financial)	Paying more attention to dissemination activities oriented to private companies. EMT strategy focused in creating a set of mobility services oriented to electric fleets	City EMT

Table 150: Risks identified at the measure planning stage.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

The design phase took place between September 2016 and July 2017. It built upon some initial experiences in renting of electric cars conducted by the municipality, and included the key decision of decentralising the management of the renting contracts. Renting proved to be an effective mechanism to accelerate the inclusion of innovative technologies, such as electric cars, in the city fleet. The Waste Collection Service was selected for the pilot. The vehicles are dedicated to inspection of the services of garbage collection and street cleaning. Concerning the expansion of the public charging network, the planning stage included some pilot fast charging points installed by EMT in its public parking *Benavente* in February 2017, and the necessary paperwork to get the official permit required to offer charging services to the public (electric charging manager license). In late 2018, the requirement of such official license was considered by the national government as a relevant barrier to the expansion of the charging network at the national level, and was abolished in October 2018.

The implementation phase took place between August 2017 and July 2018. It included the drafting of the first Request for Quotations (RfQ) for renting 22 electric cars. An additional RfQ was launched subsequently, in 2018, for 32 additional electric cars. Concerning the charging network, in March 2018 EMT had charging points in operation at 4 public parkings (*Colón, Benavente, Salamanca, Recuerdo*), within the programme “Electro-EMT”. It also included the preparation of the RfQ by the municipality for 20 additional fast-charging points in the city, in private premises with public access; these fast-charging points should be operational in 2019. The involvement of private companies in the measure has been difficult. Thus far, two companies (COOLTRA, offering e-mobility services, and Pascual, a freight distributor) have agreed to explore the possibility of including electric vehicles in their fleets. Pascual is building upon their previous experience in the FP-7 “FREVUE” project, and has recently decided (board decision in March 2018) to procure several plug-in hybrids, as an intermediate step before considering to include full electric vehicles in its fleet. COOLTRA’s mobility services are focusing on renting of electric motorbikes, but the company is considering to expand its services to include a new last mile delivery service with electric vans in Madrid.

The operational phase is taking place since February 2018 and includes 19 electric cars (9 electric cars initially, and 10 additional cars since January 2019). They are part of the new 70 (44 acquired by Environment Area and 26 belonging to Economy Area) electric cars that started regular operations in municipal services in April 2018. In addition, 136 electric cars (74 acquired Environment a mobility Area and 62 new electric vehicles acquired by the Municipality’s Economy Area) are expected to start operating in January 2019. For monitoring and evaluation purposes, the measure remains limited to the fleet of 19 vehicles initially envisaged in the project description. The operation of the EMT charging points has been monitored since March 2018.

There have been some minor changes in the measure, mostly during the implementation stage. The main components of the measure are now the electrification of the municipal fleet (with a number of vehicles much higher than initially expected, thanks to the renting scheme and the decentralised management system put in place within the municipality), and the

expansion of the fast-charging network in the city. For the latter, the municipality is following a mixed approach, combining the expansion of the EMT network of charging points at their public parking facilities with the upgrading of the municipal on-street charging network (most of the points in the network will offer fast-charging services) and with agreements between the municipality and private sector stakeholders (at least 20 fast chargers will be supplied by the City Council to private operators for the deployment of the fast-charging network). This new approach has been facilitated by the national government with the removal of regulatory barriers in October 2018.

B.2 Process evaluation activities

The activities undertaken to collect factual information about the implementation process have included a process evaluation survey opened to the stakeholders involved in the measure, interviews with key decision-makers, in some cases replacing the surveys, and regular meetings of the local evaluator with the measure leader and with other members of the measure team. Furthermore, as this measure had been singled out for detailed process evaluation, a process evaluation workshop was held on November 19, 2018.

The survey intended to assess the role played by each stakeholder in the process, including aspects such as their motivation and engagement. This analysis is also useful for identifying future actions aimed at engaging stakeholders and to increase the measure's impacts.

Six participants responded to the survey: two members of the municipal technical staff (Public Space and Environment), one city councillor (in charging of Finance, and therefore responsible for the general layout of the renting contracts), one member of the Eccentric measure team, one member of the EMT technical staff (involved in the development of the EMT public charging network) and one member of the technical staff of COOLTRA, one of the private companies approached by the municipality to include electric vehicles in their fleets. The latter was involved in COOLTRA's ECOSCOOTING service, providing e-motorbikes for renting.

The respondents have shown a high level of identification with the objectives of the measure. In a 1-5 scale, and in a decreasing order of importance, they have given an average score of 5.0 to get a *more efficient fleet from the environmental point of view*; 4.7 to *reduce fuel consumption, CO2 and air pollutant emissions*; 4.3 to *comply with corporate environmental objectives of the company*; 3.7 to *increase the number of electric vehicles in private companies' fleets*, and 3.5 to *increase the number of electric recharging points*.

The interviewers could be involved in one or more of the six different actions envisaged within this measure: regarding the *definition and incorporation of electric vehicles in the municipal fleet*; *use of the new electric vehicles of the municipal fleet; definition and incorporation of electric vehicles in the EMT's fleet; use of the new electric vehicles of the EMT's fleet, expansion of the number of public recharging points*, and *inclusion of electric vehicles in private companies' fleets.* Only four of the respondents were involved in some of these actions: Two of them in the *expansion of the number of public recharging points,* one of them in the *incorporation of electric vehicles in private companies' fleets, and the other one, in the use of the new electric vehicles of the municipal fleet.* The member of the EMT technical staff know the ECCENTRIC measure, although he was not involved in it.

In addition to those listed above, three additional stakeholders were identified as relevant for this measure by the respondents: *vehicle manufacturers*, *staff in charge of the maintenance of municipal buildings equipped with recharging infrastructure* and *entities dedicated to the provision of fast-charging services*.

All the respondents stated a positive assessment of their degree of interest in the measure (average scores above 4). As expected, the scores on influence and impact are lower than the ones on interest (subjective and objective perception).

The differences between the subjective self-perception and the objective perception (from other stakeholders) of interest are low, below 1 point. Differences between subjective and objective perception of influence and impact are higher in the case of the member of EMT technical staff, which considered himself as having low impact and influence whereas the other stakeholders considered him as holding a high capacity of impact and influence.

The average score of satisfaction with the measure among the respondents is 3,8 points, reflecting a moderate level of achievement of their initial expectations towards this measure.

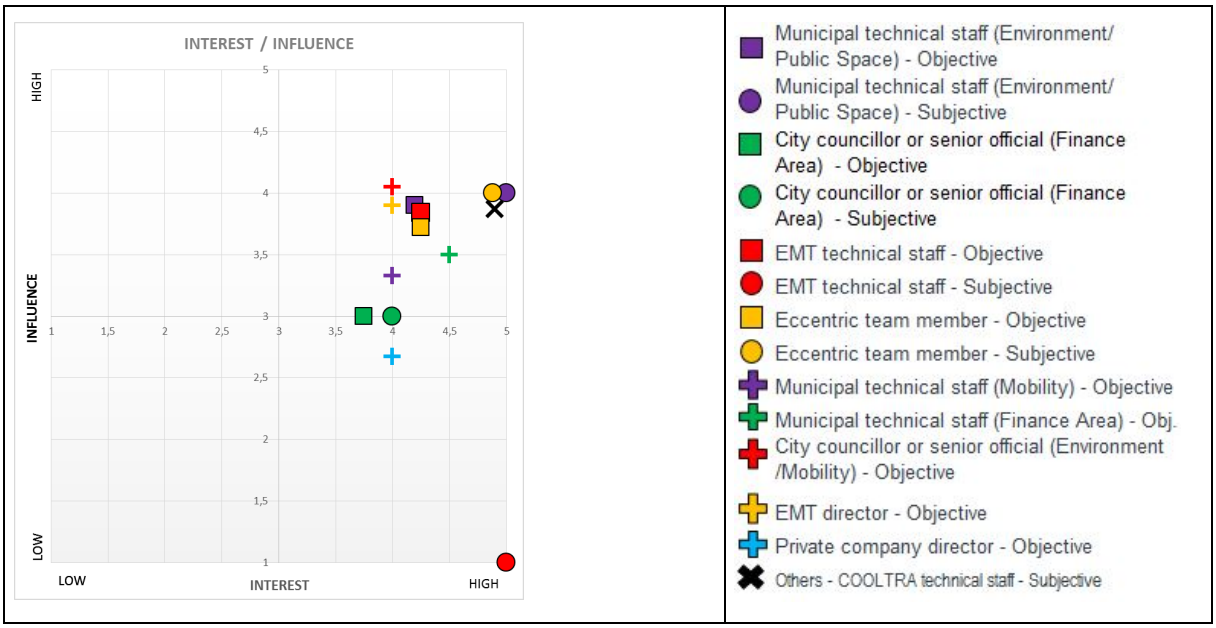

Figure 92: Interest & influence of stakeholders

Figure 93: Interest & impact of stakeholders

This measure was discussed at interviews with three institutional stakeholders. There were no interviews with social stakeholders, as the measure was considered of a technical character and without impact at the Living Lab level. The City Councillor for mobility and her deputy agreed in giving a very high priority (5) to this measure, whereas the EMT CEO considered it of a slightly lower priority (4). The three stakeholders agreed in considering that they had very high interest in the measure, and that they had had very high impact in its contents. Regarding their influence, the City Councillor and her deputy saw themselves as having very high influence (5), whereas the EMT CEO valued his influence slightly lower (4).

The workshop held in November 2018 took together participants from different departments of the municipality, from the Electro-EMT programme of EMT and from two private companies (COOLTRA and PASCUAL). The workshop allowed to establish a common storyline of the activities undertaken within this measure and to identify some key barriers and drivers (see sections B.3 and B.4); the following conclusions can be highlighted:

- The transition towards an electric fleet needs substantial a key strategic decision at the adequate level and substantial preparation and capacity-building within the organisation. The two private companies highlighted their strategic commitment with sustainable mobility, and their prior experience in other projects. Participation in other projects had helped to build up a sound business case to be presented at the company's board on the basis of corporate responsibility, energy efficiency and even cost savings, in spite of a risk-avoiding culture seeing electric vehicles (or plug-in hybrids) as unreliable compared to conventional ones.
- Decentralisation and the new renting scheme have both been critical in the municipality to empower those professionals interested in electric vehicles to be able to include them in their fleets in a relatively short time. Once the experience is proved successful in one department, it can quickly move forward and expand within the organisation. In this case,

it was important that the services provided by the fleet targeted for electrification was very well suited to the characteristics of existing small-size electric cars.

- The relevance of the public charging network for the deployment of electric vehicles in cities should be analysed from a strategic perspective. Most users of EVs (and particularly those within large fleets) seem to prefer slow charging at home or in their premises, and the experience of PASCUAL (financing charging points at home for their drivers of electric vehicles) confirmed this conclusion. EMT's experience suggests that there is no relevant demand for fast-charging services in parking facilities, as paying for charging on top of paying for parking seems to be not an attractive service for users (maybe because charging is considered as an added-value service which should be offered for free when paying for parking). However, many customers are attracted by the service offered by the on-street electric hub located in *Plaza de Colon*, where there is no access fee to the facility. Similarly, fast chargers in convenient petrol stations, strategically located in the city have been very successful among electric vehicle users; this would suggest that a combination of a proper pricing scheme, free access and a convenient location is a key issue while deploying a public charging network.

B.3 Barriers

The main barriers to the implementation of the measure were identified during the interviews and at the workshop. They are summarised in the Table below.

No.	Barrier field	Description	Action to overcome the barrier
1	Technological	Lack of adequate vehicles to meet the private companies' needs (mainly regarding range and limited model choice).	Some companies (Pascual) chose plug-in hybrids as a more reliable solution for its personnel. They also considered to provide charging infrastructure at their employees' homes, as they usually take the company car home at night.
2	Financial	High up-front costs compared with conventional vehicles and insufficient incentives.	The municipality has established some incentives (such as free parking), and successfully lobbied the national government to establish subsidies for e-vehicles (probably starting in 2019).
3	Institutional	Administrative procedures within the municipality for the procurement of new vehicles are cumbersome, and do not favour electric vehicles.	Renting was identified as a convenient option to overcome administrative barriers, to limit the technological uncertainties about maintenance costs and reliability and to cope with the higher up-front costs
4	Financial	Deployment of a public charging network unfeasible due to lack of profitability of the service. Administrative framework (including the structure of electricity fares) hostile to those interested in offering charging services.	The removal of the administrative requirement of obtaining a license has facilitated the involvement of private stakeholders interested in offering charging points at their premises, with public access. The municipality has established a plan with financial incentives to those interested.

Table 151: Identified barriers and planned/taken actions.

B.4 Drivers

The main drivers to the implementation of the measure were identified during the interviews and at the workshop. They are summarised in the Table below.

No.	Driver field	Description	Action to make use of the driver
1	Political	Since June 2018, national government more active in supporting electric vehicles	The municipality is establishing agreements with private companies to establish public charging points. Also providing additional incentives such as free parking, access to low emission zones (Madrid Central), zero circulation tax…) to EVs.
2	Cultural	There is a certain boom in demand for car-sharing services.	Some private companies, like COOLTRA, considering entering the car-sharing market with electric cars. Currently, 10 private companies are offering electric car and moto sharing services.
3	Institutional	Keen interest within certain municipal departments (and among some civil servants) to test innovative, clean solutions.	Administrative reforms within the municipality to increase decentralisation and to stimulate the adoption of environmentally-friendly solutions, such as renting of electric cars, with a bottom-up approach

Table 152: Identified drivers and planned/taken actions.

B.5 Influence on risks

The key risk identified at the beginning of the project within this measure (see section A.5) referred to the low interest of private companies to include electric vehicles in their fleet. The mitigation actions implemented by the ECCENTRIC measure team consisted of reaching out primarily to companies that had been active in past EU-funded projects related to electro-mobility in Madrid, as well as in working groups focused on urban freight and fleet management, and identifying potential incentives for them. One of the key incentives identified was related to the use of EMT parking places and the fast-charging points planned in these facilities.

These incentives proved to be insufficient to get the commitment of private companies to include electric vehicles in their fleets. As stated in section B.3 above, the national regulatory framework was indifferent, if not hostile, to electric vehicles, and, partly for this reason, car dealers in Spain were not actively (lack of active offering of new models, long time for delivery…) responding to the demands of potentially interested users.

Identified risk	Category	Mitigation actions	Responsible
Difficulties in engaging private sector in the electric mobility uptake	9 (Financial)	Paying more attention to dissemination activities oriented to private companies. EMT strategy focused on creating a set of mobility services oriented to electric fleets	City EMT

Table 153: Reported period risk assessment.

The framework context at the national level is changing rapidly since mid-2018, and could result in higher interest and involvement of some private companies in electro-mobility. Therefore, the measure team will keep its activities reaching out to these companies during 2019, to make them aware of the new incentives at their disposal if they decide to include electric vehicles in their fleets in Madrid.

C.Specific observations on the supporting activities in this reporting period

There are no additional observations regarding the supporting activities in this reporting period.

D. Additional Evaluate findings

As this measure had been selected for detailed process evaluation, a closing workshop was held on 12 February 2020. The workshop took together participants from different departments of the municipality, one member of the EMT technical staff involved in the public charging network, three members of the ECCENTRIC team, and three persons from two private companies (ECOSCOOTING and GEOTAB).

The workshop allowed to deepen into the drivers and barriers identified in the previous workshop (sections B.3 and B.4), as well as to identify lessons learned and possible improvements in future fleet electrification processes.

The following topics can be highlighted:

- Even though the operating and maintenance costs of electric vehicles are much lower, in the short term the cost of renting will not decrease. This is primarily because the product is incorporating technologies that will increase battery autonomy. Secondly, it depends on the interest of car manufacturers to offer a wider choice of models in the different vehicle segments. On the latter, there are contradictory views, and there is some evidence[24] that more models will enter the market in 2020-2025, with at least 14 launches of electric vehicles planned for the year 2020 (before the COVID-19 crisis), in spite of other participants0 views that the EV production by manufacturers will remain low, reducing competition and leading to a low supply of electric vehicle models on the market, especially to cover certain uses (commercial vehicles, long distances, etc.).
- Despite the incentives offered by EMT and the project team for providing charging services, agreements with operators and fleet managers have not materialised. According to some participants and feedback received from some companies, the main difficulties in incorporating electric vehicles to corporate fleets are their high upfront cost, low autonomy and lack of a sufficiently developed charging infrastructure network. On the one hand, the companies are totally focused on their day-to-day processes, aiming to lower costs to cope with stiff competition. On the other hand, they are reluctant to take risks with new technologies. Although the companies are committed to finding more sustainable options, apparently companies do not have a sufficiently

[24] See Transport and Environment (2019). Electric surge: Carmakers' electric car plans across Europe 2019-2025 https://www.transportenvironment.org/publications/electric-surge-carmakers-electric-car-plans-across-europe-2019-2025

developed business model including electrical mobility. This makes it difficult to enter into agreements with public administrations.

- Many of the urban freight companies (and other companies operating in cities) use self-employed workers and do not manage their own fleet. In this case, it is even more difficult to have control over the type of technology used.
- Although the incentives have not been sufficient to attract private companies to adopt electric vehicles, the new Zero Emissions Zone (and other measures envisaged in the Air Quality Plan for the next years) are forcing many of them to change vehicles. Among other incentives, zero-emission vehicles can access *Madrid Central* and park in the *Zona SER* (the on-street regulated parking area covering the central districts) without time restrictions.

D.1 Barriers

In addition to the barriers already mentioned in section B3, the second workshop identified other aspects that have hampered the MAD6.2 measure process:

No.	Barrier field	Description	Action to overcome the barrier
1	Technological	The deployment of a fast charging network in municipal buildings and public access facilities is technically and administratively complex.	The municipality is carrying out power extension works in public buildings. It is also working on a charger session agreement[25] to develop a fast charging network (the owners of publicly accessible private land would be responsible for the installation).
2	Financial	Low level of use of the fast charging infrastructure. Users consider the price of kWh high and prefer to recharge at home or at the workplace.	The municipality is considering opening a line of subsidies to finance charging infrastructure for fleets and professional users.
3	Planning	Many of the urban freight companies use self-employed workers and do not manage their own fleet.	The municipality is considering opening a line of subsidies to finance electric vehicles for private and professional users.
4	Financial	At the moment, the price of renting may not decrease because the electricity market is incorporating technologies that will increase the autonomy of the vehicles.	This is likely to change in the near future. In the next few months, more than 10 EV models may enter the market.
5	Cultural	Companies are afraid to invest in a new technology, with many barriers to be overcome.	This concern is likely to disappear in the near future with greater battery autonomy and the expansion of the charging network. Lower fuel and vehicle maintenance costs may also attract more users.

Table 154: Identified barriers and planned/taken actions

[25] This is a standard legal agreement between the fast-charging provider and its users.

D.2 Drivers

The main drivers to the implementation of the measure were identified during the workshop:

No.	Driver field	Description	Action to make use of the driver
1	Political	Restrictive urban regulatory framework (*Ordenanza de Movilidad* and *Madrid Central)*	Incentives: exemptions to access and parking restrictions, bonuses and subsidy programmes.
2	Organizational	EMT and other departments of the municipality are building up expertise and leadership around electric mobility	Take advantage of this expertise in the design of future European projects and in the dialogue with vehicle manufacturers, urban freight and fleet management companies.
3	Technological	14 launches of electric vehicles are expected in the next months.	Take advantage of the greater diversity of vehicle models to incorporate them into a variety of uses within the administration.

Table 155: Identified drivers and planned/taken actions

E. Conclusions

E.1 Main process findings

ECCENTRIC was successful in establishing a design and implementation process that led to the integration of a significant number of EVs- and particularly electric cars- in the fleets of some municipal services. Building upon previous activities and experiences, ECCENTRIC was able to identify those services better suited to benefit from the replacement of conventional cars by electric ones, to establish adequate procurement models through leasing contracts and to successfully put into operation and monitor the fleet during the demonstration. This experience showed the relevance of fully involving the EV users and the administrative services since the early stages of measure design: it allowed a precise definition of technical specifications and the identification of the most suitable contracting regime, consistent with the municipalities' practice and regulation and with the characteristics of the companies that could provide the vehicles.

EMT showed an amazing flexibility and learning capacity to become a charging service provider in a record time, especially considering the stringent legal regime in place at the time it entered this business (this legal regime was subsequently relaxed by the national government in 2018, when EMT was already operating its charging stations). As an early bird in this market, EMT had to face the constrains of the limited size of the electric fleet in Madrid and uncertainty about the potential users' needs and expectations. In this sense, the pilot allowed to gain a more accurate understanding of the profile of early EV adopters, the prospects of urban charging as a commercial venture and the needs of charging stations as a public service.

The procedure set up by the project to identify changes in the regulatory framework and incentives was not able to significantly accelerate the uptaking of EVs by private companies in Madrid due inter alia to unfavourable framework conditions. In spite that some progress in the development of corporate social and environmental responsibility, all the companies contacted kept considering economic assessment as the key- if not single- criterion for vehicle selection

in their fleets, making it impossible to identify a private partner for the demonstration. Furthermore, the co-existence of other competing technologies also labelled as clean by the local and national governments (and notably hybrids and GNC vehicles), made it hardly attractive the EV choice even for companies interested in greening their public profile, as they found they could do it with these cheaper and officially back as also clean options. Finally, the existing incentives for EVs at the national level were at the time lower than in other European countries. Rather than entering in a competition to identify the huge- and probably difficult to justify and get approved- incentives that would have been necessary to make the EV option attractive to these players, the design and implementation process in this measure focused on mapping this situation in detail and keeping private companies informed about the results of the EVs in the municipal fleet and the prospects for adoption of more restrictive traffic and freight delivery regulations in the city in the future, that would create a more favourable environment for the adoption of EVs by some of these companies, and encourage them to undertake the development of business models and exploitation plans for such future. In this sense, the access restrictions imposed by the new "Madrid Central" Zero Emissions Zone, although for the time being putting EVs almost on an equal footing with CNG and hybrid vehicles, could contribute to this in the medium term as access rules become progressively more stringent.

E.2 Process lessons learnt

To be effective in engaging private companies, the design and implementation process for measure MAD.6.2 would have needed much more favourable framework conditions: on the one hand, in terms of the relevance of corporate social and environmental responsibility by the engaged companies; on the other hand, in terms of planning of a much more stringent access policy (at least in the medium term) for conventional vehicles in Madrid. From this perspective, at its initial stages, the process would have probably been more successful if it had included an early identification of those companies willing to strengthen their environmental commitments.

The identification of adequate incentives and regulatory changes was somehow jeopardized by the implementation during this period of Madrid Central, as private (and also municipal) stakeholders had difficulties in differentiating between the demonstration character of ECCENTRIC (which simply tried to establish a strategic discussion on the conditions under which EVs would become attractive for corporate fleets in Madrid) and the actual regulations being discussed and implemented at the City Council under Madrid Central.

The strong- and apparently fruitless- effort of EMT to negotiate contracts with private fleet managers to provide charging services and reserved parking space at some of its most entral parking facilities provided further evidence about the difficulties to engage into a process to negotiate incentives with companies that do not feel any external (like changes in regulations) or internal (like Board-approved environmental objetives) pressure to change their routine practices and see the negotiation as a mere eventual opportunity to make some easy additional economic profits.

At the termination of the measure design and implementation process, it became clear that the expectations of the companies and the municipality had not converged. However, the process

provided a dialogue channel- strengthened by the participatory process within the preparation of the Air Quality Plan (*Plan de Calidad del Aire*), approved in 2018, that would be worth to be maintained and strengthened, as a way to push these private companies to adopt more ambitious environmental measures within their corporate environmental responsibility schemes, and to undertake a more strategic discussion. Some current trends in urban transport service provision, such as the outsourcing of these services by many corporations and the parallel expansion of self-employed workers seems to raise further hurdles to the prompt expansion of EVs in corporate fleets.

The project also showed the need to expand the number of stakeholders in any process leading to the expansion of charging stations. The EMT experience showed the complicated commercial prospects of such services, and the need to mobilise other potential providers, such as real estate developers and major facility managers. Whereas the current provision of incentives to those willing to offer public charging stations at their premises (such as commercial centres) is helping, any medium term approach should look for alternative financing sources, such as the introduction of regulations imposing the provision of public charging ports in certain new or existing buildings and facilities.

E.3 Process recommendations

As a result of the measure MAD.2.8 process evaluation, the following recommendations can be made for actions aiming at expanding the EV fleet at the local level:

- Establish and strengthen as much as possible the channels of dialogue between the local government and private companies operating sizable vehicle fleets. Early identification of those companies with strong corporate social and environmental responsibility policies is necessary, as it is unlikely that in the absence of these companies will engage in a fruitful dialog. From this perspective, the promotion of such policies at the local level can be a necessary preliminary step to be undertaken by the local government.
- At the municipal (or other public institution or company) level, any action to facilitate the electrification of the municipal fleet needs the early identification and involvement of the possible users, as well as thorough discussion with the administrative services to identify the adequate legal framework for vehicle supply and operation.
- Local initiatives need to be sufficiently supported by the regional and national levels. Many incentives to EVs (or disincentives to conventional vehicles) need to be adopted at those levels, and private companies are more likely to buy-in when they see a consistent e-mobility policy being promoted from all the levels of governance.
- Make the short-term process aiming at electrification consistent with a wider strategic discussion on a long-term mobility vision. Most stakeholders will be more interested in considering the prospects of electrification if they see it as a part of accommodating to a long-term sustainable mobility policy that makes their current practices obsolete and in need of revision. This may include the involvement of other stakeholders, such as real estate developers and major property managers.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MUC 6.3

Electric lightweight vehicles for car sharing and logistics

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Experience GmbH	Germany	GCX
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

Partner nº	Organization	Country	Abbrev.
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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ECCENTRIC	Munich		
Measure code	**Measure name**		
6.3	Electric lightweight vehicles for car sharing and logistics		
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A. Introduction

A.1 Expected results of the measure

The measure objectives are:

(1) City policy level in perspective of CIVITAS goals/ longer term:
Reduce Energy use and CO2 emissions
Reduce Air pollution
Improve Space efficiency
Improve Accessibility for all
Improve social inclusion and equal opportunity
Improve liveability
(2) Strategic level:
Reduce car ownership and density
Increase cost-efficiency of electric mobility
Avoid long charging times
Optimize the multiple sharing concept
Increase awareness about the innovation among Domagkpark residents
(3) Measure level:
Deploy the ACM vehicle as part of a public sharing offer among Domagkpark residents
Test the vehicle for multiple purposes among the residents and businesses and thereby collect experience to improve the prototype for production

A.1.1 Quantifiable impacts

Expected Impacts	Reduce car ownership, increase cost efficiency of electric mobility. Increased awareness about the innovation amonog Domagpark residents. Increased acceptance by the users. Optimize the multiple sharing concept and adapt the business model.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Increased awareness / knowledge of ACM					X	X				
2	Acceptance of the ACM by those that had the life experience					X	X				
3	Satisfaction among those that had the life experience							X			
4	Increased access energy efficiency	X	X					X			
5	Access to mobility services for mobility impaired groups					X	X				

Table 156: Quantifiable impacts.

A.2 Measure description

This measure tests the Adaptive City Mobility (ACM) concept, which provides a new solution in e-mobility and fits into the evolving ideas of the shared economy, urban commons, and MaaS.

ACM is based on three innovations: a new lightweight EV (650 kg incl. batteries, L7E classification), a flexible manual battery swapping system (100kg), and integrated fleet management and multipurpose sharing software (European Commission, 2016).

Its multimodal design allows for operation of both people and goods transport, such as taxi, carsharing and logistics. Shared usage and the swapping battery system can contribute to reducing car ownership and long charging times, respectively.

The vehicle has already been developed through the ACM research project and the aim within ECCENTRIC is to test the vehicle for multiple use cases (taxi, sharing, deliveries) in the Domagkpark Living Lab. While the original plan foresaw public availability especially for the sharing scenario, limitations in the street-legality of the vehicle licensing process have made it necessary to adapt the concept. ACM is now being tested within field test events in which the car is driven by designated ACM project members and several research target groups can experience the feeling of riding the ACM vehicle in the passenger seat. The main research target groups consist of (1) private users and (2) commercial users such as mobility and fleet managers as well as entrepreneurs and taxi services.

To enhance the ACM measure, it is planned to include a shared electric motor scooter service in the measure to broaden the knowledge and experience on how to promote the uptake of clean vehicles. Currently, GCX is successfully generating replicable solutions to promote the use of electric lightweight vehicles for car sharing and logistics. Since the beginning of the CIVITAS ECCENTRIC however, the mobility market has rapidly evolved. It now features electric and shared mobility innovations that target additional user groups, thus creating an even larger possible user group for clean vehicles in suburban spaces. By expanding the measure to include a shared motor E-scooter service (*emmy)*, it would be possible to tap the full potential of the current mobility market for clean mobility in European cities. The measure expansion would focus on analyzing the sustainability potential of a shared motor E-scooter service in an eccentric space.

A.2.1 Measure outputs

The output is the testing of the ACM vehicle in the Living Lab in multiple usage scenarios (taxi, sharing between private customers, deliveries).

A.2.2 Supporting activities

None

A.2.3 Interactions with other ECCENTRIC measures

The vehicle could be advertised on the website (MUC 2.7) and could be available at mobility stations (MUC 5.9). Since the vehicle has fulfilled the prerequisites for street legality as of 2019 but remains only partially stable when being driven, the ACM mobility concept has been tested within field test events. During these testes, the ACM vehicles are driven by members of the ACM project consortium, offering different user groups (private and business users) an ACM usage experience from the passenger seat (cf. 0).

Other communicational advantages came from close contact to the Department of Public Order (KVR) who is responsible for the integration of the ACM into the existing mobility stations (MUC 5.9). In addition to that, one ML (MUC 2.7 and MUC 7.5) who is often present in the Living Lab supported the marketing actions of the field test events by networking in order to acquire test groups. She advertised the field tests events both digitally and in a conventional way (e. g. via flyer and posters).

A.2.4 Interactions outside ECCENTRIC

The ACM vehicle and concept belong to the ten partners of the ACM research consortium, which is sponsored by the German Federal Ministry of Economics and Energy (BMWi) and its technology program “ICT for Electromobility III: Integration of commercial electric vehicles in logistics, energy and mobility infrastructures”. The implementation and testing of the vehicle and swapping station, however, are financed by CIVITAS ECCENTRIC to 70%. This implicates that the ACM research project has to be successful in order for the ECCENTRIC measure to be implemented as originally planned.

Moreover, the GCX ECCENTRIC team toured to disseminate the idea of the ACM vehicle nationally and internationally. Besides the field test events in the Living Lab, there were fairs and forums (e. g. the Hanover Fair, the Battery Expert Forum and the Tage der digitalen Technologien) focusing on sustainable mobility and courses and lectures at several universities where the concept was presented.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
Other	Test users who use the ACM in one of the variations (private persons, businesses, taxis)	Living Lab	Domagkpark & Parkstadt Schwabing

Table 157: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
1	Green City Experience	P	PR	L	ML
2	Companies in the Living Lab and employees	P/S	PR	O	Test the vehicle and business model and provide feedback for further development
3	Individual users	S	Other	O	Test the vehicle and business model and provide feedback for further development
4	Taxi drivers	S	PR	O	Test the vehicle and business model and provide feedback for further development
5	ACM Research Project	S	PR/KI	O	Develop the ACM vehicle and make it available for testing within ECCENTRIC
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					

Table 158: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
The vehicle is not street-legal yet.	Problem-related	Project partners are currently working on several technical aspects. However, the development and licensing is happening within the ACM project and the ECCENTRIC ML has only very limited impact.	ACM-Partners

Table 159: Risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning milestones

To clarify conditions and regulations to set up the multimodal usage of the vehicle and the installation of the battery swapping stations, GCX has had an in-depth exchange with several departments of the City of Munich as well as the Bavarian Ministry of the Interior, Structures and Transport.

For the analysis of the shared E-motor scooter service, the *emmy* business area has been expanded to include the Domagkpark/Parkstadt Schwabing neighborhood. Moreover, a collaboration with *emmy* has been established to obtain usage data and to be able to collect customer data on their usage patterns and motivations via a survey.

Phases 2: Procurement & Implementation

INFRASTRUCTURE IMPLEMENTATION: GCX collaborated with Isarwatt, a local energy supplier, to ensure the usage of renewable energies for the ACM field tests. The battery swapping infrastructure was installed in Domagkpark, drawing the attention of local residents. Two local cooperative associations, WOGENO and Wagnis, have granted access to their parking lots in order to install parts of the infrastructure.

VEHICLE: The actual ACM vehicle is still not street-legal although the technical requirements to obtain a road approval have recently been fulfilled. Nonetheless, it is not technically stable to be driven by a third party. In spring of 2019, ACM obtained a testing-license, which enables registered test drivers to use the vehicle on public roads. This has been the basis to plan and implement the ACM field test events in the Living Lab in summer/fall of 2019. The field tests focus on all three use cases (taxi, sharing, deliveries) originally identified when planning the project.

RESEARCH DESIGN: The research design for the ACM field tests has been adapted to fit the technical state of the vehicles. It enables the test users to experience the vehicle and the battery swap first-hand. Then, the users' data concerning their evaluation of the ACM vehicle, its mobility concept and usage potential is collected via a "walk-through survey". The research design for the analysis of the E scooter service use has equally been developed: On the one hand, it draws on usage data tracked by the company (e. g. containing *emmy* trips and variables such as distance travelled and the duration of the trip). On the other hand, a customer survey containing approx. 30 questions (including variables on mobility behaviour, motivations to use *emmy* and behavioural changes) has been developed.

Phase 3: Next steps

DEMONSTRATION: GCX implemented the first round of ACM field test events in Domagkpark focusing on private users of the ACM CITY vehicle in the summer of 2019. The field test goals were to obtain in-depth knowledge on both user experience and the ACM usage potential. To reach this goal, GCX successfully collected data from 40-50 private participants. They were reached via online advertising (e. g. social media such as Facebook and Twitter as well as several internet sites), conventional advertising (e. g. posters and flyers) as well as via print

media (e. g. newspaper articles on the ACM field tests). Before the survey, the participants experienced the ACM CITY vehicle and battery swapping station first-hand. The research data is now being analysed. At a first glance, the data indicates the users are open towards the idea of a shared and multifunctional EV and would welcome it working with their neighbourhoods. The main results are expected within the coming months. A second testing round focused on local businesses, companies in Domagkpark and their employees as well as taxi services. Data was collected from approx. 35 participants.

For the study on the shared E-motor scooter service *emmy*, the analysis of the usage data (containing approx. 1.150 trips in Domagkpark in 2018) has begun. The full data analysis is expected within the next months. For the analysis of the customer survey data, the online survey was launched in summer of 2019 and has produced more than 550 data sets so far. Results of the data analysis are expected within the next few months.

By 01/2020, the ACM vehicle meets all requirements to become street legal. The approval process for the special approval is currently taking place. The street license is being obtained from the Driver and Vehicle Licensing Agency (DVLA) DEKRA.

B.2 Process evaluation activities

Due to the delays the ECCENTRIC activities concerning the ACM mobility concept, a process evaluation was not possible at this point in the project. Activities around the technical development and the technical approval steps are not part of ECCENTRIC. However, the new ML (took over in September 2018) could provide some valuable insights into the process so far, guided by the questions of the standardized form survey.

Standardized form surveys were used to get information about the roles, tasks and backgrounds of the various stakeholders, as well as their view on barriers, drivers, and risks of the measure. The online survey was spread to all applicable stakeholders with the help of the ML and reminders were used to maximise the response rate.

In a joint effort with other LEMs, a common survey framework was developed and operationalized with the open source survey tool "Limesurvey" (in the case of Munich).

After collecting general information about the stakeholder and its role in the project (job, tasks, contact information, and engagement in which phases (planning / implementation / operation / maintenance / others), we asked for opinions about barriers and drivers in a two-level-approach:

In a multiple choice set, stakeholders were asked to identify supporting thematic areas / sectors for the measure:

Political / strategic
Institutional
Laws and regulations
Cultural
Problem-related
Involvement / Communication
Planning
Organisation
Financial
Technological

Spatial

In the next level, we asked for a detailed description of the drivers in detail as well as how these drivers were used to maximise the measure's impact.

Through this approach, we are able to identify both general supporting sectors, but also detailed, measure-specific information about drivers with a high level of information. Showing the full list of sectors first did also 'inspire' stakeholders to include all possible drivers they could find.

The same methodology was used to collect information about barriers.

The last block in the survey asked about risks of the measure. For each risk, we asked for an assessment about the likelihood as well as about the risk's potential to endanger the measure's success.

Due to difficulties to get the ACM vehicle on the road and the delayed testing phase, there are not many stakeholders who did take part in the stakeholder survey. The information about barriers, drivers and risks are given by the ML and her indirect assessment of the other stakeholders. Nevertheless, together with the ML, it was possible to create a stakeholder analysis to get deeper into the process.

To complement the information which is given through the stakeholder online survey, an emerging pattern of all stakeholders is mapped in a three-dimensional chart. All ML were asked about the perception where to locate themselves and other relevant stakeholders within the stakeholder analysis matrix. The objective of the stakeholder analysis is to engage stakeholders in order to improve process and maximise impact. Each stakeholder is given a coordinate within the chart. The coordinate depends on the stakeholder's power potential (the bigger the bubble the higher the power potential), the interest (between low and high) and the ability to impact the measure (from low to high).

Figure 1 shows the stakeholder analysis of the measure MUC 6.3. The ML GCP (Green City Project; recently changed to Green City Experience (GCX)) has the highest interest and power potential but only a medium ability to impact the measure. That medium ability to impact the measure mainly depends on two other stakeholders: the DVLA DEKRA and the ACM research project. Both strongly influence the preconditions for starting the measure as it was originally conceived. Until this precondition is not met there is no street permission to test ACM.

The ACM research project is located in the highest right corner of the stakeholder matrix because it has the biggest interest and ability to impact the measure as it did all the research to build this vehicle but also providing the needed software and hardware. The objective is to bring this zero emission mobility concept on the road with the permission by DEKRA and provide it to GCP which organize test drivers.

The testers of the vehicle are important stakeholders as they are the target group of the testing phase. The group of testers includes taxi drivers, local companies, their employees and residents. The latter have stronger interest in participating than the taxi drivers because they are part of the local Domagkpark community. Overall, their ability to impact the measure is quite low compared to the other stakeholders in the matrix. Still, their feedback will be used for further improvements.

In addition to the **stakeholder online survey** and **stakeholder analysis** (matrix) mentioned above, the following sources are used to obtain a more Detailed Process Evaluation:

- **Review of measure reports** as well as some informal observations from the Living Lab.
- Carrying out **interviews** with the ML at different times during the process.
- Visiting the **field test** of the ACM vehicle to gain insights into the internal process of introducing the measure.
- Carrying out a **learning history workshop** with stakeholders which have been closely involved into the process.

The **review of measure reports** as well as some informal observations from the Living Lab and its residents are taken into account for the process evaluation. In order to get a complete picture, opinions from different stakeholders were included in this report.

Especially the **guided interview** helped to look deeper into the process and its main barriers and drivers, hence giving a helpful overview for the lessons-learnt part. The interview questions focus on the following matters:

General information about the current status of the measure
Thinking about the ACM set-up: positive thoughts and worries
Explaining the whole process and developments from his/ her own viewpoint: drivers and barriers
Lessons learnt through the process

The choice for executing guided interviews was made because it is a simple method to gain deeper insights from the ML and to keep the time expenditure of the key-stakeholders and the LEM on a low level. The results of the interview are to be found in section B.3 Barriers and B.4 Drivers.

Moreover, a **Learning History workshop** (LHW) was conducted to evaluate the process of the ACM project.[26] It is a method to evaluate the entire process of a measure ex post regarding its planning, implementation and operation performance. For this purpose, the stakeholders involved in the measure are invited to explain their experiences regarding the applied strategies, the achieved results and what happened why, in chronological order. The aim is to learn from the actions and experiences of those involved and to draw conclusions that will be of added value for the planning of future projects.

The workshop was structured by the following steps[27]:

Reconstruction of the measure process with timeline and milestones.
Milestone evaluation by defining barriers and drivers of the process.
Definition of “actions to overcome” the barriers and possibilities to make use of the drivers.
Reflection of the results and concluding the experiences of the participants under “lessons learnt”.

[26] Due to the current political and health situation in Europe (03/2020), which is dominated by a mandatory public shutdown in Bavaria and event restrictions throughout all of Germany, the workshop was conducted digitally via visual workshop sessions.
[27] The Learning History Workshop was designed after “Refined CIVITAS process and impact evaluation framework”, 08/2017, see ANNEX 7 LEARNING HISTORY SESSIONS.

For this measure, the learning history workshop was organized by the ML and LEM and was conducted in 03/2020 with relevant stakeholders which accompanied the measure process. Representatives of the following three stakeholder groups[28] listed in section 0 participated in the workshop (cf. Figure 94):

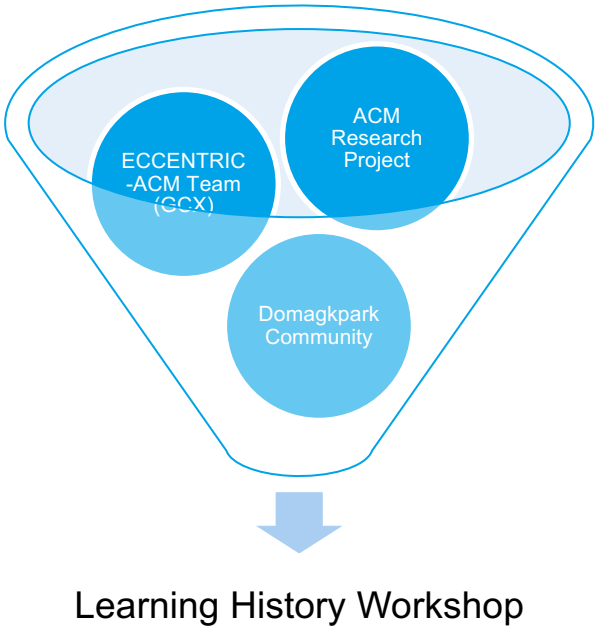

Figure 94: Participants in the Learning History Workshop, 03/2020

Due to the process itself and several changes of personnel, not all participants accompanied the entire measure development (see section B.3 Barriers). Instead, some stakeholders accompanied particular milestones/ events or periods.

For the LHW, a measure timeline was prepared based on the milestones previously stated in the official ECCENTRIC ACM measure description. During the LHW, it was a starting point to discuss the most important processes and milestones, in turn allowing to adapt and optimize them. The optimized timeline is shown in Figure 95.

[28] The ACM Research project was represented by the **four** ACM project team within GCX, while **three** participants partook in the workshop as ECCENTRIC-ACM team members. Meanwhile, the Domagkpark community was present via **one** representative of a local neighbourhood association in Domagkpark.

Figure 95: LHW project timeline and milestones (MS)

Secondly, the most important barriers (see chapter B.3) and drivers (see section B.4.) of the process were identified and discussed. Besides, the experiences how barriers could be overcome und drivers were used to advance the measure were discussed. Finally, the experiences of the participants were concluded under "lessons learnt".

The ML and the ML's institution organized two **field tests**. The field test consisted of a test drive (guided and steered by the ACM manufacturer) and a "walk-through research trail" where the GCX teams used an explorative focus to ask the testers semi-open questions. This helped to understand the customer's acceptance of the mobility concept and the general usage potential of ACM. The user research focused on collecting data from specific target groups:

Private sharing customers → ACM Experience Days in 08/2019 (approx. 40)
Companies and their employees for corporate ACM use as well as taxi services and mobility managers → ACM Experience Days go corporate in 10/2019 (approx. 35)

The results of the field tests are to be found in section B.3 Barriers and B.4 Drivers as long as they refer to the process itself. Other comprehensive content-wise information about the customer acceptance were recorded in a separate document compiled by the ML. In order not to leave out any important findings, a short overview about the main results is given in chapter B.4.

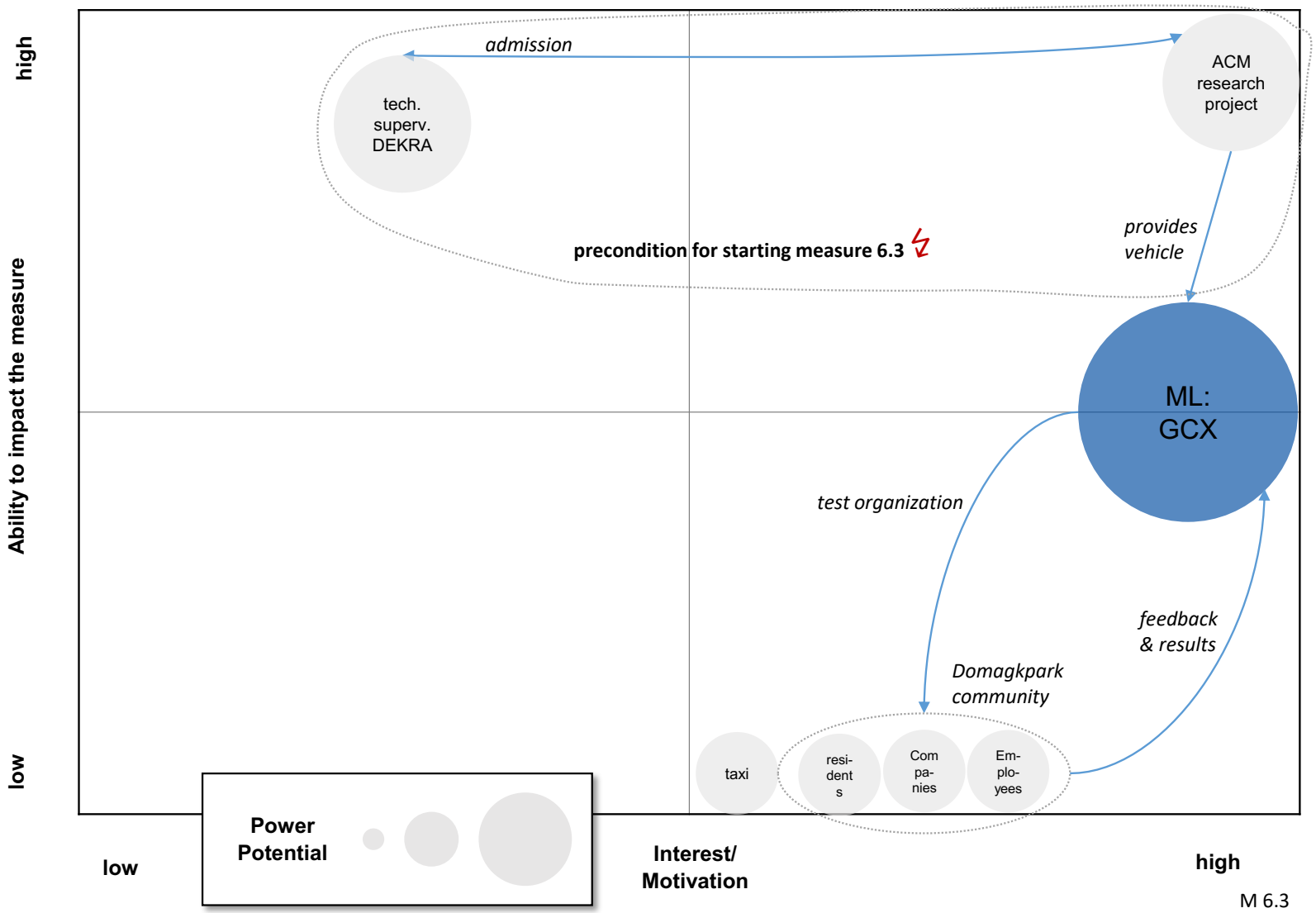

Figure 96: Stakeholder Analysis

B.3 Barriers

Five main barrier fields could be identified (see Table 144), of which the detailed barriers are described in the following table:

No.	Barrier field	Description	Action to overcome the barrier
1	Laws and regulations	Both taxi services and food delivery require certain standards, e. g. concerning hygiene. There is no legal foundation to combine these use cases.	Dialogue with the authorities lead to solutions for the test phase and their willingness to further negotiate and find a solution once the vehicles are ready for long-term street-use.
2	Political/ strategic	Fast developing sector of sustainable means of transport. Political importance could abruptly decrease.	Use the current importance of the topic and lay the foundation for further developments.
3	Problem-related	The research design, where the final result of another research project is needed to start activities is challenging.	This is an ongoing issue, with the certification of the ACM still pending. An adapted research design ensures that ACM field tests can be implemented, and key project results can be obtained.
4	Involvement and communication	Selective test drives during the field test couldn't show how the vehicle would be used in daily life.	Pursue the idea of providing the ACM for daily usage in the Living Lab, when it is finally street-legal. Adapt the research design for the ACM field tests in case the vehicle does not obtain street legality or is not technically stable to be driven by a third party. That way, key results are obtained and broadened by the results from the *emmy* part of the measure.
5	Technological	The technical development and implementation of the ACM vehicle outside ECCENTRIC is delaying the measure.	A close cooperation with the ACM project team helps to adapt the research design for the measure.

Table 160: Identified barriers and planned/taken actions.

The ECCENTRIC measure team had to deal with some **regulatory** from the DVLA (DEKRA) which is responsible for the approval of the car. Several requirements must be met to get an individual operating permit for the newly developed vehicle. These expert assessments take their time, especially if the approving authority did not participate in the vehicle's developing process right from the start. Another regulatory issue refers to the multi-purpose usage of the vehicles. Both taxi services and food delivery require certain standards, e. g. concerning hygiene. There is no legal foundation to combine these use cases. However, dialogue with the authorities lead to their willingness to further negotiate and find a solution once the vehicles are ready for long-term street-use. Another regulatory challenge was met when trying to obtain an ideal space for the implementation of the battery changing station (cf. Figure 95, milestone 3), since they had to comply with building approvals (or rather: not needing a building approval) and specific technical infrastructure was needed. In the end, it was possible to install the battery swapping station due to the support of the city of Munich and the Domagkpark community, who helped find a suitable privately-owned area in Domagkpark. Insurance related challenges were solved last minute (cf. Figure 95, milestone 4), leading to delays and to the fact that during the field tests, the user groups could not drive the ACM vehicle by themselves.

In terms of **political and strategic** barriers, the pressure to communicate the content of the project in numerous political forums soon after the project had begun raised high expectations.

According to the LHM participants (the GCX ECCENTRIC team in particular), this was especially challenging since the vehicle was not fully developed at the time. The consequence was that the marketing concept could not be adequately drawn up (cf. Figure 95, milestone 1). Currently, political support is a driver in Munich's mobility landscape. However, a possible change of political support from funding electric mobility to funding other kinds of sustainable means of transport could have a financial impact on subsidies (and therefore the ACM selling price) as well as on the establishment of its charging infrastructure.

The prerequisites for the measure as it was originally planned are challenging or **problematic**: In order for user groups to be able to test the ACM in the Living Lab 'all by themselves', the ACM vehicle has to be street legal (which depends on the achievements of a different research project, see section A.2.4). Moreover, it must be stable enough to be driven by a third party without any technical complications occurring. As this other project was heavily delayed due to technical complications that impacted the licensing for street use, the ECCENTRIC measure initially started its testing in summer/ fall of 2019 based on an adapted research design. Processes regarding the development are interdependent and depend upon each other, which leads to delays. This problem-related barrier was met by a high flexibility concerning the technical status of the vehicle. Short-term field tests were deemed the most adequate form of testing (cf. Figure 95, milestone 4), which resulted in an in-depth analysis of the ACM acceptance and sustainability potential of several usage groups (cf. Figure 95, milestone 5). The timeline of these field tests could have been more user friendly, since parts of the tests were implemented during summer vacation. However, this was necessary because of the ongoing developments and adjustments during the project process. Due to advertisement with the help of the Domagkpark community, it was nevertheless possible to win over a sufficiently large group of people for the field testing process. Last but not least, the results of the business model remained on a theoretical/abstract level but generated relevant results (cf. Figure 95, milestone 6). In the end, the research enabled to develop a qualitative model with a detailed user group perspective.

A minor barrier concerning **communication** occurred with the energy provider while underlining the necessity to use sustainable energy for the charging station. However, this barrier was overcome by dialogue (cf. Figure 95, milestone 3). Concerning the testing of ACM (cf. Figure 95, milestone 4), there could not be any independent test drives within the Living Lab, only organized field tests allowing testers to experience the vehicle as a passenger due to the uncertainty about the street legality of the vehicles. The ACM was driven by one of the manufacturers and only on a defined route. This leads to a barrier in the field of **involvement** and communication. Potential users could not experience all advantages of a daily or more frequent ACM usage. Short test drives during the field test couldn't emphasize all the benefits of the vehicle compared to a testing phase which is available for everyone living in Domagkpark and Parkstadt Schwabing. If the vehicles fulfil all the prerequisites (street legality and stability while driving), the project team would kick off another testing phase allowing the users to drive the vehicles 'all by themselves'. If the prerequisites are not fulfilled, the project team will continue to focus on advertising the ACM concept known and broaden the project insights by analysing emmy usage.

Most barriers are **technical**. The consortium developing the light-weight vehicle faced various technological problems. As the car had to be developed and built from scratch many internal

arrangements and technical modifications were necessary. Not to forget the ACM vehicle also depends on a sharing-software and a charging station which had to be developed, produced and tested. This increased the challenge to obtain an entire functioning mobility system. Throughout the ECCENTRIC project process, the uncertain technological status quo of the mobility system hampered the definition of the target group (cf. Figure 95, milestone 1). To overcome this barrier, it was necessary to consider and to develop several testing scenarios to be prepared for different technical outcomes. The technical status quo was challenging when it came to dissemination activities (cf. Figure 95, milestone 2). Due to the technological status quo, it was necessary to advertise a mobility service with unclear main features to the potential sample of subjects in the research area. However, after having decided on a marketing and dissemination concept, the ongoing advertising enabled to arouse and maintain the neighborhoods' interest and curiosity. It was also technically challenging to install the battery swapping station (cf. Figure 95, milestone 3). Members of the ACM research project contributed to overcome this barrier by finding technical solutions that enabled a functioning swapping station during the field tests.

Active risk management, communication and a flexible research design during the entire ECCENTRIC research process made it possible to overcome each of the barriers listed in this chapter.

B.4 Drivers

Even though the measure is delayed due to the barriers mentioned earlier, a wide field of drivers could be identified. They are described below in more detail.

No.	Driver field	Description	Action to make use of the driver
1	Political	Negotiations secured support from the City of Munich and the Bavarian Ministry of the Interior	The result is a solution for multi-mode testing and an openness to find more permanent solutions once long-term testing is possible.
2	Involvement / Communication	Openness to be involved in testing among citizens and companies and their employees.	So far, both residents and businesses signalized openness to take part in the testing of the ACM.
3	Cultural	Especially residents in the "WOGENO" buildings of the Living Lab are very open towards alternative mobility solutions	This facilitates the recruitment of residents for testing
4	Planning	Detailed planning, but also a "plan b" to test alternative vehicles ensure the measures' success	With the introduction of the e-scooter sharing system ("emmy") in the Living Lab, ML considers using this mobility concept for testing in case the ACM will not be ready in time to broaden results.
5	Organisational	Close cooperation between Munich's ECCENTRIC partners	Coping strategies for delays in measures can be discussed together
6	Financial	ECCENTRIC funding enables in-depth testing with various user groups	The measures focuses on testing within ECCENTRIC (not on vehicle construction)
7	Technological	New technologies enable innovative concepts like ACM	Without the app, the battery swapping station and the actual vehicle, the multi-mode approach would not have been possible.

Table 161: Identified drivers and planned/taken actions.

The measure team was able to gain **political** support through negotiations on the multi-mode use cases of the ACM vehicle for testing. Negotiations were mainly enabled by support from the City of Munich and the Bavarian Ministry of the Interior. These high-level institutions

provide a positive political starting point for the project. There is a general openness towards innovative multiuse mobility concepts. In general, the current political and administrative framework supported the project from its beginning. For instance, the possibility to reduce the number of parking spots in residential construction projects by offering sustainable public mobility alternatives fuelled the ACM concept, which is ultimately based on the idea of such a mobility alternative (electric carsharing). The encouragement of the local representatives had a positive effect on the start of dissemination activities (cf. Figure 95, milestone 2). Besides, the local political and administrative support facilitated finding an area to install the battery swapping station (cf. Figure 95, milestone 3), as did involving key figures and disseminators within the Domagkpark community.

In general, the reliable flow of information among all project partners can be considered a basic **communication** driver throughout the project. Recruiting subjects willing to test the concept (private residents, local businesses) was facilitated by the fact that both groups had signalized their interest in participating in the tests early on during the project. This general attention towards the project among private users, businesses and research institutions had been created via public presentations of the ACM project in business networks, scientific conferences and during fairs beforehand (cf. Figure 95, milestones 1 and 2). When the testing phase was about to begin, being able to use offline and online information platforms of the Domagkpark community (cf. chapter 0) was a communication driver when the field tests were being organized (cf. Figure 95, milestone 4). The participating stakeholders of MUC 6.3 also used their vast **network** of potential partners and test users due to previous projects. Besides, **local newspapers** being interested in the field tests and publicly announcing them created attention. This then contributed to winning over a sufficiently large group of test users and thus creating a satisfying dataset for the customer and the sustainability analysis (cf. Figure 95, milestone 5). Besides, the strong and positive response to measure MUC 6.3 indicates that the Business Model stands a good change of scaling and replication (cf. Figure 95, milestone 6).

Another important driver which enables a successful testing of the ACM vehicle is the change in **culture** of the local population of the Living Lab. Residents and companies aim to change their mobility behaviour towards a more sustainable usage of different transport modes. Informal interviews within the Living Lab and with potential project partners showed that large parts of the local population (e.g. WOGENO housing) are in favour of new, sustainable forms of transportation. In addition to that, many companies which are located in Parkstadt Schwabing have a strong affinity for technology because they are themselves active in this field. In general, this is a good starting position for the process. Besides, general public interest is very high because of the new concept, the design, the technological features and multipurpose characteristics the ECCENTRIC-ACM project. This not only refers to the interest of the local communities in the research area but to a broader interest throughout society, which is currently open to alternative solutions to power vehicles and seeks to share instead of to own. The positive atmosphere among the project partners contributed to maximizing the productivity within the ECCENTRIC throughout the project.

While the measure was facing critical barriers because it depended on the ACM research project, agile **planning** worked as a driver to cope with these delays. As a plan B, the ML suggested using electric scooters (“emmy”, see MUC 5.10) as alternative vehicles for testing,

in case the ACM was delayed even further. Another action furthering the project was a modified, detailed research concept to thoroughly determine user needs, requirements and ACM sustainability potential. This was the basis for the implementation of the field tests.

Besides, the good cooperation between the ECCENTRIC partners in Munich has been helpful to deal with the delays. This **organizational** driver ensures new strategies and solutions can be generated. The ECCENTRIC partnership arrangements are very constructive here and other MLs help to promote the ACM idea within their own measures (see 0)

As a foundation for the measure's success and a well-executed process, the **financial** support through the EU and its research project Civitas ECCENTRIC are an important driver. The financial support was not just used to set up the field tests but enabled the presentation and promotion of the ACM concept nationally and internationally at forums, fairs and other events (see 0). Regarding the time after ECCENTRIC, one can count on a general financial support of electric mobility in Germany when it comes to furthering ACM or ACM-like concepts.

From a **technological** point of view, there were not only barriers interfering the process. The general technological progress in Germany's automotive landscape towards more sustainable solutions is an important driver. The knowledge of the ACM project partners responsible for building the vehicles enabled the ACM field tests in the first place.

Results of the field tests:

The first impressions of the test users about the ACM vehicle and concept sum up how they perceive the design of the car and the interior as well as its usability and flexibility.

The design is seen as being simple and pleasant with a futuristic carbon interior with lots foot and head space. The large windows allow a panoramic view. Regarding the usability of the vehicle, testers highlighted the practical concept, especially the cargo version, and the intuitive handling which is thus adequate for multiple user groups. In terms of flexibility the 24/7 manual battery swap is seen as a big advantage.

Potential customers are interested in using ACM for shopping or transporting goods or leisure activities. Fewer private users would use the car to go to work. The same goes for employees and businesses where only a small number would use the vehicle for trips to customers.

Concerning the substitution effects of ACM, the biggest share of potential private customers or employees and businesses consider replacing trips taken with their own car by using the ACM vehicle. Another smaller share considers replacing trips by PT or bike with the ACM. Thus, ACM has the potential to contribute to sustainable mobility.

B.5 Influence on risks

At the moment (03/2020), the risk is high that ACM receiving street legality might further be delayed or that the mobility system (vehicle, charging station or software) is not technically stable enough to be used by third parties. This would prevent ACM from being employed in long-term ECCENTRIC tests by third parties driving the vehicles by themselves. To mitigate this, GCX adapted the ACM research design and implemented the ACM field tests via field test events. In 11/2019, it was announced that all requirements for a street legal usage had

been met. The DVLA DEKRA has been licensing one of the ACM vehicles ever since. In order to continue to reach the objectives, the GCX ECCENTRIC team has been pursuing a plan B which includes a strong communication campaign to keep ACM visible nationally and internationally (the latter requiring extra financial support from the EU). Currently, a delay in the licensing process and the communication campaign is being experienced due to the worldwide public health situation (in 03/2020)[26], which is slowing down non-essential labour processes (including licensing processes) and until further notice, does not permit to partake in any communication events. Furthermore, the it is questionable whether the events that GCX was planning on using for ACM communication in spring and the early summer of 2020 will take place at the moment.

An extensive mitigation action consists in broadening the research concept to include testing and studying the use shared electric motor scooters. These vehicles are already deployed and ready to be used within ECCENTRIC. Currently, this mitigation action is becoming official by creating a new ECCENTRIC GCX measure (MUC 5.10).

Identified risk	Category	Mitigation actions	Responsible
Further delays in the ACM project	Problem-Related	• Plan B to implement ACM field test events • Plan B to strengthen dissemination work (concerning the ACM concept) by implementing the ACM communication campaign • Broadening the research focus to include emmy e-scooters as test vehicles	ML/SC/LEM

Table 162: Reported period risk assessment

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

STO 6.7

Promote installation of EV-charging facilities in multifamily houses

Process Evaluation Report

Deliverable No.:	8.2
Project Acronym:	CIVITAS ECCENTRIC
Full Title:	
Innovative solutions for sustainable mobility of people in suburban city districts and emission free logistics in urban centres	
Grant Agreement No.:	690699
Workpackage/Measure No.:	6.7
Workpackage/ Measure Title:	
Promote installation of EV-charging facilities in multifamily houses	
Responsible Author(s):	
Neva Leposa	
Responsible Co-Author(s):	
Eva Sunnerstedt	
Date:	2020-11-01
Status:	Draft
Dissemination level:	Confidential

2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KTH
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

Partner nº	Organization	Country	Abbrev.
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

Document History

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

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ECCENTRIC	Stockholm		
Measure code	**Measure name**		
6.7	**Promote installation of EV-charging facilities in multifamily houses**		
Last update	**Responsible**	**e-mail**	**telephone**
	Eva Sunnerstedt	eva.sunnerstedt@stockholm.se	

A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

The City of Stockholm has a long-term policy goal to eliminate the transport dependency on fossil fuels. Sweden aims to be fossil-free by 2045.

2) Strategic level:

In order to decrease fossil fuel dependency, the city aims to strengthen the infrastructure needed to make EVs a realistic car choice. Since about 90% of Stockholm citizens live in multifamily houses, 50% in the co-op based housing, it is important to increase the number of EV charging possibilities in these and at the same time decrease the number or fossil driven cars.

3) Measure level:

This measure is information and communication focused. It supports and establishes a precondition for the EV charging infrastructure in multifamily houses by communicating the possibilities and instructions to stakeholders. This measure includes, inter alia, a production of movies, presentations, and a step-by-step guide about the installations of chargers in multi-family residential co-operative buildings. The information is presented through a serious of seminars. The information is also made available on a website. It also requires a continuous updating of information. The target is to attract 500 participants to these seminars and this will lead to 100 co-ops installing 200 charging stations per year between 2016 and 2018. This sums up to total of 600 charging stations installed during that time.

A.1.1 Quantifiable impacts

Expected Impacts	The measure is expected to strengthen the infrastructure needed to make EVs a realistic car choice for people living in multifamily houses, which is true for 90 percent of Stockholm's population. This is an important step to increase the number of EVs and at the same time decrease the number or fossil driven cars.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Reduction of CO_2 emissions	x	x								
2	Acceptance/Satisfaction of the measures by the users					x	x	x	x		x
3	Exploitation of the funding for implementation of the plan and giving opportunities to local economy								x		x
4	Improvement of mobility in the City of Stockholm							x			

Table 163: Quantifiable impacts.

A.2 Measure description

This Eccentric measure is a ’communication measure’. It aims to provide all the necessary information about ‘how’ and ‘why’ to install EV charging in multi-family housing in the wider area of Stockholm, i.e. the municipality of Stockholm and its neighbouring municipalities. Stakeholders contributing to, and supporting, this measure are besides the City of Stockholm also the energy supplying companies installing EV charging. Stakeholders whom this communication is targeting are mostly the board members of housing associations and companies, who can then act as initiators for EV charging in their area of living. The majority of the citizens (90 %) in Stockholm reside in multi-family housing, which are managed by various housing associations or/and rental companies, for the rental housing. 50% live in co-op based housing, which we focus on. The scope of this measure is the wider area of Stockholm, this means Stockholm city and its neighbouring communities, such as Solna, Danderyd, Hanninge, Sundbyberg, Täby, Huddinge, Sollentuna, Norrtälje, Järfalla, Tyresö, Botkyrka, and Nacka.

A.2.1 Measure outputs

The following communication outputs were produced in this measure:

1) Instructional films promoting the installation and management of charging stations in multi-family residential buildings.
2) Templates for investigating interest for EV charging among the residents within the association and for inquiring about the energy supplying quote from the different suppliers for example.
3) A check-list: to do list in order to install EV charging.
4) A step-by-step guide to establish EV installation.
5) An example of a survey to use to find out the interest for EV charging in the estate.
6) An example of a letter to the board of the estate, proposing EV-charging in the estate.
7) A film showing the presentations from the first seminar – to be viewed afterwards.
8) Good examples from multi-family housing estates where charging had already been installed.
9) Information campaign.
10) Seminars.
11) Mini-exhibitions to showcase potential charging solutions.
12) A website containing all the information.

A.2.2 Supporting activities

The most important output was the seminars, which was supported by the associated website where information was provided for a later access. The seminars were also advertised in the local newspapers and the project was presented at various other occasions: seminars, workshops etc. The material received attention in media.

A.2.3 Interactions with other ECCENTRIC measures

This measure interacts with Measure 6.6 which refers to the on-street charging installations. Some data assembled was useful for both of the measures. Additionally, it interacts with Mobility Motors and the Nissan EVs companies in Stockholm. The material on how to arrange for the charging equipment is also valid for them.

A.2.4 Interactions outside ECCENTRIC

This measure was supported not only by Eccentric, but also by the Energy Agency and by using the governmental incentives for decreasing emissions (Klimatklivet) operated by the Swedish Environmental Protection Agency (Naturvårdsverket). Other cities and regions in Sweden are using the material and copying the events locally. There is a larger interest from all over the country. Amsterdam has had similar seminars with inspiration from this measure in Stockholm. Other cities and regions in Sweden are using the material as they organize the events locally. There is larger interest from all over the country.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
Residents	Residents of multi-family residential cooperatives	Municipalities	27 municipalities in Stockholm County, including the City of Stockholm
Board members	Members of MFR cooperatives' management boards	Board members	Approximately 4 000 housing association boards contacted by mail
EV users	EV owners and potential new EV owners living in a MFR	City of Stockholm at is surroundings	Information through advertisements in local media and on signs on-street.

Table 164: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
P02	Citizens of the City of Stockholm	S	Other	P	
P03	Environmental Department of the City of Stockholm	P	C	L	
P10	KTH Royal Institute of Technology	P	KI	P	
P19	Potential buyers of electric vehicles	S	Other	O	
P20	Companies related to charging infrastructure	S	PR	P	
	EV owners	S	Other	O	
	EKR – Energi och Klimatrådgivningen	S	C	P	
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					

Table 165: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Under communication	5 Involvement/ Communication	No action. Continue working as planned. It is a communication project, so this is crucial, so far the project has received a lot attention, much more that estimated	City of Stockholm
Resource shortfalls (Inability to secure sufficient resources, overspending)	9 Financial	Take note of the costs and not do more than what could be affordable	City of Stockholm
Insufficient attention and resources to evaluation tasks	5 Involvement/ Communication	Communication between evaluator manager and measure leaders	City of Stockholm
Priorities/Objective changes	1 Political/ Strategic	No action	City of Stockholm

Table 166: Risk assessment.

B.Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning milestones (2016-2017)

- Information material including the film was produced and completed in late 2016.
- In January and February, 2017 the first 6 seminars took place with in total over 750 people present. Between 10 to 15 charging unit companies were present with the equipment (in total 16 different companies participated during one up to all six events).
- In April seminar no 7 was arranged and during September and October another 5 seminars took place. In order to attract attendees invitations were sent in mail to all multifamily housing estates in Stockholm Region. Advertisements in local newspapers as well as face book also took place.
- Information material was updated in early September 2017.
- Survey has been sent out to around 630 participants at the first 6 seminars in Jan and Feb 2017. Slightly over 200 participants answered this survey and they claim that their multifamily homes in total have out up 950-1400 charging units.
- A survey has also been sent out the 16 participating companies selling the charging equipment to hear about their estimation of number of sold and installed units. They were very pleased with the seminars and the information as well.
- A report describing the first part of this project and the outcome was completed in December 2017 in Swedish. Results have also been presented to the Environment and Health Political Board in January 2018.

Phases 2 and 3: Implementation of the measure (2018-2019)

- Updated the material on the website during the spring 2018.
- More seminars implemented in the fall of 2018.
- Included more good examples on web-site about multifamily that have already put up charging.
- Enabled including information to single family homes on the same website and arranged joint seminars in the fall of 2018.

Phase 4: Analysis and continuation of the measure (2019-2020)

- Ongoing answering of questions through phone and e-mail.
- Instructions for other municipalities in Sweden that wants to use the material for local events (possible action).
- Since the measure has been ongoing, until 2020, around 30 seminars have been arranged, 3000 people have participated and at least 5000 charging units have been installed or are planned to be installed.

Deviations

No substantial deviations from the project plan were made.

B.2 Process evaluation activities

The Measure Leader has recorded progress with design and implementation in the measure report, including deviations and obstacles. In addition, the Measure Leader completed a survey regarding barriers and success factors, as well as provided feedback on a summary of deviations so far and on the online survey design so that it could be improved and adapted for distribution to other stakeholders involved in the measure. Finally, the Measure Leader has helped to identify which stakeholders have the highest interest in and the greatest influence on, respectively, the measure's success.

The mapping of interest and influence essentially found that the most important stakeholder group, in terms of both interest and influence, is the boards of multifamily housing cooperatives. They take the most important decisions on behalf of their members in terms of research, budget allocation, space allocation, and charger installation. As well, they (in addition to the fellow residents that they represent) have the most to gain by the added potential for home-based electromobility. Surveys conducted on board members have found high levels of satisfaction with information received from this measure and from the progress of installations.

Another important stakeholder group is the companies providing charging equipment suitable for installation in multifamily homes. Without this equipment the measure would not be possible, and they have an interest in growing the market for their products and services. As it happens, for the moment at least, demand is growing faster than their capacity to increase supply. The survey that was sent to all the stakeholders and we received 17 answers.

B.3 Barriers

In the table below, we are listing in the survey identified barriers and actions what were, or that could be, taken in order to overcome them. We are categorizing barriers according to the groups of stakeholders who perceive the barriers and the stakeholders who could take the main responsibility for overcoming them, e.g. the City, the enterprises, or the housing associations/cooperatives.

No.	Barrier field	Description	Action to overcome the barrier
1	Technology & Knowledge	The city Technological development goes quickly, so information can become outdated. The enterprises express that there is a low level of competences, experiences among customers.	The City The City staff is staying up-to-date and updates material often, which is time-consuming. The enterprises Besides the provision of knowledge via the seminars, in relation to the questions asked, one strategy expressed was to instead of answering the questions directly, rather steer the conversation towards thinking about the broader perspective – the functions, conditions, and the possibilities.
2	Financial, Organizational, Market	The City - experienced the evening seminars to be cumbersome and exhausting, as it includes giving talks and answering many, often thorny, questions from the audience outside the regular working hours when people can attend. - limited amount of available time for those working on the Eccentric project. - limited budget for advertising in the widely spread target areas (it is expensive to advertise seminars). Housing associations - perceive the installations to be costly. - catch 22 – lack of existing EV owners, can limit the support among the tenants and thus also affects the future purchases: *'we currently have no one in the association that has an electric car, where the expensive purchase price is seen as a stopping factor.'* Enterprises & Housing association -a few enterprises and housing associations expressed that EV cars are perceived to be expensive: *'A major obstacle is that the electric cars are so expensive that most residents cannot afford to buy these cars.'*	The City - In the beginning, only the measure leader was giving the talks, now others have been trained. - Regarding advertising the seminars, the solution that was found was conducting and advertising a whole series of seminars (e.g. in autumn or in spring) all at once. When planning the series, it is ensured that seminars are not too long, and that there is a day's gap between each of the planned seminar. Housing associations - the installations can be justified via climate change argumentation and the increased value of the apartments. -several discussions. Enterprises -since EV cars can be expensive for the private customers, the companies are trying to target businesses. Housing association -board members suggest the EV car purchase could be subsidized. - a board member expressed that in their association, they are waiting for the market to grow, through which prices would reduce, and the demand raises, meanwhile they rent the parking places to others.
3	Regulative	Enterprises One respondent expressed that regulations and laws are hindering and perceive political unwillingness	Enterprises One respondent expressed that a way to overcome this obstacle is to challenge the regulations, by voting different representatives, or with *'a little civil disobedience'*

4	Communication channels and target groups	*<u>The city/municipalities</u> - expressed that there were difficulties in reaching all housing co-ops and single-family homeowners with this information (direct post and advertisement is expensive) - it is difficult to reach all the key persons in the housing associations and there is a high fluctuation of the board members (e.g. no mailing list with all associations and their respectful board members/key persons contacts) *<u>Enterprises</u> - this measure was focusing on the information provision to the cooperatives (multifamily housing associations), whereas an enterprise expressed that such knowledge would be needed also among the property owners and businesses. - an enterprise expressed that focus on geographical areas was not ideal strategy - difficult to find the right contact path to the housing associations (the key persons)	*<u>The city</u> - targeted a dispersed sample of housing co-ops so that word-of-mouth between neighbours could occur. Advertisements are done in local press, social media, organizations for home-owners in order to spread the word effectively without too high of costs, there is also a link to the website with all the information provided. *<u>Enterprises</u> - invested some of their additional efforts to come into contact with other potential target groups. - reached housing associations via mail (direct post)
5	Grant dependency	<u>Enterprises & Municipalities</u> - uncertainty about the provision of the subsidies by the state in the future, potential cut in the subsidies creates insecurity and it is yet unknown whether there will be funds for 2020 and beyond. - the grant system also appear to dictates a tempo of working: *'The fact that there are Climate Grants to apply for creates a market focused on the grant cycle'* *<u>Housing associations</u> - expressed that if the subsidies/grants for the installations are not reintroduced, such organized installations of charging may also be discontinued.	<u>The City</u> is closely monitoring the decisions made by the new government, so it can act swiftly once the decision has been made. *<u>The municipalities</u> Provision of information around practicalities *<u>Enterprises</u> to deal with the insecure future, businesses are trying to assure an added value and competitive prices to the property owners, and sell to the customers less dependent on grants - adjustments to the grant cycle

6	Procedural	*Enterprises - changes in the parking infrastructure and in the ways parking is managed in multifamily housing can be expensive and time consuming for some. - issues around costs of charging stations and the costs for charging *Municipalities - inertia within the housing associations underpinned by a lack of interest or unwillingness to invest into charging infrastructure when tenants raise the issue - a municipality expressed that it can take some time to receive results from the application (for the grant/subsidy) *Housing association/cooperative - expressed that the procedure to apply for subsidy/grant was difficult when applying for the first time *The city - found the process of applying for the grant from Klimatklivet difficult - the process of procurement of the charging stations can also be difficult for the housing associations as they might not have the knowledge and time.	*Enterprises -responsibility for the costs of the infrastructure has to be clearly defined as well as who is bearing the risks. - when cooperatives are unsure about the costs, they can be shown examples of how others have resolved this. *The city -developed the template which can be used to include the issue onto the housing association's agenda as well as provision of positive effects of installations (e.g. attractiveness of the places of living) *Housing associations - had to patiently work through the procedures *The city - supported the target groups through the application process - the city has produced a quotation request template which can help the housing associations
7	Infrastructure, Geography, Material restructuring	*Enterprises & Municipalities - express that there is a perception among the stakeholders that there is not enough public EV charging possibilities. *Housing associations - several housing associations expressed that the majority would like to keep their regular car parking spots and are unwilling to switch. Since they commonly do not have any empty parking spots available, that is an issue. - the (measuring) system for the electricity might not be suitable for a larger scale garage charging. - if multifamily is centrally located, with a good public transport connection, several tenants do not need a car, thus the need for the charging places is also lower.	*Enterprises & Municipalities are providing information that the majority of the charging is done at home. *Housing associations - dealt with unwillingness to "switch/let go" their parking spot by providing the electricity in almost all parking spots. - it took some up to half a year of continuous discussions to resolve the issues. - a housing association reports that they managed to install 6 more charging sports, but then after the investment would be more costly.

8	Cultural Attitude	*Housing association - expressed that there are financial barriers, since they need to treat everyone equally (presumably owners of EVs vs. owners of non EVs) - some board members expressed resistance towards such installations *Enterprises - perceive lack of knowledge as well as resistance to making changes. - society's inertia, unwillingness. *The city - experienced a diverse attitude towards the installations among the tenants vs. the board members/the management.	*Housing association - in order to investigate the interest among the tenants, surveys have been done and informative meetings were organized. - several discussions were taking place within the housing associations *Enterprises - addressed the lack of knowledge and resistance to change with provision of information *The city - provided material (a film, reasons for installations) which could support the negotiation process and the survey template was provided.

Table 167: Identified barriers and planned/taken actions.

B.4 Drivers

The following drivers have been identified in the survey and the talks as helping the success of the measure, and several actions were proposed to help capitalize on these. We are also categorizing the drivers based on the stakeholder groups, i.e. the city or other municipalities, the board members from the housing associations, and the energy companies.

No.	Driver field	Description	Action to make use of the driver
1	Demand & Interest	*The city -Residents are interested in having EV cars thus also there is an interest in having an EV charging possibilities where they live. -the city recognizes that the Housing Associations are in need for information for their members, which welcomed this measure. *Municipalities: -recognized the importance of charging at home and were motivated to be part of this measure. -recognized the need for information *The enterprises: -there is a demand and interest in EV charging among new EV owners. - a general (public) interest in electrified transport solutions. - the city is (to be) seen as a forerunner - interest also among the charging station installers -there is a need for information *Housing associations: -appreciated that the city provided the information -some are motivated to provide the possibility to their tenants to have an EV car. -provision of an environmentally friendly image of the cooperatives.	*The city, municipalities: -offer informational seminars at different locations in the county, with an exhibition where providers and customers can meet - provision of check-lists, templates for seeking governmental subsidy - offering support from energy and climate advisors - identified the target group - designed a communication project that supports installations *The enterprises: -respond to the demand and with the City's support provide the information, provide practical solutions, support and establishing contacts through this forum: *"We solve this problem for those responsible. Often, there is a lack experience and knowledge about EV charging. Here, the "Fixed charging station" initiative has played a very important role by establishing contacts with associations and private individuals who are seeking charging solutions."* -the interest can be used by providing information campaign adjusted to the target groups. - since the charging station installers were interested to participate, it was easier to organize and set up the exhibition. - use targeted marketing. -the provision of credible information was made possible through the (reoccurring) seminars: *"where companies presented without selling"* *Housing associations: -some have taken advantage of the subsidies/grants and have installed charging in their garages or/and outdoor parking areas. -some are planning to do so.

2	Market	*<u>The city</u> The use of EVs is increasing - need to charge (in Stockholm (25% - the largest % in Sweden) of all chargeable vehicles in Sweden but only 10% of all vehicles). *<u>Enterprises</u> - new EV cars are developed with improved performances - the city is (to be) seen as a forerunner *<u>Municipalities</u> - this measure took place in a very good timing, when a breakthrough happened among the private people creating the demand for charging stations. *<u>Housing associations</u> -motivated to increase the attractiveness of the association and the value of the apartments by installations of EV chargers.	*<u>The city</u> Is constantly striving increase the range of our targeting, to keep up with this increasing share of EVs. *<u>Enterprises</u> - provide solutions - organizing events in a city which is recognized to be at the forefront, can attract (more) visitors *<u>Municipalities & The City:</u> - Offered information seminars in several rounds at several different locations in the county, with exhibitors of charging equipment. This provided a sales channel for them and assistance with technical information for the (potential) consumers. <u>Housing associations</u> -took pride in the fact that they care about the environment -inform the real estate agents about the EV charging possibilities, so that the apartments become more attractive on the market.
3	Financial	*<u>The city & the enterprises</u> recognized the benefit of the possibility to apply for state-sponsored benefits to apply for, which gives up to a 50% subsidy for the costs (“Klimatlivet”, “Ladda-billen” and “Ladda-hemma”) <u>Housing associations:</u> -a few of them see installations as a way to increase the value of the apartments and take advantage of the subsidy -associations are motivated to improve their economy	*<u>The city</u> - provided information about subsidies in training on how to obtain, install, and maintain chargers. *<u>The enterprises:</u> -participated as exhibitors in the seminars <u>Housing associations:</u> -used the argument of increase in value of the apartments and use the available subsidies when discussing the issue with the members. *“Economically, the installation of charging spots has meant that we now have all our parking spaces in the garage rented out, which has given the association a positive financial contribution.”*

4	Cultural and Organizational	*the City -EV-owners have a strong desire to charge at home (this is the best charging place!) -interest among other municipalities *Municipalities: -smooth collaboration -well established network within energy and climate consultancy and commitment was one of the driving forces for this project*: "Strong, committed project management at the City of Stockholm."*	*The City: -Little was needed to make use the motivation of charging at home, just to emphasize that the project is all about home-charging. -all municipalities interested, were given access to the material *The City & Surrounding Municipalities: - the previously established network was 'made use of' in this measure. -the City provided the support to all that expressed interest (with a check-lists, advertisements, lectures)
5	Environmental awareness	*The enterprises - stress the importance of the (environmental) responsibility - there is already (pre)existing environmental awareness - in the debate the EV cars are seen as part of the solution to the climate crisis - enterprises can improve their (brand) image as they address environmental issues. *Municipalities - there is an increased climate awareness among citizens *Housing associations: -a few expressed that residents are motivated to contribute to the environmental purpose and improved air quality in Stockholm. For ex.: "*It is important for us that our tenant-owner association is ahead when it comes to initiatives that reduce the environmental impact."*	*The enterprises - provide solutions for different vehicle fleets and different consumers: *"We offer companies, municipalities, organizations, the society and housing associations simple solutions to establish the infrastructure needed."* *Municipalities -to use the environmental awareness, the aspects of reducing the fossil fuels and switching to a new technology is communicated as one of the solutions. *Housing associations: -due to the environmental awareness the installations were important for them. -one cooperative representative expressed that they are trying to maintain public transport connection and even expend this (so the installations would not replace public transport use). -a couple expressed that these installations are not done at the expense of the public transport and other environmental projects (e.g. solar cells) -the opposite, this measure inspired the associations to examine also other ways of decreasing the environmental impact -taking small steps towards improved environment: *"we cannot change the world but if everyone takes small steps then that will represent big steps overall."*

Table 168: Identified drivers and planned/taken actions.

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Under communication	5 Involvement/ Communication	No action. Continue working as planned. It is a communication project, so this is crucial, so far the project has received a lot attention, much more that estimated	City of Stockholm
Resource shortfalls (Inability to secure sufficient resources, overspending)	9 Financial	Take note of the costs and not do more than what could be affordable	City of Stockholm
Insufficient attention and resources to evaluation tasks	5 Involvement/ Communication	Communication between evaluator manager and measure leaders	City of Stockholm
Priorities/Objective changes	1 Political/ Strategic	No action	City of Stockholm

Table 169: Reported period risk assessment.

C. Specific observations on the supporting activities in this reporting period

No additional supporting activities were part of this measure, since the measure itself included the seminars, which supported the implementation of EV-charging in the multi-family houses. Indirectly, measure 6.6, with the focus on the development of the on-street charging infrastructure can be seen as supporting this measure 6.7, that focus on the home-based charging.

C.1 Quality of the Supporting Activities

The implementation of measure 6.6 was successful, which positively affected the implementation of 6.7 as well.

C.2 Influence of the Supporting Activities on the implementation process

The implementation of the measure 6.6 that focused on the installation of the EV on-street charging, led by the same measure leader has indirectly supported the implementation of this measure 6.7. In particular, the established network, the experience with work with the stakeholders, the different departments within the City of Stockholm, and after all the knowledge around charging technology that the leader acquired through the work in 6.6 was supporting the production of the movies, organizing the seminars for the

C.3 Influence of the Supporting Activities on the impact of the measures

No significant influence could be identified on the impact (the key performance indicators) as such.

C.4 Lessons learnt on the Supporting Activities

1) Holistic planning for the EV-infrastructure

While the home charging infrastructure is increasingly in demand that this measure has supported, on street charging (measure 6.6) can be seen as supporting and complimenting the EV use in general.

D. Conclusions

D.1 Process evaluation findings

This measure led to a considerable accumulation of experience and institutional expertise that built on the City of Stockholm's already strong expertise in supporting electric vehicle deployment, complemented by new capabilities in carrying out workshops as a means of education and dissemination. The barriers and drivers that were observed had much to do with refining the workshop practices, both in their targeting and implementation, and with placing emphasis on process issues such as subsidy grant applications and housing board decision-making procedures.

D.2 Lessons learnt

The key lessons of the measure revolved around the mobilisation of markets and expertise for electromobility and the logistical considerations of reaching a receptable audience.

Key Drivers

1) Expertise in energy questions: The City of Stockholm's Environment Department has accumulated considerable knowledge, both technical and institutional, around transition toward electromobility, not only in Stockholm but as a *de facto* national resource.
2) Market availability of technical solutions: rather than a one-size-fits-all solution, the market has matured to the point of providing different business models for on-site charging that can be suitable to different circumstances.
3) Knowledge of the target group: the information seminars have been most effective when they target a target group that is sufficiently mature in prior knowledge about electromobility to be receptive to information about on-site charging infrastructure.

Key Barriers

1) Some target groups are more difficult to reach: multi-family housing assocations can be easily reached, but a key market is single-family homeowners, and this group is much more difficult to reach at scale since they are not organised into associations.
2) Regional and national security issues: wider adoption beyond the City of Stockholm has been hampered by the lack of applicable or consistent fire safety codes for indoor parking garages with respect to EV chargers.

The human factor: delivering a long series of information seminars to a large audience has required of city staff not only technical knowledge but also a certain kind of communication skill not normally needed in the line of work. This has taken some time for staff to become proficient.

D.3 Process recommendations

The measure's implementation yielded the following general recommendations for future projects:

1) Carefully plan the organisation and implementation of the workshops: to avoid exhaustion and improve effectiveness, the workshops should be planned to conserve the staff energy resources, as well as to choose both their localisation and advertisement strategically so as to reach a wide range of the city while also attracting strong interest at each location.
2) Pay attention to process issues: much of the interest from housing associations was on how to navigate their own decision-making processes as well as how to maximise their benefit of available government subsidies; to assist them, the workshops should give ample space to work through these issues and provide materials that participants can take home with them.
3) Cooperate with smaller municipalities: this kind of initiative can have greater reach when a larger city such as Stockholm has the resources to develop and coordinate the workshops.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MAD 7.1

Consolidation centre with EVs and local regulations for clean urban freight logistics

Process Evaluation Report

Deliverable No.:	8.3
Project Acronym:	CIVITAS ECCENTRIC
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Responsible Author(s):	
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Status:	Final

2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
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4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
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28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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ECCENTRIC	Madrid		
Measure code	**Measure name**		
7.1	Consolidation centre with EVs and local regulations for clean urban freight logistics		
Last update	**Responsible**	**e-mail**	**Telephone**
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A. Introduction

A.1 Expected results of the measure

The measure objectives are as follows:

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

(2) Designing and implementing new local regulations and policies to promote the use of clean vehicles for urban goods distribution.

(3) Strategic level:

(4) To reduce traffic levels from good distribution vehicles.

(5) To reduce illegal parking.

(6) To reduce energy consumption and emissions from urban goods distribution.

(7) To promote the uptake of clean vehicles in urban goods distribution.

(8) Measure level:

- To develop an urban freight distribution centre following the “consolidation centre” concept.
- To manage the consolidation centre operated by electric vehicles.

A.1.1 Quantifiable impacts

Expected Impacts		CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use	Air pollution	Road	Road	Accessibility	Social	Liveability	Competitiven	Efficiency of	Local
1	Reduction of 90 t CO2eq per year (compared to diesel/gasoline vehicles)	X									
2	Reduction of pollutant emissions		X								
3	Reduction of energy consumption	X									
4	Improved delivery service performance (optimisation of delivery vehicle use)										
5	Increased acceptance and awareness (receiver)										

Table 170: Quantifiable impacts

A.2 Measure description

Every day, more than 33,000 operations of freight distribution take place in Madrid, inside the M-30 ring-road. This activity produces an important part of the overall transport emissions of pollutants (14.2% of CO2 and 18.9% of NOx emissions of the whole road transport sector can be attributed to urban delivery in accordance with the estimates in the municipality’s study

Vehicle Fleet Characterization – Study of the City of Madrid 2017). Furthermore, it contributes to traffic congestion and illegal parking.

The Municipality of Madrid (through its Energy and Climate Change Department) in co-operation with a logistics operator (FM Logistics) will combine the implementation of an urban consolidation centre for last mile distribution, operated with clean vehicles, with regulatory measures, such as access regulations in traffic-restricted areas (by applying time windows for goods delivery) or vehicle restrictions based on weight, size and technology (zero and ultra-low emissions vehicles).

The measure is in line with Madrid's Sustainable Urban Mobility Plan (approved in 2014 and currently under revision), and with the city's Air Quality Plan (*Plan de Calidad del Aire y Cambio Climático de la ciudad de Madrid*, also known as *Plan A*, approved in 2017) All these plans aim at improving urban freight distribution through a combination of a regulatory approach and the use of cleaner vehicles. As an initial step, the measure is expected to provide a deeper understanding of the urban logistics sector in Madrid and its stakeholders, and to support the design of new logistics products and services taking advantage of emerging new technologies to fit the needs of a multiplicity of actors.

The measure is being developed through the following steps:

Planning and research

- Study on freight distribution in Madrid (in cooperation with MAD 7.6). This study was completed in 2017.
- Definition of a management plan for the consolidation centre: distribution areas, potential clients, goods to be delivered, services, etc. Not management plan has been produced for the consolidation centre.
- Local freight partnership including the participation of service providers.

Procurement implementation

- Creation of a consolidation centre linked to the use of clean vehicles, including the implementation of electric charging points.
- Liaise with stakeholders and potential clients (freight partnership).
- Design of regulatory tools: time windows, positive discriminations, etc.

Demonstration and monitoring

- Operation of the consolidation centre (including the use of the ultra-low emissions prototype developed within MAD 7.6).
- Monitoring and assessing impacts derived from the operation of the consolidation centre and the new regulations.

Communication and exploitation

- Dissemination of conclusions and lessons learnt.
- Definition of a business case for urban consolidation centres in other areas.

A.2.1 Measure outputs

- Study on freight distribution in Madrid (in cooperation with ECCENTRIC measure MAD 7.6).

- Definition of a management plan for the consolidation centre: distribution areas, potential clients, goods to be delivered, services, etc.
- Local freight partnership including the participation of service providers.
- Creation of a consolidation centre linked to the use of clean vehicles, including the implementation of electric charging points.
- Design of regulatory tools: time windows, positive discriminations, etc.
- Definition of a business case for urban consolidation centres in other areas.

A.2.2 Supporting activities

There are no supporting activities linked to this measure.

A.2.3 Interactions with other ECCENTRIC measures

This measure interacts with measure MAD 7.6 (urban freight distribution prototype) in the study of freight distribution in Madrid. Furthermore, the new consolidation centre will serve as the operational base for the prototype.

A.2.4 Interactions outside ECCENTRIC

No interactions outside ECCENTRIC were foreseen for this measure. However, it is worth noticing the municipality approved on 29 October 2018 the implementation of a large low emissions zone, “Madrid Central”, targeting some of the districts in the city centre. In terms of urban delivery, the new LEZ establishes different time windows for delivery depending on the vehicle category (electric vehicles enjoy a 24-h window, hybrids are allowed from 7—23 and conventional ICE vehicles have increasingly reduced windows depending on their year of registration). “Madrid Central” was one of the measures included in the Air Quality Plan, approved on 27 September 2017, which also sets some measures to facilitate urban distribution activities and to encourage the use of clean vehicles.

At the dissemination level, the measure team has met with private stakeholders in the logistics and real estate sectors, interested in the consolidation centre concept.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
8	Local businesses interested in sustainable clean supply chains		Central districts (within the M-30 ring-road)
10	Logistics operators interested in sustainable clean supply chains		Peripheral districts with industrial land, suited to host consolidation centres.

Table 171: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC project partners and other important actors

The table below includes all the stakeholders that were identified as relevant at the initial stages of the measure planning and design.

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
1	City councillor or senior official (Environment)	S	C	L	Political decision-maker
2	City councillor or senior official (Mobility)	S	C	O	Political decision-maker
3	Municipal technical staff (Environment)	S	C	O	Political decision-maker
4	Municipal technical staff (Mobility)	S	C	O	Political decision-maker
5	Municipal technical staff (District Services: Villaverde)	S	C	O	
6	FM Logistics director	S	PR	L	Logistics operator
7	FM Logistics technical staff	S			
8	FM Logistics client	S			
9	Consolidation centre team member	S	C	L	Measure partner
10	UPM	P	KI	L	Measure partner

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

Table 172: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Budget limitations for the consolidation centre have hindered to choose a location closer to the urban core, and able to harbour more logistic activities	9 (Financial)	Change consolidation centre location, sharing the facility with other activities	FML
Lack of companies which contract logistics services in the consolidation centre	8 (Organizat.)	Increase clients seeking and offer alternative urban freight distribution formulas	FML
Insufficient volume of goods to make the consolidation centre efficient/operational	8 (Organizat.)	Increase clients seeking and offer alternative urban freight distribution formulas	FML
Electric vehicles poorly suited to provide the distribution services envisaged	Technol.	Operations with cleanest available option (hybrids)	FML

Table 173: Identified risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

The design phase took place between September 2016 and February 2017. During this stage, a study on freight distribution in Madrid (in cooperation with MAD 7.6) was completed, including some interaction with local operators, and feasible locations for the consolidation centre were identified. However, the operator was unable to produce a management plan for the consolidation centre, including distribution areas, potential clients, goods to be delivered, or services, and the envisaged "local freight partnership" including the participation of service providers was not put in place.

The implementation phase took place between March 2017 and February 2018. During this stage, the final location of the consolidation centre was selected (in Villaverde, in the southern periphery of the municipality), and the logistics operations were analysed. For the operations, it was decided to make use of hybrid trucks (12 t) instead of electric vans as initially envisaged; this made unnecessary the installation of charging points at the consolidation centre, unless until the electric prototype developed within measure MAD 7.6 becomes operational. During this stage there have been reporting on further actions to liaise with stakeholders and potential clients, in order to establish the promised local freight partnership; the only client interested in making use of the new clean services was SEPHORA, as a result of its commitment to meet certain clean standards in their distribution activities. No particular activities were conducted for designing regulatory tools on urban freight delivery, as these tools were already under development in the context of the preparation of the revised Air Quality Plan and the new low emissions zone "Madrid Central"; the new norms have established differentiated time windows for urban delivery depending on the vehicle's characteristics.

The operation phase is taking place since February 2018, serving several SEPHORA shops in the central districts. Efforts to develop the freight partnership and to reach out to other clients have not been reported. The members of the measure team from the municipality have actively participated in the design of the new regulatory framework to access the centre of Madrid (low emission zone Madrid Central) and the management protocol in case of high pollution levels in the city; in these developments, the experience gained from the implementation of this measure.

Three main changes in the measure contents can be identified compared to the initial proposal. The first one is the location chosen for the consolidation centre, which moved outside the living lab in order to find more affordable renting options. As the initial site, the chosen site is close to the inner beltway (M-30), but at a longer the distance from the city centre. Second, the use of hybrid trucks, instead of the electric vehicles initially envisaged; the electric prototype developed in measure MAD 7.6 is expected to join this service in the future. Third, the lack of development of the "local freight partnership" initially envisaged, due to a combination of insufficient promotion from the part of the operator and lack of positive responses from the potential clients approached.

B.2 Process evaluation activities

The activities undertaken have included an on-line process evaluation survey opened to the stakeholders involved in the measure, semi-structured interviews with key institutional decision-makers, and regular meetings with the measure leader and team. Furthermore, as this measure was selected within ECCENTRIC for detailed process evaluation, a process evaluation workshop was held on November 20, 2018.

The survey intended to assess the role played by each stakeholder in the process, including aspects such as motivation and engagement, and the mutual perception among stakeholders. This analysis is also relevant for developing actions aimed at engaging stakeholders and maximising impacts.

Fourteen participants responded to the survey: two members of the Eccentric project team, three directors and three members of the technical staff of FML, two FML clients (of which one of them was making use of the consolidation centre services), three members of the municipal technical staff (Environment and Public Space Department) and one member of the technical staff of the consolidation centre. Three main gaps in terms of participation can be identified: representatives from the municipality, potential clients and other logistics operators. In the first case, municipal decision makers were reached through personal interviews; in the second case, clients and logistics operators were invited to the process evaluation workshop. As for the lack of municipal experts, it was stated that there were no other experts outside those already within the project team that had been mobilised in the municipality during the design and implementation of the measure. The final picture showed a modest involvement of stakeholders in the measure outside those already participating in ECCENTRIC.

The answers gathered indicated that the measure centred its efforts in the operating activities involving FML's staff in the operation of the Consolidation Centre. Besides not having interacted with municipal technical staff in the areas of mobility and at the district level, outside those directly involved in ECCENTRIC, the measure did not reach out to local stakeholders in the Living Lab. This is consistent with the technological profile of the measure, which is unlikely to gain the interest of local agents in Vallecas; furthermore, the need for such interaction completely disappeared when the consolidation centre was finally located close to but outside the living lab (Vallecas), in the neighbouring peripheral district of Villaverde.

The respondents have been involved in different activities within this measure. Five of them are involved in analysing freight distribution in Madrid, two of them in the site selection and the definition of the key characteristics of the consolidation centre, three of them are involved in the commercialization of the service and search of customers, and one as a customer of the new distribution service. Three of them knew about this measure, but did not participate in it. None of the respondents seem to have been involved in the selection of the clean vehicles or the review of regulations. This suggests that both issues, in spite of their relevance, are largely outside the realm of activity and influence of the measure. For the former, it may be explained by the fact that decisions on fleet procurement were taken by FML management without prior discussion with the ECCENTRIC measure team. For the latter, it may be a consequence of the relevance gained in the municipality by the wider discussion on the new Low Emission Zone and the Pollution Management Protocol, which replaced the narrower revision of municipal regulations on freight distribution that the measure initially envisaged. This may become a decisive weakness for the next steps of the measure, as "designing and implementing new local regulations and policies to promote the use of clean vehicles for urban

goods distribution" is one of its objectives, aligned with the long term goals of CIVITAS. This isolation of the measure and lack of participation of additional stakeholders does not seem to be a concern for most of the respondents, as only a few of them mentioned additional stakeholders that should have been involved in the measure; it could be concluded that the ECCENTRIC measure team did not get engaged in trying to set the measure within the wider framework necessary to engage into public discussion and to actively encourage the participation of agents from other areas.

The respondents showed a high level of identification with the objectives of the measure. In a 1-5 scale, and in a decreasing order of importance, they gave an average score of 4.6 to the objective of "reducing fuel consumption and CO2 emissions", 4.5 to "launching of new logistic services with less environmental impact", 4.4 to the objective of "more efficient use of vehicles", and 4.4 to the "compliance with corporate environmental objectives of the company". The last one, "changes in municipal regulation of the goods distribution" received the lowest score: 4.0.

All the stakeholders stated a positive assessment of their degree of interest in the measure (average scores above 4). The differences between this subjective self-perception and the objective perception (from other stakeholders) of interest are low, below 1 point. In most cases, the objective perception is higher than the subjective perception.

Reported scores on influence are always lower than the ones on interest. Differences between subjective and objective perceptions are higher for influence than for interest in all cases, and larger in the case of ECCENTRIC team members, FML´s technical staff and clients: all these stakeholders consider themselves as having a median to low influence. However, the objective perceptions consider that all the stakeholders hold a high capacity of impact and influence.

In terms of impact in the measure's contents, subjective and objective perceptions have a significant difference in the case of ECCENTRIC team members and FM Logistics technical staff.

The degree of satisfaction with the measure is very high among the respondents: 85% of them consider that their initial expectations have been positively achieved, providing scores equal or above 4.

The information collected through on-line surveys was complemented by in-depth interviews to some key decision makers in the City Council: the City councillor chairing the two districts of the Living Lab (Vallecas), the City councillor in charge of mobility, environment and sustainability and her deputy. These interviews provided a general overview of the key drivers and barriers the project as a whole was facing, and an assessment of the relevance of the different measures from these stakeholders' perspective. These stakeholders provided high scores in all the dimensions of priority, interest, influence and impact.

From the perspective of the municipality (City councillor of mobility, environment and sustainability), the city council's political priorities are well aligned with ECCENTRIC, and this should be an advantage for the project. Furthermore, these political priorities are resulting in plans and actions -Air Quality Plan, New Ordinance on Sustainable Mobility, new Protocol to fight Air Pollution, Madrid Central (a large Low Emissions Zone covering the whole central district)- that offer clear synergies with ECCENTRIC, and also a potential to scale up ECCENTRIC measures at a city-wide level. The city is currently very much focused on short-term, urgent actions, and it needs to develop or strengthen a medium-to-long-term vision; this

medium-term perspective can be partially provided by ECCENTRIC, and in this sense, the project can gain attention from local decision-makers.

Another barrier identified by municipal decision makers refers to the fact that the leadership of the measures is challenging for measure leaders, as they are municipal officials involved in many other actions, and with limited experience in the intricacies of EU research projects.

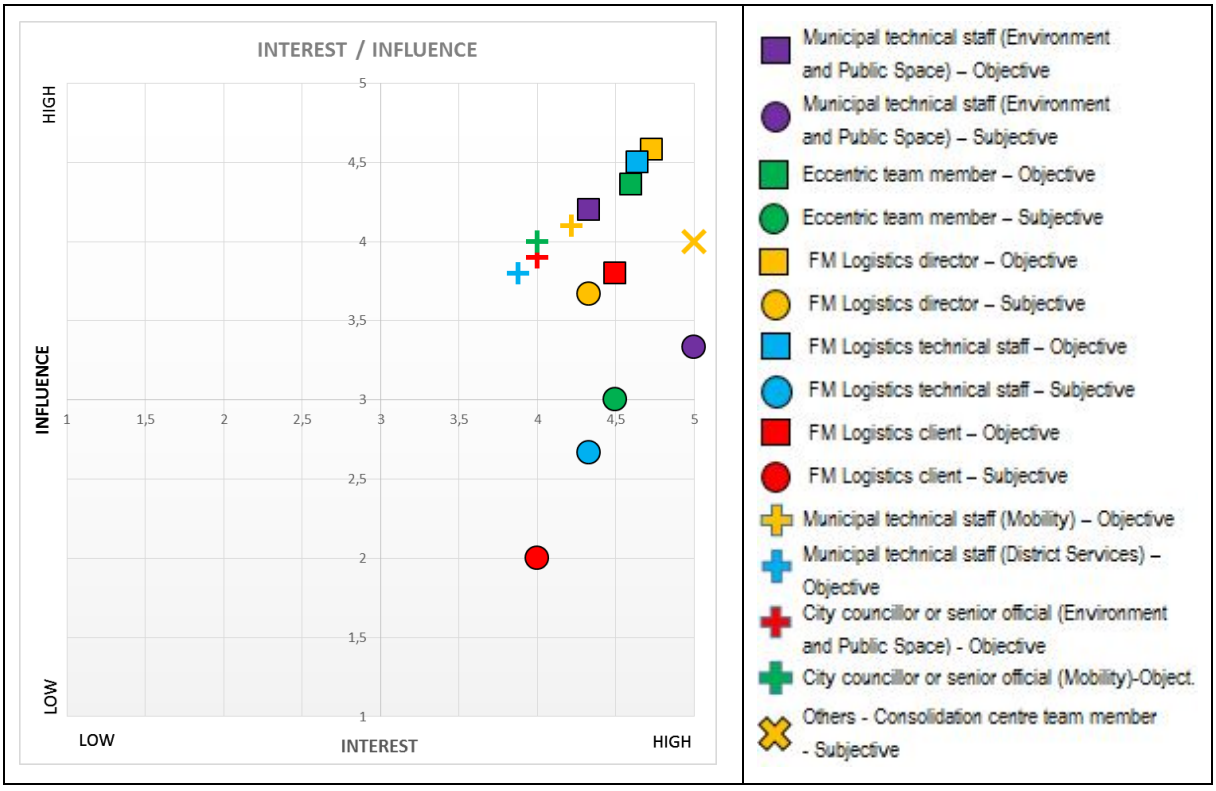

Figure 97: Interest & influence of stakeholders

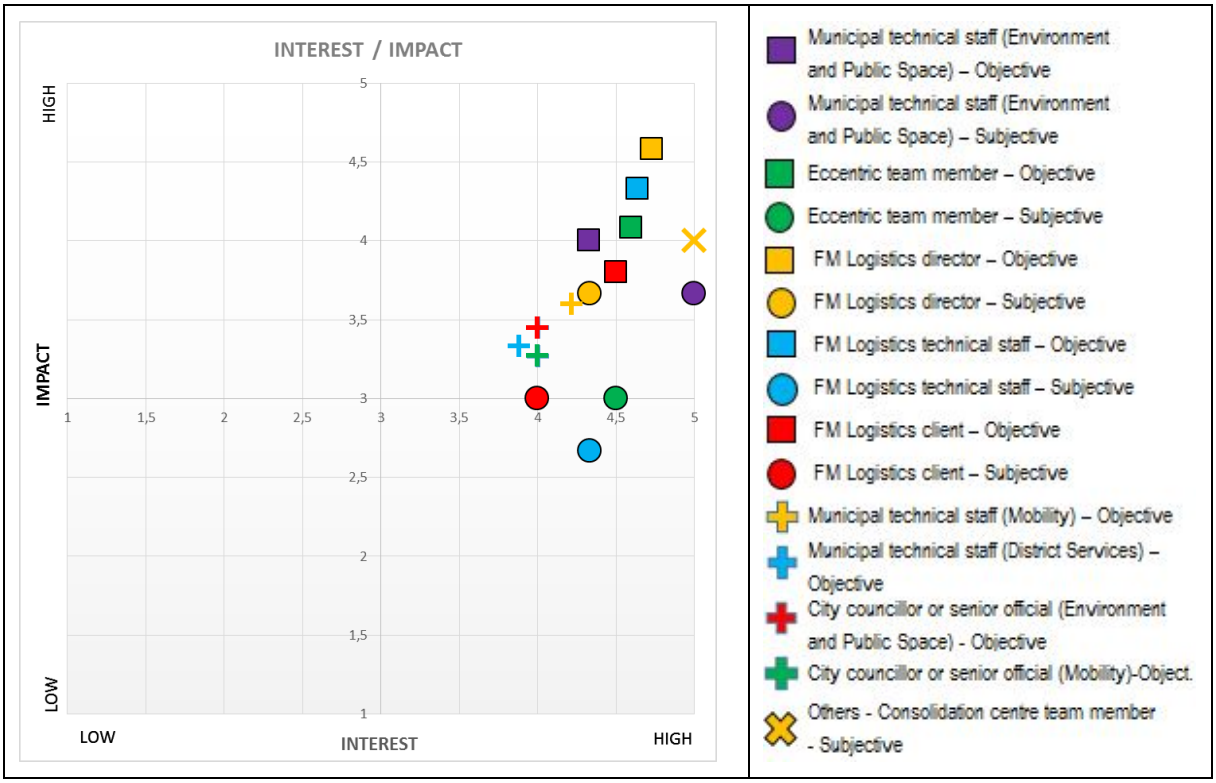

Figure 98: Interest & impact of stakeholders

As measure MAD 7.1. is selected for detailed evaluation within the project, a process evaluation workshop was held on November 20, 2018. The workshop was attended by two of the three members of the measure team (municipality and FML: no attendance from UPM), members of the ECCENTRIC coordination and evaluation teams in Madrid, and one inspector of the municipality, who had dealt with the environmental claims made by the residents due to the noise produce by the logistics facility in which the consolidation centre is included. There was no participation of FML executives, *Ontime* (FLM's subcontractors actually managing the logistics operations on behalf of FML), or FML clients served by the consolidation centre (SEPHORA and others). This limited participation of stakeholders was a handicap to undertake in-depth discussion about the process the measure had followed until reaching the current operational stage.

During the preparation of the ECCENTRIC proposal, the measure MAD 7.1 was prepared building upon the positive experience of the municipality of Madrid and FML in the project FREVUE (VALIDATING FREIGHT ELECTRIC VEHICLES IN URBAN EUROPE), which run from March 2013 to September 2017. ECCENTRIC was seen as an opportunity to test in a living lab the conditions necessary to make a consolidation centre viable (and profitable) in Madrid; furthermore, there was the opportunity to combine the demonstration of a consolidation centre with the development and operation of a prototype of a new clean vehicle for urban delivery (to be conducted within ECCENTRIC measure MAD 7.6).

The measure design was initially intended to start with a study on the characteristics of urban distribution in Madrid, as a basis to identify the potential users and geographical zones to be served by a consolidation centre. However, it was decided to make use of a study completed in 2016 by CITEC (*Centro de innovación para la logística y el transporte/ Innovation Centre*

for Logistics and transport), an innovation cluster on urban logistics, on behalf of the municipality. The key client identified to make use of the services to be provided from the consolidation centre was SEPHORA. This retailer was requesting FML clean logistics services, with hybrid trucks, to serve their stores in the city centre.

The selection of the appropriate location was made considering the sometimes conflicting objectives of proximity to the city centre, operational capacity (e.g. number of docks), rental costs, availability of charging points (electric vans were expected to be operational, and the prototype- although not decided yet- could be an electric vehicle), and vicinity to the ECCENTRIC Living Lab (*Vallecas*). The location used by the project FREVUE was no longer available after August 2016, and the space available in Vallecas (in the industrial zones of Mercamadrid or CTM) were considered too expensive, and needing the installation of charging points. FML decided to rent some space from *Ontime* in *Villaverde*, another peripheral district in the south of Madrid, close to *Vallecas*; the first location chosen was in the Marconi area, and operations started in April 2017; in this place ECCENTRIC enjoyed a dedicated space, a meeting room and visibility with an advertising totem; however, FML felt that there was a need for more space and closer vicinity to the city centre, and moved operations in October 2017 to another logistics space in a former railway facility owned by ADIF (the national rail infrastructure manager) in *Butarque (Zafiro* street), also in *Villaverde* district. This facility has been operated by *Ontime* since March 2016. In this place, ECCENTRIC has not a fully-dedicated space, and operations take place during a designated time window in a part of the facility; it is estimated that the activities of *Ontime* for FML in *Butarque* (which include many customers besides SEPHORA, although not served with clean vehicles) account for around 20% of the whole capacity of the platform.

Another relevant decision was the selection of the vehicles serving the consolidation centre. This decision was taken in February 2017, and was based on the requirements of one retailer (SEPHORA), a client requesting FML to serve its shops in the city centre with clean vehicles. The selection was based on the characteristics of the goods to be transported and the regulations in place in Madrid at that time. The best available option was to use hybrid trucks with Gross Vehicle Mass (GVM) of 12 tons. The goods are transported from one of the main logistic platforms in the region (*Torrejón*) to the consolidation centre with trailer trucks. These are not the only vehicles serving the consolidation centre, as it is used to provide services to other customers besides SEPHORA: there is a mix of use of diesel vehicles, and a few electric vans are also operating from the consolidation centre, mainly providing service to Amazon and other e-commerce retailers.

Since January 2018 FM Logistic has tried to gain new customers for its clean logistics services, following SEPHORA's trends. Although there are good expectations to expand the service in the next months, this has not materialised for the time being. The visibility of ECCENTRIC and CIVITAS has been low thus far both for the population at large (the consolidation centre and the vehicles do not have ECCENTRIC or CIVITAS logos), and for the potential customers, in spite of some dissemination efforts undertaken since August 2017 (e.g. presentation video).

The measure was expected to include a component for the revision of existing regulations in the city on urban freight distribution and the development of regulatory proposals to incentivise clean logistics. However, the political decisions on this front have been taken in a much quicker pace than initially expected: since 30 November 2018, a large Low Emissions Zone has been

set in place in the whole Central District (Madrid Central), and a new Ordinance on Mobility has been approved and is operational since 24 October 2018, including the new regulations on freight delivery. It is expected, however, that ECCENTRIC measure MAD 7.1 will be able to provide additional input on future regulations, particularly in what refers to consolidation centres located close to the city centre, in highly populated neighbourhoods.

B.3 Barriers

The barriers identified by the stakeholders during the evaluation are summarised in the table below, with the actions undertaken to overcome them.

No.	Barrier field	Description	Action to overcome the barrier
1	Financial	Priority to financial considerations outside the project's scope dominated the selection of the site for the consolidation centre.	Location of the consolidation centre outside the city lab, and at significant distance from the potential final destinations in the city centre. The solution did not compromise the achievement of the measure main objectives, but will probably result in less significant impacts.
2	Positional	The Consolidation Centre is sharing a larger facility with other activities. Not having an exclusive or independent centre weakens the identity and visibility of the project.	No action has been undertaken thus far.
3	Planning	Lack of comprehensive analysis of options to use electric vehicles for operations.	Decision to make use of hybrid trucks already available in the market.
4.	Planning/ Organizational	Lack of management plan for the consolidation centre, jeopardizing the expansion of operations to more clients.	No action has been undertaken thus far.
5.	Involvement	Insufficient involvement of institutional actors (Air Quality Plan) and users (clients).	Compatibility with Air Quality Plan assured through the municipal experts involved in the measure. No action undertaken to reach out to potential users.

Table 174: Identified barriers and planned/taken actions.

During the process evaluation workshop, the following barriers were discussed in detail among the participants:

- There is a lack (and high cost) of logistic space close to the city centre. The development of such spaces is jeopardised by lack of consideration of these spaces in the land use and urban planning regulations, as different from conventional industrial space. The building design should also be compatible with logistic operations in terms of accessibility to the building for heavy- or medium- duty vehicles, acoustic isolation, and design allowing the realisation of the necessary operations inside the building.

ECCENTRIC dealt with this barrier looking for shared logistic space in the vicinity of the first motorway orbital (M 30) and with good communication with the city centre.

- The deployment and operation of consolidation centres is likely to raise concerns, if not outright opposition, from residents due to the noise and heavy traffic associated with them. This can only increase if the centre needs to operate at night or in the early morning. This problem has been addressed in the case of ECCENTRIC through the action of the municipality and dialog with the logistic operators in order to revise their practices and to reduce the sources of noise and disturbance to residents.
- The ECCENTRIC consolidation centre is located outside the first orbital motorway (M 30). Logistic operators would have an interest in developing smaller (micro) consolidation centres within this orbital, but this would require on-street operations, which could only further raise the opposition of residents mentioned above. It does not seem feasible to develop such concepts within ECCENTRIC, as noiseless vehicles and operations need further development in Madrid, and adequate spaces have not been identified for such practices.
- The offer of clean vehicles for urban delivery remains limited compared to the operators' needs: there has been small progress in electric vans (only a handful of providers, with rather expensive options), and offer in small and medium-sized electric trucks is still lacking, in spite of recent announcements. This could change in the near future, but until then the options for noiseless and clean delivery remain limited. ECCENTRIC is contributing to this innovation effort through the development of a prototype (a mid-size electric truck replacing the current hybrids) within measure MAD 7.6.

B.4 Drivers

The drivers identified by the stakeholders during the evaluation are summarised in the table below, with the actions undertaken to make use of them.

No.	Driver field	Description	Action to make use of the driver
1	Cultural	Increasing interest from logistics operators and their clients in consolidation centres and clean urban distribution, as a result of the new regulations adopted by the municipality. Some companies may be introducing clean logistics considerations within their practices.	No action undertaken thus far.
2	Institutional	New regulations adopted by the municipality support the use of clean vehicles.	No action undertaken thus far to explore the potential of share logistics.

Table 175: Identified drivers and planned/taken actions.

During the process evaluation workshop, the following drivers were discussed in identified among the participants:

- The demand of one relevant customer (SEPHORA) requesting clean logistic services from FML. This has provided a steady demand to be served with hybrid trucks from the consolidation centre, and has contributed decisively to the viability of the concept. ECCENTRIC benefited from this driver to implement the concept, and is trying to build upon it to find retailers with a similar profile and interest in clean logistics to expand the activity of the consolidation centre.
- SEPHORA's approach is expected to be followed by other retailers, although for different reasons. In particular, main e-commerce retailers (like Amazon) are requesting shorter and more reliable delivery deadlines, which can be better guaranteed through consolidation centres closer to the city centre. Other major retailers (IKEA, Decathlon…) are also developing new business models, with small shops in the city centre and home delivery of the selected products. Supermarkets in the city centre, requiring frequent deliveries, are also becoming increasingly popular. ECCENTRIC is trying to benefit from this driver by approaching some of these potential customers.
- Small businesses in the city centres, with quite limited storage space, should also be interested in more reliable and frequent delivery. They can also be interested in night delivery (which requires noiseless vehicles and operations). This option has not been explored by ECCENTRIC, as the consolidation centre has limited storage capacity and is not located close enough to the city centre to allow for small-size deliveries at a competitive price.
- The general trend in the EU towards cleaner and more efficient vehicles, with more ambitious regulations also favour technological development and a quicker expansion of clean vehicles for urban freight delivery. ECCENTRIC has benefitted from these developments, making use of medium-size hybrid trucks for operations.
- The new regulations implemented in Madrid at the end of 2018 are expected to have a decisive impact in urban logistic practices. ECCENTRIC measure MAD 7.1 is planning to increase its dissemination effort, and to gain new customers, based on these new regulations. ECCENTRIC will make an additional effort since the end of 2018 in order to identify potential new customers affected by recent changes in regulations.
- The expansion of consolidation centres in Madrid is also expected to increase due to the combination of the new regulations and new trends in retailing. An expanding market could attract the interest of investors in this retail product. However, ECCENTRIC is not planning to further explore this issue, as there are no indications that this trend is emerging in Madrid yet.

B.5 Influence on risks

At this stage, the main risks refer to the difficulties the measure is facing to reach more visibility. This is probably related to the low number of users (just one client) and the limited number of clean services provided.

Identified risk	Category	Mitigation actions	Responsible
Operations do not reach critical mass, in terms of deliveries and clients.	Involvement, communication	Produce a consistent management plan, including commercialisation aspects for the consolidation centre	FML
Key stakeholders and potential partners outside the project remain unaware of the measure's contents	Organizational	Raise visibility of the measure's activities (infrastructure, vehicle, clients…).	FML
The project is unable to deliver contributions to the revision of regulations, due to lack of activity on this.	Institutional	Establish appropriate communication channels with those in charge of implementation of regulations (e.g. delivery permits, enforcement…).	MAD, FML

Table 176: Reported period risk assessment.

C Specific observations on the supporting activities in this reporting period

No supporting activities have been undertaken during the reporting period.

D. Additional Evaluation findings

As this measure had been selected out for detailed process evaluation, a closing workshop was held on 23 July 2020. The workshop gathered together three members from the Technical University of Madrid, two members from the Municipality of Madrid (Climate Change Department and Urban Planning Division), and two persons from two private companies (FM Logistics, one of the project partners, and Merlyn Properties).

The workshop allowed to deepen into the drivers and barriers identified in the previous workshop, as well as to discuss the lessons learned and possible process improvements for future projects, based on the clean logistic model demonstrated in the framework of ECCENTRIC.

The following topics can be highlighted:

- The ECCENTRIC measure, based on a consolidation centre close to the centre and operating with clean freight vehicles, has shown positive results in terms of emissions, as well as higher levels of customer satisfaction. The operation also offered a reduction in costs for deliveries at Sephora, but increased the costs of the shipments to other clients that were now served from the consolidation centre in spite of their peripheral locations; this means that the economic sustainability of the service could be attained only if there is an increase in the number of shipments to the city centre. The knowledge acquired and lessons learned from ECCENTRIC have improved the business model of the sustainable urban logistic division of FM Logistics (Citylogin)[29].
- It seems difficult to find clients interested in this new service: although clients use environmental marketing as a sales strategy and are increasingly concerned in having a provider that cares about innovation and environmental sustainability, they are not willing to pay for it. In the current context, in which goods distribution is suffering from unprecedented demand and competition, environmental commitment is being left aside.
- There is a major problem partly generated by the logistics sector itself: the final customer is unaware of the economic and environmental costs of goods distribution. "Zero cost" delivery had a negative impact on local commerce, and led to a bad behaviour by the final customer, such as ordering the same product from different places and returning all but the one that arrived first.

[29] Currently FM Logistics is initiating other projects that include consolidation centres in the city centre. One example is the European LEAD project, led by EMT, that will use vans, bicycles and motorbikes for last mile logistics.

- To reduce operating costs, 80% of urban freight companies in Spain use self-employed workers and do not manage their own fleet. These practices to cut down costs are incompatible with the fast introduction of clean vehicles, due to their higher costs unless these companies are willing to fairly compensate those self-employed workers for the use of clean vehicles.
- As the only client, Sephora actively contributed to the measure development. The additional costs were transferred directly to this client. As FM Logistics moved along the learning curve, costs were reduced, so that currently FM Logistics claims to be able to offer the clean logistics services at almost the same price as the regular ones, mainly thanks to the fuel savings provided by hybrid trucks. However, there no additional customers have requested such services.
- Emergence of new stakeholders: the rapid evolution of the sector is bringing new actors into the scene, notably property management entities. Merlyn Properties, for example, stated that they are looking for new business opportunities linked to changes in urban freight delivery and mobility behaviour; for example, as there is a growing availability of obsolete parking space in its buildings and commercial centres, the company has decided to invest in a business model based on renting this unused parking space to logistics companies, especially at night when the parking lots are empty. As owner of this property, Merlyn Properties can offer very competitive prices for logistics companies, charging by the hour of use.
- The new Zero Emissions Zone (and other measures envisaged in the Air Quality Plan for the next years) will increasingly force freight logistic companies to replace and upgrade their fleets. Among other incentives, zero-emission vehicles can access Madrid Central and park in the Zona SER (the on-street regulated parking area covering the central districts) without time restrictions.

D.1 Barriers

In addition to the barriers already mentioned in section B3, the second workshop identified other aspects that have hampered the MAD7.1 measure process:

No.	Barrier field	Description	Action to overcome the barrier
2	Financial	Difficulty in attracting clients for the clean logistics model due to higher costs and low considerations of environmental issues by many corporate customers.	FM Logistics is succeeding in reducing costs by improving the business model and reducing operating costs. For scaling up the measure, FML is considering to make use of more central consolidation centres, as well as the use of alternative and less expensive vehicles, such as bicycles and motorbikes.
3	Planning	Many of the urban freight companies use self-employed workers and do not manage their own fleet.	Self-employed workers can also benefit from any public subsidies to to finance electric vehicles for professional users. Logistics companies can revise their conditions for contracting-out transport activities, requesting the use of clean vehicles and compensating their partners fairly for their use.

4	Financial	Final consumers are unaware of the economic and environmental costs of goods distribution, as on-line retailers are hiding them within the total cost of the product.	Good practice agreements and regulations could request to make this cost visible and to charge a fee for unjustified returns.

Table 177: Identified barriers and planned/taken actions

D.2 Drivers

The following drivers favouring the implementation of the measure were identified during the second workshop:

No.	Driver field	Description	Action to make use of the driver
1	Political	Restrictive urban regulatory framework (*Ordenanza de Movilidad and Madrid Central*)	The use of hybrid trucks by the project took benefit of these restrictions and prepared FML to adapt to the additional ones announced in these regulations and entering in force in the next years
2	Organizational	The municipality is building up expertise and leadership around urban freight logistics and electric mobility.	The project took advantage of this expertise in the design and implementation of future European projects and in the dialogue with vehicle manufacturers, urban freight and fleet management companies.
3	Technological	A growing number of companies hiring logistics services is expected to demand cleaner and more sustainable delivery models in the future.	The project worked with the only company requesting such sustainable models in Madrid. For future projects, it is important to encourage companies to adopt environmentally responsible logistics and to cover the additional costs.

Table 178: Identified drivers and planned/taken actions

E. Conclusions

E.1 Main process findings

The main aspect that has marked the process was the difficulty to get clients interested in the clean logistics model developed by ECCENTRIC. Only 6% of the capacity of the consolidation centre was used for this particular service. The remaining capacity has been used to serve shipments with distances much longer than those for which the consolidation centre can provide environmental and economic benefits.

The fact is that the claims made by many companies to be interested in hiring logistics providers that incorporate innovation and environmental sustainability seem merely cosmetic and a marketing strategy not backed by facts: most of them are not willing to pay for the increased costs associated to sustainable logistics.

In this context, the project's marketing efforts to attract additional companies did not deliver the expected outcomes. Although the project started with a detailed analysis of the logistics sector in Madrid, it was unable to put in place an effective marketing campaign, as only one company was interested in hiring these services.

Furthermore, the strategy of many logistics companies to face competition resorts to massive substitution of fixed contracts by self-employed workers. This practice, in addition to harming

the social dimension of sustainability, makes it far more difficult to encourage the replacement and upgrading of vehicle fleets, and particularly the deployment of electric vehicles. Logistics companies could encourage this by requiring the use of clean vehicles and accepting to pay the fair costs for these services, which they can subsequently pass to their customers; however, they do not feel a demand from customers for such clean logistics services.

In the case of MAD7.1, two factors contributed to the good results of the measure. The first one was the fact that FM Logistics requested its delivery subcontractor (Online) to make use of a clean fleet (hybrid trucks). The second ones aws that the customer (Sephora) actively participated in the process, paying for the higher initial costs of the service as a way to cope with its internal environmental responsibility standards.

E.2 Process lessons learnt

The following lessons can be highlighted:

- At the beginning of the project, it was found that the goods distribution sector in Madrid received insufficient attention from the municipality. It was limited to very functional issues such as the regulation of on-street loading and unloading spaces, authorisations, etc. Throughout the project, and as a result of the study carried out in partnership with MAD7.6, it became clear that logistics is a key part of the urban system, and that there should be greater integration of logistics activity, urban planning and regulation, always focusing on low environmental impact modes.
- Regulations are a key component to break the inertia of the logistics sector. Regulations, however, have to find the right balance between competing priorities, even if it can make it difficult to adopt innovative practices. In Madrid, for example, current regulations restrict the conversion of a part of the parking lots into areas for storage and logistics; in the past, this was a positive step forward to protect residents or other building users from noisy and disturbing activities, but new innovative technologies and practices may make this prohibition unnecessary at least when some additional conditions are met.
- The critical relevance of regulations is confirmed by the significant impact the access restriction imposed by the new "Madrid Central" Zero Emissions Zone and other measures envisaged in the Air Quality Plan are having on logistic companies to encourage them to renew their fleets.

E.3 Process recommendations

At the end of the project, the following recommendations can be highlighted concerning the process:

- For future actions in this field, it is critical to undertake an early mapping and identification of those companies with consistent environmental responsibility commitments beyond mere rhetoric, as sustainable logistics undertake a modest (compared with the companies' whole operations) but additional cost compared to conventional practice and this is not going to be accepted by those companies thinking

only in terms of short-term costs. Only those company with a consistent environmental responsibility policy are likely to allocate the necessary financial resources to cover additional costs. Within the project, the partnership with Sephora worked precisely because the company accepted to pay the additional costs of the new distribution service.

- Besides the identification of such *early adopters*, usual in many innovative demonstrations, action in this area needs a strong and ongoing marketing effort to identify additional customers.
- Although the clean logistics concept developed by the ECCENTRIC measure achieved high levels of awareness and acceptance by the customers, no additional customers actually requested such services. This suggests that additional marketing efforts should be undertaken by FM Logistics, if the company intends to continue the service building upon the results obtained by ECCENTRIC.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

STO 7.4

Night delivery with clean and silent vehicles

Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KTH
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Quartiersgenossenschaft DomagkPark eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

Partner nº	Organization	Country	Abbrev.
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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7.4	**Night delivery with clean and silent vehicles**		
Last update	**Responsible**	**e-mail**	**telephone**
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A. Introduction

A.1 Expected results of the measure

The measure objectives are:

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

- The City of Stockholm strives to promote and implement sustainable, clean and (energy and time) efficient urban transport measures. In order to address this long-term goal of the city, innovative technological solutions, as well as innovative practices are often required.

(2) Strategic level:

(3) In order to support the long-term goal of implementing sustainable, clean, and efficient urban transport and to smoothen an introduction of a novel procedure and technology, this particular measure provides some evidence by comparing a 'traditional' and a 'new' way of conducting urban freight logistics. In particular, the measure tests and compares normal procedures, day-time deliveries - using regular vehicles, with night time deliveries, using modern vehicles.

(4) Measure level:

- The evaluation of the measure particularly focuses on transport efficiency, air emissions and noise. Transport efficiency and air emissions are studied comparing nigh to daytime deliveries by using fleet management system data. Noise is studied by KTH within a context of research building on a pilot project report from 2017.

A.1.1 Quantifiable impacts

Expected Impacts	By extending the existing scheme Stockholm City (one of few cities holding a night ban) continues as one of few global cities testing off hour deliveries. Expected impacts were more efficient transportation and handling of goods, improved work environment and an increased use of clean vehicles. Moreover, learning was to be gained related to how to enable night deliveries without disturbing the residents.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Increase of transport efficiency		x		x			x		x	
2	Maintaining noise at acceptable levels	x						x		x	
3	Reduction of air pollution		x								

Table 179: Quantifiable impacts.

A.2 Measure description

The measure mostly evaluates and compares night-time delivery using hybrid vehicles with a traditional day time delivery, using regular vehicles. In particular, three night-time delivery routes serving six McDonald's restaurants located in central Stockholm are used. A plugin hybrid electric vehicle (PHEV) delivered by Scania were used by the company Havi logistics. The city of Stockholm issued a permit for the vehicle to perform these deliveries during night time, which we call off-peak hours (22-06) allowing an exemption from the night ban normally applied to heavy trucks due to the risk of disturbing residents. Transport efficiency, noise levels and emissions (CO_2, NO_x and PM10) were evaluated. In order to reduce vehicle noise and improve safety, geo-fencing will be tested to force electric propulsion in populated areas. Geofencing means that connected vehicles automatically adapts to local traffic rules when entering a predefined zone.

A.2.1 Measure outputs

The measure produced several outputs:

- Launch of the night time deliveries: 1 vehicle, three delivery routes and 6 locations - beginning of 2019.
- Transport data: assembled till autumn 2019.
- Acoustic data: assembled till winter 2019.

A.2.2 Supporting activities

The activities supporting this measure were regular meetings between the City of Stockholm, KTH, HAVI, McDonalds, and Scania.

A.2.3 Interactions with other ECCENTRIC measures

This Eccentric measure does not particularly interact with any other measure.

A.2.4 Interactions outside ECCENTRIC

The city of Stockholm interacted with several contractors and policy making authorities during the project. In addition, the city has investigated how the night ban evolve by identifying a list of parameters to be fulfilled in order to get an exemption. The city also established routines for the handling and monitoring of night permits. This was a parallel ongoing activity. The city has also conducted another parallel off-peak project in which recycling material compactors were collected from centrally located underground facilities and were transported out from the city to recycling facilities using a PIEK certified biogas truck. The city also aims at reforming the night ban to promote more clean and silent freight transports during the off hours.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
Shippers	Companies issuing goods to be delivered in Stockholm	Urban areas	Streets in urban areas throughout the city covered by the night ban.
Receivers	Businesses receiving delivered goods in Stockholm	Urban areas	Streets in urban areas throughout the city covered by the night ban.
Carriers	Transport providers operating in Stockholm	Urban areas	Streets in urban areas throughout the city covered by the night ban.
Residents	Residents in the city who risk being disturbed by night deliveries.	Urban areas	Streets in urban areas throughout the city covered by the night ban.
City of Stockholm	The Stockholm transport administration being responsible for the handling of permits and target of possible complaints.	Urban areas	Streets in urban areas throughout the city covered by the night ban.

Table 180: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
P02	Citizens of the City of Stockholm	S	Other	O	
P03	Environmental Department of the City of Stockholm	P	C	P	
P04	Transport department of the City of Stockholm	P	C	L	
P10	KTH Royal Institute of Technology	P	KI	P	
	Havi logistics	S	PR	P	
	LOTS group	S	PR	O	
	McDonald's	S	PR	O	
	Scania	S	PR	O	
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					

Table 181: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Important tasks/decisions missing from the schedule	7 Planning	Continuous meetings and reconciliations.	KTH/City of Stockholm
Delays (implementation, data collection, dependent tasks etc.)	Operational	Well prepared and transparent procurement process	KTH/City of Stockholm
Inefficiencies with stakeholders (conflicts, turnover, no support, disengaged)	5 Involvement, Communication	Well prepared and transparent procurement process	KTH
Under communication	5 Involvement, Communication	Continuous meetings and reconciliations.	KTH/City of Stockholm
Resource shortfalls (Inability to secure sufficient resources, overspending)	9 Financial	Well prepared and transparent procurement process	KTH
Legal & regulatory issues	2 Institutional	Involvement of stakeholders at the city of Stockholm with regards to existing and future policy framework	City of Stockholm
Problems in procurement	8 Organizational	Well prepared and transparent procurement process	KTH
Insufficient attention and resources to evaluation tasks	9 Financial	Well-designed evaluation activities	KTH/City of Stockholm
Lack of data/data of low quality	Operational	Well prepared and transparent procurement process	KTH/City of Stockholm

Table 182: Risk Analysis.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning milestones (2016-2018)

a) Pilot-study: Between 2014-2016, there was an off-peak deliveries project (Volvo, Scania, KTH and the municipality of Stockholm). Both noise and transport efficiency were measured.
b) Kick-off for the overall Eccentric project, September 2016: defining the scope
    a. The overall scope – to improve the traffic situation and reduce congestion
    b. Off-peak deliveries were introduced to the Eccentric project, with the focus on reducing the emissions
    c. Based on the previous experience, it was decided to do an (innovation) procurement/an activity where external actors, i.e. consortiums, were invited to present their proposals for off-peak deliveries set-ups, rather than contracting one project partners doing the project (this was negotiated with the project officer).
c) The procurement, 2017

During 2017 (until September), the team was defining the criteria for the procurement. The call was open for bids during October 2017.

- Delays occurred during the procurement phase, since the type of the procurement had to be changed, to follow the legislation. Finally, a specific type of procurement was identified.
- Allocation of responsibilities and the budget called for some reflection: it was realized that the KTH was responsible for the procurement of an off-peak freight transport scheme while the City had the budget for the evaluation. One could consider an alternative allocation of the budget and responsibilities where the City would be responsible for the procurement and the KTH would be responsible for the evaluation.

In the procurement, requests included a PHEV truck, a transport operator and a freight receiver. The winning consortium consisted of Scania (vehicle manufacturer), Havi logistics (transport operator) and a number of McDonald's restaurants (receiver). While the call was open, the consortium had already existing strategic agreement and collaboration in other activities, which made the process of developing both, the bid proposal and executing the project easier. However, there were still (new) challenges that emerged, described later on in this report. In the procurement though, the stress was on the measurement of the kilometres that would be emission free. These were core the team was sticking to in the implementation of the Eccentric project, thus this was included as a requirement in the procurement call.

Phase 2: Initiating the measure (2018)

a) Planning: Quite some time was spent on the defining the details, i.e. what should be delivered, how the measurements should be done, and how to evaluate the performance of the measure.

b) An agreement between KTH and Scania was reached. Further planning for the operational stage started. From that point, Scania took lead of the management of the measure, which was according to the persons involved in the planning the measure identified as effective way of conducting the measure.
c) A "Learn and transfer knowledge" workshop was organized in August 2018, in the workshop the knowledge from the pilot was shared with the stakeholders in this measure.
d) A Kick-off meeting with all involved partners was held in March 2018. Further detailed planning and preparations of operational phase was initiated.
e) A transfer of EU funding from the City of Stockholm to KTH was performed in order to let KTH be responsible for the noise research and evaluation permitting them to build on results from a former off peak project.
f) The city of Stockholm performed a procurement of the logistics company LOTS Group AB, to perform a transport efficiency evaluation of the delivery scheme using vehicle computer data.
g) The development of the new prototype of a vehicle increased the uncertainty and caused around a half a year delay. While the plan was to start with the off-peak deliveries in September 2018, this was delayed until January 2019.
h) "Go & See" before the implementation the locations have been examined regarding the potential noise disturbance, the set-up for the on/loading, the opening times of the restaurants, the staff availabilities, the availability of charging.

Phase 3: Measure implementation (2019)

Operation of the off-peak delivery scheme started in January 2019. Deliveries are performed on Sunday, Tuesday, Thursday nights, avoiding the weekends due to security issues. Collection of transport as well as noise data was an ongoing activity that continued until at least September 2019.

During this phase, two sets of data was collected:

a) Transport data (emissions and efficiency) was collected for the day-time operations January 2019-August 2019, in order to provide a baseline.

Acoustic data (noise) collection as well as analyses was an ongoing activity conducted and analysed by KTH starting in December 2018 and continued until autumn 2019.

Phase 4: Measure evaluation (2019-2020)

During the last phase of the measure, the focus was on the analysis of the data and the impact and process evaluation activities.

Deviations:

- **Deviation 1: Evaluation** – The city of Stockholm originally had the whole evaluation budget before doing a budget transfer to KTH for the noise evaluation and research.
- **Deviation 2: Delay in Vehicle Delivery** – Deliveries were scheduled to start in the early Autumn of 2018 but had to be postponed due to difficulties related to the vehicle manufacturing (vehicle is a prototype for Scania's first PHEV).

B.2 Process evaluation activities

The Measure Leader has recorded progress with design and implementation in the measure report, including deviations and obstacles. In addition, the Measure Leader completed a survey regarding barriers and success factors, as well as provided feedback on a summary of deviations so far and on the online survey design so that it could be improved and adapted for distribution to other stakeholders involved in the measure (conducted in Spring 2019). Three stakeholders responded out of ten, which is about 30% response rate. Finally, the Measure Leader has helped to identify which stakeholders have the highest interest in and the greatest influence on, respectively, the measure's success.

The mapping of interest and influence showed that the City of Stockholm is the highest interest in the project's outcome, since it fits into a longer-term strategy to use night-time deliveries to reduce congestion during daytime traffic and thereby facilitate a more sustainable transport system. Havi Logistics also has a high interest in that this strategy has the potential to economize its business through more intensive use of its vehicle fleet and faster delivery times. Havi Logistics is also the actor with the greatest influence on the outcomes, where it makes the key operational decisions such as using low-noise equipment during deliveries and carrying out appropriate training activities for its employees. The receivers in this experiment, McDonalds franchises, also have a strong influence on the outcome as it is their staff as well that must be prepared to create the necessary conditions at the point of delivery for low-noise operations to take place.

In summary, the process evaluation included the following activities:

a) Survey about the barriers and drivers was conducted in the spring of 2019

b) Interview with the measure leader in September 2019.

c) Histories workshop in October 2019 (present were representatives from Havi, KTH acoustic team, KTH evaluation team, the City, McDonalds, Scania).

B.3 Barriers

The table below summarizes the barriers expressed both in the survey, the interview, and the history workshop. It also identifies what type of actor experienced the barrier (company, the City), what type of actions were taken to address the barrier or what could be done to address the barrier and who should take responsibility for this.

No.	Barrier field	Description	Action to overcome the barrier
1	New technology	*City: when the project deals with new technology, that adds uncertainty and can cause delays *Scania: truck (development) was delayed, it was difficult to estimate, the charging was placed on the side of the truck not matching with placements of the street charging. *KTH acoustic: technical issues had to be sorted (power supply), a switch relied on a human factor, replacing failing	*City & KTH: flexibility, collaboration, patience, and enough time was needed. For example, the measure was initiated in January 2019 rather than September 2018, due to the need to develop the modern vehicle prototype. It also took KTH some time before it was possible to have a continuous stream of data, gaps in the data were created and the measurements had to be extended from August till later in the autumn.

		equipment, testing the new technology	
2	Management/ distribution of responsibilities	*City: Challenge to work in a large project with many actors *City & KTH: unnatural distribution of the responsibility and the budget for the task can cause delays *KTH acoustic: issues with the installations of the microphone (the rules, the permit, and potential casualties) and technical complications. *High fluctuation of project coordination staff: e.g. 3-4 official project leaders at KTH over the project period	*All: regular meetings can address the challenge of working in a large team *City & KTH: while learning new tasks can be also beneficial (for KTH to learn how to conduct an innovation procurement), the process could have been faster if the tasks were distributed based on what the institution has experiences with, e.g. KTH as a research institute to focus on the evaluation and acoustic measurements and the City to focus on the procurement. *KTH acoustic: steps should be identified early in the project to identify and secure all the permits required. All: Due to staff fluctuation, there was more intensive communication between involved staff to enhance knowledge transfer between coordinators, researchers and administrative staff as well as other project partners.
3	Infrastructural	*The consortium & City: -challenge to establish the availability of the charging for the plug-in hybrid truck. -at one location the truck would not fit, so the location was not used	*All: sites were visited to examine the practical feasibility.
4	Operational shift from day to night	*The consortium: It is a challenge to shift operations from day to night time, adjustments are needed: -some resentments at the first line to the switch to the night -the restaurant needs to be open -staff has to receive goods at night, -driver willing to drive at night, learn how to act at night. *City: -the operations has to be within the noise limit as residents should not be disturbed, -finding a receiver of goods for night time	*The consortium: -the resentment/worry was dealt by provision of the benefits and opportunities -extra staff had to be hired, -driver had to be trained how to behave at night and adjust to work at night, driving had to be switched to battery mode when in residential areas, beeping sound on the truck had to be switched off when reversing. Some further adjustments can be tested in the future – using more silent delivery equipment. -routines were adjusted, risk analysis of solitary work *City & business: -choosing locations which are more suitable (where background levels are already higher) or/and scheduling deliveries accordingly. -indicating in the procurement that the partnership with a vehicle and receiver of the goods should be established.
5	Legislative – night time noise regulations	*City: Night ban due to national noise regulation	*City: the city has issued exempts. Noise levels have to be kept within the required range for the night time.
6	Practical implementation	*KTH acoustic: finding solutions due to not having constant power supply, the microphone/sensors was going off, was depending on the human	Delays before a continuous streams of data could be collected. Identify all steps at an early project stage to secure necessary permits. The delay was

		factor for switching off/on since the risk was the battery would drain, -some equipment had to be replaced -identifying how to proceed with the installations on the façade/signage (different ownerships and responsibilities), some parts of the equipment were lost.	allowed, which allowed to collect enough of the sufficient data to compensate for the gaps in the data. Additional funding was used for the equipment.
7	Financial	*<u>The consortium</u> -the cost increases (the driver, the staff, the equipment, the development of the truck, the management) *"There are [societal] benefits, but cost increases as well, when you think, the challenge is – to do the right thing, you are adding the value– less congestion, less noise, but then if you are paying a premium to do that?"*	<u>All:</u> -seeing this project more as a innovation testing project which could in a long term provide some returns, but is not seen as a profit making project. It was expressed: *"it costed more than expected, but that's not the point of the project"* -the current business model does not support socially and environmentally responsible business behaviour – businesses are forced to compete on the market by being (price) efficient, to change that, the (global) business model should be changed to take in the externalities (congestion, pollution, less noise)

Table 183: Identified barriers and planned/taken actions.

B.4 Drivers

The table below summarizes the drivers expressed in the survey, the interview, and the history workshop. It also identifies what type of actor experienced the driving force (companies, the City, KTH), what type of actions were taken to capitalize on the driver or/and what can be done in the future in order to do so and who could take responsibility for this.

No.	Driver field	Description	Action to make use of the driver
1	Collaboration	*<u>KTH:</u> there was a pre-existing partnership between KTH, Scania, and the Municipality, as well as Havi and Scania and Havi and McDonalds. -Strong collaboration between Scania, Stockholm City and KTH	*<u>Collaborative:</u> While the bid for the procurement was open, it was easier for the partners to apply together and to implement the measure – since the collaboration was pre-established. - Further project ideas are generated to continue collaboration (how to improve the efficiency and sustainability urban areas)
2	Process knowledge	*<u>KTH & City:</u> there was a pilot on off-peak deliveries during 2014-2016, which measured noise and transport efficiency which involved Scania, KTH, and the City.	*<u>Collaborative:</u> since there was a pre-study with a similar focus, this provided a good knowledge base for this measure. In particular, due to the pre-existing knowledge, it was negotiated to avoid using a one single partner for implementing the measure, but rather have an innovation procurement in which a consortium would be chosen.

3	Theoretical & Method knowledge	*KTH: progression of knowledge	*KTH: Due to experiences from the pilot project, KTH developed a more sophisticated noise measurements, Scania was aware that good planning is needed (conducted site visits)
4	Practical knowledge	*City & KTH & Scania: previous knowledge, that it is important to: - choose the right sites – where neighbours would not complain - examine the charging environment (which matters for the plug-in vehicles) – one of the McDonalds restaurants has the charging facilities. This was added, but was not part of the initial bidding requirements.	City&Scania: Sites were visited and due to previous knowledge it was known what to examine: the location being close or further from the main road (noise), the loading possibility, charging availability, safety issues in different parts of the city. The existing knowledge about the locations allowed selection of the restaurants located close to the main roads (where noise levels are higher), since these were assumed as locations where night deliveries could work (and not on the smaller, quiet streets). Provision of training to the driver (to not listen to the music aloud), knowing that the beeping when reversing the truck has to be switched off at night. It all turned out well, no resident complained.
5	Planning	*KTH: defining what should be delivered, how it should be measured, how the evaluation should be done and the core idea of the project.	*Collaborative: based on the previous experience it was learnt that planning phase is very important, thus, time was devoted on defining the details of the project, which requires time, but can increase the success of the measure.
6	Management	*Scania: regular meetings were organized by Scania, experienced in project management, that took the lead.	*An experienced entity in project management: taking the lead in the implementation of the project can increase the chance of success.
6	Political	*City & Businesses & Research: there was a positive view, political acceptance of the project. Private actors and research institutes are motivated to adopt new technological solutions to address sustainability goals.	*City: the pilot project already familiarized the decision makers with the topic, recognition that it can improve the congestion, lowering the CO2 emissions, and liveability in the city. The process of getting the permit for transport by night was thus smoother.
7	Sustainability (economic, environmental)	*City: -motivation for the transport to become efficient and sustainable and there is existing market interested in providing new solutions. -interest in reducing congestion *Business perspective: -improved economic efficiency, -to make a better use the vehicles (vehicle utilization rate) -in the restaurants it is easier to receive goods at night, smooth inventory process	*Collaborative: take advantage of the interest among the market actors by testing it in real case scenarios. -this project allowed learning among actors -learning and understanding and potential evaluating upscaling (to address congestion) -by extending operations from day to also night time, there is a continuity of the production flow, night transports are faster which also reduces the costs.
8	Interest/acceptance among stakeholders & private public	*KTH: there is big interest among transport actors, vehicle manufacturers and municipalities in	KTH: New/future proposals were drafted international project proposals with actors to utilize the off-peak concept for

	actors knowledge sharing	the knowledge generated in the Off-Peak project. - Knowledge sharing about previous experiences with ZEUS concept from between international project partners in ZEUS.	different flows, e.g., CERAON, DeHORS, ZEUS. - Collaboration will bring forward new perspectives and interests of stakeholders, e.g., actors might have different (complementary or competing) objectives in different cities / regions.

Table 184: Identified drivers and planned/taken actions.

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
Noise disturbance	Cultural	Noise aspect had a central focus in the planning of this measure, mitigation included: -carefully choosing the locations -the driver received training how to behave at night -the beeping when reversing was turned off -possible resident complaints were monitored	The consortium
Security concern	Security	Planning included security considerations: -locations were carefully selected, the ones perceived as less problematic (since the delivery occurs through the main entrance, not a garage). - scheduling the deliveries on days when security issue would be less problematic (not on the weekend)	The consortium
Important tasks/decisions missing from the schedule	7 Planning	Devoting additional time to the planning phase (between the time when the consortium was selected and launching the off-peak deliveris)	KTH/City of Stockholm/the consortium
Equipment installations and insurance	Legal	Taking additional time to examine the legislation, rules, responsibilities, and potential consequences.	KTH
delays due to work with technological innovation (implementation, data collection, dependent tasks etc.)	Operational	Flexibility in shifting the start date.	KTH/City of Stockholm
Inefficiencies with stakeholders (conflicts, turnover, no support, disengaged)	5 Involvement, Communication	Well prepared and transparent procurement process	KTH
Under communication	5 Involvement, Communication	Planning phase was extended to communicate the aims (KTH, The City, Consortium). Thenafter, Scania, which has a good project management, took the lead and held bi-weekly meetings.	KTH/City of Stockholm/Consortium
Resource shortfalls (Inability to secure sufficient resources, overspending)	9 Financial	Well prepared and transparent procurement process, profit not being the primary goal of the consortium, but more so the advancement in the new technology market	KTH/Consortium

Identified risk	Category	Mitigation actions	Responsible
Legal & regulatory issues	2 Institutional	Involvement of stakeholders at the city of Stockholm with regards to existing and future policy framework	City of Stockholm
Problems in procurement	8 Organizational	Well prepared and transparent procurement process, adjustments in the *evaluation* budget allocation.	KTH/City of Stockholm
Insufficient attention and resources to evaluation tasks	9 Financial	Well-designed evaluation activities	KTH/City of Stockholm
Lack of data/data of low quality	Operational	Choosing experts, with previous experiences in conducting and analysing similar data, KTH for noise measurements and Lots group for transport efficiency and emissions data. Due to the measurement problems, and to assure the quality, some delays did occur.	KTH/City of Stockholm

Table 185: Reported period risk assessment.

C Specific observations on the supporting activities in this reporting period

During the process evaluation, 'good communication' and a good way of transferring and upgrading the previous knowledge was identified as one of the important supporting factor contributing to the success of this measure.

Before the launch, the planning phase was extended to clearly define the what, how and whys of the project. There was a "go & see" part of the process (initiated by Scania and the City), visiting the sites and carefully selecting the locations based on the feasibility (noise, security, physical arrangements. The intention was to identify where charging facility could be installed and to inspect the unloading possibility and needs for regulatory adjustments for on street loading zones. This, among other things, contributed to the successful implementation of this measure. When the locations were selected, before the start of the project, a "learn and transfer knowledge" workshop was organized where the previous team (from the pilot study done in 2014-2016) passed on the concrete and practical knowledge to this group. Since the locations chosen were similar, it was possible to discuss more concretely. This enabled the Eccentric group to anticipate well, also those who have not been involved in a night time deliveries before. During Eccentric, there were regular meetings as well as the training provided to the driver. All actors were considered important. The activities and the impacts of the measure were also communicated externally to the other actors in the transport business. For example, via press communication day in February 2019, with some news media present and all the actors, also a commercial film was made and shown on TV. As expressed during the histories workshop: *"we could feel that we are important part of the project and that it's good and important".* These external activities thus contributed to the team spirit and to the internalization of the importance of this project.

C.1 Quality of the Supporting Activities

Several activities, good communication, and previous knowledge contributed to the successful implementation of this measure. The activities included the knowledge transfer workshop, 'go and see' initiative, bi-weekly meetings lead by Scania, provision of training to the driver (how to behave at night deliveries), planning well the implementation phase (identifying what will be measured and how KTH-Consortium-the City), careful selection of the sites and timings of the deliveries, adjusting to the opening times, safety issues, and the noise levels in order not to disturb the residents.

In terms of the good communication, off-peak includes a shift from a normal procedure, day-time deliveries, to the night time deliveries. This requires a change in the routine. It was stressed during the histories workshop that in such situation, it is that much more important to communicate what is aimed to be achieved and why. That means presenting the positive effects of the project to all the actors involved. In particular, the "why" has been reported to be very well communicated in the process of the implementation of this measure which supported the motivation for the implementation (what and how).

The previous knowledge, experiences and expertise contributed to the success of this measure. For example, Scania, experienced in the project management, took the lead in the

project management. KTH had experience with noise measurements, which was taken one step further – by testing new equipment and validating the off-peak sound methodology (measuring at the source and the receiver; at the truck and at the façade). Based on the previous pilot project the actors (KTH) identified that rather than having one single project partner, it is more optimal to have a consortium. Moreover, while the procurement process was open for various companies to apply, previous collaboration of the partners (Havi, Scania, McDonalds) made it easier for them to both apply for and implement the project. Based on the previous experiences, KTH also identified that good planning is important for the implementation of the project, thus that phase has been extended in this project.

Activity	Target group	Qualitative score
Knowledge transfer (seminar)	Eccentric, the consortium	Satisfactory/Excellent
Meetings	Eccentric, The consortium	Satisfactory/Excellent

Table 186: Quality of the supporting activities.

C.2 Influence of the Supporting Activities on the implementation process

Due to the supporting activities, among other things, there were some delays in the implementation process. However, they greatly supported the implementation of the measure. For example, selection of the sites, choosing optimal times for deliveries and training to the driver might have added extra hours to the implementation process, but in the end, the residents did not complain.

C.3 Influence of the Supporting Activities on the impact of the measures

Since the off-peak deliveries locations and timings of the deliveries were carefully selected (based on the security issues, opening times, noise disturbance), the noise measurements of the deliveries, and thus the impacts of this measure, are contextual - time and location specific. In the MER report, we reported the noise delivery levels for the site with existing high background noise for example. The CO2 emissions savings are more straightforwardly calculated, but savings are still dependent on the charging possibilities. Consequentially, we do not know whether the measure could have similar impacts in other locations, where charging might be more limited or more silence is required. However, the pilot project conclusions that the last meters are the most “noisy” were confirmed in this measure and new silent equipment could be used. This should be tested further in potential replication or upscaling projects.

C.4 Lessons learnt on the Supporting Activities

Here we present the most important lessons.

1. **Plan well**

During the pilot, it was learnt that it is very important to plan the project well. Thus, in this project, extra time was spent after the bidding process was over and before the launch of the off-peak deliveries. This planning phase included defining what will be measured, how, and why to all the actors involved.

2. **Maintain good communication with all actors**

By providing regular meetings among actors, the actors can be updated with the process and potential issues.

3. **Carefully select and examine the sites**

It is essential to 'go and see', and examine the possibility for the practical implementation of the project. However, the more of the previous experiences, the better can the viewer examine what to examine. In this case it was the charging possibility (the side on which it is possible to charge, how far is it from the delivery location), the off/on loading possibility.

4. **Be flexible – extra time and risk analysis is required in innovation projects**

There is a need for flexibility and extra time is required when new technological solutions, and the tests of these, are part of the project. It is important to also assess the potential problems, and communicate these to all actors involved.

D.Conclusions

D.1 Process evaluation findings

This measure experienced many of the complications that arise when a new technology is demonstrated and observed in a real-world setting. The technology behind both the truck itself and of the acoustic measurement equipment experienced minor technical problems that nevertheless accumulated delays. Human factors played a significant role in that it required a driver to work at night, and noise levels needed to be at least tolerable by neighbouring populations (according to national and city regulations) in order for the trial to be carried out. Finally, setting up the demonstration in the first place required cooperation among a complex network of actors including the municipality, the equipment manufacturer, the logistics company (including driver), and the shipping client (including receiver).

D.2 Lessons learnt

Several key lessons can be drawn from the barriers and drivers experienced during the demonstration:

- The project benefited from the existing strategic collaboration between the City of Stockholm, KTH, and Scania
- Some additional examination of test site feasibility might have identified earlier on that one site was not viable due to its physical configuration
- Night-time deliveries using new technology can require somewhat different driving practices than day-time deliveries, such as in this case training on how and when to use battery-only mode and to silence the reverse signal sound.
- With a variety of stakeholders comes a variety of expectations, some of which being more realistic than others. An important step was to converge on a shared set of expectations that was both realistic and meaningful.

D.3 Process recommendations

To help capitalise on the lessons learnt, we emphasise the following recommendations for future, similar demonstrations:

- Building on an existing collaboration among several of the project partners helped manage the complex stakeholder network
- Careful examination and selection of test site feasibility to maximise the chance that the demonstration will be able to be carried out
- Supplemental driver training helps them to adapt to driving at night in a way that conformed to noise regulations
- De-emphasising any expectation of profit-generation at the demonstration stage, and emphasising the importance of lessons learned for future, profit-generating initiatives, especially with regard to city goals with respect to congestion, emissions, and liveability.

2020 CIVITAS
Cleaner and better transport in cities

ECCENTRIC

MUC 7.5

Neighbourhood-oriented Concierge System Process Evaluation Report

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2020 CIVITAS
Cleaner and better transport in cities
ECCENTRIC

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Project Partners

Partner nº	Organization	Country	Abbrev.
1	**Ayuntamiento de Madrid (coordinator)**	Spain	MAD
2	Grupo de Estudios y Alternativas 21, S.L.	Spain	GEA21
3	Consorcio Regional de Transportes de Madrid	Spain	CRTM
4	Empresa Municipal de Transportes de Madrid S.A.	Spain	EMT
5	Universidad Politécnica de Madrid	Spain	UPM
6	Ingeniería y Diseño S.L	Spain	AVIA
7	FM Logistic_Iberia*	Spain	FM
8	Ingeniería y Consultoría para el Control Automático S.L.	Spain	ICCA
9	**Stockholms Stad MF**	Sweden	STO
10	Kungliga Tekniska Högskolan	Sweden	KHT
11	Carshare Ventures B.V. formerly Flexidrive Sverige AB*	Netherl.	FLEX
12	UbiGo Innovation AB	Sweden	UBIGO
13	Mobility Motors Sweden AB	Sweden	MM
14	Cykelkonsulterna AB	Sweden	CYKEL
15	GoMore ApS	Denmark	GOMORE
16	**Landeshauptstadt München**	Germany	LHM
	MVG_Münchner Verkehrsgesellschaft mbH	Germany	MVG
17	Domagkpark Genossenschaft eG	Germany	DOMAGK
18	Green City e.V.	Germany	GC
19	Green City Projekt GmbH	Germany	GCP
20	Technische Universitaet Muenchen	Germany	TUM
21	**City of Turku**	Finland	TUR
	Union of the Baltic Cities_ Sustainable Cities Commission	Finland	UBC
22	Regional Council of Southwest Finland	Finland	RCSF
23	Turku City Traffic Ltd.	Finland	TUKL
24	Western Systems Oy	Finland	WS
25	Turku University of Applied Sciences	Finland	TUAS
26	Gasum Oy*	Finland	BVK
27	**Municipality of Ruse**	Bulgaria	RUS
28	Club “Sustainable Development of Civil Society”	Bulgaria	CSDCS

Partner nº	Organization	Country	Abbrev.
29	ICLEI - Local Governments for Sustainability	Germany	ICLEI

* Partners with changes pending of GA amendment

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Project	City		
ECCENTRIC	Munich		
Measure code	**Measure name**		
MUC 7.5	**Neighbourhood oriented concierge system at the development area Domagkpark**		
Last update	**Responsible**	**e-mail**	**telephone**
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A. Introduction

A.1 Expected results of the measure

The measure objectives are:

(1) City policy level in perspective of CIVITAS goals/ longer term:
- Promote and implement sustainable, clean and energy efficient urban transport measures
- Build up a critical mass and market for innovation
- Exchanging good practices

(2) Strategic level:
- To reduce significantly the burden caused by courier services
- Reduction of neighbourhood oriented freight transport (courier services)

(3) Measure level:

The main goal is to reduce vehicle kilometres travelled by delivery trucks in the demonstration area. As a result, energy use and emissions (CO_2, NO_x, PM) are decreasing, congestion is reduced, contributing to better social inclusion, liveability, and efficiency of urban freight.

A.1.1 Quantifiable impacts

Expected Impacts	The expected effects are a reduction of the burden cause by courier services in the area such as emissions and local traffic.	CIVITAS ECCENTRIC Objectives									
		Reduce:				Improve:					
ID	Quantifiable Impacts	Energy use, CO2 emissions	Air pollution	Road accidents	Road congestion	Accessibility for all	Social inclusion and equal opportunity	Livability	Competitiveness	Efficiency of urban freight	Local economy
1	Awareness and acceptance of the concierge system						X				
2	Satisfaction with the service							X			
3	Mode shift towards sustainable modes	X						X		X	
4	Avoided VKT by delivery trucks	X			X					X	
5	Reduced emissions CO2	X									
6	Reduced emissions NOx, PM		X								

Table 187: Quantifiable impacts.

A.2 Measure description

This measure implements a concierge system in Domagkpark, aimed at reducing transport burdens and offering several services to support its residents. Residents will be able to walk there and pick up delivered goods or even get their goods delivered on the last mile by the local concierge with an eco-friendly electric cargo bike (100% carbon free energy), instead of having CEP-companies attempt home delivery with heavy vehicles.

Aim of the process is developing a multilateral cooperation with the logistic (CEP) services.

The service with the name “DomagkWerk” has launched in October 2017 and offers also mobility services, like the maintaining of the e-mobility station, training for bike-repairing or other secondary services for everyday life (laundry, cleaning, childcare and craftsmen) with the character of a neighbourhood shop.

However, in spring 2019, the operator has decided to leave the project as it was not possible to maintain the service. Main reason was a lack of profits and a financial loss with every parcel

handled. ML has found a new operator who will restart the concept in a modified way in April 2019.

Since April 2019 the shop is called “Shubidoo” and offers different services to the residents. There is some cooperation planned with other ECCENTRIC measures, e.g. offering information and (rental) pick-ups for MUC 6.3a (ACM: light-weight vehicle), MUC 5.6 (E Trike), MUC 4.2 (PING-button) and MUC 2.9b “Kreuz und Quer” (start in 02/2020).

A.2.1 Measure outputs

The measure output is a concierge service ("DomagkWerk" (10/17-03/19)) in the Living Lab. This service includes:

- Handling of packages from three CEP companies: Either customers have their parcels sent directly to the concierge (address=concierge), or the drivers will drop the package after a failed home-delivery attempt at the shop. It is also possible for customers to send their parcels from the shop.
- Direct delivery of other delivery providers to the shop for personal pick-up.
- Mobility services:
    - Rental/ coordination of parking spots
    - Consulting for e-mobility
    - Car services (cleaning, refuelling, …)
- Facilitation/organisation of additional services:
    - Laundry
    - Shoe repair
    - Cleaning
    - Childcare
    - Craftsmen
- Sales of used books

After discontinuance of business of the first shop owner, a new concept was introduced and the name changed into “Shubidoo” (since 04/19). Shubidoo is offering the following services:

- Handling of packages from one CEP company (GLS)
- Mobility services:
    - Information and handing out of PING-button (see measure MUC 4.2)
    - “Kreuz und Quer” game for children (see measure MUC 2.9b)
    - Planned: Information point for the light-weight vehicle (ACM) (see measure MUC 6.3a)
    - Planned: E Trike rental (see measure MUC 5.6)
- Facilitation/organisation of additional services:
    - Event ticket sales (München Ticket)
    - Café venue (coffee, ice cream, etc.)

A.2.2 Supporting activities

-

Interactions with other ECCENTRIC measures

The measure is advertised in the community portal (Measure MUC 2.7) and the Concierge office is providing a space for a screen with real-time PT information. Cooperation with MUC 6.3 “E-light vehicle” for last mile delivery was envisioned, but is currently unclear. The local

community is informed and involved in the measure through different ECCENTRIC events and advertisement. The concierge is located in a strategically important position in the Living Lab, becoming a "hub" for the entire area.

A.2.3 Interactions outside ECCENTRIC

The operator has been trying to add further additional services outside ECCENTRIC in order to build a sustainable business model.

A.3 Target groups and/or affected part of the city or region

Target group		Affected area	
Type	**Description**	**Type**	**Description**
1	Domagkpark Residents		Living Lab
1	Parkstadt Schwabing Residents (and Employees)		Living Lab

Table 188: Target groups or affected parties.

A.4 Stakeholders: ECCENTRIC 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
1	Domagkpark Genossenschaft eG	P	NG	L	ML
2	DomagkWerk/ Shubidoo	S	PR	L	Provider
3	CEP Companies	S	PR	P	Involved companies
4	Dynamo Fahrradservice	S	PR	O	Vehicle Safety/Maintenance
5	Employees	P	Other	P	Cargo bike drivers, support for daily business
6	Users	S	Other	P	Customers
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					

Table 189: Measure stakeholders.

A.5 Identified risks

Identified risk	Category	Mitigation actions	Responsible
Limited interest of delivery companies and KEP service providers to cooperate with the Concierge.	Organizational, Involvement	Further talks and negotiations. Additional services of the concierge will be developed in order to establish a community shop.	ML, Operator
Residents are not using the new Concierge services	Involvement	Marketing and service campaigning will be initiated in order to raise awareness within the Living Lab	ML, Operator

Table 190: Risks.

B. Process Evaluation findings for the reporting period

B.1 Implementation phases

Phase 1: Research and measure planning

Relevant milestones accomplished:

- Concept developed
- Shop and service space/rooms identified
- Research for delivery partners
- Rental contract for shop premises made with shopkeeper
- Ongoing communication with logistic and parcel delivery service companies
- Three delivery companies are interested in concierge partnership (Hermes, GLS, UPS)
- Official launch of the concept: Community summer festival at the Living Lab, 22.07.2017

Phase 2: Procurement & Implementation

Relevant milestones accomplished:
- Product marketing concept developed
- Soft Launch 02.09.2017
- Opening Concierge as parcel shop in 10/2017
- Partnership with delivery companies assigned and three companies contracted (Hermes, GLS, UPS)
- Integration of other neighborhood and community related business services (laundry, shoe services, handicraft services and facility management) in 11/2017
- Parcel monitoring system initiated

Phase 3: Operation & next steps:

- Product marketing campaigning
- Further growth in contracted KEP and delivery partners
- Service Extension with contracted delivery companies towards last mile delivery
- Test operation for last-mile delivery service 08/2018
- Cooperation with M.6.3 “E-light vehicle” for last mile delivery
- Further extension of other neighborhood and community related business services (for example energy management advisory)

In December 2018, the current operator of the concierge service announced to stall operations and from April 1st 2019, there is a new operator in charge of the concierge. The concept is likely to be changed significantly (see section 0, p.704).

B.2 Process evaluation activities

Several meetings took place between the operator of the Concierge and the LEM. A close contact was held with the ML to exchange about the latest encountered barriers and drivers. However, all attempts to get the CEP companies involved failed. Drivers were not even able to take part in short interviews during their daily workflow and were not allowed to take part in any kind of survey due to their employer's strict regulations.

To deepen the evaluation, a "study project"[30] was written about the measure. Within this context, the operator was interviewed and visited by the student a couple of times.

Standardized form surveys were used to get information about the roles, tasks and backgrounds of the various stakeholders, as well as their view on barriers, drivers, and risks of the measure. The online survey was spread to all applicable stakeholders with the help of the ML and reminders were used to maximise the response rate.

In a joint effort with other LEMs, a common survey framework was developed and operationalized with the open source survey tool "Limesurvey" (in the case of Munich).

After collecting general information about the stakeholder and its role in the project (job, tasks, contact information, and engagement in which phases (planning / implementation / operation / maintenance / others), we asked for opinions about barriers and drivers in a two-level-approach:

In a multiple choice set, stakeholders were asked to identify supporting thematic areas / sectors for the measure:

- Political / strategic
- Institutional
- Laws and regulations
- Cultural
- Problem-related
- Involvement / Communication
- Planning
- Organisation
- Financial
- Technological
- Spatial

In the next level, we asked for a detailed description of the drivers in detail as well as how these drivers were used to maximise the measure's impact.

Through this approach, we are able to identify both general supporting sectors, but also detailed, measure-specific information about drivers with a high level of information. Showing the full list of sectors first did also 'inspire' stakeholders to include all possible drivers they could find.

[30] The thesis titles "Concierge stations as a solution for sustainable last-mile delivery in the City of Munich" is not published, but available on request by the Munich LEM.

The same methodology was used to collect information about barriers.

The last block in the survey asked about risks of the measure. For each risk, we asked for an assessment about the likelihood as well as about the risk's potential to endanger the measure's success.

In total, two stakeholders (namely the operator of DomagkWerk and the ML) completed the survey. We are facing especially a lack of cooperation from CEP companies, who are neither open to extend the concierge services nor to take part in (detailed) process evaluation activities. With the help of a new operator and the ML, we will start a new approach in spring 2019 to dive deeper into the process findings.

But as long as the process of implementing this measure is partially delayed because of several barriers, together with the ML we did identify relevant stakeholders and made is possible to create a stakeholder analysis. The analysis can help to look deeper in to the process.

The stakeholder online survey is an emerging pattern of all stakeholders mapped in a three-dimensional chart. The current ML was asked about the perception where to locate herself and other relevant stakeholders within the **stakeholder analysis matrix**. The objective of the stakeholder analysis is to engage stakeholders in order to improve process and maximise impact. Each stakeholder is given a coordinate within the chart. The coordinate depends on the stakeholder's power potential (the bigger the bubble the higher the power potential), the interest (between low and high) and the ability to impact the measure (from low to high).

Figure 1 shows the stakeholder analysis of the measure MUC 7.5. As the ML DomagkPark Genossenschaft eG (DOMAGK) has the highest interest and ability to impact the measure, it is coordinated as the biggest bubbles in the high right corner. Right next to it is the DomagkWerk (DOMAGK) with the same high power potential and similar high interest and motivation as both stakeholders cooperate closely to implement the measure. Due to the fact that the operator of the DomagkWerk changed recently, the process structure changed because of a lack of constancy.

The relation triangle between the CEP companies, the DomagkWerk (operator) and the residents of Domagkpark is decisive for the success of the measure implementation and an unproblematic process. The CEP companies have a really high ability to impact the measure paired with the highest power potential (same as Domagkpark Genossenschaft eG). What makes them a dangerous stakeholder is the low interest and motivation they bring into the process. They basically should deliver the parcels to the concierge (DomagkWerk) and the DomagkWerk should do the last-mile delivery with emission free cargo bikes on costs of the delivery firms. At least that's what the CEP companies prospected within the first conversations with the ML. In the end the CEP companies denied to finance this concept and therefore the DomagkWerk operator introduced a monthly cost model for residents to pick up their parcels and furthermore benefit from additional concierge services. Not many residents were willed to use these concierge services with a monthly subscription rate. Thus some stopped using the services. Reversely, that means the CEP companies deliver the parcels directly to the residents and the concierge is not used in the proper sense. The basic idea was to do an emission free last mile delivery with a cargo bike and use the DomagkWerk as a hub for the parcel delivery by the CEP companies.

Another stakeholder on the bottom of the stakeholder analysis is the bike repair service Dynamo (DYN). As if they are settled in the Domagkpark anyways they should maintain the cargo bike if necessary. In fact, they have very low power potential and even quite low ability to impact the measure.

Other methods added to the above described stakeholder online survey and stakeholder analysis to assess a more Detailed Process Evaluation, are:

- **Review of measure reports** as well as some informal observations from the Living Lab.
- Carrying out several **guided (expert-)interviews** with relevant stakeholders and customers of the old and new concierge shop.
- Carrying out a **learning history workshop** with the ML, the current shop owner and his employee working in the parcel handling department.

The **review of measure reports** as well as some informal observations from the Living Lab and its residents are taken into account for process evaluation. In order to get a complete picture, both the opinions from the former shop owner (DomagkWerk) as well as from the current shop owner (Shubidoo) were included in this report.

Especially the **guided interviews** help to look deeper into the process and its main barriers and drivers, hence give a helpful overview for the lessons-learnt part. The interview questions are developed in cooperation with the ML and contain the following matters:

- General information about the current status of the measure status
- Thinking about the concierge concept(s): positive thoughts and worries
- Explaining the whole process and developments from his/ her own viewpoint: drivers and barriers
- Lessons learnt through the process
- General thoughts on transport, mobility and environment

For the detailed process evaluation of this measure, the ML contacted 6 people to carry out a telephone interview regarding the process evaluation. There was no cooperation from the CEP companies which have been contacted by the ML several times before. Actual interview partners are the former shop owner and a customer of the concierge services.

The choice for executing guided telephone interviews was made because it is a simple method to gain deeper insights from an important stakeholder and to keep the time expenditure of the residents and the LEM on a low level. The interviews were guided with the same questions so that there can be a valid comparison of the answers in the end. In total there were two telephone interviews carried out. The interviews lasted about 30 minutes and were recorded in key sentences on paper. The results of the interviews are to be found in section B.3 Barriers and B.4 Drivers.

The **Learning History workshop** is a method for evaluating the whole process of a measure ex post regarding its planning, implementation and operation performance. For this purpose, the stakeholders involved in the measure are invited to explain their experiences, regarding the applied strategies, the achieved results and what happened why, in chronological order. The aim is to learn from the actions and experiences of those involved and to draw conclusions that will be of added value for the planning of future projects.

The workshop was structured in the following steps[31]:

- Reconstruction of the measure process with timeline and milestones
- Milestone evaluation with defining barriers and drivers of the process
- Definition of “actions to overcome” the corresponding barriers and possibilities to make use out of the drivers
- Reflection of the results and concluding the experiences of the participants under “lessons learnt”

For this measure, the Learning History workshop was organized by the ML and LEM and conducted at the concierge shop with the LEM, ML, the current shop owner and his employee working in the shop’s parcel handling department. As a result, the following timeline (see Figure 99), including the most important processes and milestones was developed together by the participants. For a more detailed description of the important milestones see chapter B.1 (p.707).

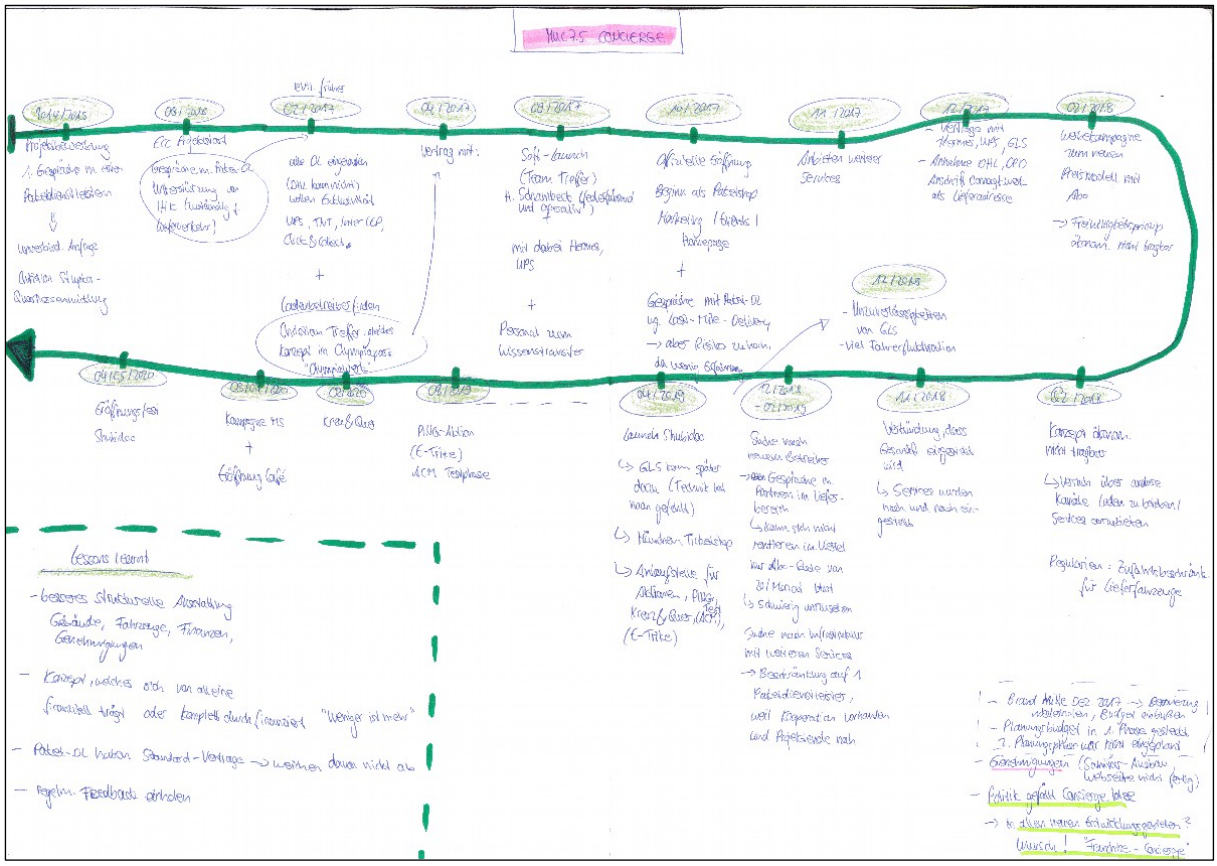

Figure 99: Learning History Workshop timeline

As a second step, the most important barriers (see chapter 0) and drivers (see chapter 0) of the process were identified and discussed. Also, the experiences, how barriers were overcome

[31] Learning History Workshop was designed after “Refined CIVITAS process and impact evaluation framework”, 08/2017, see ANNEX 7 LEARNING HISTORY SESSIONS.

und drivers were used to foster the measure were discussed. Finally, the experiences of the participants were concluded under “lessons learnt”.

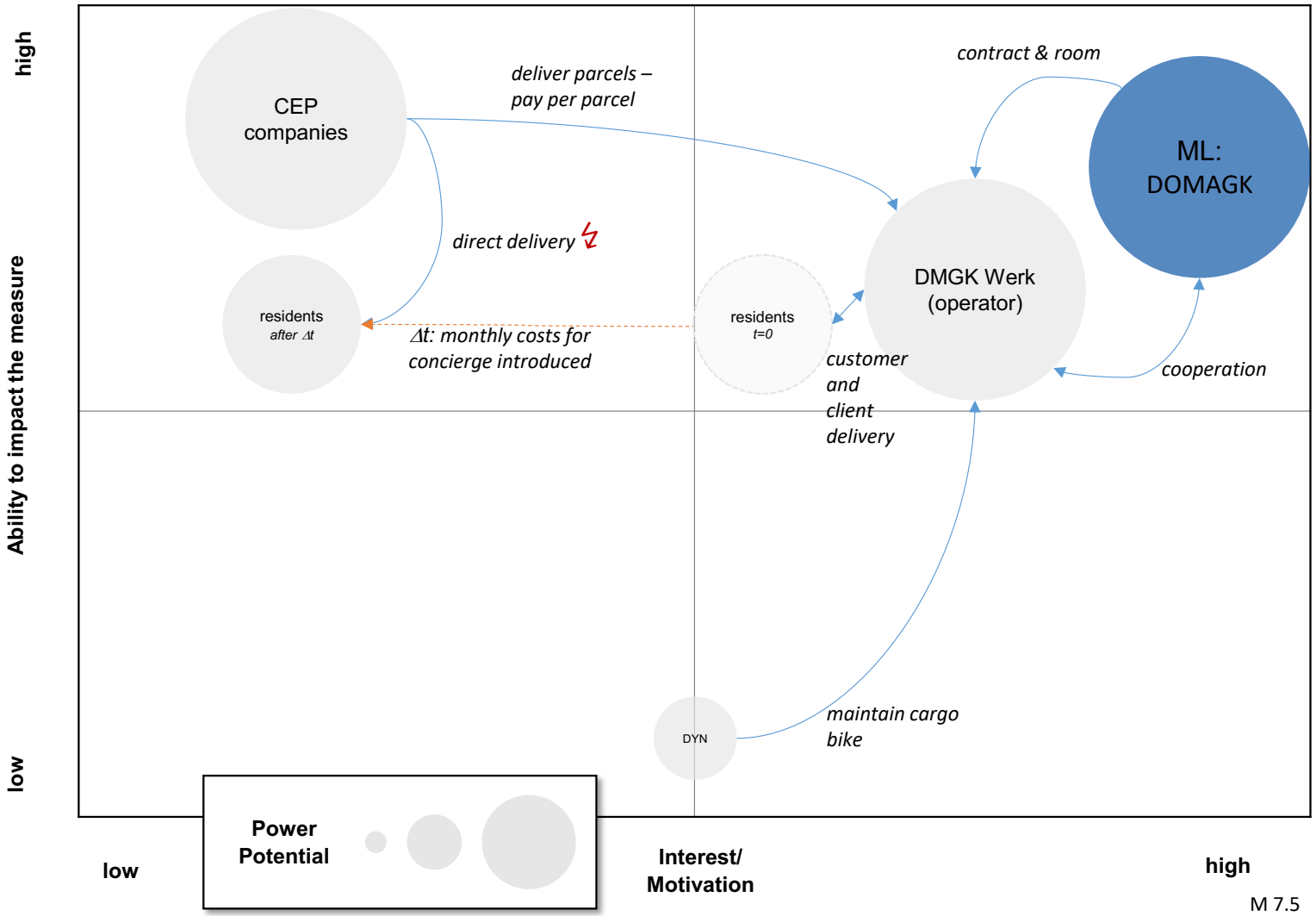

Figure 100: Stakeholder Analysis

B.3 Barriers

The barriers are retrieved from several sources (source description see above):

- Stakeholder online survey (11/2018)
- Guided interviews (10/2019-02/2020)
- Learning history workshop (01/2020)
- Learning history workshop with stakeholders from one of the participating firms (01/2020).

Multiple barrier fields have been selected, e.g. *political/strategic, cultural*, *financial* and *planning*. In detail, the following barriers were identified so far:

No.	Barrier field	Description	Action to overcome the barrier
1	Political/ strategic	No overall concept for concierge or last mile delivery yet developed resulting in confusion about responsibilities and options for support.	Develop overall concept with necessary interfaces.
2	Political/ strategic	No political willingness to make decisions, and thus support, before the local elections.	Create the necessary regulatory framework before such a period.
3	Laws and regulations	No political pressure to change something about the status quo of parcel delivery (diesel ban, …)	Taking up political talks to decision makers, goal: to empower corresponding authorities.
4	Cultural / Financial	Lack of willingness to pay for the concierge service among residents, since no added value is visible for users.	Include additional services to subscription. Added value for users must be created (e.g. by excluding delivery trucks from the Living Lab) and made visible (e.g. explanation of cost-benefit ratio: time, money and environmental benefits).
5	Organizational	Lack of sufficient knowledge and experience by the ML in the delivery business	Background in delivery business as requirement for applying as concierge operator.
6	Involvement and Communication	Lack of support and involvement from the CEP partners – no profitable last-mile delivery possible.	Foster willingness to cooperate by regulations and incentives (need to be defined by political authorities).
7	Involvement and Communication	Lack of support and involvement from city authorities, because no responsible person defined	Clarify responsibility for delivery traffic, if not yet existent, create new position.
8	Planning	It was difficult to react to the developments and regulations on the CEP market.	Residents should be participated more in planning processes and actual changes in the cost models of the concierge.
9	Planning	The focus on parcel delivery didn't keep the shop financially alive, this led to a change of shop owners and thus the entire concept.	Prepare for the challenges in the field of parcel delivery. Try to keep employees from former concierge shop, thus knowledge transfer.
10	Financial	Business concept of CEP companies does not provide enough revenue for concierge.	In long term: finance service (partly) by subscriptions of residents. In short term: provide more sufficient funding in initial phase.
11	Financial	Funding is not sufficient to cover the time until the service makes profit.	Generation of additional income through other services necessary.
12	Financial	Not enough financial scope to handle unexpected events (in this case fire and change of operator)	Funding reserve for such cases.

13	Spatial	The location of the concierge, central in the Living Lab, does not allow the argument that delivery trucks would not have to drive into the Living Lab, if they would hand the last mile over to the concierge.	Locate the concierge at the entry of the Living Lab.
14	Spatial	Limited room in the concierge shop to store a huge amount of parcels.	Look for other options, e.g. locate independent storage boxes in the Living Lab (see MUC 7.3).
15	Planning	Too early planning led to differences between project plans and reality.	Be aware of the fast development of the delivery business when planning such a project.

Table 191: Identified barriers and planned/taken actions.

The lack of a **strategic** plan for a functioning overall concept for last mile delivery in the city of Munich is one of the main barriers. This becomes evident in many individual cases of the measure.

Currently no **laws or regulations** exist to foster such a last mile delivery respectively concierge service, thus the CEP companies have no need or incentive for giving away this part of their business. This issue made the original idea of the concierge as last mile delivery hub impossible, but only second attempt deliveries or packages sent directly to the concierge were handled by the service. This barrier could be overcome by giving the corresponding authorities power for example to limit the access for delivery services and their trucks. Here, an **involvement** barrier arises, since the responsibility in this new field is unclear. The ML had no central contact person at the city administration, which led to unsolved questions as how the concierge could be supported by the City of Munich, as well as difficulties and inefficiencies in all necessary approval processes (e.g. delivery zone, sanitary installations, website). **Political** and administrative support would be necessary to set boundary conditions that make it attractive (or even obligatory) to hand over the last mile services entirely to the concierge. Especially in the area of administration and regulation, which exceed the competences within this project, the concierge measure needs political support. An example could be restrictions for driving into the quarter (with delivery trucks). A reason why this support through political decision makers is currently not given, are probably the communal elections in Munich in March 2020. Beyond, these responsibilities lie with the Free State of Bavaria, Germany's federal administration and the European Union.

With more support, the concierge concept could also overcome its **financial** barriers. Under current conditions it seems impossible that the concierge operates self-sufficient within the delivery business: The CEP companies are not willing (or maybe also not able) to offer an individual delivery concept, supplying the concierge and offering last mile delivery in the Living Lab. The concierge was used as first delivery address, first delivery for people which allowed to hand over their parcels to neighbours (in this case the concierge) and furthermore as deposit if first customer delivery fails. The money that the CEP companies are paying per parcel according to their standards do not cover the of the costs the concierge (personnel costs for being in-store, provision of storage space, sorting/arranging, etc.). The idea was to overcome this financial difference by making the residents subscribe and pay for the concierge service. This concept was not well accepted by the residents who are used to a free parcel delivery to their doorstep, thus they did not see an added value from their **cultural** perspective: the

subscription would mean extra paying for fetching their parcels by themselves from the concierge instead of having another try for direct delivery and fetching it afterwards from the delivery provider depot. To overcome this barrier, the concierge operator tried to increase the value for the residents by adding additional services (laundry service, craftsmen's services, locksmith service, ticketing, etc.). Another approach to overcome this barrier would be to make the profit (less traffic in the Living Lab since delivery trucks hand over the last mile to the concierge), the users/residents would have, more visible (e.g. test phase, information events etc. where explaining cost-benefit ratio). To overcome the financial issues, the concierge operator wishes full financial support for the starting phase, until the business reaches a profitable zone or even better a permanent support in the sense of an environmental protection measure, if profitability cannot be achieved. Thus, a qualitative high service could be provided for from the beginning, leading to a high number of users and a possibly profitable business in the long-term. Since the current delivery service is already very convenient for the users an external change in the status quo (fees from CEP companies for doorstep-delivery, bans for delivery vehicles, …) could potentially change these habits, but cannot be realized within the project framework.

More **financial** scope would also have been necessary to handle unexpected events, as a fire and the change of the operator in this case, in a better way. After a fire in December 2017, the building had to be renovated before the actual tasks could be continued. Even though the damage was covered by insurance, the process of getting back this money took a long time. A financial backup to bridge this period would have helped to reduce delays. Another problem was the change of the operator of the concierge in spring 2019. Since the first operator already got the biggest share of financial support from the funding, not much money was left for a second round of financing. On the one hand, this made it difficult to find a new operator and, on the other hand, it meant a tough start for the new operator. Regarding the decreasing finances, the new owner couldn’t afford the full amount of financial start-up aid.

Further barriers (**organizational** and **spatial**) were the lack of know-how because there hasn’t been any similar concept with focus on an emission free last mile delivery yet. At the start, the involved persons, especially ML and the concierge operator did not have any experiences or expertise in the field of delivery. On the other hand, the location of the concierge especially for parcel storage or rather its possibilities to store parcels was not ideal in terms of keeping delivery trucks out of the residential area of the Living Lab.

About the **spatial** issue: Another solution of storing the parcels, location-wise and regarding a space big enough for lots of parcels, could have been better from a strategic point of view. If there would have been a parcel storage solution at the Living Lab “entrance”, it could actually prevent delivery trucks from entering the residential area. Traffic could be reduced and the concierge could care about an emission free last mile delivery. It would also be conceivable that the concierge shop could have chosen another location to set up the store. There is no commercial area in the entire Living Lab that is optimal for such requirements. This was not planned (land-use plan) and also not built. That is why this available space was used, being well aware of the limitations. Another spatial problem which impeded the concierge to concentrate on offering more parcel delivery services is simply the limited room within the concierge shop. There is no particular storage room for such purpose.

The fact that **planning** took place years before the project began was another barrier. Thus, it was difficult to cope with the rapid development of the CEP market and has made matters more complex. In addition to that the initial assumptions and behaviours of Domagkpark residents have not proved to be true. Another unforeseen barrier in the field of planning, was the fact that the focus on parcel delivery didn't keep the shop financially alive. This led to a change of shop owners and thus the entire concept. An action to overcome this barrier is to try to keep employee/s from the former concierge shop for the new concept development to retain the very important (tacit) knowledge and good contacts to customers.

B.4 Drivers

The drivers are retrieved from the same sources as for the barriers (source description see above).

Among others, *spatial, financial,* and *involvement/communication* were identified as significant fields of support. In detail, the following drivers were identified:

No.	Driver field	Description	Action to make use of the driver
1	Political / Strategic	The large outreach of ECCENTRIC and the (local) political focus on mobility helped to advertise the service.	The participation in the ECCENTRIC project made it strategically easier to find both business partners and customers.
2	Political	Political interest promotes to establish the concierge concept in all new developed quarters of the city.	The concierge concept could act as an exemplary project which could be replicated in other newly developed areas of Munich.
3	Institutional	The concierge shop acts as an important node and place to meet to promote the local neighbourhood management.	Advertising for the own service.
4	Involvement / Communication	The close connection to other ECCENTRIC measures was helpful to promote the concierge services.	Events that are organized at the concierge facilities, the website (MUC 2.7), etc. helped to promote the services.
5	Involvement / Communication	Concierge acts as community meeting point in the neighbourhood.	More people get into touch with the concierge concept and other Living Lab residents.
6	Involvement / Communication	At the beginning, the concierge offered parcel deliveries by different delivery firms.	Parcel delivery led to more customers in the concierge.
7	Organisational	The concierge concept is flexible to offer additional services if requested by the residents/ customers.	Customers feel appreciated and other target groups might be attracted by a larger assortment of services.
8	Organisational	Concept regarding the services the concierge offered didn't have to be developed from scratch. The owner of a similar shop in Munich, called "OlympiaWerk" became the first operator of the concierge.	Other concept can serve as role model and enable knowledge transfer.
9	Financial	Financial support through ECCENTRIC.	The money was essential to set up the concierge in the Living Lab.
10	Spatial	The location of the concierge in an area with a low urbanisation and newly developed.	A lack of services in the area makes the concierge even more important and attractive.
11	Spatial	The central and good accessible location of the concierge in the Living Lab.	Using the concierge facilities as location for events of ECCENTRIC as well as others, is leading to more customers in the shop.

Table 192: Identified drivers and planned/taken actions.

The local **politics** are promoting the topic in principle and have a positive attitude towards developments and innovation in the field of (emission free) mobility. The case of a concierge service attracted interest by local politicians, who wished to establish such a concept in every new developed quarter in Munich. The concierge concept could act as an exemplary project which could be replicated in other newly developed areas of Munich. In general, this can be seen as a driver to implement the concierge concept but it also leads to a barrier (see barrier #1). This political support was verbally outspoken but couldn't be transposed into actions because there was no dedicated person within the City of Munich or other political committees to handle this specific topic.

The concierge became a central **institution** in the Living Lab for the residents. From the beginning, it was a central point of meeting, communication and getting information about the quarter. In this way, the concierge fulfilled the role of a neighbourhood management institution, which meant extra attention and advertisement for the concept and the shop.

The **involvement** with other ECCENTRIC measures brought more attention to the concierge and its services: The opening of the store was combined with the official start of the mobility stations in the Living Lab, which created a lot of media articles due to the presence of the lord mayor. The Living Lab's website (MUC 2.7) advertised the service, in order to make it even more public. In general, many ECCENTRIC events and others (e.g. "Kreuz und Quer" a mobility project for children of the City) were organized in the facilities of the concierge. These local events in combination with the friendly atmosphere the concierge operator and his employee created, led to a good reputation of the shop and many people getting in touch with it. The involvement of different delivery providers (DHL, DPD, GLS, Hermes, UPS) in the modified concierge concept led to having all users of the different delivery providers in the shop, whereas in the current situation with only one provider (GLS), only a smaller user group has to go to the shop.

The flexibility of the concierge in its offers was a driver from an **organizational** point of view. When it became clear that the concept could not be implemented as originally planned, the operator offered additional services. These services were created under consideration of the needs of the residents, thus the shop operator could keep his business alive. The first operator of the concierge was the owner of the "OlympiaWerk", a shop with a similar concept in Munich (the OlympiaWerk is a shop offering a variety of (parcel)services for the residents of the surrounding Olympiadorf. Its owner is a carpenter offering also services as mediation of craftsman, laundry and shoe-repair service. The OlympiaWerk is located in the north of Munich, close to Olympiapark). This led to knowledge transfer and having a functioning example as vision.

The location of the concierge led to **spatial** advantages. Since the quarter is not in the very central part of the city and services were only rarely developed in this new developed area, the offer of the concierge was very welcome and frequently used. In addition, the concierge is located central with good accessible by al modes of transport, making it the ideal location for events and for meeting of the residents. This led to a good reputation of the shop under the residents and made it a central point for occasional meeting in the quarter.

Without the **financial** support from ECCENTRIC, the project would not have been realized.

Lessons learnt

As a result of Learning History workshop the experiences of the participants were concluded under the following “lessons learnt”:

- Better structural appropriation and conditions in all aspects as facilities, vehicles, financial scope and power of authorization (i.e. for driving and parking permissions)
- Business concept which is financially self-supporting or completely subsidized
- Lack of flexibility by standardized contracts of the parcel delivery providers which makes it difficult to involve them in such a new concept
- Establish feedback culture during the process

B.5 Influence on risks

Identified risk	Category	Mitigation actions	Responsible
A lack of funding could make the operator leave the project	Financial	This has happened – new operator was found already.	ML
No enough qualified personnel is found for support of the service	Involvement	With the opening of a student dorm in the coming months, a high number of potential workers is moving into the Living Lab	ML / Operator

Table 193: Reported period risk assessment

C. Conclusions

The following section sums up the main process findings and lessons learnt. Some process recommendations conclude the Detailed Process Evaluation Report of MUC 7.5.

C.1 Main process findings

As there weren't any considerable supporting activities, the process suffered a bit from standing quiet isolated from other ECCENTRIC measures being implemented in the Living Lab. But still, there are some important developments in the background which helped to form and speed up the process.

First of all, the stakeholder constellation was very well in the beginning, experienced people from the same field supported the project and signs seem to be good towards a cooperation with the most important stakeholders of the measure MUC 7.5: the CEP companies. During the process it turned out that the CEP companies can be seen as an uncertain and not very reliable partner in the stakeholder matrix. They have very high ability to impact the measure and cannot be seen as very motivated to develop the Concierge idea of MUC 7.5. They don't engage in sustainable last mile delivery solutions for small units like the Domagkpark Concierge.

Due to the deviation of the initial Concierge concept including an emission-free last mile delivery, the idea of offering other services at the Concierge shop had to take place. The shop operator started to offer several kinds of services for the residents in the Living Lab which he couldn't afford for long because it wasn't economically sustainable. This change in shop ownership influenced the process mainly because new structures had to be set up.

C.2 Process lessons learnt

- The process is assumed to be more successful if there would have been any strategic plan for a functioning overall concept for last mile delivery in the city of Munich. Political support probably could have moved the cooperation actions with the CEP companies to another level.
- The offered services at the Concierge shop had to be paid by the users, which was implemented in forms of a monthly subscription. People were not willed to pay for picking up their parcels or other services which they could receive for free at their doorstep.
- Regarding the idea to store the huge number parcels, it has to be thought through that there is a big space needed in or close to the location to make a last mile possible. The Concierge shop itself didn't offer too much space for this storage.

C.3 Process recommendations

Due to the fact that there was no cooperation possible with the big CEP companies, another more detailed risk scenario made in the beginning of the process could have helped to cope with this unfavourable situation of being let down.

The new Concierge concept including services like picking up laundry or offering craftsmen services could have needed a more precise business concept to outlive longer. A new shop operator took over and improved the concept. Very recommendable though, is the way of

participating the residents in developing the Concierge concept, e.g. defining the services which are being offered at the shop.

Other concepts or places to store a huge amount of parcels could have been developed to get around that spatial/ space problem when storing the delivery goods.

In order to keep all stakeholders in the same loop of information, it is recommendable to establish a feedback culture during the entire process. The ML and all other relevant stakeholders should follow a transparent communication to prevent immediate and unexpected changes.