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# Building Capacity of Small-Medium Cities' Local Authorities to Implement MaaS and Other Innovative Transport Schemes

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**Abstract.** Sustainable development requirements in combination with extreme technological evolution have changed the way mobility is considered, creating challenges to Local Authorities (LAs) both in planning and implementation phases of mobility solutions. This paper focuses on the capacity building of LAs to deliver Mobility-as-a-Service (MaaS) and other innovative transport schemes as part of Sustainable Urban Mobility Plans (SUMP). It presents a methodological approach for the design and employment of an integrated learning tool that intends to increase the adoption rates of measures' packages through LAs knowledge strengthening. The learning tool consists of a detailed facilitator guide to run a one-day classroom course along with the conceptual background and necessary training material. The methodological approach consists of a multi-level and multicriteria process that integrates the results/outcomes of the assessment of the cities capacity to implement SUMP through an evaluation framework. The classroom course has been structured in order to clarify the value of MaaS and other innovative measures for small-medium cities, analyze successful case studies under the spectrum of overcoming challenges efficiently, present tools and guidelines supporting collaboration between team members. The results of this work have been validated through the pilot application to six LAs. The overall evaluation of the pilots showed that content's accuracy and achievement of workshop's objectives was more than satisfactory (more than 50% of the participants gave the highest rate) and participants became more engaged with SUMP measures implementation.

**Keywords:** Capacity Building, Sustainable Mobility, Innovative Mobility Measures, MaaS, SUMP.

## 1 Introduction

Sustainable development requirements in combination with extreme technological evolution have changed the way mobility is considered, creating challenges to Local Authorities (LAs) both in planning and implementing mobility solutions, as they are the main actors for the development and implementation of Sustainable Urban Mobility Plans (SUMP) [1]. This paper focuses on capacity building for LAs to deliver Mobility-as-a-Service (MaaS) and other innovative transport schemes, as part of SUMP measures. In the case of Small-Medium (S-M) cities<sup>1</sup>, where resources and expertise are more restricted than in larger ones, a capacity building program can support LAs to become more independent and resilient to changes.

So far, capacity building programs in the sustainable mobility sector, that address/target organizational level, include webinars, e-learning courses, guidelines on designing and implementation procedures produced either in the framework of projects funded by European programs also available in [2] and [3] or by other organizations ([4], [5]). This paper introduces a Capacity Building Program (CBP) developed in the framework of SUITS Project funded by Horizon 2020 program, focusing on the training module "Building capacity of S-M cities' Local Authorities to implement MaaS and other innovative transport schemes".

SUITS CBP's overall ambition is the transformation of LAs into learning organizations, as a response to the intensively changing ecosystem of mobility. In learning organizations, people continuously expand their capacity to create the results they desire when new and expensive patterns of thinking are nurtured while learning how to learn together [6]. In this context and taking into account that capacity development at organizational level is also a process of optimizing the utilization of human and financial resources [7], SUITS CBP has adopted the "train the trainer" approach, an approach applied in different sectors to achieve long-term capacity development [8], while raising awareness [9]. In SUITS case, CBP incorporates instruments more concerted to small target groups (in-house workshops and guides on how to run a workshop - facilitator's guides) next to mass training approaches (i.e. webinars and guidelines). These practices aim to optimize LAs resources, and enhance leadership, management and technical skills of LAs staff. Moreover, this approach raises awareness on the value of collaboration between LAs' staff and knowledge transfer when dealing with integrated mobility planning.

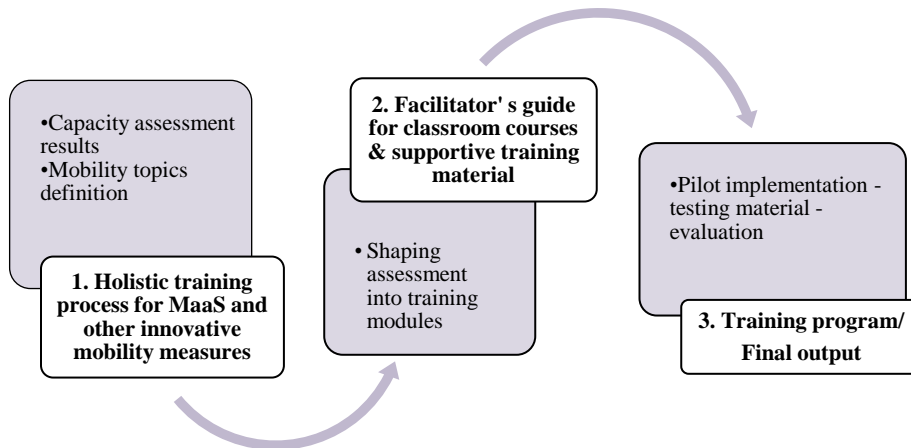
By presenting SUITS CBP formulation, this paper aims to contribute to CBPs addressed to LAs, focusing on mobility solutions implementation, by updating the knowledge on current capacity issues, proposing the in-house workshop approach along with facilitator's guide and highlighting the need of capacity development regarding innovative transport schemes such as MaaS.

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<sup>1</sup> 50,000 - 250,000 residents in cities' urban centers.

## 2 Methods

A training program for capacity building of S-M cities has been developed taking into account the following elements: (a) cities' specific needs in the sector of transport and mobility (sample from the participant cities at SUITS project) and (b) the new mobility concepts, methodologies and tools deriving from the combined expertise of SUITS consortium and CIVITAS network, as well as from the results of related EU projects. The process is described in three (3) steps (Fig.1).



**Fig. 1.** Proposed methodology.

The first step includes topic definition and capacity assessment. A multicriteria analysis was carried out to identify the more interesting mobility topics. MaaS, among other innovative mobility concepts, is revealed as one of the topics to consider in the CBP. At this step, a baseline capacity assessment also defined the cities' specific capacity needs (financial, organizational, technical etc.) related to SUMP measures implementation. The capacity assessment results, both aggregated (all cities) and disaggregated (S-M cities), reveal the need of a holistic approach. The second step refers to the transformation process of the findings from step one into training module. The output of this process is the facilitator's guide along with the supportive material. "Building capacity of S-M cities' Local Authorities to implement MaaS and other innovative transport schemes" training module is further analyzed. The third step validates the output based on pilot training program implementation on participant cities at SUITS project. Pilots contributed to outputs amelioration and prepared the ground for post capacity assessment.

### 2.1 Innovative Transport Schemes and MaaS as Part of SUITS CBP

The selection of module topics began by considering LAs' critical feedback regarding the content of SUITS CPB as well as the accumulated experience and expertise of

SUITS academic and consulting partners. Selection of topics considered also the Urban transport priorities of S-M CIVITAS cities and SUMP v2.0 directions. An initial list of topics included forty-two (42) mobility measures and aspects, derived from relevant EU projects[10]. A more detailed selection was decided to be made in order to determine the exact content of each CBP module and to avoid overlaps with other training material already available from other relevant projects or sources. To meet this objective, a multicriteria-based approach of four (4) stages, equivalent to four (4) criteria, followed to rank the initially selected topics according to their importance. Weights assigned to criteria were based on the subjective weighting of direct rating method [11] (Table 1).

**Table 1.** Criteria and weights selected for multi-criteria analysis.

Criteria ( $c_i$ )	Criteria description	Weights ( $w_i$ )	Weights value
$c_1$	Stage 1 ranking	$w_1$	1
$c_2$	Stage 2 ranking	$w_2$	2
$c_3$	Stage 3 ranking	$w_3$	3
$c_4$	Stage 4 ranking	$w_4$	4

The first stage reviewed the CIVITAS database and the mobility measures which CIVITAS cities currently focus on [12]. Topics were compared against this review considering their relevance to CIVITAS network's mobility priorities. They were assigned a score from 0 (no relevance) to 1 (maximum relevance) and weighted with  $w_1$ . Scorings were provided by the SUITS partner leading the CBP development.

The second stage included a doodle pool and communication process with other research projects which at that time or previously were also dealing with CBPs for SUMP development in European cities to ensure the originality of the work. In this respect, representatives of the projects were asked to provide a score (0 for very high overlapping to 1 for no overlapping) to up to 20 topics, after revising the overall list of the 42 topics. The scores were weighted with  $w_2$ .

The third stage ( $w_3$ ) examined whether the initial topics adequately fulfilled the overall CBP ambition. Scores from 0 (no relevance) to 1 (maximum relevance) were provided from SUITS academic and mobility consulting partners to align the final decision with SUITS main objectives.

The fourth stage was considered as the most determining one ( $w_4$ ) considering the actual mobility needs, priorities, challenges and objectives of 7 cities (partners of SUITS project), three big cities, and four S-M ones. An ad-hoc workshop was made for this purpose so that SUITS cities were able to provide their importance scores (0 for very low and 1 for very high importance) against the initially selected topics. The total scores per topic have been calculated by summing up the four stages' results (1).

$$s = \sum_{i=1}^4 w_i * c_i \quad (1)$$

where  $s = total\ score$  per topic,  $0 \leq s \leq 10$ ,  $0 \leq c_i \leq 1$ , for  $c_i = 0, 0.2, 0.4, \dots, 1$

The top sixteen (16) topics are displayed in Table 2, as part of the overall ranking of the 42 topics. MaaS solution and innovative procedures, methods or tools (innovative mobility data gathering methods, innovative procurement and financing, bankable projects, crowdsourcing etc.) are, among other topics, highly rated, raising the need to be included in SUTS CBP training modules.

**Table 2.** Sixteen (16) top results of multicriteria analysis. Topics' nature has been added in order to be considered to modules formulation.

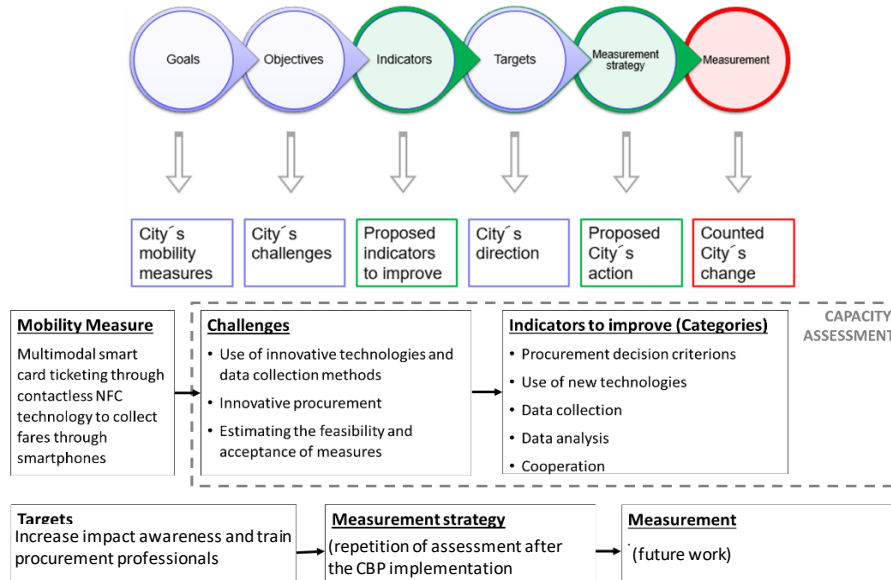
	<b>Topics under consideration</b>	<b>Score</b>	<b>Topics nature</b>
1	Electric mobility and clean fuels	10	Mobility solution
2	Low emission zones	10	Mobility solution
3	Mobility as a Service (MaaS)	10	Mobility solution
4	Innovative mobility data gathering methods	9	Tool
5	Innovative Procurement	9	Procedure
6	Parking management	9	Mobility solution
7	Demand Management Strategies	9	Mobility solution
8	Traffic calming measures	9	Mobility solution
9	Vehicular traffic management	9	Mobility solution
10	Safety and security	8.5	Mobility solution
11	Engagement of people and stakeholders	8.5	Procedure
12	Financing for environmentally friendly transport systems.	8	Procedure
13	Innovative and sustainable financing	8	Procedure
14	Development of bankable projects and partnerships	8	Method
15	Cycling	8	Measure type
16	Crowdsourcing	7.5	Tool

Specifically, MaaS was one of the topics with the highest rate. From cities' perspective, MaaS is considered as a topic with moderate importance (0.74 in average) in comparison to bike sharing (0.92 average score), carpooling and car sharing (0.8). MaaS has been more highly evaluated by large cities (0.8 average score). Nevertheless, experts' opinion and current availability of training tools and material addressed to local authorities, prioritized MaaS.

## **2.2 Capacity Assessment Results and the Correlation with the Development of Training Material**

After prioritizing and grouping candidate topics for CBP, the application of a capacity assessment framework provided insights for the content, the structure and the form of the modules. The evaluation aimed to assess the effectiveness of LAs to plan and implement mobility measures and identify key indicators to be improved in order to increase LA capacity. Workshops and interviews with mobility planners of the LAs and transport operators of the SUTS cities provided insights. Each city's mobility measures were associated with challenges and pertinent indicators and according to the results of the evaluation, capacity targets were set which could be evaluated after the training to measure the impact of the CBP in the future (Fig.2). In particular, the set of indicators was composed in order to assess the capacity to face challenges and reveal possible

inefficiencies in all the elements that form the capacity [13]. The indicators assess the current operations of the cities in 4 main areas (organizational, political, legal and societal) and 4 subareas (communicational, financial, managerial and technical) related to the environment in which an authority exists and operates.



**Fig. 2.** Example of capacity assessment results for a city.

The results are described in detail in [14]. Fifteen (15) challenges that cities cope with when shaping sustainable urban mobility plans were derived (Tables 3, 4, 5). At an aggregated level, the capacity assessment of the cities demonstrated that the priority areas for interventions are project monitoring, innovative financing and training, regular self-assessment, cover staff's needs, coordination and cooperation between sectors, understanding of legal and regulatory framework and acquisition of power delegation. Each city's mobility measures were associated with challenges and pertinent indicators and, according to the results of the evaluation capacity, targets were set which could be evaluated after the training to measure the impact of the CBP.

### 2.3 Shaping Assessment into Training Module for MaaS and Innovative Transport Schemes

The afore-presented processes provided insights for the content and training format. Conclusions focused on elements that raise the need of capacity development on MaaS and innovative schemes implementation, and determine training objectives, are analyzed. Insights contributed to the formulation of the integrated SUITS CBP [15].

In this framework, it is concluded that measure-oriented modules, rather than procedures or method-oriented modules, allow capturing cities interest directly. A measure is usually the starting point from which LAs staff launch their effort to deal with

implementation barriers and search for capacity building solutions (Fig. 2). Resuming § 2.1 results, MaaS, is a new concept of mobility solutions, attracting the interest of both S-M and large cities while few integrated CBPs are available. It embeds also mobility topics such as "Development of bankable projects and partnerships", "Innovative mobility data gathering methods", and all available and future transport systems/schemes such as shared mobility. Moreover, LAs staff struggle to demonstrate measures value in order to enhance political commitment and sustainable thinking. Therefore, better understanding of measure requirements and its wider context of implementation could allow to overcome corresponding challenges (Table 3).

**Table 3.** Challenges associated to specific training objectives supporting module's structure.

<b>A. Module's structure</b>	
<b>Challenges</b>	<b>Objectives of module (identification number)</b>
Understanding political interests and affecting political decisions	Highlight how measures serve relevant European goals. (1)
	Highlight the value of measures for the society in local and national level. (2)
Sustainability Thinking	Explain sustainability positive impact from a more social and economic aspect. (3)
	Highlight negative impact of current mobility habits. (4)
Effective project management and monitoring	Explain monitoring procedures and tools. (5)
	Explain implementation steps to assist project management giving real - world examples. (6)

Classroom course/workshop is considered the appropriate form to help cities facing three (3) capacity challenges (Table 4). Through exercises, teamwork, and discussion, LAs could recognize weaknesses and strengths, make collective commitments and get to know requirements and available resources to perform sustainable urban mobility measures more efficiently. In this respect, facilitator's guide approach replies potentially to knowledge management and systematic staff development.

**Table 4.** Challenges associated to specific training objectives supporting module's form.

<b>B. Module's form</b>	
<b>Challenges</b>	<b>Objectives of CBP</b>
Institutional cooperation	Introduce classroom courses instead of only e-learning courses and webinars. (7)
Knowledge management / knowledge transfer	Introduce facilitator's guide to enable LAs' staff to manage and transfer knowledge running course in-house. (8)
	Develop teamwork exercises rather than individual tests/workshop. Knowledge transfer between LAs to be available. (9)
Systematic staff deployment and development	Introduce facilitator's guide providing insights of the course, sources & references to keep staff updated after course completion. Enable knowledge transfer to new staff. (10)

Procedures such as procurement, financing and data management are important for all types of mobility measures (Table 5). Indeed, innovative data collection methods, innovative financing, procurement and partnerships have been highlighted also by



capacity baseline assessment results. Therefore, introducing these topics into one inclusive module entitled "Building capacity of S-M cities LAs to implement MaaS and other innovative transport schemes" has been considered more valuable for the cities. Hence, decision makers, political representatives and staff of the procurement department are considered as potential participants along with technical staff.

**Table 5.** Challenges associated to specific training objectives supporting module's range of topics.

<b>C. Module's inclusive topics</b>	
<b>Challenges</b>	<b>Objectives of CBP</b>
Use of innovative technologies and data collection methods	Inform about innovative technologies and data collection methods. (11) Develop modules addressed to innovative technologies. (12)
Understanding and applying innovative financing methods Innovative procurement	Present innovative financing and innovative procurement methods and familiarize with the processes required. (13)
Interaction and cooperation with business partners	Present partnerships concepts already applied. (14)

### 3 Results

"Building capacity of S-M cities LAs to implement MaaS and other innovative transport schemes" module is comprised of two main elements: "facilitator's guide" and "supportive material" such as workbook to be distributed to course participants, presentation for use in the classroom and handouts (exercises). Educational strategies and methods from training programs already available in various fields are adopted to formulate the facilitator's guide. Its components aim to provide all necessary information to run the workshop without requiring previous experience as a facilitator. The content of the training is structured into chapters including team-work activities based on the results of the applied methodology and in particular on final conclusions of § 2.3. In Table 6, the course flow is shown with a short description of the provided content, developed activities and correspondence with training objectives. For each chapter the facilitator obtains: (a) a condensed version of the content with reference to the respective workbook pages, where the content is further employed, (b) an estimation of its duration, (c) instructions on how to run each training section including relevant information (team-work activities, a reference to the supporting PowerPoint slides etc.). References and additional sources are provided to enhance knowledge on the topic. The classroom course/workshop is designed to be conducted within a single day and with representatives from a single authority. However, the course flow is formed in a way that can be split into more days and allows participation of more than one local authority to better serve local needs and expectations.

Following the module development, three (3) pilot workshops were carried out to identify course drawbacks in terms of content, teaching processes, distributed material and to evaluate its effectiveness regarding the wider ambition of SUITS CBP.

**Table 6.** Course flow of the module. Main content, activities and correspondence with training objectives.

No	Chapters title	Description (training objectives)	Activities
1	Introduction	Course/workshop objectives Why sustainable mobility?	Ice-braker activity
2	Description of measures	MaaS, shared mobility	
3	Value for the cities	Measures benefits, stakeholders, participatory methods, relevant EU strategies, Social Impact Assessment (1,2,3,4)	Exercise A: Analyzing benefits and views of stakeholders on MaaS and shared mobility
4	Successful case studies or Best practices of SUITS cities	Free floating bike sharing in Turin (SUITS city) MaaS "Whim app" in Helsinki (2,3,5,6,9)	Discussion on any similarities or differences with the city
5	Innovative financing, procurement and partnerships	Recommended for MaaS and shared mobility Reference to relative guidelines (13,14)	EXERCISE B: Matching funding mechanisms and partnership schemes with implementation components
6	Business model canvases for MaaS and shared mobility	Presentation of methodology and exercise on MaaS business model canvas (2,6, 11,12, 13 ,14)	EXERCISE C: Filling out business model canvas for MaaS and shared mobility schemes
7	Process and implementation aspects	Required data, available data collection methods, evaluation procedure (5,6,11,12)	Discussion on implementation activities /steps tailored to the city
8	Available tools and guidelines	Reference to available tools to support implementation steps (10)	EXERCISE D: Performing CIVITAS ECCENTRIC tool for the city

One pilot focused only on MaaS and shared mobility and other two on combined modules (all innovative mobility solutions). The participants were from different departments of selected LAs (policy and strategy, project management, procurement, technical) and with different roles (head of department, transport graduates etc.).

The aggregated evaluation results showed that participants were either fully satisfied or almost fully satisfied with most of the issues under evaluation. More than 74% of the participants gave positive rate with regard to content accuracy, exercises structure, course structure, gaining knowledge/ideas/skills. More than 80% of the participants awarded the two highest rates regarding confidence in applying the learnings from the workshop, and it believes that workshop achieved its objectives. Successful case studies have been proved one of the most interesting part. The workbook was characterized useful and user-friendly. Finally, alternative funding mechanisms and exercise on business model canvases have also been highlighted as important by the participants.

## 4 Discussion

The overall purpose of this course is to increase understanding about the value of innovative measures such as MaaS and shared mobility solutions. The course is designed to offer concrete practical tools and guidance to better implement these measures and to build specific skills regarding how success of these measures can be ensured by convincing stakeholders and by overcoming financial, administrative and technical barriers. The course aims to strengthen cooperation between LA's staff on different levels, from policy makers to junior engineers, through the conduction of interactive exercises and eventually to advance local priorities on innovation such as MaaS and other emerging mobility solutions. It can be applicable to other S-M cities. The parameters to be considered when willing to enhance implementation of innovative mobility services and raise their positive impact, exceed beyond technical issues and pertain to other capacity gaps (cooperation issues, financial issues, etc.) and challenges such as behavioral change. It requires LAs not only to overcome the implementation barriers but become highly resilient and responsive to new challenges and changes. Future work includes the capacity assessment of LAs after application of the capacity program and the evaluation of their progress as learning organizations.

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