

JPI URBAN EUROPE URBAN TRANSITIONS PATHWAYS SYMPOSIUM: SHAPING COMMON GROUND IN URBAN SUSTAINABILITY?

A symposium to support urban transitions pathways

Title: **MAMCA: a multi stakeholder approach for assessing sustainable urban solutions**

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1. Introduction

Construction is required to create more attractive, sustainable and economically viable cities. This urban transition includes the expansion and transformation of infrastructure, development of new residential areas and renovation of buildings. However, construction-related activities have a negative impact on people who live, work and/or travel in the vicinity of construction sites. Tackling these issues is challenging considering the high-density and sensitive environment of urban construction sites and the amount of stakeholders involved, with often contradictory interests and associated criteria. The ENSCC funded CIVIC-project (Construction In Vicinities: Innovative Co-creation) focuses on solutions that facilitate and support transport to, from and around urban construction sites that minimize disruptions in the surrounding community and optimizes energy efficiency by evaluation of alternative measures in a multi-actor participatory setting by using the MAMCA methodology. Goal is to integrate this

methodology (together with dynamic logistics optimization methods aiming at operational efficiency improvements) into a smart governance concept.

The Multi-Actor Multi-Criteria Analysis (MAMCA) developed by Macharis (2000, 2005) is a decision-making model to enable the simultaneous evaluation of alternative policy measures, scenarios or technologies, while explicitly including different stakeholders' opinions at an early stage of the decision-making process. MAMCA is therefore very well suited to complex decision-making processes where many stakeholders from several areas and backgrounds are involved. It is therefore clearly applicable in domains beyond construction logistics (as will be illustrated below). In the CIVIC project, the MAMCA methodology will be enhanced by not only allowing citizens to voice what they find important but also to investigate how they can propose solutions for the problem situation in their neighborhood. The increase in citizen participation will be measured in an assessment framework that looks at citizens' acceptance of proposed alternatives. In this way, citizens become more actively involved in the urban transition process.

This paper will present the methodology of the MAMCA and assessment framework and discuss how this can help to shape common ground in urban sustainability.

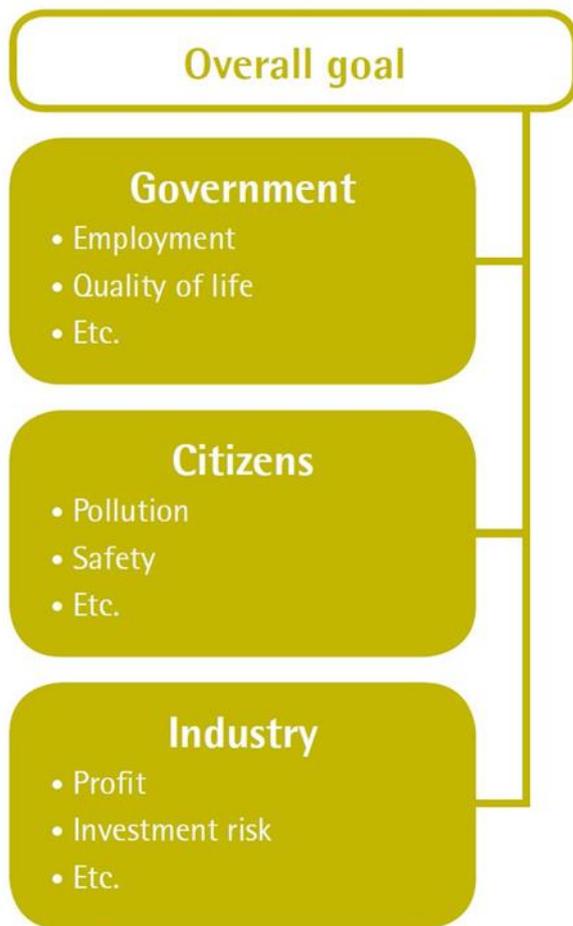
2. MAMCA: background and methodology

As anyone who has ever attempted to organise a group holiday or family trip can testify, taking into account the concerns of different people when selecting a destination and lodging out of a range of options can be quite cumbersome as it is not easy to keep everybody satisfied. It is therefore no surprise that decision making in (transport) projects, be it the choice of new infrastructure, the implementation of road pricing or selecting between different transport technologies, frequently also leads to much discussion, controversy and disagreement. Typically, these are issues where several levels of public policy are involved in (local, province, regional, state and European level) and a number of stakeholders (e.g. freight forwarders,

investors, citizens, industry...) are affected which have a vested interest in the ultimate decision. When the different points of view of stakeholders are not taken into account, projects are often not implemented as they are ignored by policymakers or lead to unacceptable delays as decisions are attacked by the stakeholders who feel that the analysis failed to take their interests into account.

Currently, there is no widely systematic approach to incorporate these different points of view within the evaluation process of projects. Often, cost benefit analysis (CBA) is being used in this field and in some cases cost-effectiveness analysis (CEA), economic impact analysis (EIA) and the social cost benefit analysis (SCBA). These instruments surely have their utility, but they fail to incorporate the points of view of the stakeholders and restrict the analysis to specific criteria or monetary values. However, several objectives are difficult to quantify and certainly in terms of money (e.g., quality of public transport, quality of urban livability, value of human life, etc.) (Damart & Roy, 2009; Savage et al, 1991; Tsamboulas, 1999). As the focus in decision making has gradually started to shift towards the three dimensions of sustainability (people, planet, profit), the challenge of monetarisation has become more and more complex. The difficulties that arise when measuring all relevant impacts of a project in monetary terms, in particular with respect to intangible aspects and externalities, have led to the complementation of monetary evaluation (unique criterion) with methods using more than one criterion, i.e. multi-criteria methods (Tsamboulas, 1999). In addition, multi criteria decision analysis (MCDA) also allows the analyst to involve the objectives of different interest groups or stakeholders (Banville et al, 1998; Janic, 2003, Macharis, 2005).

Figure 1: Multi-stakeholder perspective

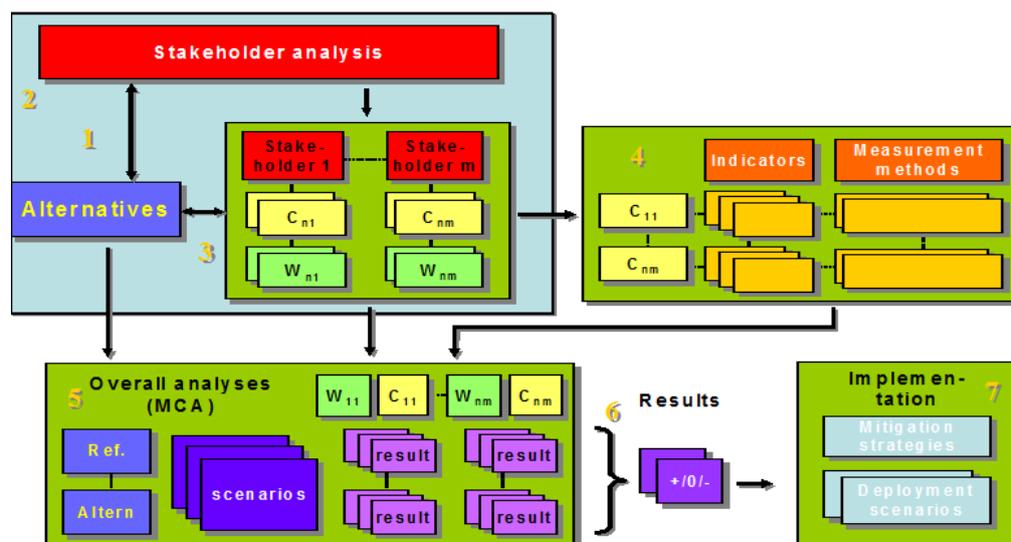


In the MAMCA methodology, which can be seen as an extension of the traditional MCDA, the stakeholders are explicitly taken into account. Moreover, it allows using non-numeric or non-monetary values in the evaluation. The MAMCA-methodology was developed by Macharis (Macharis, 2000, 2005 & 2007) and has been used for many applications, mainly in transport related decision making problems (Macharis, De Witte & Ampe, 2009; Bernardini, Turcksin & Macharis, 2011). The MAMCA-method makes the objectives of the various relevant stakeholders explicit thereby leading to a better understanding of the objectives of these stakeholders by all parties concerned. Including stakeholders into the analysis improves the likelihood of acceptance of the proposed solution at the end of the evaluation process.

The MAMCA consists of **two main phases**. The first phase is mainly analytical and tries to gather all the necessary information to perform the analysis. The second phase is the synthetic

or exploitation phase and consists of the actual analysis. These two phases are then divided into respectively **four and three steps**. The first step is to give a clear *problem definition* and to determine the alternatives that need to be taken into account. In the second step all the *relevant stakeholders* are determined as well as their objectives. These objectives are then translated into *criteria* in the third step. Weights need to be assigned to the different criteria in order to know how important these objectives are for the stakeholders (i.e. priorities). The fourth step links one or more *measurable indicators* to each criterion. These indicators allow evaluating each alternative with regards to a given criterion. These indicators can be either quantitative or qualitative, depending on the criterion. The fifth step performs the aggregation of the information of the previous steps into an *evaluation matrix*. The *actual results* are given in step six and are generated by using a Multi-Criteria Analysis (MCA). For each stakeholder the advantages and disadvantages are shown. The Multi-Actor newness brings it all together. The seventh and last step is the definition of *mitigation and deployment strategies* based on the new insights.

Figure 2: MAMCA (Macharis, 2005)



This methodology looks at the different possibilities *evaluating the alternatives on the criteria of the stakeholders*. The analysis gives a clear idea of advantages of disadvantages of certain

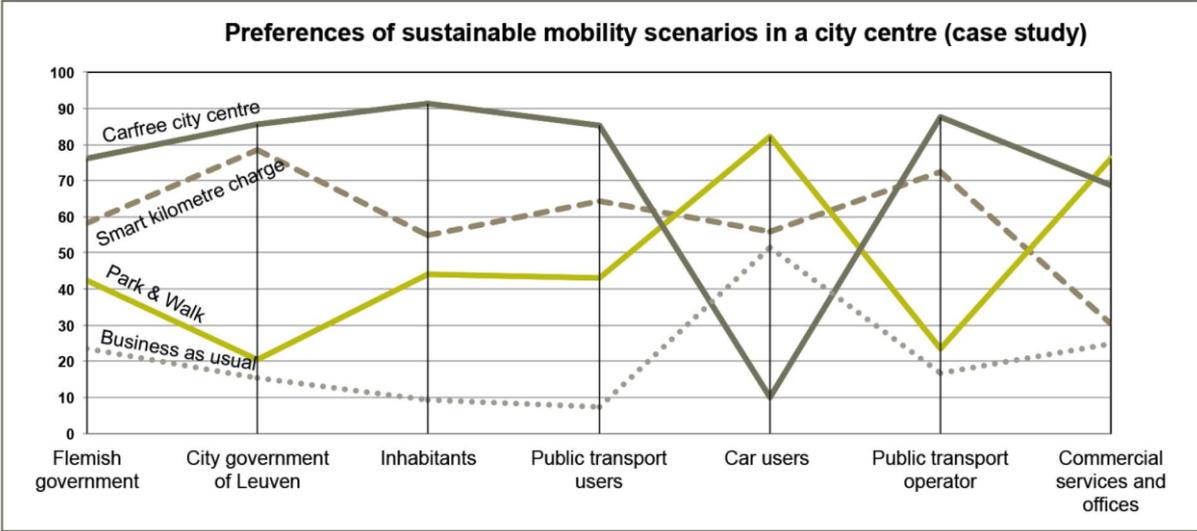
measures or concepts and this according to the different stakeholder groups. MAMCA is therefore very well suited to complex decision-making processes such as those involved in mobility policies and transport sectors where many stakeholders from several areas and backgrounds are involved. It allows decision makers to arrive at a comprehensive and coordinated vision with regards to complex scenarios

The MAMCA methodology has already proven its usefulness in several transport related decision problems. It was used i.e. to cope with an intermodal terminal location decision problem, for a study on the choice between waste transport alternatives in the Brussels region, for the location choices of a new high speed train terminal, for the evaluation of different driver assistance systems in the ADVISORS project, for the evaluation of DHL's hub strategy at Brussels airport, in the project 'Night Deli' for the evaluation of different night distribution scenarios, in the assessment of spatial data infrastructure strategies, for deriving implementation priorities for innovative road safety measures, for the evaluation of stimulating measures for the purchase of more environmental friendly vehicles and for the evaluation of road pricing schemes (see Macharis et al., 2012 for references).

With the online MAMCA software, accessible on www.mamca.be, the different steps of the methodology are easily followed and a good visualisation of the problem is generated. The example below visualizes how different stakeholder groups evaluate different sustainable mobility scenarios in the Belgian city of Leuven. As will often be the case, no scenario scores highest for all stakeholders. The "carfree city centre" might be preferred by most stakeholders, but scores (not surprisingly) very poorly for car users, who even would prefer to keep "business as usual". However, notwithstanding this exception, this particular MAMCA clearly demonstrates that alternatives are considered an improvement when compared to business as usual, so there is a clear potential for implementing an alternative. A "smart kilometer charge" might be a reasonable compromise, although it might require some adjustments towards the

commercial services and offices, in order for them to be fully acceptable. But even for this stakeholder group, the alternative scores higher than business as usual. On the stakeholder level, MAMCA allows to see how a particular alternative is scoring on the selected criteria of a stakeholder group. In this way, the implementation path can take into account on which criteria for which stakeholder group, additional action might be required.

Figure 3: Example of MAMCA evaluation of alternatives



As this example illustrates, MAMCA does not aim to find the ultimate overall preferred solution, but allows to define implementation paths for selected solutions that take into account the concerns of stakeholder groups. In this way, increased acceptance of imposed measures by all stakeholder groups can be achieved.

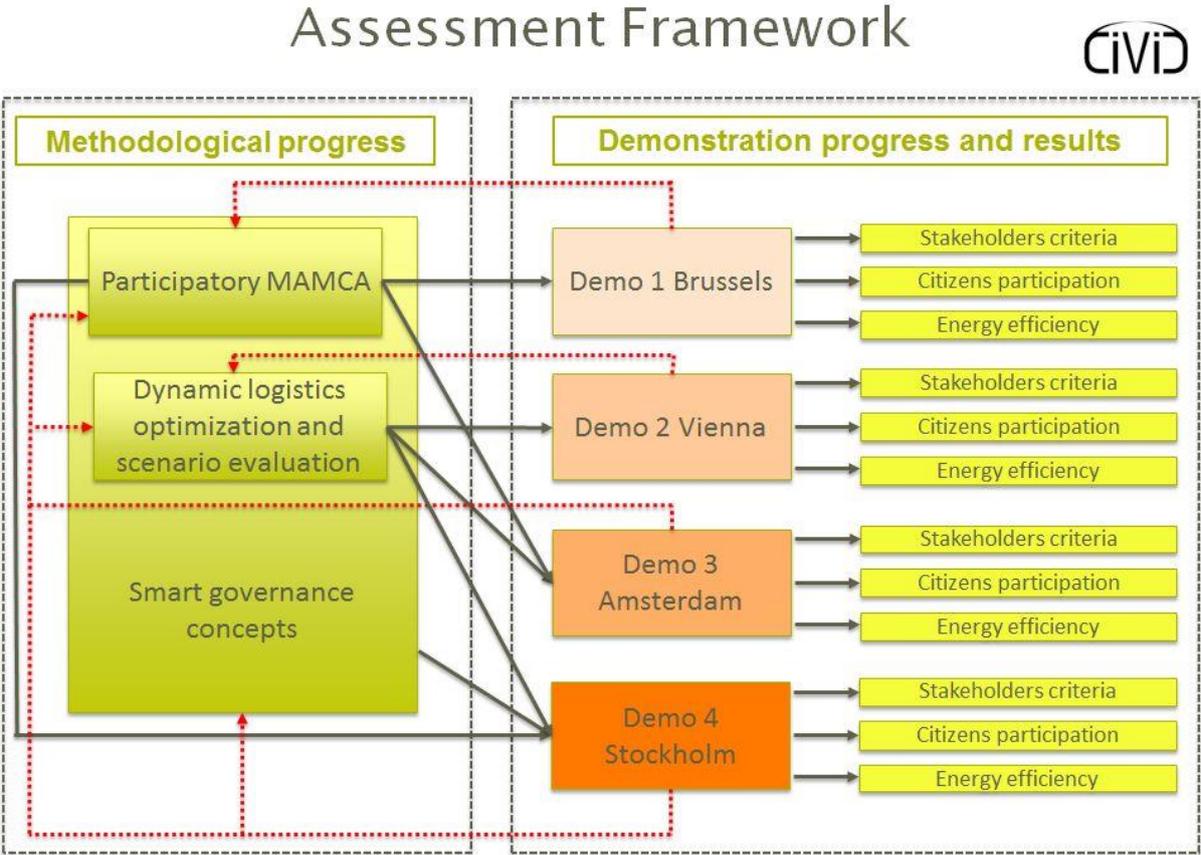
3. CIVIC Assessment framework

Within CIVIC, the focus is on solutions that facilitate and support transport to, from and around urban construction sites that minimize disruptions in the surrounding community and optimize energy efficiency. In order to do this, methodologies such as MAMCA and smart governance are (further) developed and demonstrations are setup to test the methodologies in four European cities. In order to monitor progress towards more urban sustainability, an assessment

methodology that will be used to systematically assess progress and valorize results of the demonstrations and provide valuable feedback to the different methodological frameworks, is developed. In this way, the methodologies can be adapted and improved for application in a subsequent urban demonstration, creating a continuous learning cycle.

The evaluation activities within CIVIC serve two major objectives: (i) facilitate the implementation of the methodological frameworks within CIVIC, and (ii) identify cost-effective strategies, measures and tools to improve the sustainability of construction related urban logistic activities. Both evaluation subframeworks are linked in order to allow feedback from one framework to be used as input in the other framework over each cycle. The structure of the Assessment framework is given below.

Figure 4: Assessment Framework



Goal is to integrate/embed the participatory MAMCA and dynamic logistics optimization methodologies within a smart governance concept. As these concepts will be tested in the demonstrations (black arrows), the first assessment subframework will primordially deal with identifying the key success factors of the methodological progress in the different frameworks as well as the potential for improvement towards subsequent demonstrations. The methodological assessment framework setup should be applied in a flexible manner, and should be tailored towards the specific needs for a particular methodology.

The second assessment subframework needs to monitor the progress of the four CIVIC demonstrations both with regards to timing as with regards to performance indicators. Each demonstration needs to be assessed on three dimensions: impact on stakeholders' criteria, impact on citizens' participation, and impact on energy efficiency. A list of recommended CIVIC indicators and assessment methodologies is provided to national demonstration coordinators, however the particular circumstances of each demonstration context and/or solution might require additional case-specific indicators to be added or might make some of these more general indicators less relevant in which case they can be left out of the framework. The indicator and assessment methods list is therefore recommended rather than compulsory.

The demonstration cases will provide lessons learned with regards to the specific methodological frameworks involved that will feed back into these methodologies, creating a learning cycle (red arrows).

3. Relation to the main questions of the symposium

Although the focus in CIVIC is on the specific theme of urban construction related transport and MAMCA is until now mainly used in a transport related context (see examples above), there is a clear potential to apply the framework on other urban domains (such as energy, networks, spatial planning, waste management,...) as well. The structured way in which the multi-stakeholder perspective is taken into account is one of the strengths of this approach. The

identification of stakeholders, knowledge about their criteria and the corresponding weights of these criteria allows for a much more refined assessment of sustainability impacts of proposed (policy) alternatives. Subsequently, the implementation of a chosen alternative might be facilitated by taking the negative impact of that alternative on affected stakeholders into account on a more differentiated level and trying to reduce the impacts on the highest scoring criteria.

This approach enables to take into account the emerging trend of citizens taking initiatives for participating in co-designing their urban environment. This co-creation of alternatives with different stakeholder groups is an element that can be integrated within the MAMCA methodology and which will be investigated in the CIVIC project.

There is also still quite some additional further development potential in this MAMCA framework. One example is the clustering of stakeholder groups. Traditionally, this is done through a classification based on categories or socio-demographic characteristics. In urban freight transport, for example, traditionally five stakeholder categories are identified: shippers, transporters, receivers, citizens and (local) government. But within a certain group, the weight given to specific criteria might differ substantially, or even the list of criteria considered important might not be the same (e.g. younger versus older citizens). So it might be worthwhile to investigate subgroups within a certain cluster. Once stakeholder (sub)groups are identified, a next challenge is to ensure representativeness of the stakeholder (sub)groups, especially within the citizens category (ethnic minorities, elderly people, children,...). The emergence of smartphones allows for more participative interaction with citizens through the use of apps, but to ensure that sufficient voices are heard, both online as offline channels still need to be addressed. So language and technology barriers are therefore important issues that still need to be tackled on the field as well (and not only within scientific communities).

Another barrier to overcome is the presentation of the alternatives to the stakeholders. As urban (transport) related issues can be quite complex, and people do not have the time to study the

context and proposed alternatives in detail, they should be presented in a clear and visually attractive manner. On the other hand, oversimplification with regards to the effects of alternatives on the criteria should be avoided, as stakeholders should be sufficiently made aware of potential interaction between effects, countereffects or uncertainties. This is particularly challenging for issues where there is not yet scientific consensus or effects are uncertain (e.g. size of rebound effect through “generated traffic” on congestion reduction, or in other words how much of freed up capacity on roads is subsequently taken up by latent traffic demand).

In order to present the results of the MAMCA to the stakeholders, efforts have been made to present the results in a visually clear and attractive manner. A very important element is the way sensitivity analysis can be performed and visualised, in order to determine the robustness of the results. This is also an important element to find agreement on the alternative to select (if the result is not robust and the scoring of alternatives on important stakeholder’s criteria is changing significantly, it might be more interesting to investigate how alternatives might be improved before selecting an appropriate alternative than when the selected alternative is robust).

With regards to the integration of MAMCA within a smart governance framework, an important issue to resolve is finding out at which level (operational, tactical, strategic) or stage (implementation phase, planning phase or even before) the methodology can be (best) applied. And for the smart governance concept, a clear definition and description of what smart governance actually entails is also one of the aims within the CIVIC project as well. There is currently a wide variety of definitions, which makes it difficult to have a common understanding.

Once a certain alternative is selected, it is important to monitor the actual impact on urban sustainability. Not only for correctly assessing the actual impact on sustainability, but also for

verifying how accurately the ex-ante assessment was performed. Here a feedback loop should ensure that ex-ante assessment methodologies are improved.

With regards to greenhouse gas reduction, a major issue still to be tackled is the lacking of a universally agreed methodology to calculate transport (or logistics) related emissions when direct fuel consumption figures are lacking. In our opinion, efforts to achieve this should be coordinated on a European or even global level in order to arrive at a methodology that is accepted and implemented worldwide (and industry wide).

The MAMCA has, in our opinion, the potential to be applied in other urban domains than transport (and looking into this is on the CIVIC project agenda), so whatever the choice of the common case, it will be interesting for us. But if a proposition from our side would be welcomed, we like to suggest urban mobility (both for passengers as well as freight). This will continue to be one of the major challenges in keeping urban environments liveable and reducing transport related externalities such as air pollution, climate change, accidents, noise, congestion, visual intrusion and space usage is crucial for improving urban sustainability. This impact of mobility on urban sustainability is currently not yet diminishing. In addition, urban mobility is linked to other important domains such as energy networks (e.g. emergence of electric vehicles), tourism, construction, spatial planning,....

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