CITIES 4 PEOPLE
PEOPLE ORIENTED TRANSPORT & MOBILITY

D5.1 A Methodology for Developing a Core-Outcome-Set of Indicators for Cities-4-People June, 2018

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Project overview:	Cities-4-People unfolds in five European areas: the Oxfordshire County, Hamburg District of Altona, Üsküdar in Istanbul, Budapest and Trikala. In these areas Mobility Communities are set up involving citizens, city authorities, mobility providers and innovation experts. By developing and providing a framework of support services and tools, Cities-4-People empowers these communities to actively contribute to shaping their local mobility innovation ecosystems in line with a People-Oriented Transport and Mobility (POTM) approach. POTM encompasses a blend of new digital and social technologies under an inclusive and multidisciplinary approach in order to bring out solutions that have a low ecological footprint, a sharing mentality and the potential to solve real urban and peri-urban mobility issues.

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Abbreviations

C4P	Cities-4-People
COS	Core-Outcome-Set
POTM	People-Orientated Transport Mobility

> **NOTE:**
> This deliverable 5.1 (due M12) should be understood as a working
> document. The content in this document is subject to change as it is part of
> a live and evolving project process as part of the C4P project structure. An
> updated and revised version of this document will be included as part of
> the final submission (due M35).

Executive summary

This report, **D5.1 '**A Methodology for Developing a Core-Outcome-Set (hereafter
COS) of Indicators for Cities-4-People' (hereafter (C4P), is the first layer of **Work
Package 5** (hereafter, **WP5**), which is concerned with the evaluation the of C4P
project. The deliverables in **WP5** can be understood in terms of three layers:
D5.1, is the first step in documenting this open process of how to co-develop a
common COS of definitions, measures/indicators as well as a methodology to
guide People-Orientated Transport & Mobility (hereafter POTM) impact
assessment. **D5.2** completes the description of the methodology and metrics for
POTM. Based on the outcome measures identified from the process in **D5.1 and
D5.2**, in **D5.3** a web based application/tool will be adapted/developed to collect
data to quantify selected outcome measures in the COS for assessing C4P mobility
interventions which constitute the mobility solutions in 5 city partner areas. **D5.3**
and **D5.4** will be used to co-evaluate and validate the performance and impact of
C4P mobility interventions, from pilot to scaled-up versions based on outcome
measures identified using the methodology described in this report. **D.5.5** and
D.5.6 will report on the evaluation outcomes of the mobility solution
(intervention) outcomes.

The objective of this first layer (**D5.1**) is to co-create a novel, inclusive and
transparent evaluation methodology along with a set of standardized indicators,
metrics and definitions based on the COS concept. **WP5** and indeed **D5.1**, evolves
parallel to the development and piloting/ scaling- up phase of the pilots across
the 5 Cities (Oxford, Hamburg, Budapest, Istanbul, Trikala), drawing on the
community structures and works streams across the C4P consortium. Task **5.1**
will deploy its activities before the pilots' deployment phase, as it works towards
the establishment of a common baseline of measurements for assessing the take-
up and impact of innovative mobility approaches, applied through our testbeds. In
particular, a minimum set of outcome measures and recommendations of "what"
should be measured and reported will be defined. In addition, we will conclude (i)
on new standardized metrics that will be utilized as "success criteria"

(considering quantitative measures and qualitative factors and (ii) commonly acceptable definitions.

The following sections in this report provide an account of how the activities undertaken by the CP4 partners have been incorporated into the co-development of the COS evaluation methodology to date, as well as an overview of the methodological framework used to develop the COS: **Section 1** introduces how evaluation is being defined in the C4P: including theoretical grounding, terms, what type of evaluation and what purpose an evaluation component serves in the C4P project. This section also provides a background and definition of COS in C4P. In particular, a common definition of what is meant by an outcome measure and an overview of the process of co-developing COS with in the overall C4P project structure. **Section 2** focuses on the framework and development of the COS, and details how the evolving phases (Phases 1-3) of community structures will be utilized/incorporated to ascertain the main challenges and intervention types across the 5 cities. As part of the development of the evaluation framework, **Section 3** provides information about impacts and related measures for typical mobility interventions, focusing on the types of interventions identified from the previous sections as well as a consideration of common know intervention types. **Section 3** also specifies how these intervention types are translated into measurable outcomes for the next part of the COS development process (Delphi Method). **Section 4** relates to the final stages of the COS development process where the Delphi Method will be used to capture the views of C4P project stakeholders across the 5 cities. A general methodological overview of the Delphi Method is provided as well as discussion on how it will be applied in the context of C4P. As noted at the beginning of this report, the content in this document is subject to change as it is part of a live and evolving project process as part of the C4P project structure, (updated and revised M35) as such, the closing part of this section and report provides details that will guide the next steps of the COS development process (including how to take knowledge gained from the Delphi Method into measureable outcomes in preparation for **D5.3** and **D.5.4**. **Section 4** will be discussed and decided upon by C4P project partners during the Consortium meeting in Hamburg May 29th-May 31st (2018).

1. Introduction

1.1 Evaluation in the context of C4P

What do we mean by evaluation?

The term 'evaluation' can be categorized in a number of ways, but in an urban mobility-related context evaluation can be broken down into two fields of assessment:

- Impact/effect evaluation
- Process evaluation

The main goal of ***impact/effect evaluation*** according to Dziekan et al., (2013:217) is to "draw a balance of the effects of the measure's implementation and the situation before the implementation".[1] Focusing on the evaluation from an impact perspective, project researchers/stakeholders are able to assess how the intervention being evaluated affects outcomes. By contrast, ***process evaluation*** is intended to allow the stakeholders of the project to make an informed judgment about the effectiveness of all project activities throughout its lifecycle. In the context of the C4P project, and '**WP5 Assessment of project approaches and pilots'** we are concerned with the former definition of evaluation: impact/effect evaluation.

In evaluation theory, it is widely accepted that an effective evaluation methodology should have clear objectives that can be measured.[2] [3] As such, C4P will aim to adopt George T. Doran's (1981) '**SMART'** approach to evaluation[4] as follows:

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[1] Dziekan, K., Riedel, V., & Stephanie, M. *Evaluation Matters: A Practitioners' Guide to Sound Evaluation for Urban* Mobility Measures. Waxmann Verlag GmbH, Germany, 2013, *p.7.*

[2] Commission, E., for Regional Policy, E. C. D.-G., & Cohesion. MEANS Collection: Principal evaluation techniques and tools. Office for Official Publications of the European Communities, 1999.

[3] Patton, M. Q. *Qualitative Research & Evaluation Methods*. SAGE Publications, 2002.

[4] Doran, G. T. 'There's a S.M.A.R.T. way to write management's goals and objectives.' *Management Review*. AMA FORUM, vol.70, no.11 (1981): 35–36

- **S**pecific: Clearly stating the objective of the outcome to be measured

- **M**easurable: Measurement: Defines the outcome through tangible assessment/evaluation criteria (quantity, quality, frequency etc.).

- **A**chievable: The outcome should be accomplished during the project time frame and through available project community participants/resources

- **R**elevant: The impact of the evaluation objective (why? and the relevance, including strategic policy context)

- **T**ime-Oriented: Defining when the evaluation data will be collected: at the beginning and the end or at intervals.

In Cities-4-People, where the evaluation methodology cuts across 5 distinct cultural, social and economic contexts, and is constrained within the C4P project timeframe[5] the **SMART** approach provides a useful structure for developing an evaluation methodology in **WP5**.

Why is evaluation important?

According to Dziekan et al.,(2013)[6] the importance of evaluation within the context of transport projects is to:

- Measure the performance
- Learn for future projects
- Exchange experiences

Therefore, the evaluation component of the project is vital in order to ascertain what is working and what is not working in terms of the interventions' expected outcomes. Impact evaluation allows for the Cities-4-People project community to move away from assumptions about what might work toward specific evidence of

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[5] Time constraints, such as specific timeline for iterative evaluations to take place and fixed timescale to from June 2017-May 2020)

[6] Dziekan, K. 'Evaluation of Measures Aimed at Sustainable Urban Mobility in European Cities–Case Study CIVITAS MIMOSA.' *Procedia - Social and Behavioral Sciences*, vol. 48 (2012): 3078–3092.

what does work. In terms of the wider impact of the C4P project, providing an evidence base for the interventions is essential for decision makers and for the scalability beyond pilot and demonstrator sites.

Who is the evaluation for?

By incorporating an impact evaluation approach, C4P aims to deliver multiple benefits for the project community -- such as decision makers and most importantly the citizens -- as it helps to:

- Better understand the impact of interventions on diverse citizen groups
- Improve future planning and optimize the allocation of resources
- Provide transparency and evidence for public spending

Fundamental to C4P, and what distinguishes it from previous transport and mobility interventions projects, is the concept of POTM and a **people-centric approach**. One of the main objectives of POTM is to establish a common baseline of outcomes, known as a Core Outcome Set (hereafter COS), through a participatory process of co-definition and co-creation. We will use this common baseline throughout our evaluations. Therefore, in addition to the traditional transport and mobility evaluation indicators, the development of an evaluation set of outcome measures (COS) will also be informed by what citizens' value. As noted previously about the wider impact and providing an evidence base for decision makers, a co-created evaluation set of outcome measures could be extremely beneficial to politicians regarding public support for a policy or project intervention.[7]

1.1 Core-Outcome-Set (COS) background & definition in C4P

Building upon the principles of the Health Technology Assessment (HTA)[8] and Implementation science[9] the POTM framework encompasses a COS evaluation methodology. COS is typically defined as an agreed minimum set of

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[7] Ibid.

[8] HTA is defined by the World Health Organization as "the systematic evaluation of properties, effects, and/or impacts of health technology", which, in turn, is described as "the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives".

[9] Although traditionally applied strictly to the health care sector, HTA and principles of implementation science can be fruitfully used in other domains which can have an impact on health, including transportation and mobility.

measures   and a recommendation of 'what' should be measured and reported.

C4P will adopt HTA's approach where COS provides a set of outcomes across a range of dimensions – social, health and environmental. Activities and interventions should benefit citizens in a way that is inclusive and reduces inequalities.

What is meant by outcome?

In C4P and part of developing a COS, the term '**outcome**' is intended to refer to the benefits or impact on daily life at an individual, family and community level as a result of the mobility intervention in their city. The **outcome measure** in this sense, which is also sometimes referred to as an 'indicator,' is the way in which the intervention is deemed to be successful or had the desired impact.

For urban mobility interventions across all 5 EU partner cities, COS will provide a set of outcome measures and recommendations of <u>what</u> should be measured and reported.

Using the fundamental process components of the COS (as discussed above), a novel evaluation methodology will be created. As noted previously, what distinguishes C4P from other similar mobility projects is a people-centric approach, where citizens are at the centre of the process. Therefore Cities-4-People will adopt an <u>open process</u> to co-develop a common COS of indicators and methods, which will guide the assessment of the impact of POTM interventions:

- New standardized set of indicators that will be utilized as 'success criteria' (considering quantitative measures and qualitative
- Commonly acceptable definitions

1.2 Process of developing COS

While COS will be rooted within existing or known intervention impact measures, the process of developing COS evaluation methodology will utilize the knowledge acquired from the existing C4P community structures (as outlined in **Figure 1** over three phases):

Figure 1. COS development using 3 Phases of C4P community structures

Expert and community citizen stakeholder interviews

o To analyse the wider context that affects the needs of the community

o The resources needed to develop the programme or intervention

Citizen lab formation – from Challenges to Concepts

o Intervention type and challenges are identified and captured:

1. **Short term outcomes (ST),** including changes in attitudes or behaviours
2. **Medium term and longer term (LT)**, social, health, and environmental impacts

M3-M10 (2017-2018)

Phase 1   **Phase 2**   **Phase 3**

M1-M8 (2017-2018)

M11-M25 (2018-2019)
& M26-M28 (2019)

Community warm-up and engagement workshops

o To capture the outputs from engagement activities/ discussions to determine needs and challenges form the local community of users

The contribution of citizens and local communities is considered fundamental to identify the outcomes that should be measured, the metrics and tools to measure them and the expected targets that our interventions should meet. Instead of being developed top-down process by public/professional organizations. C4P's COS will build upon local knowledge and local needs. The COS Evaluation Methodology and Metrics will be strengthened by the fact that it will remain open even after the end of the project, thus facilitating its continuous improvement and creating a new open standard for evaluation of mobility interventions.

The knowledge acquired from the existing C4P community structures as identified as part of Phase 1-3 (above) will be used to identify a taxonomy of intervention types across all 5 cities to develop an evaluation framework of outcome measures (intervention and impact types). The outcomes measures

framework, which will be utilized to develop and start to map-out the first iteration of COS, will also draw on mobility intervention literature with a particular focus on public health and well-being. This first 'draft' of COS will then form the content and first round of 'Delphi' method process (as detailed in section 4 of this report), which will provide a systematic participatory way to develop standardization of outcomes based on community participation: <u>open process.</u>

Figure 2. Diagram showing COS development process
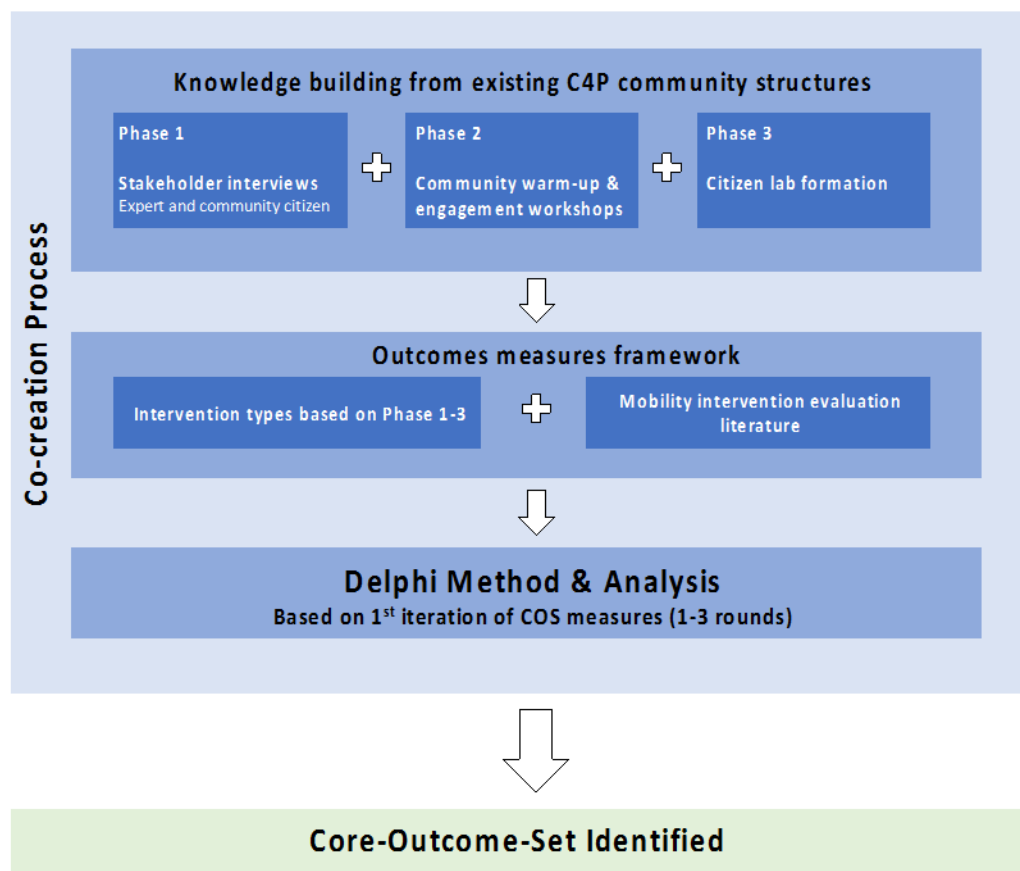
In most cases, impact evaluation takes place towards the end of a project to assess its effects or impacts on participants. In the context of C4P, evaluation will be conducted at particular intervals:

- **Pre-intervention** evaluation to capture a baseline
- **Post-intervention** evaluation at intervals (tbc) to assess the relative effect of the interventions at different scales (pilot intervention to scaled-up area)

The **pre-intervention** aims to establish a common baseline for the measurements identified. Borrowing from the procedural components of COS, this activity will precede any transport mobility intervention. **Post-intervention** evaluation, to be carried out at defined intervals (tbc) will use the pre-intervention COS as baseline to guide the impact assessment efforts. In particular, we will promote a framework in which actual users of our mobility interventions will have a central role by providing crowd-sourced assessment data.

2.   COS framework development: community of practitioners & citizens engagement workshops

2.1 Community of practitioners' views (Phase 1)

As part of deliverable **D1.2** from **Work Package 1**, the report 'Urban socio-economic and mobility contexts and specificities in the 5 target areas' was developed using semi-structured interviews of selected stakeholders from the local community of practitioners (public authorities, NGOs, transport providers etc.), as well as an online survey to leverage responses from citizens from the local communities. This mixed-method qualitative and quantitative approach was analysed in conjunction with secondary contextual social demographic literature/data to create an urban profile of each city.

Table 1. Community of practitioners' views of the main challenges identified across all 5 cities

Main challenge type	Oxford	Budapest	Trikala	Üsküdar	Hamburg
Road Congestion	✓	✓	✓	✓	✓
Low quality and provision of end-to-end cycle and pedestrian Infrastructure	✓	✓	✓	✓	✓
Low -connectivity of public transport services (service gaps)	✓				✓
Affordability (Including access to a viable alternative to private car)	✓	✓		✓	✓
Parking provision/capacity	✓	✓	✓	✓	✓

Low-frequency of public transport services (service gaps)	✓		✓	✓	
Air & noise pollution (due to traffic)		✓	✓		✓

Table 2. Community of practitioners' views of possible intervention types identified across all 5 cities

Intervention type	Oxford	Budapest	Trikala	Üsküdar	Hamburg
Promotion of active travel (cycling & walking)	✓	✓	✓	✓	✓
Improved/prioritization of public transport service infrastructure	✓				
Traffic reduction policies (i.e. congestion charge)	✓	✓	✓		✓
Access to affordable mobility options (socio-economic)	✓	✓		✓	✓
Inclusive mobility options (Inc. safety)	✓		✓		✓
Travel Information provision (timetable literacy & new technology applications)	✓		✓	✓	✓
Parking Policy*		✓		✓	✓
Emission control policies*	✓		✓		✓
Dynamic Public Transport Service (Demand Responsive Transport)**	✓	✓	✓		✓

*   Overlap with traffic reduction policies
** Overlap with Access to affordable mobility options

This overview of challenges and potential solutions across all 5 cities provided a basis to develop an evaluation framework of outcome measures beginning with main challenges from the view of the city experts and towards a classification of intervention types and associated impact measures. As the COS evaluation

methodology is intended to operate across all 5 cities and not one city specifically, a comparative classification of the main challenges and proposed solutions is useful in in working towards this objective.

As noted in the report from **D1.2** from **WP1**, the cities of Oxford, Budapest, Trikala, Istanbul and Hamburg have large historical, economic and social differences; however, they also share similar urban mobility as well as social and economic challenges (as shown in **table 1**). **Table 1** shows the main challenges which are shown in the order of shared concern across the 5 cities. At this first phase as seen in **Table 3**, from the perspective of the community of transport related professionals, classification of interventions has identified 5 main typologies**: promotion of active travel; traffic reduction policies; affordable travel options; inclusive mobility infrastructure; travel information provision & literacy. Table 3** summarises the main intervention types and includes examples of interventions for each type. It should be noted that although inclusive mobility infrastructure is included as a separate intervention type, all intervention types should be inclusive.

Table 3. 5 Main intervention types with subcategory of related interventions

Intervention type	Subcategory of related interventions
Promotion of active travel	Cycling and pedestrian infrastructure (condition and provision)/ incentives / car free zones
Traffic reduction policies	Congestion & carbon emission control / parking management
Affordable travel options	Public services / taxi / parking / Dynamic Travel options (DRT)
Inclusive/Accessible mobility infrastructure	Disability (such as ramps/priority seating) / safety-related (such as lighting/CCTV)
Travel information provision & Literacy.	Real-time service information/ multiple modes of delivery (including web/apps) / outreach workshops

2.2 Engagement workshops (Phase 2)

The semi-structured interviews and online surveys as discussed above as part of Phase 1 were used to facilitate the next steps of the project process, which focused on consultation with the local mobility ecosystem stakeholders to co-

select specific mobility challenges and intervention areas (neighbourhoods, districts, peri-urban areas, etc.). The outcomes of these workshops can be seen in **D1.3** report, 'Co-Definition of Mobility Challenges and Intervention Areas'. In relation to the process of developing COS, knowledge captured from this phase of co-creation workshops in each city contributed to a thorough discussion of the challenges identified in the previous report (**D1.2**).

As discussed in the report (**D1.3**) local city and academic partners were responsible for organizing the workshops, which aimed to co-define the mobility challenges and city areas and districts that Cities-4-People's interventions should target. The workshops were held in each of the five urban areas between December 2017 and January 2018 and included mobility stakeholders and citizens, ensuring an inclusive process characteristic of co-creation processes. The primary goal of the workshops was to discuss the challenges which was identified from the initial research, assess achievable goals for the project, and decide on a key area in each city, where the future mobility interventions will be carried out during the remainder of the project. In terms of the challenge and intervention types identified in the first Phase 1(as seen in section **2.2**), the engagement workshop activities/discussions were useful to advance the initial typologies, and more significantly, based on the needs and challenges from the community of users. As discussed in the report output of this Phase (**D1.3**) the challenges were closely aligned with those identified in the previous phase. One of the key outcomes from workshops was that an intervention area in each city was decided upon by the mobility stakeholders and citizens as a result of the workshops:

Table 4. Co-definition of intervention areas across 5 cities.

Partner	Intervention area
Oxford	Barton
Budapest	Upper Embankment of the Danube on the Buda side
Trikala	Central Square and its immediately surrounding area
Üsküdar	Üsküdar Square, including Selmanipak St, Hakimiyeti Milliye St and New Masque Square
Hamburg	Surrounding neighbourhoods of the Mitte Altona and Holsten development projects

As a consequence of the more specific community of users and indeed a specific intervention area, the taxonomy of interventions as identified in **Table 4** was extended. For instance, in the case of Budapest and Hamburg, interventions can potentially contribute to integrated travel between public transport and cycling/walking by making the space more attractive and accessible for users. Therefore, leveraging green and recreational space to address the identified mobility issue of continuity between services as well as creating places to transfer to active forms of travel (cycling or walking) was added. Rather than create a separate typology for continuity of services, the emphasis on green/recreational space in this sense can be classified under promotion of active travel (***Table 5).*** In the case of Trikala, potential localized interventions -- such as car free zones, car-sharing and the redesign -- redistribution of urban space -- can be classified under traffic reduction policies.

Table 5. Extended taxonomy of main intervention types with sub-category of related interventions (1)

Intervention type	Subcategory of related interventions
Promotion of active travel	Cycling and pedestrian infrastructure (condition and provision)/ incentives / car free zones /green/recreational space /bike parking management /bike pooling system
Traffic reduction policies	Congestion & carbon emission control / parking management/car-pooling system / car free zones/ car-sharing/ redesign – redistribution of urban space
Affordable travel options	Public services / taxi / parking / Dynamic Travel options (DRT)
Inclusive/Accessible mobility infrastructure	Accessibility related interventions (such as ramps/priority seating) / safety-related (such as lighting/CCTV)
Travel Information provision & Literacy.	Real-time service information/ multiple modes of delivery (including web/apps) / outreach workshops

2.3 Engagement workshops (Phase 3)

Implementation of Mobility Labs in the selected locations – which will advance the mobility challenges towards co-created concepts and intervention solutions, and provide further input into the co-creation of the final COS.

Note: Phase 3 takes place from **M11-M15** and **M26-28**, which is after the deadline of this deliverable report. Therefore, any information regarding the activities from **Phase 3** will be included as part of a revised and final version of this report in M35.

3.   Evaluation framework development

3.1 Typical mobility interventions and measures

In this section we provide information about impacts and related measures for typical mobility interventions focusing on the types of interventions identified in **Table 5** but also the inclusion of other common intervention types as shown in **Table 6**.

Table 6. Extended taxonomy of main intervention types with sub-category of related interventions (2)

Intervention type	Subcategory of related interventions (examples)
Promotion of active travel	Cycling and pedestrian infrastructure (condition and provision)/ incentives / car free zones, green/recreational space, bike parking, bike pooling systems, local action for public space, campaigns
Traffic reduction strategies	Congestion & carbon emission control/parking
Affordable and quality travel options	Public services / taxi / parking / Dynamic Travel options (DRT), increased frequency of public transport,
Inclusive mobility infrastructure	Accessibility related interventions e.g. ramps, priority seating, safety related interventions, placement of public transport stops, redistribution of space
Travel information provision and literacy	Real-time service information/ multiple modes of delivery (including web/apps) / outreach workshops, signage
Emission & noise control strategies	Low-emission zones, incentivising electric cars (e.g. more charging points)
Speed control strategies	Lower speed limits, better enforcement, traffic calming, public education

Two points related to impacts of the types of interventions in **Table 6** are noted here. There is overlap between the potential impacts of types of interventions in **Table 6**, for example motorised traffic reduction strategies might also reduce emissions and noise and encourage active modes of transport. In addition, not all impacts might be beneficial. For example, traffic reduction strategies in selected zones might have adverse consequences by reducing access to services for some groups and might shift traffic to other zones resulting in increased traffic and increased emissions and noise in other zones. The added value of the C4P approach is that we are developing a living COS which is a broad framework of outcomes intended to capture impacts of transport and mobility interventions that matter to communities. Such interventions may be intended to be beneficial, but there remains the possibility of adverse consequences. It is necessary to measure and monitor these in order to learn how to maximize beneficial impacts and mitigate risks. The COS intends to capture both positive and negative impacts.

Figure 3 in section **3.2** presents a preliminary framework of intervention types and impact outcome categories for people-oriented transport and mobility.

3.2 From intervention types to measurable outcomes

Intervention types identified in **Table 6** often involve multiple components to achieve them. In **Table 6** the multiple components are termed sub-categories of interventions. Taking the promotion of active transport as an example, recommendations for interventions to promote active transport were published by the National Institute for Clinical Excellence (NICE) in the UK (**Box 3.1**). The recommendations are based on a systematic review of evidence (NICE 2018)[10] and are relevant to countries across the broader European region. It is worth noting that the sub categories of interventions detailed in **Table 6** and **Table 7** correspond to many of the recommendations drawn from the NICE evidence review on promoting active transport.

Progress in each of sub category of interventions detailed in **Table 6** and can be measured and monitored by process outcomes and corresponding indicators. Process outcomes and indicators are a way of capturing what's' been done, while the effect of what has been done is captured by impact outcomes and indicators.

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[10] NICE 2018 National Institute for Clinical Excellence, 'UK Physical activity and the environment, Evidence' https://www.nice.org.uk/, accessed 27.04.2018.

Process indicators can be used to measure and monitor changes arising from each component intervention towards achieving an increase in active transport, or other type of intervention goal. To illustrate this point, **Table 7** proposes a template for process outcomes and indicators for pedestrian infrastructure, a subcategory of types of intervention to promote active transport. Similar templates could be developed for each sub category within each intervention type.

Table 7. Process outcomes and indicators for subcategories of intervention by intervention type.

Intervention type	Subcategory of interventions	Process outcome/s	Indicator/s
Promotion of active travel	Pedestrian infrastructure (condition and provision)	e.g. street lights,	e.g. number and frequency of street lights,
		e.g. traffic/pedestrian lights	e.g. number and frequency
	Cycling infrastructure (condition and provision)		
	Bike parking		
	Bike pooling systems		
	Incentives		
	Car-free zones		
	Green/recreational space		
	Local action/campaigns (including community participation)		

A fundamental part of the C4P approach is community participation, ensuring that the voices of communities affected by interventions are integral to the decisions about how the interventions are implemented. This cuts across all interventions types and subcategories of interventions.

Note that Intervention types also have a range of medium and longer-term impact outcomes that can be measured in a number of ways.

Figure 3 identifies categories of potential impact outcomes related to the intervention types. Transport and mobility affect people's lives in many ways through providing access to education, employment, goods, services, leisure activities, and opportunities for physical activity and social interaction. All of these aspects of life affect health and wellbeing, and therefore transport is considered an important social determinant of health and wellbeing (Schalkwyk and Mindell 2018[11]), (Cohen et al 2014[12]), (WHO Europe 2014[13]) Inequalities in access to transport and mobility options, and inequalities in exposure to hazards and experience of benefits associated with transport and mobility contribute to health inequalities (WHO Europe 2014[14]). The POTM perspective prioritises improving opportunities for access, physical activity, and social interaction while minimising risks associated with transport, such as air and noise pollution and traffic accidents. In the process of developing the POTM Core Outcome Set, the C4P projects seeks to capture outcomes that matter to people, their families and their communities.

Figure 3 depicts a preliminary framework of intervention types and impact outcome categories for people-oriented transport and mobility. Across the top of the framework are listed intervention types which include seven strategies or areas for interventions: promotion of active travel, traffic reduction strategies, speed control strategies, emission and noise control strategies, inclusive mobility infrastructure, affordable and good quality travel options and travel information and literacy. Each of these types has a distinct primary focus or aim, and each encompasses many potential sub categories of interventions that contribute to achieving that aim, as shown in **Table 6.**

Below the intervention types in **Figure 3** there are a set of impact outcome categories, which are outcomes that would be expected to change as a result of the intervention types. For example, promotion of active travel is expected to change walking and cycling behaviours; traffic reduction strategies are expected to change traffic volumes; speed control policies are expected to change traffic

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[11] M C I van Schalkwyk, J S Mindell. 'Current issues in the impacts of transport on health,' *British Medical Bulletin*, vol. 125, no. 1 (2018):67–77.
[12] Cohen, JM, Boniface, S & Watkins, S. 'Health implications of transport planning, development and operations,' *Journal of transport & health*, vol. 1, no. 1 (2014):63-72.
[13] WHO European Office, 'European review of social determinants and the health divide,' 2014, http://www.euro.who.int/en/publications/, accessed 27.04.2018
[14] Ibid

speed; emission and noise control strategies are expected to change air pollution and noise levels. The outcomes are often overlapping: traffic reduction, speed control and emission and noise controls will also encourage active transport. Depending on what sub categories of intervention are implemented in communities there may also be changes in provision of green or public spaces, changes in levels of physical activity, changes in parking provision, road safety, and community cohesion/social interaction.
On the right-hand side of the diagram, inclusive mobility infrastructure, affordable and acceptable travel options, and travel information, provision and literacy are expected to improve equality in access to good quality travel options. This might be expected to improve access and reduce inequalities in access to a range of public and private services.
Improved access to goods and services, increased opportunities for social interaction and community cohesion, increased physical activity, reduced noise and air pollution all impact health and wellbeing.

Note that this is a preliminary framework that will be more fully developed with C4P partners and community stakeholders. Not all connecting arrows are noted in **Figure 3** to avoid the diagram becoming over complicated. **Figure 3** is intended to prompt thinking about a broad scope of changes that the interventions might have.

Within the outcome categories identified in **Figure 3**, measures for assessing impact outcomes of transport and mobility interventions exist. Measures may be objective (direct) indicators or subjective. For example, objective measures of outcomes of interventions to promoting walking include measures of distances walked e.g. using pedometers, global positioning system (GPS) devices, or accelerometers (Sener IP et al., 2016)[15], subjective measures include survey instruments that ask about walking behaviour.

 In C4P we take into consideration that outcomes can be conceived as 'hard outcomes' and/or 'soft outcomes':

      Hard Outcomes - Objective and requires independent measures
      Soft Outcomes   - Subjective assessment of self-reporting

The use of hard and soft outcomes will be discussed in the May 2018 Consortium meeting in Hamburg by C4P project partners.

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[15] Sener IP, Lee RJ, Elgart Z, J. 'Potential Health Implications and Health Cost Reductions of Transit-Induced Physical Activity,' *Transp Health*. vol.3, no.2 (2016):133–140.

Figure 3: Framework of intervention types and impact outcome categories: People-oriented transport and mobility
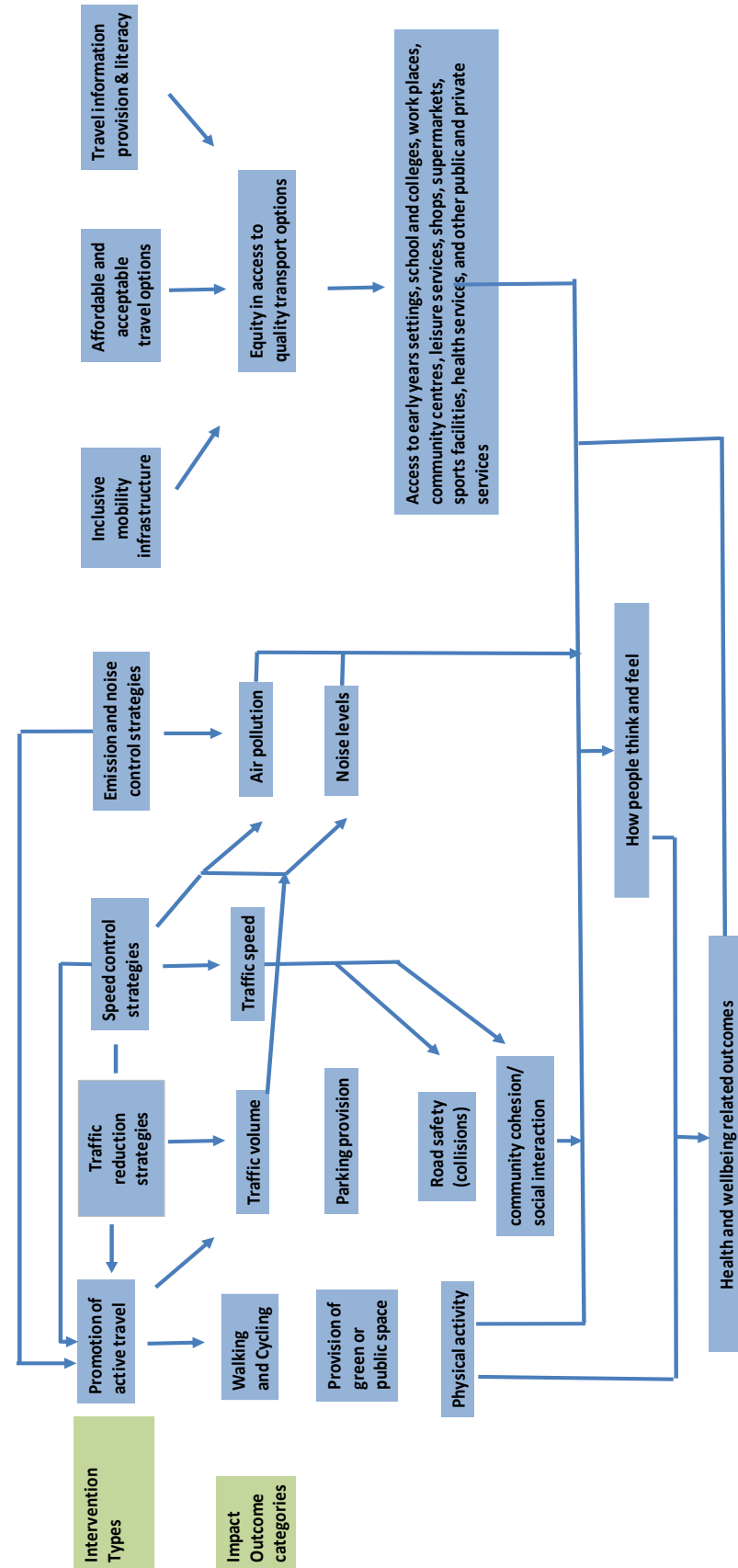
4.   Using the Delphi Method

The COS will be developed using a Delphi Method to capture views of C4P project stakeholders in the 5 cities. The following section describes the Delphi Method and discusses how it will be applied in the context of C4P project.

4.1 General methodological overview of the Delphi Method

The Delphi Method was originally devised to improve forecasting but has since been utilized extensively to implement multi-stakeholder approaches to the process of consensus building and participatory policy making. The Delphi technique relies on asking a panel of 'experts' their opinions through an iterative process of sequential questionnaires, which are answered anonymously by participants, and then aggregated and reviewed by the primary Delphi facilitator. Anonymity of the responses given by panel of experts is one of the key features of the Delphi Method, which means respondents are able to put forward their views without being prompted or guided by others. The removal of hierarchy or status from the process is seen as a way for respondents to suggest potential outcomes that they feel should be considered through the alleviation or overcoming of the pressures that can arise in a face-to-face meeting setting.

General Delphi process and adoption in C4P

Step 1: Choose a Delphi facilitator
The first step is to choose a facilitator, who is typically a researcher or person who is deemed *neutral* and familiar with research and data collection. In C4P the facilitator will be UCL as the lead for **WP5** and then one local-facilitator from each city who can act as the central point of contact between the Delphi participants and UCL.

Step 2: Identification of experts and sample size
The Delphi technique is based on the principle that a structured group of experts are more likely to reach an accurate decision than an unstructured group of experts. In general, an expert panel may consist of members of a project team, organization or industry community, as it is thought that 'expertise' on a given topic/context will be more likely to reach a sound decision given their knowledge of the area. The C4P project aims to be sustainable and continue beyond the lifecycle of the H2020, therefore we are defining 'expert' to mean representatives of groups interested in local transport issues. The expert panel is defined in this

manner as we believe they are more likely to have thought through the subject and have an idea of the improvements that would be meaningful to themselves as well as others in their neighbourhood.

Unlike survey studies where the goal is to generalize results to a larger population, the goal of Delphi is to reach consensus among a group of experts, thus the emphasis is on group dynamics rather than statistical power. Group dynamics in the Delphi method can be thought of in terms of homogeneity (all the same discipline) and heterogeneity (diverse mix of backgrounds) of the sample size. According to Ludwig (1997:2), "the majority of Delphi studies have used between 15 and 20 respondents."[16] Literature on Delphi research design by scholars such as, Needham and de Loë (1990) recommend a minimum sample size of 10 and a maximum of 50.[17] It is thought that a sample below this minimum recommendation of 10 is insufficient in terms of idea generation and maximizing grouped judgments on given issue. Conversely, if the sample size is too large (above 50), the iterative process of the Delphi will result in an extended time period between rounds and have a significant impact on the overall time and resources to conduct the study. In many cases this would be unfeasible due to project constraints such as time, resources and cost. Additionally, a more time-intensive process owing to increased sample size may also contribute to the attrition rate where respondents drop out due to committing to a lengthier process than anticipated.[18]

Step 3: Defining the problem to reach consensus on
Before the process and exchange between facilitator and expert panel begins in Round 1, it is imperative that the panel of experts know as precisely as possible the problem/issue they are being asked to comment on. One of the reasons for this is linked to the reason for choosing the Delphi Method in the first instance. The Delphi Method is essentially intended to harness and organize judgement through a process of controlled feedback and is particularly well suited to problems or questions that are multifaceted and complex as well as lack a well-defined knowledge base.[19] Therefore, questions will be carefully drafted to ensure that they are understood as clearly as possible. For example, in selecting desirable outcomes, one could envisage that the answers to a question looking for desirable outcomes, may be different to the answers given to a question looking for feasible options.

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[16] Ludwig, B. 'Predicting the future: Have you considered using the Delphi methodology?' *Journal of Extension*, vol. 35, no. 5 (1997): 1-4.
[17] Needham RD, de Loë RC. 'The policy Delphi: purpose, structure and application,' *The Canadian Geographer,* vol.34, no. 2 (1990):133-42.
[18] Ibid.
[19] Strear, M, L, Forbes & J, Henninger. 'Procedures, Pitfalls, and Product: Delphi Methodology in Counselling Research,' *Counseling Outcome Research and Evaluation*, vol.9, no.1 (2018): 55-66.

Step 4: Round One questions
Delphi begins in Round 1, where a set of general questions are crafted to gain a broad understanding of the experts' views on a given piece of content/topic. The research instrument is typically in the form of a questionnaire or survey. Once responses have been collected by the facilitator, they are collated and responses are summarized. Irrelevant or redundant materials are then removed so the facilitator can clearly identify common viewpoints. In C4P we have 5 different countries and hence 5 different languages. The primary facilitator will craft the questions in English before sending on to the local city facilitator for translation. The questions for Round 2 are aimed at resolving differences present after the first round. Each local facilitator will also need to translate responses before sending to the primary facilitator (UCL) to examine and process for Round 2.

Step 5: Round Two questions
As noted previously, Delphi is an iterative process, and therefore based on the responses to the questions in Round 1 the next round of questions is intended to dig deeper into the topic/content of interest and work towards consensus and clarification of specific issues. As in Round 1 the process of translation and the role of the primary facilitator to remove irrelevant material and identify common viewpoints is repeated.

Step 6: Round Three questions
There is no fixed number of rounds. However, due to factors (project constraints) such as time, cost and attrition of expert participant, Delphi tends to be take place over a series of 2-5 rounds. The final questionnaire is intended to reach an agreement and focuses on supporting decision making, hence shared consensus and what have the panel of experts agreed upon. In C4P, this would resemble a set of measurable outcomes that the panel of experts value and equate to a level of 'success' or effectiveness of a given mobility intervention in their city.

Figure 4. Diagram showing typical Delphi process
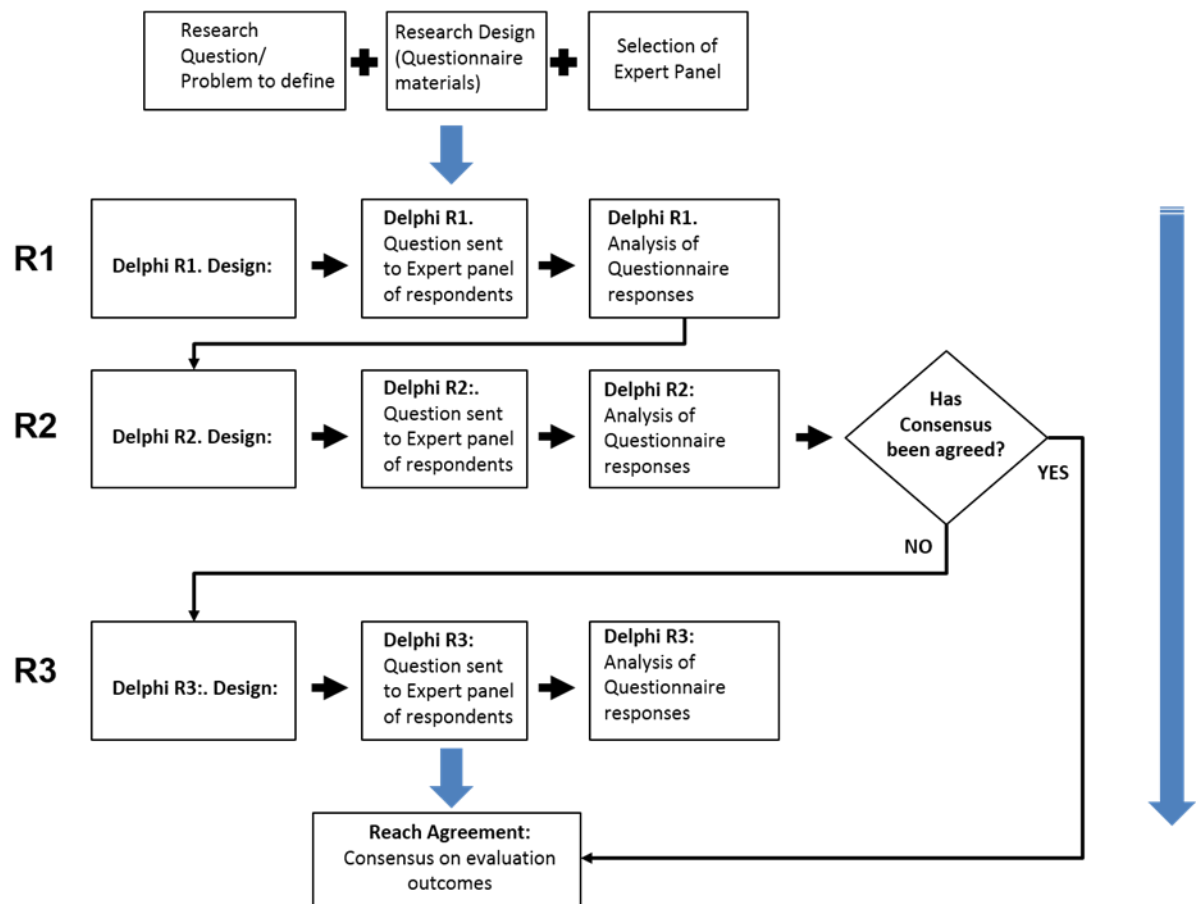
As can be seen in **Figure 5**, the main difference in the version of Delphi used in C4P concerns Round 1 of the Delphi process. Knowledge gained from C4P community structures and the activities (such as semi-structured interviews and workshops as part of WP1-2) will be used to advance the Delphi process as substitute for the broad opening question typically used in Round 1 of a traditional Delphi process. Also, additional processes will include the translation of materials between city facilitator and the primary facilitator (UCL), which will increase the time between rounds of as well as the total time taken to carry out the whole Delphi process.

Figure 5. Diagram showing preliminary sketch of Delphi process in C4P
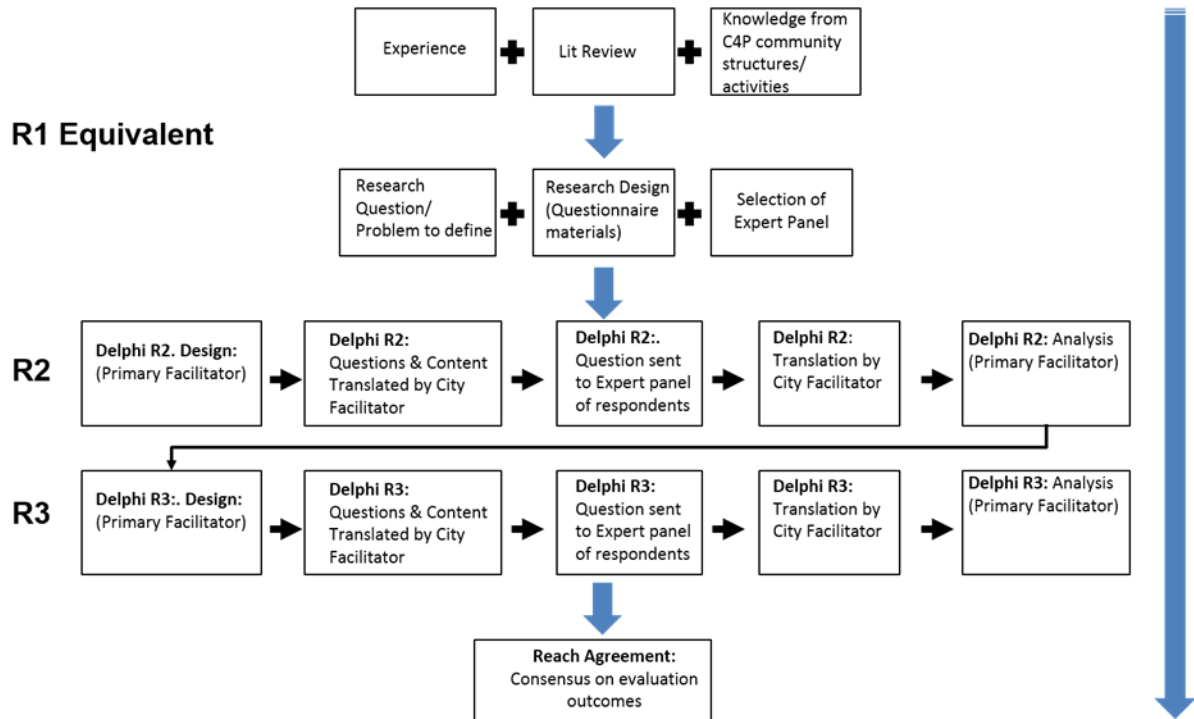
4.2 Delphi and the co-creation concept

As highlighted earlier, fundamental to developing the COS is an agreed minimum set of measures and a recommendation of <u>what</u> should be measured and reported across the different cities. In order to produce a COS, we will rely on the Delphi method which will allow the wide community participation and co-production of the outcomes to be measured as part of our evaluation methodology. In C4P the Delphi Method is therefore a systematic and participatory way of gaining opinions from a panel of experts from the broader project community. This method will enable us to co-define a set of new metrics (taking into consideration both quantitative measures and qualitative factors) and acceptable definitions that will minimize biases and address the problem of inappropriate or non-uniform outcome selection between cities.

As mentioned previously, the choice of experts to be included is critically important. For example, by using experts who are local representatives of pressure groups on transport, we may get stronger results for what is desirable than if we asked local data or technical experts. However, the latter may be able

to give a stronger picture of what is feasible. Working with our city partners, participants will be identified and selected from the culmination of C4P engagement actives, such as workshops and interviews from the previous work packages. The final selection criteria and will be one of areas of discussion in the Hamburg Consortium meeting, which is after the due date of this draft document (May 29th-May 31st 2018). Therefore, details of this aspect of the Delphi research design will be included in the final version of this document in (M35).

The C4P project intends to use the Delphi methodology (see section 4) to gather views from representatives of the C4P transport and mobility communities (including citizens and city transport professionals) to ascertain the kind of transport and mobility outcomes that they value and what differences the interventions in their particular cities will have on their quality of life.

In planning the Delphi questions, the C4P consortium will make decisions using its internal participatory processes about what the focus of the Delphi questions should be; for example, whether to apply the Delphi process to develop both process outcomes and indicators and medium and longer-term impact outcomes and indicators, or to develop only the impact outcome framework, or some combination of process and impact.

Furthermore, the C4P consortium will make the collective decision whether the Delphi process will ask Delphi participants from each city to focus solely on outcomes they expect or value from the specific intervention in their own city, or more broadly to consider outcomes they value for all seven types of intervention strategies identified in **Table 3**, or some combination of these options. For example, Delphi participants might be invited first to state what outcomes they value with regard to the specific intervention happening in their own city, and then to state what outcomes they value with regard to all of the seven types of intervention strategy. **Figure 3** might be used as a prompt in asking participants to state what outcomes they value for any of the intervention types.

Additionally, Delphi participants could also be invited to respond in the form of a statement describing outcomes of value, which could be outcomes that matter to themselves, to members of their family, or to the community. A preliminary template to initiate the process of co-creating the COS is presented in **Table 8**.

Table 8. Provisional template example for co-creation of the COS

Strategy type	Example of subcategory of interventions	How would this intervention have an impact on daily life for:		
		You	**Your Family**	**Your Community**
Promotion of active travel	• Pedestrian infrastructure (condition and provision) • Cycling infrastructure (condition and provision) • Bike parking • Bike pooling systems • Incentives • Car free zones • Green/recreational space • Local action/campaigns (including community participation)			

A strong argument for taking a broad approach, rather than focusing solely on the local intervention, is that the C4P project wishes to develop an outcome framework that has applicability across diverse contexts in Europe and beyond. Furthermore, since the outcome framework will remain an open framework, a broad scope would make it more amenable to further development beyond the scope of the current C4P project. Against this must be set the limitations of the Delphi methodology being used in the C4P project, notably that increasing complexity of questions in the Delphi process might inhibit engagement of participants.

4.3 Next Steps: From Delphi to COS outcome measures

The operational details of the Delphi process, described here in **Section 4,** will be discussed and decided upon by C4P project partners during the Consortium meeting in Hamburg May 29th-May 31st (2018), following a presentation and discussion led by UCL on **WP5**. As this will be after the due date of this document submission, an update on **the Delphi process to COS outcome measures** will be included in the final submission of this document (due M35).

At this Consortium meeting in Hamburg the following agenda items will be discussed which will guide the next steps in the Delphi and COS development process:

- Establish provisional timeline for Delphi Method
- Establish the local facilitator of each City to carry-out the Delphi
- Consideration of short-term and long-term outcome measures to capture in Delphi (R2)

The consortium will also discuss the process that will take place after the Delphi Method has been completed, and how **D5.1** will lead into **D5.3** and **D5.4** -- where a web-based application/tool will collect data to quantify the outcome measures identified. **Table 9** provides a provisional template for this process for discussion purposes at the meeting.

Table 9. Provisional template of how outcomes identified from the Delphi process will be integrated in COS and evaluation measures

Outcome	Specific outcome statement	How will the outcome be measured	Indicator

In conclusion, this report has documented the process whereby C4P will co-develop a core outcome set that will identify a set of indicators and metrics that will guide evaluation of interventions that provide mobility solutions based on the POTM concept.