European Platform
on Sustainable Urban
Mobility Plans

Monitoring and evaluation

Assessing the impact of measures and evaluating mobility planning processes

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Planning for sustainable urban mobility in Europe

Dear reader,

The European Commission is committed to help national, regional and local authorities develop sustainable, people-focused urban mobility and have European actors take the global lead in this field.

Planning sustainable and effective transport systems for Europe is fundamental to reducing our impact on climate, and contributing to the emission reduction goals adopted in the 2015 Paris Agreement. More strategic and integrated planning approaches are required to transform the existing energy- and carbon-intensive transport systems into sustainable mobility networks and help reaching climate-neutrality before the end of the century. Providing effective, inclusive and climate-friendly urban transport infrastructure is crucial for achieving functioning, competitive cities in Europe and ensuring their resilience in the long-term.

Over the past several years, the European Commission has established a sound policy basis for the development of Sustainable Urban Mobility Plans with the Transport White Paper, Action Plan on Urban Mobility, and most recently, the Urban Mobility Package. We are aware of the demanding nature of sustainable urban mobility planning and planning authorities' need for further, practical support in integrating their long-term thinking into strategic transport planning frameworks.

Therefore, it is my great pleasure to present four freshly developed publications, which provide comprehensive guidance on four of the core pillars of sustainable urban mobility planning: actively engaging people and stakeholders in the SUMP development and implementation process; encouraging cooperation among institutional actors and addressing transport's interconnection with other aspects of urban life; selecting the most effective packages of measures from a wide range of sustainable mobility policies available; and finally, strengthening plan delivery through comprehensive monitoring and evaluation of SUMP measures and processes.

Cities across Europe are subject to a variety of contextual differences and therefore facing unique local challenges – what unites them is the overall aim to take sound and sustainable policy decisions that create vibrant urban landscapes, promote economic growth, foster social and cultural exchange, and offer residents the highest possible quality of life. Urban mobility is one of the cornerstones to achieve these aims. It will require joint efforts over the next years to pave the way for better and more integrated mobility planning in Europe. At all levels we will need to act together to steadily improve our transport systems, mitigate adverse impacts of transport and advance the environmental, social, and economic vitality of urban areas across Europe.

It is great to see you, as reader of these manuals, being part of our team and I am convinced that, together, we can deliver!

Violeta Bulc
European Commissioner for Mobility and Transport
March 2016

1 Introduction

1.1 About the manual

There is a strong interest from planners and decision-makers in applying the Sustainable Urban Mobility Plan concept and initiating a paradigm shift towards sustainable urban mobility development.

A set of four manuals has been designed to support mobility practitioners in improving local transport planning processes and conducting quality SUMP preparation. They are targeted at transport planners who need to develop a SUMP and are looking for methods and approaches most appropriate in their given context.

Focussing on the planning process, the four manuals are dedicated to providing practical advice underpinned by city examples on: cooperating with institutional stakeholders; engaging the public in the SUMP development process; selecting measures and measure packages; and carrying out monitoring and evaluation tasks.

The manuals focus on the most relevant and challenging elements of each task. There is not only one 'correct' method, but a variety of approaches due to the different contextual conditions in which planning processes are taking place. In this sense this manual is not prescriptive but presents a wide range of solutions for the development of a SUMP under different local and national planning frameworks.

As there are various approaches to improving sustainable urban mobility planning, the challenge addressed in this manual should always be considered in the context of the other three challenges detailed in the other supporting manuals.

Chapter 2 of this manual on Monitoring and Evaluation (M&E) gives information on the understanding of this challenge in the context of sustainable urban mobility planning, its relevance in the SUMP development process and the barriers planning authorities face when preparing and carrying out monitoring and evaluation activities. The core part of the manual, Chapter 3, presents recommendations, methods and approaches as well as local case examples how to tackle identified local "hot topics". The final chapters direct the reader to further relevant material.

We are convinced that a high-quality SUMP development process increases the probability of high-quality transport planning solutions. This manual will provide guidance on monitoring and evaluating both for measures and the whole SUMP development process for application by the cities. It should contribute to more effective and efficient integrated planning processes, creating the basis for the transition to a more sustainable transport system in European cities.

1.2 Planning for sustainable urban mobility

A Sustainable Urban Mobility Plan (SUMP) is a strategic planning instrument for local authorities, fostering the balanced development and integration of all transport modes while encouraging a shift towards more sustainable modes. A Sustainable Urban Mobility Plan aims to solve urban transport problems and contribute to reaching local and higher-level objectives for environmental, social and economic development.

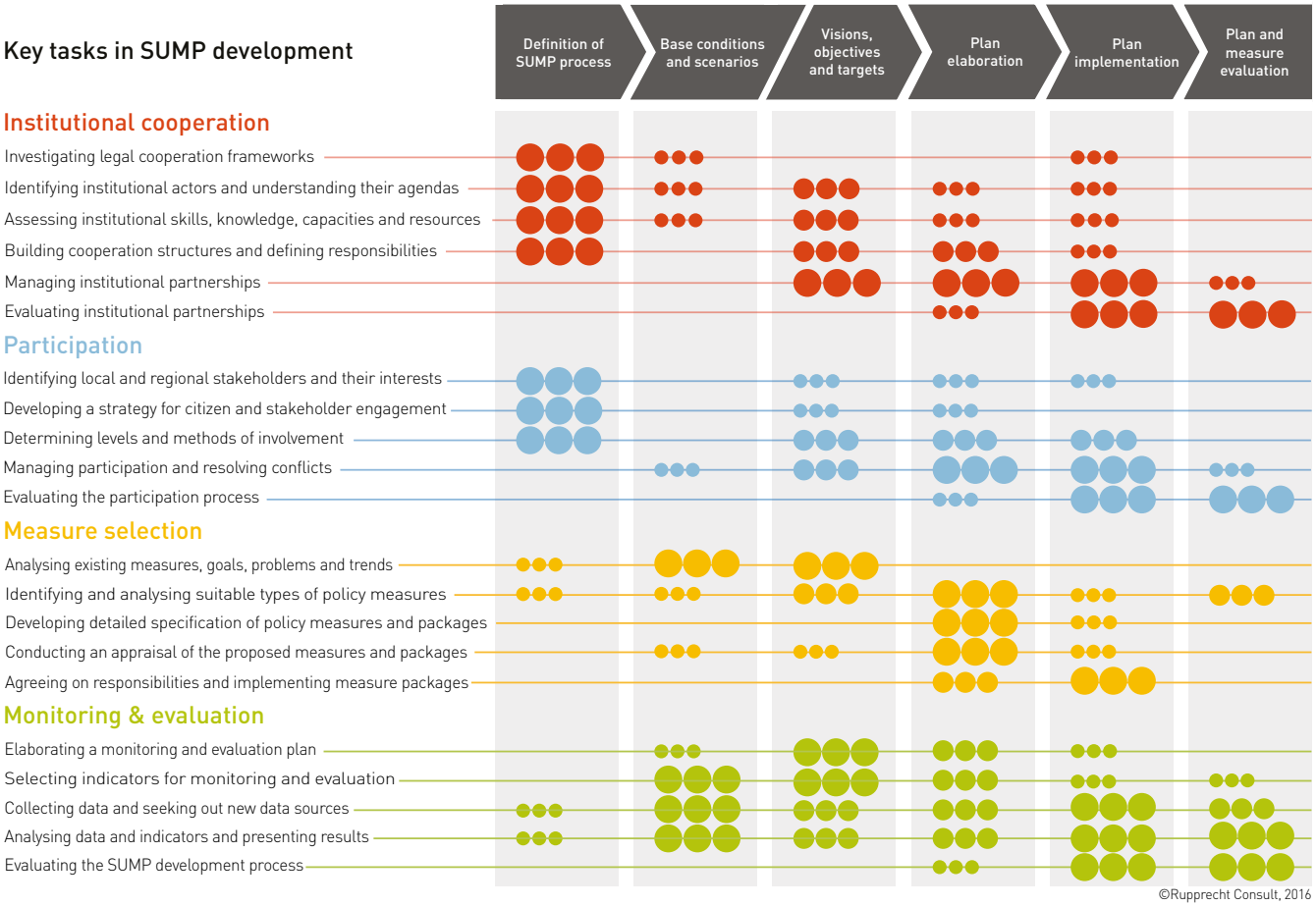
Developing a Sustainable Urban Mobility Plan is a complex, integrated planning process requiring intensive cooperation, knowledge exchange and consultation between planners, politicians, institutions, local as well as regional actors and citizens. At all levels of government, activities have been deployed to support the concept, but several challenges currently inhibit the Europe-wide uptake of sustainable urban mobility planning. Making budgets available and addressing infrastructure issues are especially difficult in times of economic austerity. As a result, cities often face

multidimensional challenges in delivering sustainable urban mobility planning. At the same time, there is no one-size-fits-all solution to increasing the number of SUMPs prepared, due to the great variety of local planning contextual conditions in Europe.

The development of a Sustainable Urban Mobility Plan is a multi-faceted planning process that involves various steps and activities, as for example presented in the SUMP cycle (see Rupprecht Consult 2014, p. 15).

The graph below illustrates that all planning activities of such a process are associated with cooperation, participation, measure selection as well as monitoring and evaluation. Some of these activities relate to specific phases of the plan development process, while others might be carried out once and then run continuously throughout the process, such as the identification of local and regional actors. Overall, practitioners need to be aware of the four challenges in order to conduct an effective and efficient SUMP process with the aim of achieving a high-quality SUMP.

Figure 1: Key tasks in the SUMP development process
Source: Rupprecht Consult, 2016



A SUMP process is a sequence of phases from process definition to plan and measure evaluation. The chart presents key SUMP tasks for planning authorities related to the four challenges.

Institutional cooperation and participation are continuous, horizontal activities that should commence early, during the SUMP process definition phase. Measure selection as well as monitoring and evaluation activities are particularly relevant in the subsequent analytical and technical planning phases. The chart reflects first-time SUMP development; revision and updating of a SUMP should build on the already established structures.

1.3 Monitoring and evaluation – the challenge in a nutshell

Monitoring and evaluation (M&E) activities deliver data about the progress of the planning process and the impact of policy measures and thus are carried out before, during and after implementation of intervention measures, as shown in Figure 1. They provide information to planners and decision makers that allow a timely identification of problems, potential successes or need for readjustment of a SUMP and its measures. However, current monitoring and evaluation practice differs widely across cities and countries in Europe, and many cities report a lack of experience, funding and institutional co-operation that are necessary to successfully carry out M&E activities. The aim of this manual is to provide guidance based on research and best practice applications across Europe on how to overcome such barriers and to plan and carry out M&E.

M&E activities start with setting up a **Monitoring and Evaluation Plan** that describes the current and baseline situation, planning objectives, intended activities, responsibilities and processes. It can be part of the SUMP itself or a free-standing document. Because there is a lack of guidance for the development of such plans CH4LLENGE has developed a M&E Plan Template for use by urban transport planners.

A key part of the M&E plan for a SUMP is the definition of **indicators** for which data needs to be collected during and after implementation. These need to be clearly linked to the SUMP's objectives. A systematic approach for indicator selection is proposed in Chapter 3.

Finally, the data that has been collected needs to be **analysed and evaluated** in order to assess whether policy interventions and the whole SUMP have been successful or require amendments. Various tools and methodologies are available, and their choice will depend on the type of plan or intervention as well as on formal requirements by national legislation or funders.

A key element in sustainable urban mobility planning is **the evaluation and monitoring of planning and implementation progress**. In CH4LLENGE, a SUMP Self-Assessment Tool has been designed to enable planning authorities to assess the compliance of their Plan with the European Commission's SUMP Guidelines (Rupprecht Consult, 2014).

1.4 Key recommendations for monitoring and evaluation

These key recommendations for M&E are discussed in detail in Chapter 3:

1. The planning authority needs to establish clear procedures for monitoring and evaluating the implementation progress and impacts of schemes (3.1.1)

2. The authority must establish the context of the plan, i.e. clear objectives for the SUMP, the measures which will be evaluated, the study area, timeframe, policy interventions and the baseline against which to compare the outcomes (3.1.2)

3. An M&E Plan needs to outline the main M&E processes, the key evaluation and monitoring questions as well as indicators, data and evaluation methods that help answer whether the SUMP outcomes are in line with its intended objectives. (3.1.3)

4. Process evaluation should be included to enable reflection upon the planning process during and after the SUMP development phase (3.1.4, 3.1.5)

5. A systematic approach to indicators selection (3.2.1, 3.2.2, 3.2.3) helps to identify core indicators reflecting the SUMPs objectives as well as supporting indicators for an in-depth analysis of developments of impacts and implementation progress. This indicators selection process should involve other institutions and stakeholders of the SUMP.

6. The planning authority has to decide how the collected data will be presented, analysed and evaluated (3.3.1, 3.3.2, 3.3.3).

2 State of the Art

2.1 Monitoring and evaluation in sustainable urban mobility planning

Monitoring and evaluation (M&E) activities are carried out before, during and after implementation of intervention measures. They are important tools in the development and implementation of SUMPs that serve the purpose of timely identification of problems, potential successes and the need for readjustment of a SUMP and its measures. Providing regular information to decision makers, potential funding bodies and local stakeholders can help to convince them that a SUMP has delivered, or will deliver benefits to the community, provides value for money and is worth continuing, or requires modifications to be successful.

For the purpose of this manual we use the definitions for Monitoring and Evaluation from the SUMP Glossary as displayed in Boxes 1 and 2.

Box 1: Monitoring definition

Monitoring is the systematic collection of data on specified indicators to provide authorities and stakeholders with an indication of the extent of the progress and the achievement of objectives in an ongoing plan. Monitoring provides information for potential adjustments and re-planning during the course of SUMP implementation in order to improve the final results. Monitoring is undertaken at shorter periodic intervals, in contrast to evaluation, which is more strategic in nature and provides information to learn from and improve future plans. As such, evaluation occurs less frequently and generally at the conclusion of one SUMP planning cycle, to inform preparation of the subsequent SUMP.

Relevance to SUMP – Regular monitoring, review and evaluation are a main characteristic of the SUMP approach to mobility planning.

Box 2: Evaluation definition

Evaluation is the systematic and objective assessment of an ongoing or completed plan, policy or measure, its preparation, implementation and results. The aim of evaluation is to determine the relevance and fulfilment of specified objectives and targets, i.e. evaluation reveals how well a plan, policy or measure has performed. Monitoring and evaluation activities are important in the planning and implementation process to provide credible and useful information, enabling the incorporation of lessons learned into the decision-making process.

Relevance to SUMP – The term evaluation is most commonly used to refer to "ex-post" ("after the event") evaluation processes carried out during and after the implementation of a SUMP or individual measure. Ex-post evaluation is used to assess whether the SUMP or measure has been effective and represents value for money, or whether it needs modification or enhancement. Regular monitoring and evaluation are a main characteristic of the SUMP approach to mobility planning. Key activities in this respect are setting priorities and measurable targets, incorporating monitoring and assessment into the plan, checking progress towards achievement of the objectives and reviewing achievements to understand areas of success and failure.

Monitoring and evaluation activities need to be carried out in a structured way and on a regular cycle, although their frequency might vary with evaluation taking place at longer time intervals. Figure 2 illustrates how these are embedded in the SUMP development process. Closely linked to evaluation and using similar methods is appraisal, i.e. the assessment of the impacts and worth of measures before implementation. Appraisal (or ex-ante evaluation) is part of the measure selection process and thus covered in the CH4LLENGE Manual on Measure Selection.

Key steps in monitoring, appraisal and evaluation are

1. Definition of objectives

2. Definition of performance indicators

3. Definition of targets and identifying problems

4. Measuring the impacts

- For appraisal (ex-ante evaluation)
  - Determining a do-minimum base against which to assess the proposal
  - Predicting the effects of the proposal

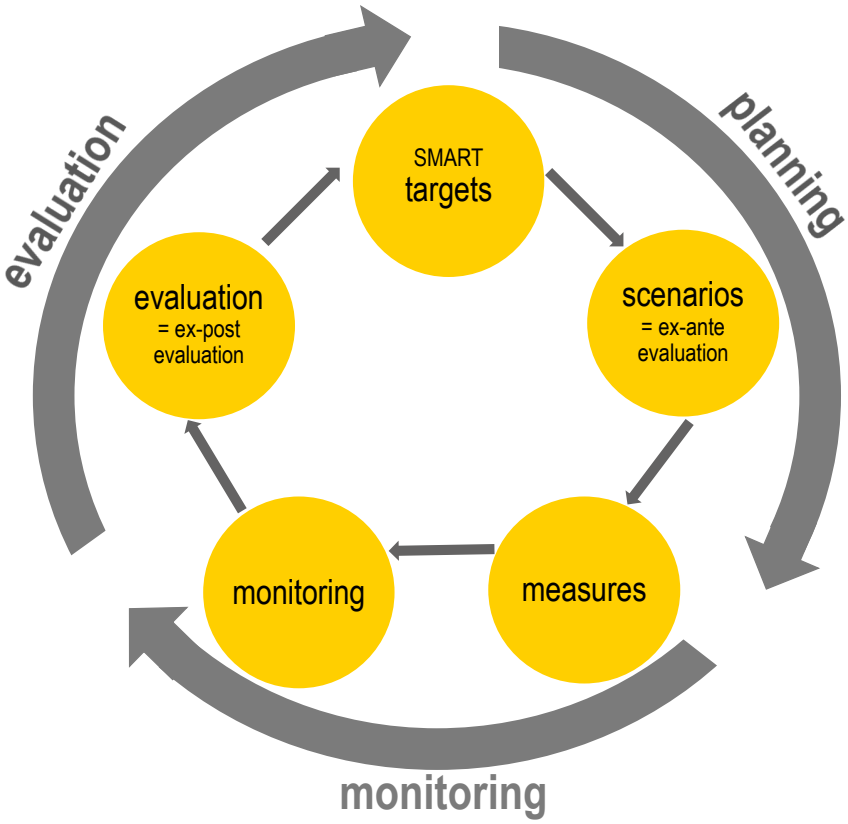
- For evaluation (ex-post evaluation)
  - Measuring the before conditions
  - Measuring the after conditions

5. Analysis, interpretation and, if appropriate, assessing value for money.

During these steps, co-operation with other institutions, e.g. to gain access to data that is held in other departments or to agree on city-wide objectives, is crucial for success and buy-in. A well-developed monitoring and evaluation scheme is also a valuable asset to inform the public about progress and support participatory planning processes.

The evaluation and monitoring of planning and implementation progress is a further key element of SUMP development. The SUMP Self-Assessment Tool provides a set of 100 clear and transparent Yes-No questions that follow the steps in the well-known SUMP preparation cycle (see also Chapter 3.1.5). By completing the questionnaire during plan preparation, or once a plan has been finalised, planning authorities can gain feedback on the strengths and weaknesses of their approach.

Figure 2: SUMP monitoring and evaluation process
Source: City of Dresden



2.2 Why is monitoring and evaluation important?

We assume that before starting M&E activities a city will have identified its objectives and their relative priority, will have an understanding of problems which it needs to overcome, now and in the future and will have an agreed set of SUMP measures. Investing in activities for monitoring and evaluation of impacts during and after the implementation of these measures against the specified objectives and of planning processes provides benefits for

- increasing the efficiency of planning processes and implementation of measures,
- contributing to a higher quality of a SUMP itself and the SUMP process,
- assessing and raising the quality of measures and measure bundles and packages,
- filling the gap between the objectives and measurable targets, the plan and its implementation,
- enhancing the empirical evidence base for future planning and project appraisal,
- providing quality management for all partners: planners, operators, politicians etc.,
- optimising the allocation of resources and saving resources, and
- improving communication with stakeholders and the public.

2.3 Monitoring and evaluation for SUMPs in Europe

Regular monitoring, review and evaluation are a main characteristic of the SUMP approach to mobility planning. Key activities in this respect are setting priorities and measurable targets, incorporating monitoring and assessment into the plan, checking progress towards achievement of the objectives and reviewing achievements to understand areas of success and failure. There are only few European countries where there are legal obligations for monitoring and evaluation of SUMPs (these include France and Belgium). In other countries, monitoring activities are often carried out to provide background information for formalised planning processes or to ensure compliance with environmental regulations. If evaluation requirements exist, they are often driven by financial considerations in the framework of project funding but there is generally little systematic integration of evaluation into the decision-making processes.

Consequently, M&E practice in European cities differs significantly: On the one hand, many cities have some experiences in monitoring of specific measures but less experience in monitoring the SUMP process. On the other hand, there is limited experience with evaluation, either for measures or for the SUMP process. The level of experience also varies strongly between cities with only limited tradition in preparation of SUMPs, where urban transport planning is often either strongly infrastructure based or part of land-use planning, and cities which have a long-established tradition of dedicated transport planning.

Many research projects in Europe have developed M&E methods and tools, as summarised in Box 3. From these sources, extensive guidance is available on M&E methods. However, in practice there is little consistency in what is monitored in different cities or over time and further guidance is required on the most effective choice and use of indicators and data (May, 2015) as well as on the choice of evaluation methods for different situations.

Practice and guidance on stakeholder involvement and participation in the M&E process and specifically for the design of M&E plans are less common. However, there are some examples available for the communication of M&E results to the public in order to show progress in policy development.

Process evaluation, the reflection upon the planning process self-critically during and after the SUMP development phase, is not yet common practice but should receive greater attention in future as it sets the basis for improved following SUMP processes.

In conclusion, although methods and tools for monitoring and evaluation are well researched, a wide range of experiences exists and modern tools and technologies

give access to a wider range of data, further guidance is required to make best use of resources and ensure the systematic integration of M&E activities into decision-making for sustainable urban mobility planning.

Box 3: Brief summary of projects on M&E for urban mobility planning

An overview of research projects on M&E in sustainable urban mobility planning can be found on the CH4LLENGE website. Several of these projects provide guidance on the process of SUMP development including monitoring and evaluation, e.g. PROSPECTS, ADVANCE or Eltisplus, while others target specific interventions such as MAX and AECOM or developed tools for M&E such as auditing in QUEST or methodologies for the selection of sustainable transport indicators in DISTILLATE or in CIVITAS MIMOSA. Differing definitions exist for indicators that should be monitored, ranging from indicators for particular impacts (e.g. environmental impacts in COST356) over those for the evaluation of particular types of measures (e. g. for Advanced Transport Systems in MAESTRO or CityMobil or for mobility management measures in MAXSumo) to complete indicator sets (e. g. in DISTILLATE).

2.4 Common challenges in monitoring and evaluation

Generally, M&E activities face the same types of barrier and challenge as sustainable transport planning generally. These are categorised in the literature into attitudinal, institutional, financial and technological (see e.g. Banister, 2005, May & Matthews, 2007, Forward et al., 2014). The following description of barriers towards implementing effective M&E activities is based on a review of literature (see May (2015) for a comprehensive overview) as well as experiences reported by the cities involved in CH4LLENGE.

Attitudinal barriers and challenges are encountered with respect to perceptions and expectations of decision-makers and stakeholders:

- Experiences from European projects show that M&E are seen as important by the administrations, but political commitment is sometimes low and consequently insufficient resources are available for M&E activities.
- With increasing pressure on available funding, financial arrangements might be tied to achieving performance targets and effective M&E will become regarded as more important.

Institutional barriers and challenges can occur in the co-operation between governmental institutions as well as between government and the private sector. They can be encountered during all steps of the M&E process:

- There are only limited experiences among cities on how monitoring and evaluation should be managed and who should do it (e.g. the city administration with focus on measures or an external body/consultant with focus on SUMP-process).
- Often, there is a lack of consistency between planning objectives of different governmental institutions, e.g. land-use development, sustainability and health, which is also leading to inconsistencies between transport and other indicators.
- Further challenges arise when data is collected and managed by different governmental as well as private organisations and collected for different purposes often involving commercial sensitivity (e.g. data from private bus operators).
- Involving stakeholder groups in the evaluation process and using monitoring data to inform the public are of growing importance but seen as difficult and potentially prone to pressure from interest groups.

Typical financial barriers towards an effective use of M&E are generally a lack of financial and staff resources, these include

- Costs of monitoring – especially in an environment of reduced resources for public authorities;
- Financial, technical and human resources for evaluation activities.

Technological challenges refer to gaps in knowledge as well as insufficient tools, techniques and technologies that can support the planning process:

- In many city administrations there is little tradition of carrying out M&E activities and consequently experience and technical know-how are lacking across the whole M&E process.
- Despite a good range of resources guiding M&E activities there are still gaps in technical knowledge with regard to defining suitable performance indicators, data retrieval and collection, data preparation and data understanding.
- Evaluating the success of measures and learning for future implementation is particularly challenging when several interventions contribute to the outcomes of integrated plans and the extent of individual contributions is difficult to identify.

We address ways of overcoming all of these barriers in Section 3, which focuses on the hot topics listed in Box 4.

Box 4: Hot topics in monitoring and evaluation for sustainable urban mobility planning

How can the process of monitoring and evaluation be designed?

- How is M&E embedded in the planning processes?
- What is the context for monitoring and evaluation?
- How is an M&E plan structured and what are its contents?
- What are crucial success factors for the implementation of M&E plans?
- How can the planning processes be evaluated?

What are appropriate indicators and data for M&E and how are they acquired?

- What are possible indicators and data for M&E and how should suitable ones be selected?
- How can best use be made of existing data sources and gaps be identified?
- How can best use be made of new data sources?
- How can barriers to acquiring data be overcome?

What are appropriate data reporting, analysis and evaluation methods?

- How can data and results be best presented to decision makers and the public?
- What are most suitable methods to analyse data and indicators?
- How can targets be defined?
- What are possible and appropriate evaluation methodologies?

3 From theory to practice

3.1 Designing the process of monitoring and evaluation

3.1.1 How is M&E embedded in the planning processes?

The establishment of clear procedures for monitoring and evaluating the implementation progress and impacts of schemes is crucial to ensuring that any problems and challenges can be identified and addressed early. Problem identification is a crucial step in the SUMP process for the selection of appropriate transport policy measures (see CH4LLENGE Measure Selection Manual) and regular monitoring during implementation allows to identify problems early, e.g. if impacts are not developing as intended, work is behind schedule or over budget or if strong adverse public reactions are encountered (GUIDEMAPS, 2004). Moreover, it provides the opportunity to systematically inform decision-makers and the public of positive progress, thus increasing acceptance of possible temporary restrictions during the implementation of schemes. To establish such procedures, a **Monitoring and Evaluation Plan** should be developed, preferably at the **early stages of the SUMP process** before implementation starts. However, the M&E Plan should be considered a living document that needs to be adapted to new developments and knowledge gained during the SUMP process, Hence, for cities at the start of SUMP development, a first M&E plan might only contain a rough outline of M&E activities that will become more detailed as experience grows.

Developing an M&E plan as a written document before implementation of SUMP measures helps to ensure sufficient allocation of resources for M&E activities, avoids unnecessary effort for data collection and contributes to good project management during the SUMP process. Ideally political or administrative approval for the M&E plan can be secured at this early stage, e.g. through existing regulations or a binding decision to integrate an M&E plan or an M&E chapter in the SUMP development and the SUMP document. This helps achieve security over the budget and commitment of staff resources with which monitoring and evaluation activities will be carried out. M&E plans should be treated as 'living documents' (Frankel & Gaga, 2007), i.e. they can always be amended or additional information added in the light of e.g. changing political priorities or external circumstances.

Box 5: Before SUMP Implementation – The Monitoring and Evaluation Plan

A Monitoring and Evaluation Plan is a guide that describes how, which and when M&E activities will be carried out, who is responsible for them and what resources are necessary to implement them. The M&E plan could be a free-standing document or part of a wider project management plan for the whole SUMP.

M&E activities should be conducted on a regular cycle, although their frequency might vary, with evaluation taking place at longer time intervals. At the start of the planning process data needs to be collected to identify problems and establish a baseline against which impacts will be compared. Monitoring should at the minimum be undertaken at key moments during the SUMP process, e.g.

- after the implementation of specific measures such as infrastructure or service improvements when corrective action is still possible before the end of the plan,
- when certain implementation activities such as awareness-raising campaigns have been completed.

Continuous monitoring with routine collection of core data and information should be carried out for the whole SUMP.

Evaluation generally happens at the end of planning cycles, but in practice monitoring and evaluation activities will often be carried out in parallel with implementation, e.g. to review intermediate outcomes.

In order for monitoring and evaluation to be successful, clear objectives, responsibilities, timelines and procedures need to be set up beforehand by the planning authority to handle any problems that have been identified. It is also crucial to design and implement effective commissioning processes for the procurement of outside expertise, data, data collection technologies or analysis tools.

In a participatory M&E approach SUMP stakeholders and the public can be involved at various steps in the process, e.g. in the setting of objectives and targets, providing access to data sources, or reflecting on intermediate and final results. Since a well-designed participatory process requires good facilitation and potentially a certain amount of resources and skills, the level of participation will vary with the type and character of a SUMP. The CH4LLENGE Participation Manual provides further guidance.

Additional to the stakeholder participation in M&E it is important to involve institutional partners in M&E. This is especially important for data collection

Box 6: During SUMP Implementation – Monitoring

Monitoring activities, where data on the performance of schemes is collected and reported, are carried out frequently or continuously during the implementation of SUMP schemes in order to identify whether resource inputs, project outputs and intermediate outcomes comply with the original plan or whether corrective action is required.

Box 7: During and after SUMP Implementation – Evaluation and Feedback

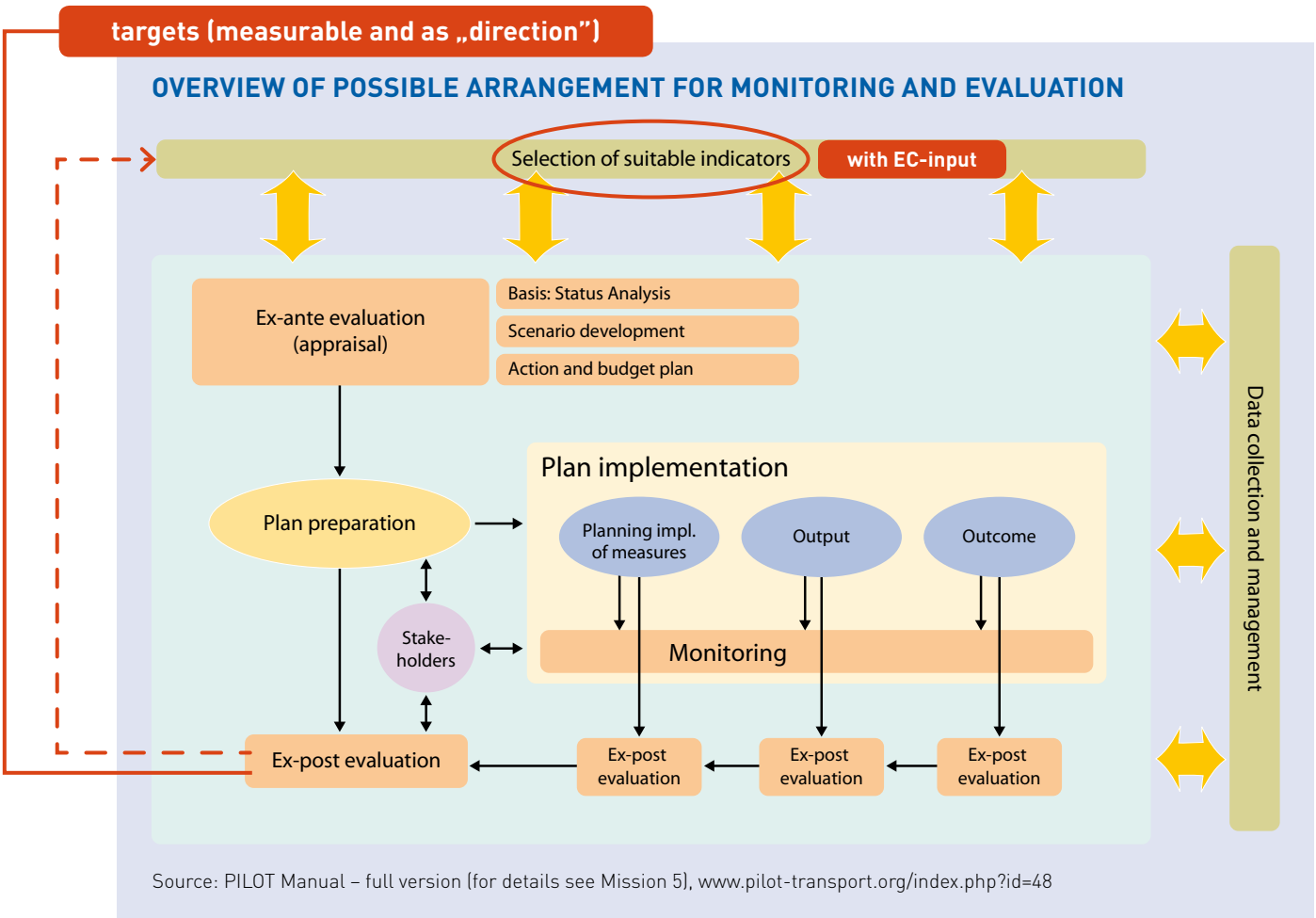
Evaluation is carried out at the end and often at crucial decision points of the planning cycle to assess the SUMP's performance against specified objectives or to identify whether planning processes need to be modified. Results feed back into the next planning cycle and can help answer key questions for future SUMPs, e.g. about how to improve on-going schemes or how to make future interventions and planning processes successful. Evaluation is particularly important to enhance the knowledgebase for measure selection as pointed out in the CHALLENGE Measure Selection Manual.

from institutional partners (e. g. police department, environmental office and others). Further guidance on this can be found in the CH4LLENGE Institutional Cooperation Manual.

After the planning cycle has been concluded and the schemes implemented, findings from monitoring and evaluation can help to identify success factors as well as barriers towards the implementation of future SUMPs and thus provide input into future strategy and policy development. In order to feed back those results into the decision-making process, a plan for the dissemination and utilisation of the M&E information should be developed, differentiated by target groups such as decision-makers / politicians, stakeholder groups and the public.

Figure 3 illustrates the SUMP monitoring and evaluation process and Box 8 summarises the factors a planning authority should consider when setting up the M&E process.

Figure 3: SUMP monitoring and evaluation process
Source: SUMP Guidelines, Rupprecht Consult (2011), amended by City of Dresden



Box 8: Success factors for Monitoring and Evaluation

The following list summarise success factors for the development of M&E plans and their implementation (see e.g. Hills & Junge, 2010, Frankel & Gage, 2007)

- Ensure political commitment and secure dedicated resources (financial and staff)
- Create a culture of M&E as enabling environment
- Develop clear objectives for the SUMP and evaluation questions for M&E
- Provide good project management by
  - clearly defined project tasks and responsibilities, including a core team
  - a clear time frame
  - clear budget and rules, make the budget realistic
  - monitoring of the SUMP process
  - effective commissioning processes for procurement
- Build up expertise
  - for data collection and technical staff, SUMP officers, team leaders and decision makers
  - and by pairing local knowledge with external support from evaluation specialists
- Ensure good communication
  - with decision makers
  - with institutional partners
  - with stakeholders and the public
  - with technical experts

LOCAL SPOTLIGHT: Dresden's monitoring and evaluation process

The City of Dresden implemented monitoring and evaluation topics in their SUMP elaboration from the beginning. Their Monitoring and Evaluation Plan is an integral part of the SUMP called „Verkehrsentwicklungsplan 2025plus", which was politically adopted in November 2014. As such, the SUMP draft includes an M&E chapter with an indicator list, which has been further qualified in the CH4LLENGE project on the basis of the CH4LLENGE template.

The indicator list has been discussed with internal and some external cooperation partners, with stakeholders and politicians at a Round Table as well as professors of the Scientific Advisory Board. The updated local M&E plan has been implemented in the politically adopted SUMP.

The experiences demonstrate that participation and cooperation brings added value and synergies for involved partners both in the planning process and in the implementation process and it brings high acceptance of the SUMP.

Round Table Meeting Dresden
Photo: City of Dresden

3.1.2 What is the context for monitoring and evaluation?

Before the actual M&E activities are planned and carried out, several questions on the context have to be clarified. This concerns potential requirements by funders for monitoring and evaluation activities as well as the development of visions and objectives, the definition of the study area, time frame and baseline conditions.

In some countries and for some funders of transport interventions there are **formal requirements to carry out monitoring and evaluation activities**, e.g. for Local Transport Plans in England (House of Commons, 2013) or French Plans de Déplacements Urbains for cities with more than 100,000 inhabitants (Certu, 2013). There can also be internal requirements within a planning department as a part of a strategy to improve processes and results, e.g. in the Department for Transport's (UK) Monitoring and Evaluation Strategy (2013) as an example at the national level. As a first step in developing a monitoring and evaluation plan it is necessary to become familiar with any such existing formal requirements, including whether guidance or templates for M&E plans and activities exist, specific data have to be collected and reported or a certain assessment methodology to be applied.

Before designing monitoring and evaluation activities it is necessary to get clarity about the intended outcomes in the form of well-defined **planning objectives** and a clearly defined **list of problems** that need to be overcome to achieve those objectives. Having clear objectives or clearly identified problems to be solved is crucial to be able to evaluate actual against desired outcomes for the implementation of SUMPs and should always take place at the beginning of the planning cycle, before strategies and measures are selected. Hence, the development of visions and objectives and the process of problem identification are described in the CH4LLENGE Measure Selection Manual.

At the point in the planning cycle of developing an M&E plan we further assume that the **main strategies and policy measures** that form the SUMP (see also CH4LLENGE Measure Selection Manual), have been identified. This is necessary to target the monitoring and evaluation activities towards establishing the effectiveness of specific interventions or strategies and choose indicators that are capable of measuring their outcomes. For instance, different data will be needed to measure whether a SUMP that is predominantly targeting land-use development or one targeting modal shift towards active modes has been well implemented and effective, although their outcome in terms of final objectives might be similar.

The rationale for the selection of **study area and time frame** for M&E is the same as described for the measure selection in the CH4LLENGE Measure Selection Manual. The study area for which data will be collected for M&E purposes depends on the area of jurisdiction for which the plan is developed and the geographical extent of expected impacts. Therefore, neighbouring authorities will likely need to be involved in the data collection process through institutional co-operation. The CH4LLENGE Institutional Cooperation Manual provides further guidance on how to overcome barriers in this regard.

The definition of a **baseline, "do-minimum" or "business as usual" scenario** that describes how conditions in the urban region would develop without the SUMP is essential for the evaluation of the programme as a whole and any measures included in it. As the CH4LLENGE Measure Selection Manual describes, such a scenario includes all policy measures that have already been fully committed to.

The following figures illustrate the importance of evaluating SUMP outcomes against the baseline scenario rather than the starting conditions. Firstly, as shown in Figure 4, the results from a SUMP might be over-estimated if external factors have a positive impact on the transport development in a city. In this case some outcomes had already been achieved in the baseline scenario. An example are local air quality improvements as outcomes that could be positively influenced by external developments such as improved car emission standards.

If, however, external pressures such as a rise in the city population and economic output increase the burden on the transport system, a comparison of the outcomes at the end of the planning cycle with those at the start will come to the conclusion that conditions have worsened and the SUMP has failed to reach its intended outcomes. However, without implementing the SUMP, conditions in the urban region might have deteriorated even more as illustrated in Figure 5.

Hence, for each indicator that measures the success of a SUMP and its measures, a baseline value needs to be established, i.e. a starting value and an expected value at the end of the planning cycle.

Figure 4: Baseline versus SUMP outcomes under positive external developments
Source: CH4LLENGE/Gühnemann, 2016

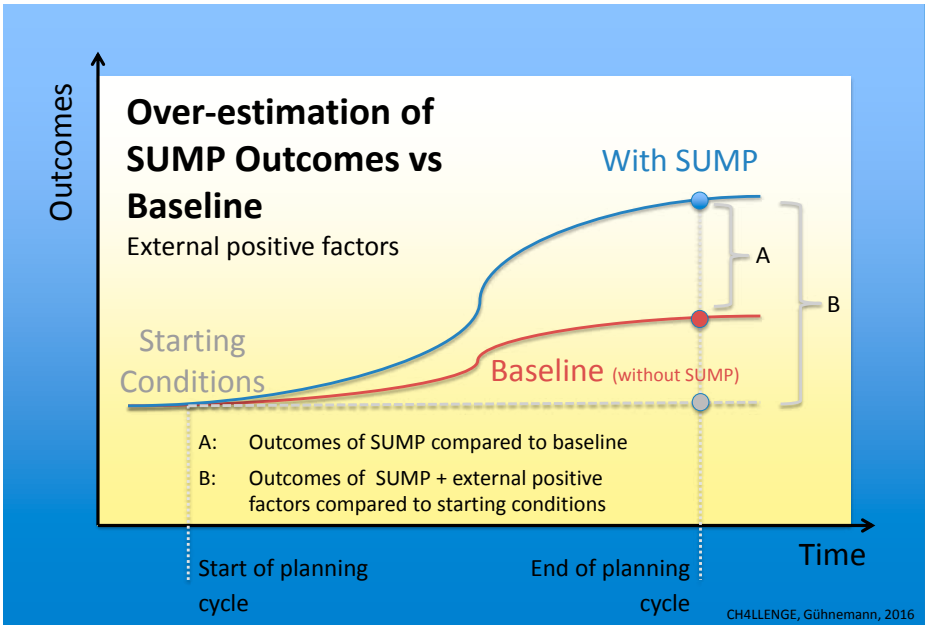
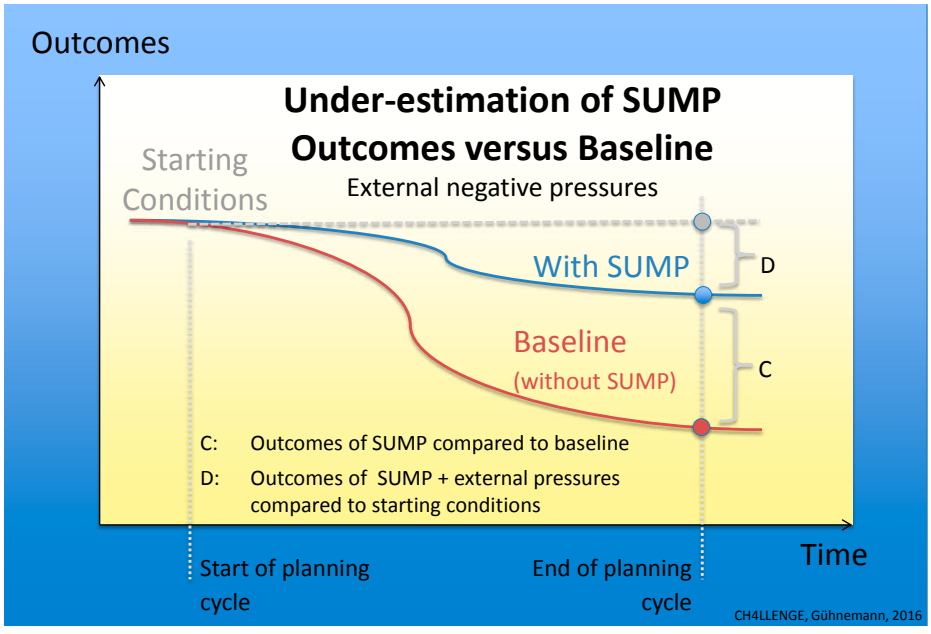


Figure 5: Baseline versus SUMP outcomes under negative external developments
Source: CH4LLENGE/Gühnemann, 2016



LOCAL SPOTLIGHT:
The importance of M&E for strategy development in Ghent

The SUMP of Ghent was politically approved in September 2015. One of the key measures concerns the "B401-overpass". The overpass connects the historical city centre directly with the highways E40/E17, causing long rush-hour traffic jams and negatively influencing the living environment within the city centre and along the overpass. It has also been observed that people use this route through the city centre instead of using the ring roads. The aim of the project is to shorten the overpass and leave only the connections with the local ring roads R40 and R4. In parallel, some alternatives need to be developed: a large P+R-infrastructure with quick connection to the centre, and some adaptations on the ring roads.

M&E is needed to assess the impact of the measure. Several steps are under action and preparation. A spatial exploratory study has been prepared to evaluate the overpass and its surroundings. The data gathered during the recent renovation works, when the overpass was sometimes partially and sometimes completely closed, will be very interesting as a monitoring and evaluation case. Different problem solving strategies that are developed in the spatial exploratory study can be checked against these experiences. Further, installing new circulation plans in the city (2017) will allow for monitoring and evaluating the impact on traffic using the overpass and thereby the scenario's that have to be developed towards a more concrete project.

B401 Overpass, Ghent
Photo: Emilio De Baudringhien

3.1.3 How is an M&E plan structured and what are its contents?

A Monitoring and Evaluation Plan outlines the key evaluation and monitoring questions that help answer whether the SUMP outcomes and processes are in line with its intended objectives. Examples of such questions are listed in Box 9. The plan provides information on which data needs to be collected, what methods and tools will be applied in order to answer these questions, and whose responsibility the different M&E activities are.

A **template** with concrete guidance to assist in writing local **SUMP Monitoring and Evaluation Plans** was developed in the CH4LLENGE project, see Gühnemann (2014). Cities can use this template to guide the development of their own plans. Its proposed structure and content are displayed in Box 10. The template text needs to be amended for local use according to local requirements. E.g. different objectives and transport strategies are relevant for different cities, leading to unique sets of indicators as well as procedural requirements. At the same time it is advisable to keep indicator definitions consistent with European practice in order to allow benchmarking own achievements against comparable cities.

In addition, the majority of cities in Europe will need to translate the document into local language for it to be useful in discussions with other stakeholders and institutional cooperation partners in the planning process. Parts of the text could also be omitted if these are already covered in other documents, e.g. the city or SUMP description. In each part, the template provides links to literature with more detailed information or guidance.

Box 9: Examples of M&E questions

(Adapted from Frankel & Gaga, 2007, p. 6, Davidson & Wehipeihana, 2010)

- Was the SUMP implemented as planned?
- Did the city or targeted parts of the population benefit from the SUMP?
- Was the delivery of the SUMP cost-effective? Did it provide value for money?
- Can improved economic, environmental or social outcomes be attributed to the SUMP's efforts?
- Which SUMP measures were more and which less effective?
- Is continued support required?
- Can the SUMP measures be transferred or scaled up?

Box 10: Structure and content of a local SUMP M&E Plan

The template for local SUMP M&E plans proposes the following structure:

1. **Introduction**
   - Definition of key concepts and justification for monitoring and evaluation activities.
2. **City Description**
   - General background of the current transport situation and main problem areas.
3. **SUMP Objectives and Strategies**
   - Main objectives and elements of the SUMP to clarify aims that are pursued.
4. **Evaluation and Monitoring Procedures**
   - General organisational and procedural framework for evaluation and monitoring activities, including the organisations responsible, time schedules, and stakeholder involvement.
5. **Evaluation and Monitoring Indicators and Targets**
   - Long list of outcome, intermediate, output and input indicators for cities to choose from to monitor success against objectives as well as progress of implementation. Core vs additional indicators are suggested as well as advice provided for suitability of indicators for different situations and for a measurement plan (sources, method, timing / regularity).
6. **Data Reporting, Analysis and Evaluation Methods**
   - Key methods are described for cities to choose from, including references for further information.
7. **Resources Required for Evaluation and Monitoring**
   - Outline of different types of resources that need to be considered, including financial, staff resources external consulting costs, existing data bases, transport models or other tools.

In the first part of an M&E plan it is necessary to provide a clear definition of **the purpose of evaluation** and objectives of the M&E plan and its users. If the M&E plan is a free-standing document it is useful to include key information on the **current transport situation** in the city or urban region and summarise **key elements of the SUMP** that will be subject to M&E activities. This will help external readers to understand the context of the M&E plan.

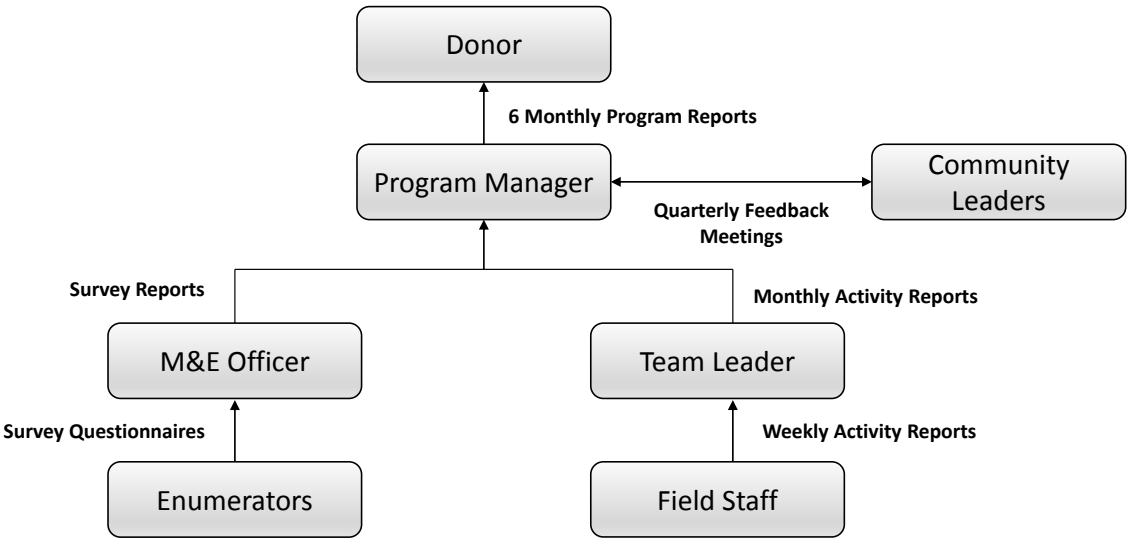
It is further necessary to include a description of the **M&E procedures**, i.e. key external requirements for evaluation, the responsibilities of technical experts, external stakeholders, decision makers etc. in the process and the intended audience of the M&E reports. In more complex settings, it is useful to include a description or flow chart of the data flow process and reporting mechanisms from source of data collection (surveyors, automatic, calculation/modelling) through technical experts (e.g. team leaders, M&E officers) to SUMP manager and decision makers and stakeholders as shown in an example for a development project in Figure 6.

A central part of the M&E plan is the description of **indicators** that are selected to measure the performance of the SUMP, the methods of their measurement and corresponding data sources. To support this, the M&E Plan Template contains a long list of indicators based on existing experiences and literature. Chapter 3.2 describes the indicator selection process in more detail.

Furthermore, the M&E plan needs to cover the methods applied for **reporting and aggregation of results**. This ranges from tools for presenting data to formal aggregation methods such as cost-benefit analysis and multi-criteria analysis that often are applied for the evaluation of large-scale interventions or whole SUMPs. The choice of method depends on the type and scale of intervention, potential formal requirements as well as the expertise and capacity of staff. Further information on this is covered in Chapter 3.3.

Finally, a description of the **resources** required to carry out the monitoring and evaluation activities needs to be covered in the M&E plan. This includes a description of existing databases and software tools that are available or need to be procured for the data management and analysis, as well as an estimate of staff and other costs. There is limited information available on the possible costs of M&E activities in transport. Costs will depend on many factors such as size of the programme, types of measures included, existing data and local context. As an indication of order of magnitude, Frankel and Gaga (2007, p. 7) suggest for USAID development projects that "5-10% of a project budget should be allocated for M&E".

Figure 6: Example data flow process for monitoring data for a development project
Source: (tools4dev, no date, p.8)



3.1.4 How can the planning processes be evaluated?

Process evaluation should be understood as an opportunity to reflect upon the planning process self-critically during and after the SUMP development phase. A systematic reflection is important as the quality, political relevance and stability of a SUMP partly depends on the details of the process. Therefore, the monitoring and evaluation activities of every SUMP should always include a dedicated "process evaluation". It should provide answers to questions such as "How did it go? What went well / wrong and why? Who did or should have done what? How is the

process perceived by key stakeholders?" This evaluation might also lead to insights that can be productively applied in the implementation and the following SUMP phases. If the results are positive, this can also help to garner additional support and participation among stakeholders and the wider public.

Therefore, process evaluation, is meant as an inherently constructive activity with the "ultimate aim … to get insight in the 'stories behind the figures' and to learn from them" (Dziekan et al., 2013). This is important, because the reality for all SUMP actors is typically complex. There a multitude of challenges including cultural issues, time constraints, lack of political support, technical problems, difficulties in obtaining important information, public scepticism, and mis-communication.

For the planning authority it is important to know which informal patterns were at play "behind the scenes", why certain unanticipated consequences emerged but also which positive factors were utilised and how problems have been overcome. The process evaluation opens the black box of the system and looks inside to understand the cogs, chains and gears that are at work. This can help to detect the reasons for "delays, changes, failures but also success of the measure … [and] to avoid making the same mistakes again" (Dziekan et al., 2013). Stakeholders and the public should have the opportunity to provide their feedback about the planning process and their involvement in a systematic manner and should be entitled to receive information about the quality of the process they have participated in.

The required information can be gathered simply by talking to various stakeholders and, more generally speaking, any participant in the SUMP process. Suitable techniques depend on the specific phase, stakeholder types and many other locally specific conditions but typically include survey questionnaires, interviews and focus groups.

For interviews, it is important to prepare a set of questions beforehand to ensure that the conversation is well structured. However, people should also be allowed to elaborate on certain points because they might have interesting information which could not be anticipated beforehand. This also applies to "focus group" discussions; these are meetings where several participants (ideally 5-10) exchange their views in the presence of a neutral moderator. For interviews and focus groups it is good to obtain the participants' written consent to participate and to promise them anonymity in order to facilitate an open and unrestrained conversation.

The key lessons from information gathered through such techniques should be extr acted in a systematic fashion. The conversations should be recorded or transcribed if a qualitative data analysis is planned.

Assessing the local SUMP process
Photo: Rupprecht Consult, 2016

LOCAL SPOTLIGHT:
Evaluating Dresden's participatory SUMP process

The City of Dresden evaluated participation in the SUMP process by a local questionnaire specifically developed for this project. The survey was carried out in 2015 and received responses from several SUMP bodies, from partners of the Round Table, Round Table Region, Scientific Advisory Board and from the internal municipal working group. Survey results (19 questions) reflect the opinions of involved partners and therefore their subjective assessment of the participation process.

The responding partners from several bodies involved in the Dresden SUMP development reflect consensually that participation is modern and absolutely necessary for a high acceptance of a SUMP. They assessed the comprehensive and cooperative participation during the four-year planning process as predominantly positive, efficient and successful. The partners expressed their satisfaction about process organization, working phases, involved stakeholders and partners as well as the planning results. The high level of satisfaction shows that the SUMP is a joint plan that has been elaborated together and should be implemented together as well. A suggested improvement was to further include the interest group of young people and representatives of broader ecological issues in the participation process.

The involved stakeholders and partners stated that the effort required for participation in SUMP preparation is not low but adequate to the task. In the SUMP development municipalities have to supply personnel and financial resources as well as clear participation plan in sufficient time necessary for participative planning.

Dresden Round Table SUMP
Photo: City of Dresden

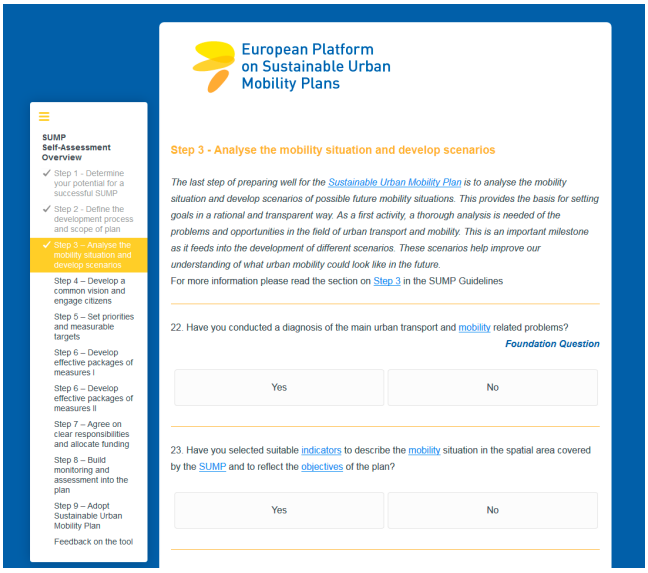
3.1.5 How can a SUMP be evaluated?

When awarding funding for mobility purposes, the European Commission wishes to ensure that the projects and initiatives proposed are the result of a sound planning process. Various operational programmes within the EU's Structural and Investment Funds now require planning authorities to develop SUMPs. As a result, cities and regions, their stakeholders as well as Member States and European institutions require a clear set of criteria to decide whether a given plan does indeed meet the criteria of a SUMP as presented in the European Commission's Urban Mobility Package (December 2013) and 'Guidelines – Developing and Implementing a Sustainable Urban Mobility Plan' (January 2014).

A SUMP Self-Assessment Tool has been designed in CH4LLENGE to enable planning authorities to check and demonstrate the compliance of their planning authority's mobility plan with the European Commission's SUMP concept. The tool focuses on validating the planning process followed by the local planning authority, together with certain aspects of the content of the plan. The feedback from the Self-Assessment helps to understand where the mobility planning authority has strong practices in relation to the SUMP characteristics and where the planning process could be improved.

The primary use of the Self-Assessment Tool is when the planning authority's local SUMP process has been finalised and the plan is freshly approved. It can also be used to evaluate an earlier mobility plan to find out whether the principles of sustainable urban mobility planning were taken into account at that time.

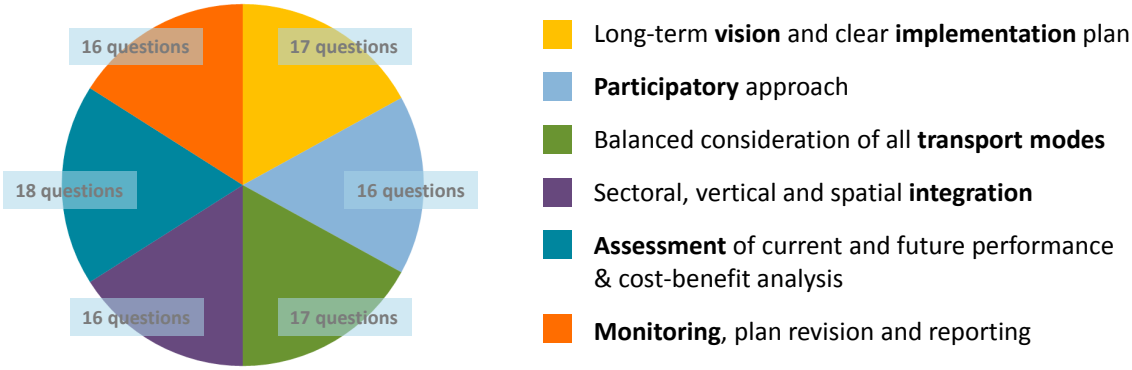
Figure 7: SUMP Self-Assessment Tool – available at the Eltis portal
Source: Rupprecht Consult/CH4LLENGE, 2016



The SUMP Self-Assessment questionnaire comprises a total of 100 yes-no questions, divided in line with the SUMP preparation cycle "steps" and each question belonging to one of six "SUMP characteristics". Furthermore, the SUMP Self-Assessment Tool sets out the basic compliance requirements a local mobility plan should fulfil to be in line with the definition of a SUMP as well as establishes criteria for processes of exceptionally high quality.

The SUMP Self-Assessment Tool is publicly available for any type of city, free of charge, and for non-commercial use only.

Figure 8: Coverage of SUMP characteristics in the SUMP Self-Assessment Tool
Source: Rupprecht Consult/CH4LLENGE, 2016



3.2 Choosing suitable indicators and data for M&E

The choice of indicators is an essential step in order to achieve a cost-effective M&E process. In the following Chapter 3.2.1, this process is described, followed by chapters that deal with specific issues concerning existing and new data sources and institutional co-operation in ensuring access to data for M&E purposes.

3.2.1 How are suitable indicators and data for M&E established?

The indicator selection method follows an objective-led planning approach set out e.g. in PROSPECTS (May et al., 2005) and further developed in DISTILLATE for indicator development (Marsden et al., 2005). This is based on a logical framework approach, in which a clear pathway between measures and their impacts, e.g. on transport behaviour change, is assumed. Although this is a simplification of reality where multiple factors influence outcomes simultaneously, it provides a clear analytical structure for the systematic choice of indicators.

Based on the literature (e.g. Marsden et al., 2005, Rupprecht Consult, 2014, AECOM, 2009) a distinction is made between the following categories of indicators: outcome, transport activity (or intermediate outcome), output, input and contextual. Each of these types of indicator helps to measure and monitor different aspects of the SUMP implementation as illustrated in detail in Box 11.

Box 11: Categories of Indicators

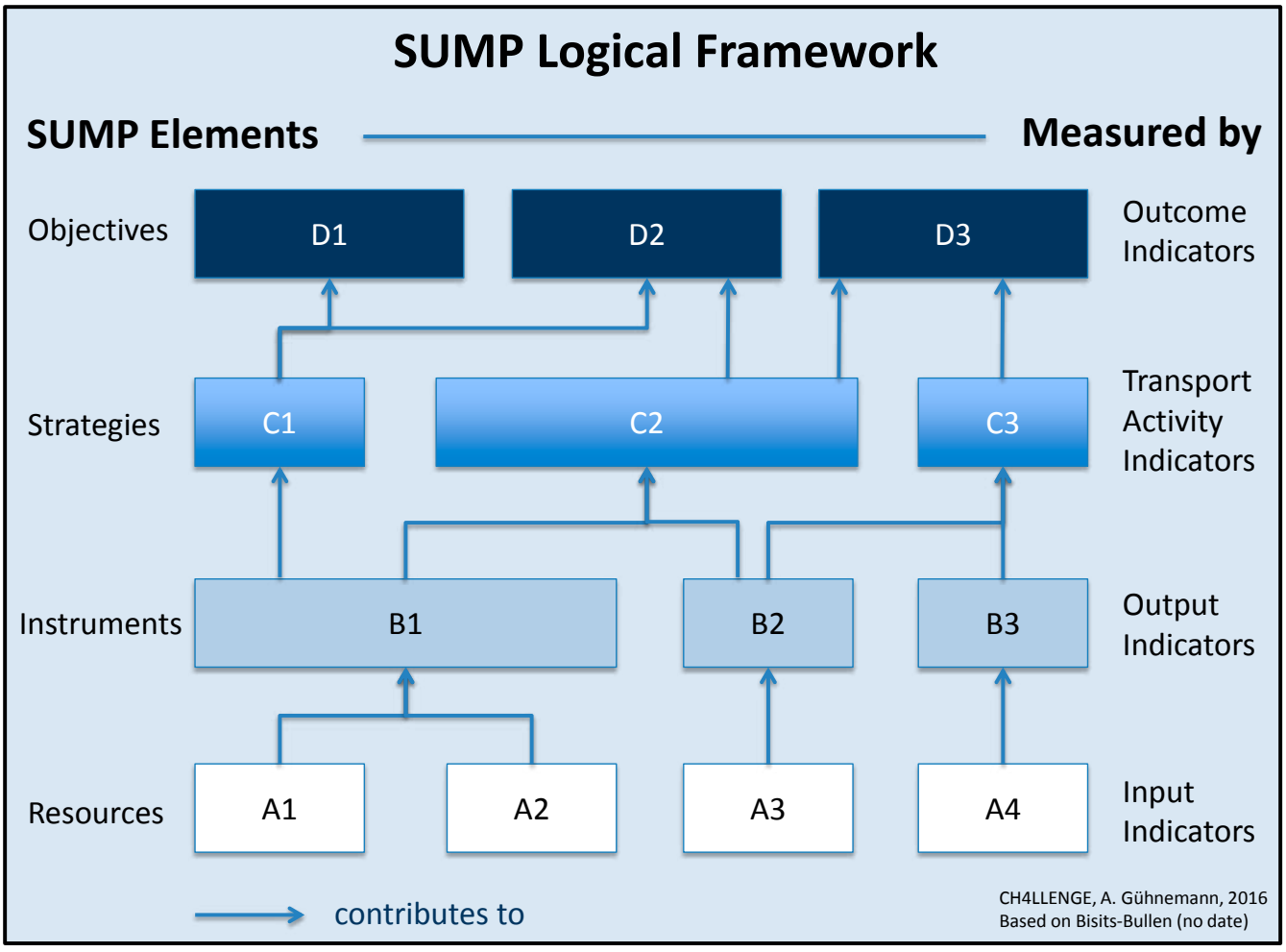
- **Outcome Indicators** measure the actual impacts for the SUMP objectives (e.g. delays per person km to measure economic benefits or greenhouse gas emissions for climate impacts);
- Intermediate outcome indicators of instruments describe changes in the transport system and can be related to the success of strategies (e.g. modal shares if the strategy is to shift to sustainable modes). These are termed **Transport Activity Indicators** here for better understanding. This category includes indicators for measuring the system performance of new transport technologies e.g. for traffic management or public transport operations which are introduced as part of the SUMP.
- **Output Indicators** measure the extent to which policy instruments have been implemented and services improved (e.g. km bus lanes implemented). Transport activity and output indicators are also required to understand why certain outcomes have been achieved and what could be done further if a situation needs improving.
- **Input indicators** provide information on the amount of resources required for delivering the plan, including cost. These indicators should be included to provide transparency on the plan implementation and allow an evaluation of the resource effectiveness.
- **Contextual indicators** provide information on external developments that have an influence on the successful implementation of SUMPs, e.g. external economic developments or national policy developments.

Starting with the following statement for each objective that is formulated for the SUMP, a set of indicators at different levels can be systematically built up:

> With **resources A (uses input)** we plan to implement **policy instrument B (produces output)** which will help to **achieve strategy C (changes transport activity)** and results in achievement of **objective D (reaches outcome)**.

Figure 9 illustrates the link between the different SUMP elements and indicator categories in the logical framework approach. The contextual indicators will be needed additionally in order to understand whether external factors might have significantly influenced outcomes.

Figure 9: SUMP logical framework for indicators categories
Source: CH4LLENGE/Gühnemann, 2016



An example for such a logical pathway and the corresponding indicators is provided in the following table 1.

Following this approach, each indicator will be directly linked to the inputs, outputs, transport activities and outcomes of the SUMP and enable later analysis of success factors and reasons for under-achievement.

For the selection of indicators, the following principles should be followed:

- Planners should aim to use standard indicators that are already well defined and where there is existing knowledge on how to measure and analyse them. This enables cities benchmarking against other cities or comparison to national / international statistics.
- Indicators need to be easily understandable for stakeholders and decision makers.
- There needs to be a clear definition of each indicator, how data is measured, the indicator calculated from the data and how often it will be measured.
- For each indicator, a baseline value needs to be established, i.e. a starting value and expectation of development without SUMP related interventions,
- The reporting format for indicators needs to be decided (Chapter 3.3.1 on reporting).
- Target values for indicators for the main objectives need to be set (see Chapter 3.3.3 on targets).
- Specific indicator needs might arise from the requirements to use a particular assessment methodology, e.g. a cost-benefit analysis for major interventions.
- The selection needs to take into account available data sources and resources for collection of new data.

In order to facilitate the process of indicator selection, the **M&E template** provides an initial long list of indicators for each of the indicator types, see Table 3. This list was derived from a range of previous projects and academic literature. For the **outcome indicators**, it is proposed to define a limited set of core outcome indicators that reflect the SUMP objectives, e.g. 1-3 indicators per objective. In order to enable later analysis it is suggested to define targets for these core indicators, at a minimum a direction of development if quantifiable targets are not feasible (see Chapter 3.3.3 on targets). Table 2 shows an example of the indicator selection and targets for the West Yorkshire SUMP, where six public facing 'headline' (i.e. core) indicators were defined together with aspirational targets to provide an overview of progress.

Table 1: Example for different indicator categories

SUMP Element		Measured by	
Objective	Reduce local air pollution from transport →	Number of days exceeding critical air pollution levels	Outcome Indicator
Strategy	Increase use of non-motorised modes →	Share of walking and cycling trips	Transport Activity Indicator
Instruments	Build segregated cycle lanes →	Km of segregated cycle lanes built	Output Indicators
	Pedestrianise city centre shopping street →	% completion of pedestrianisation of city centre	
Resources	Investment and maintenance costs →	Transport investment and maintenance costs for new / improved infrastructure	Input Indicators

Table 2: Core outcome indicators and targets for West Yorkshire SUMP objectives

Objective	Core Indicators	Definition	Target	Monitoring	Evaluation
Economic Growth	Journey Time Reliability	Proportion (length) of the WY core bus / core highway network where journey time variability in the weekday morning peak period is equivalent to inter-peak conditions.	To increase the proportion from the baseline figure of 71% to 75%	Annual	Annual
	Access to Employment	% of working population able to access key employment centres across West Yorkshire within 30 minutes using the core public transport network. (07:30-09:30)	To increase the proportion from the baseline figure of 71% to 75%	Two Monthly	Annual
Low Carbon	Mode Share	The total number of car journeys by WY people per year	To keep the total number of car trips at current (2011) levels. To increase the proportion of trips made by sustainable modes from 33% to 41%.	Annual	Annual
	Emissions of CO_2 from transport	Annual road traffic emissions of CO_2 across the WY local highway network (excludes Motorways).	To achieve a reduction of 30% between base year and 2026 in line with the national target.	Annual, two year lag	Annual
Quality of Life	All road casualties	Number of WY road user casualties: Killed or Seriously Injured (KSI) From WY Police injury accident records (2005-09 Baseline)	To cut the number of KSI by 50% between the 2005-09 baseline and 2026	Monthly	Annual
	Satisfaction with transport	Satisfaction scores across a range of transport modes and facilities.	To increase the combined satisfaction score from 6.6 to 7.0 by 2017	Annual	Annual

Table 3: List of Indicators from the M&E template

Note: The template provides further guidance on how to select indicators from this list, depending on local circumstances such as the type of project, transport strategies, type of area etc. Outcome indicators are further classified into core indicators that should be covered in a SUMP and optional additional indicators. For core indicators, targets or intended direction of development should be determined. The full M&E template is available for download at www.sump-challenges.eu.

INDICATOR	DEFINITION
Outcome Indicators	
Objective: Efficiency	
	Core Indicators
Average time lost per passenger / ton km	Average difference between time required to travel in free flow and actual conditions for motorised traffic and average pedestrian / cyclist delay at traffic signals / crossings per km
Public transport punctuality	Share of public transport services arriving at stops within set punctuality limits
	Potential Additional Indicators
Transport intensity	Passenger / Ton km / GDP
User benefits	Monetised gains from improvements to transport system
Objective: Liveable Streets	
	Core Indicators
Perceived attractiveness of street environment	Share of people who consider streets safe and easy to walk
Share of liveable streets	Share of streets considered pleasant + safe environment for walking and social interaction
	Potential Additional Indicators
Community satisfaction	Average satisfaction with local community
Security	Crime rates (in street / PT environment)
Walkability of local neighbourhoods	Walkability scores
Objective: Environment	
	Core Indicators
Carbon emissions	CO_2 emissions of traffic in city
Days exceeding critical levels	Number of days in which critical levels for local pollutants are exceeded
	Potential Additional Indicators
Noise exposure of residents	%Households exposed to Lden > 65dB from traffic
Fossil fuel intensity	Fossil fuel consumption for transport per resident
Other GHG emissions	NOx, CFCs etc expressed as CO2 equivalent
Regional pollutants	NOx, VOC emissions
Use of renewable energy sources	Share of regenerative energies of energy consumption of motorised traffic
Conservation of natural / green spaces	Net loss / gain of green space
Conservation of historical sites	Net loss of sites of historical / cultural importance
Objective: Equity and Social Inclusion	
	Core Indicators
Non-car accessibility to main services	% of non-car households within 30 or 60 minutes of city centre or main suburban centre with shopping & medical service provision
Accessibility for disabled people	Share of residents inside radius around barrier free public transport stops
	Potential Additional Indicators
Public transport catchment area	Share of residents inside radius around PT stops
Environmental justice	Distribution of exposure to air pollution or noise by groups (age, gender, income, ethnicity)
Safety justice	Distribution of traffic deaths and injuries by groups (age, gender, income, ethnicity)

Objective: Safety	
	Core Indicators
Killed and seriously injured persons by mode	Number of persons killed or seriously injured (KSI) in traffic accidents
Accidents by mode	Total number of accidents
	Potential Additional Indicators
Child KSI by mode	Number of children killed or seriously injured (KSI) in traffic accidents
Perceived safety by mode	Number of people rating it safe to use transport
Objective: Economic Growth	
	Core Indicators
GDP per capita	Local GDP
Employment	Share of residents of working age in employment
	Potential Additional Indicators
Business satisfaction	% of businesses rating transport provision satisfactory
Operator benefits	Revenue
Transport costs	Real net changes in transport costs
Economic losses due to health	Working days lost through illness
Economic vitality	Vitality index
Objective: Finance	
	Core Indicators
Cost recovery for transport investments	Ratio of transport investment funding to investment expenditure
Cost recovery for transport operations	Ratio of transport related revenue, including government funding, to cost of transport operations, including subsidies for public transport
	Potential Additional Indicators
Total cost recovery	Total revenues / Total expenditures
Per capita debt	Long-term debt / Population
Intermediate Outcome / Transport Activity Indicators	
Motorisation	Cars / household; This can be further broken down by types of vehicles, e.g. share of electric / hybrid vehicles if policy instruments target these
Traffic volume by - car, - lorry - public transport - bicycle - walking	Total passenger / ton km = Total travelled veh.km in city / region / corridor by mode multiplied with occupancy; this can be further broken down by peak / off-peak; further modes can be added if targeted, e.g. pedelecs, e-vehicles
Trips by - car - lorry - public transport - bicycle - walking	Total number of trips by mode with origin or destination in city / region or corridor; this can be further broken down by peak / off-peak, inbound / outbound; further modes can be added if targeted, e.g. multimodal, pedelecs, e-vehicles
Travel behaviour characteristics	Break-down of trip statistics by - trip frequency - trip lengths - share of multimodal trips - trip purposes
Share of sustainable modes	Share of trips by non-motorised modes and public transport, including park & ride
Transport intensity - freight - passenger	Ratio of tkm per GDP in city / region Ration of pkm / capita in city / region
Traffic flows on specific routes - car - lorry - public transport - bicycle - walking	Vehicles / hour on routes where strategies target decrease or increase for specific modes, e.g. based on capacity utilisation targets or management strategies

Traffic speeds on specific routes - peak - off-peak Capacity utilisation exceeding LOS threshold	Average speed [km/h] for vehicles on routes where strategies target decrease or increase for specific modes, e.g. based on capacity utilisation targets or safety strategies Share of street length where flows exceed LOS capacity threshold (e.g. 85%)
Utilisation of parking spaces - overall - during peak	Occupancy rate of number of parking spaces exceeding defined thresholds (e.g. 90% or 95%)
Average car occupancy	Average number of passengers per car travelling in city / region
Average public transport occupancy	Average number of passengers per public transport vehicle travelling in city / region, potentially broken down by type of public transport
Public transport user satisfaction	Share of users expressing satisfaction with quality of public transport services covering availability, reliability, comfort, cleanliness, security, fare levels, information & customer care
Wellbeing of public transport staff	Share of staff expressing satisfaction with working conditions, including driver workload, safety & security etc.
User acceptance of new transport / traffic information systems	Share of users expressing satisfaction with quality of information systems, covering aspects of availability, reliability and comprehensibility
Perception of infrastructure quality for walking and cycling	Share of population expressing satisfaction with quality of walking and cycling infrastructure, including availability, directness, security
Status assessment of transport infrastructure	Quality indices based on e.g. assessment of road surfaces, including side facilities, pavements, cycling facilities etc.

Output Indicators, Examples

Share of areas newly designated as mixed and high-density developments.
Length of new infrastructure construction by mode and type
Events to promote sustainable travel organised
Information campaigns carried out
Number of Employers / Schools with travel plans
Car sharing / car club schemes implemented
Share of barrier free public transport facilities
Share of pedestrian crossings with facilities for disabled people
Size / number of Park & Ride facilities
Number of cycling / walking facilities implemented
Traffic management systems implemented / upgraded
Traffic information systems implemented / upgraded
Discounted fare options provided
Road pricing systems implemented

Input Indicators

Transport investment costs for new / improved infrastructure
Start-up costs for new transport schemes
Expenditure for maintenance of streets, roadside facilities and public transport infrastructure
Subsidies for operation of public transport
Subsidies for discounted public transport fares
Subsidies for operation + maintenance of sustainable transport schemes, including bike hire schemes, subsidies for cycling to work schemes etc.
Expenditure for information campaigns

Contextual Indicators

Socio-demographic developments (population size and composition)
Economic performance (GDP/resident, employment, number of businesses, retail turnover, tourism if relevant)
Price developments (fuel, housing, cost of living)
National or international transport policy campaigns and legislation
Other sector policies (e.g. regeneration, health, education)

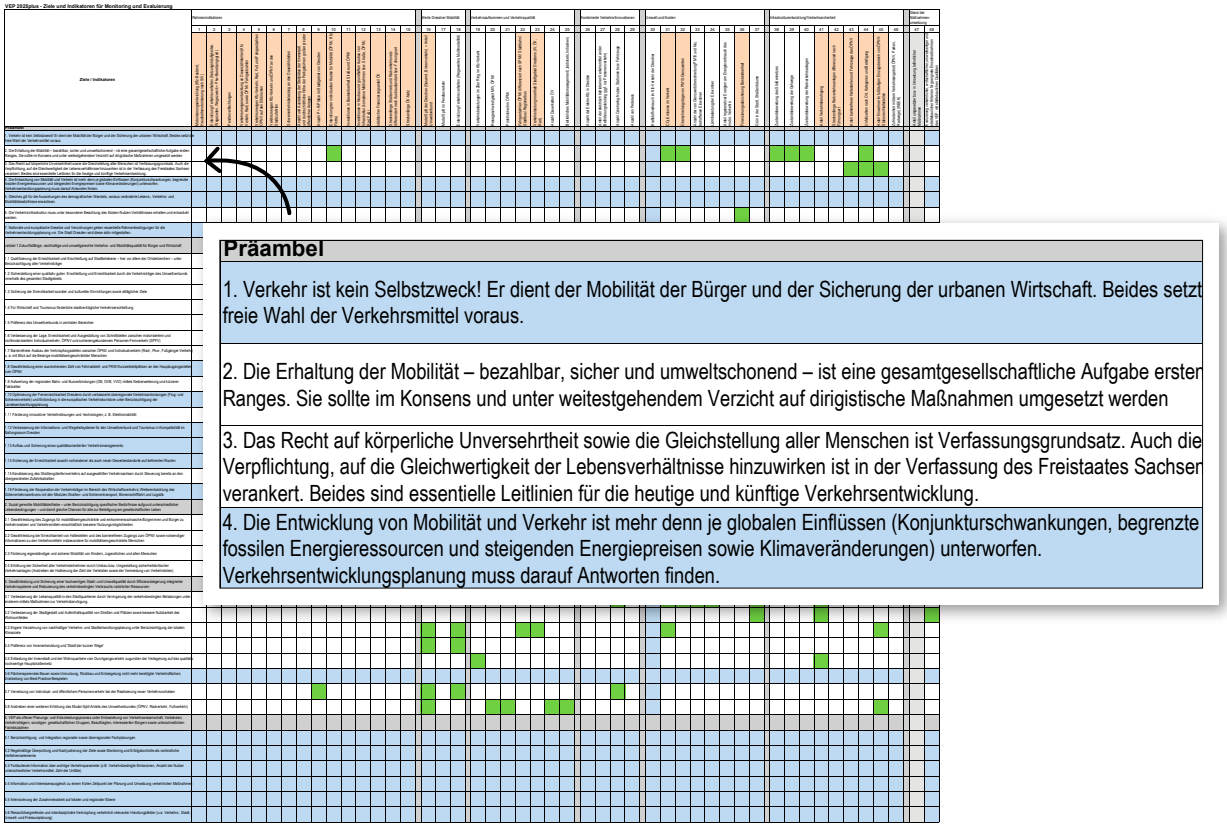
LOCAL SPOTLIGHT:
Matching objectives and indicators for Dresden's SUMP

The objectives of future transport development for the SUMP in Dresden were developed in a consensual discussion of the stakeholders at the Round Table and politically adopted by the Dresden City Council with some modifications. In order to establish their indicator list Dresden matched the objectives/targets with the proposed indicators. The matrix of objectives and indicators show

- objectives are both quantitative and qualitative
- 65% of objectives are measurable with quantitative indicators
- the Dresden objectives are formulated in a rather complex way and some objectives are not measurable with quantitative data (17 of 41, the blue coloured in Figure 10)
- targets could be more quantitatively measurable

Most of the indicators that were chosen for Dresden's SUMP were deemed suitable in the further process. However, the initial indicator list is being further qualified and shortened.

Figure 10: Dresden indicator and objectives matrix
Source: City of Dresden



In order to support the selection of **transport activity indicators**, the template for M&E plans contains tables that suggest which indicators are suitable for what strategies and what direction of change for these indicators would commonly be expected to lead to a positive outcome.

The selection of **output and input indicators** will depend strongly on the intended transport interventions by the cities. Hence, only example indicators for typical interventions and types of resources required to implement these are suggested. An example for the selection of various output indicators to monitor the progress of policy implementation and identify potential risks is given in the local spotlight for Krakow.

Similarly, typical **contextual indicators** are included which will be required in order to take external developments into account that have had an impact on the successful implementation of SUMPs. These are typically:

- Socio-demographic developments (population size and composition)
- Economic performance (GDP/resident, employment, number of businesses, retail turnover, tourism if relevant)
- Price developments (fuel, housing, cost of living)
- National or international transport policy campaigns and legislation
- Other sector policies (e.g. regeneration, health, education)

Box 12 summarises the procedure for the selection of indicators.

Box 12: Procedure for the selection of indicators

1. Start by **specifying objectives** (or main problems to solve).
2. Identify which **strategies and measures** need to be monitored/evaluated.
3. What are the **potential indicators**?
   - "Long list", given in the template for M&E plans and based on existing data bases.
   - "Core" indicators given for each objective.
   - Suggestions for indicators most suitable for types of interventions.

   Combine **bottom-up** (what do we have) and **top-down** (what do we need) approach in a systematic way.
4. Which of these are most **appropriate**?
   - Reduce to "short list", tailored for each city's needs.
   - Based on relevance, availability, cost of measuring, legal or operational requirements...
   - Keep number of "core" indicators small, easily understandable and clearly linked to objectives.
   - Need to define for each indicator where and how often measured and what baseline conditions are.

LOCAL SPOTLIGHT:
Output and process indicators in Krakow

For Krakow an evaluation tool was developed as part of a formal procedure to assess the conformity of actions undertaken by the Municipality of Krakow with the provisions of the **Transport Policy for the City of Krakow for 2007–2015**. This evaluation was carried out for the following subjects: spatial planning, public transport, road system, parking, cycling, organization and management, financial and economic policy, environmental protection, and travel behaviour and communication with citizens and community education.

For each of the above-mentioned subjects, a three-stage evaluation is carried out. In the first stage, each individual instrument is evaluated separately as part of each subject area. To this end, experts assess the total degree of implementation of policies. There are three degrees of the implementation of specific policy instruments with assessments: 1 – low, 2 – average, 3 – high.

Tram stop in Krakow
Photo: ELTIS/Harry Schiffer

In the second stage a cumulative indicator value for the implementation of the given policy subject is determined by calculating the ratio of the actual implementation of policies to the maximum possible value in percent. E.g. a possible eight instruments planned for spatial planning result in a maximum score of 24.

In the third stage, a rating is proposed for each policy subject based on the implementation achievement, using a four-point scale:

1.	0 - 30%	The transport policy is not implemented
2.	31 - 50%	Risk of insufficient implementation of the transport policy
3.	51 - 70%	Transport policy is implemented reasonably well
4.	> 71%	Transport policy is properly carried out.

A first "trial" assessment was carried out in 2014, mainly among local experts from the Technical University of Krakow and representatives of the City of Krakow. The overall average score (46%) showed, according to stage III criteria, that there is an overall risk of insufficient implementation of the transport policies. Due to some general issues and the necessity to discuss and improve the procedure details, this score is not treated as valid for now. There is a need for update of the procedure and a next assessment will be organised.

LOCAL SPOTLIGHT:
Indicator selection in Dresden

Dresden's SUMP indicator selection has been a process carried out in several steps. In the first step transport planning experts of the city administration internally discussed proposed indicators for the SUMP draft. In the second step the indicator list has been discussed with internal cooperation partners from the same administration. Afterwards in a third step the indicators were discussed with stakeholders, politicians and external cooperation partners. The result is an indicator list with a total of 45 indicators, 11 of them as core indicators. The indicator list is an integral part of the politically adopted Dresden SUMP. The politicians also decided to carry out the SUMP evaluation every 3 years, starting in 2017.

The CH4LLENGE template was used to develop the Dresden indicator list. It was a useful tool to find possible indicators and to structure the selection process. Locally specific indicators complemented the indicators chosen from the template. The Dresden indicator list has been developed for the citywide mobility and transport development. In addition, the city administration has selected a set of single measures for monitoring and evaluation.

3.2.2 Identifying existing data sources and gaps and use of new data sources

In most local authorities, a range of data sources already exist such as

- traffic data for urban traffic control,
- public transport data, for operation and fare collection,
- surveys of customer satisfaction for public transport,
- travel survey data, e.g. from national surveys,
- accident data,
- socio-demographic data,
- monitoring data for urban air quality, in particular where there is a legal obligation to fulfil air quality standards, as is the case for European cities with two air quality directives in force
- other environmental data (such as tree counts, biodiversity indicators, noise maps),
- land-use data etc.

A challenge most cities face is that these data are not harmonised in terms of time scales, spatial coverage etc. and that data is often distributed between different data owners or holders, or data storage systems. Some data might also be costly to attain if it is commercially produced. A first step in developing M&E activities and selecting indicators is to produce an overview of the existing data sources, and contrast these with a list of potential indicators.

If it is anticipated that external circumstances will change significantly during implementation, it is useful to complement the data collection of indicators by modelling or experimental survey designs (see Hills & Junge, 2010) in order to improve the understanding of causal relationships between policy measures and outcomes.

An example of activities to improve the harmonisation and access to data is shown in the development of a Data Centre of Excellence for the West Yorkshire Combined Authority, as described in the local spotlight below. This example also shows the importance of complete documentation of data sets, and of ensuring data protection and preservation of data so that data can be meaningfully used in the future.

LOCAL SPOTLIGHT:
WYCA's Data Centre of Excellence

WYCA (West Yorkshire Combined Authority) recognises that good quality data and data management, monitoring and evaluation processes are fundamental to robust SUMP development and implementation. WYCA has been developing its practice across a range of thematic areas to move towards establishing operations as a Data Centre of Excellence. WYCA started from a relatively low base, with some good processes but limited quality and scope of data. Financial constraints and limited access to third party data has placed an emphasis on developing proportionate and future-proofed processes which are resource-light and consistent. The initial focus was on laying good foundations for data management through auditing existing data, exploring emerging data sources and introducing greater discipline, consistency and clarity into how data is stored, explained and communicated. The next stage was to make progress in developing evaluation techniques applying the improved data and embedding the new practice within the SUMP cycle.

SUMP Data storage and management

WYCA uses specialist Performance Management software as an organisation-wide data repository to manage key performance indicators to focus management attention on key metrics. As part of CH4 Monitoring and Evaluation Pilot, WYCA reviewed the use of the software and its contents. Weaknesses were identified in respect of decentralisation with many different users and uses resulting in duplication or a lack of consistency in inputting data. Actions have focussed on centralising management of the data, aligning the data to SUMP uses and performance reporting (e.g. inputting to SUMP Annual Monitoring Reports) and cleaning up data to improve application to scheme appraisal process.

After evaluating existing data sources and identification of gaps to measure all intended outcomes, it may be necessary to develop or identify new sources of data, at the minimum to cover the SUMP's main objectives. The following general types of data can be distinguished.

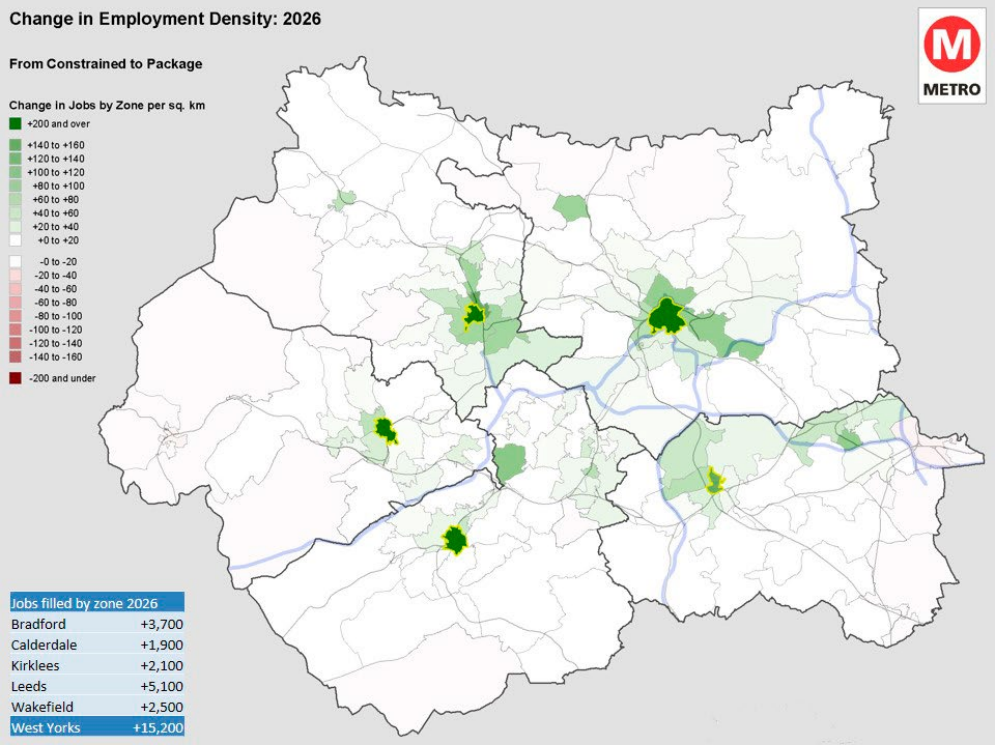
- Quantitative data from automatic measurements (e.g. traffic counts, GPS data etc.)
- Quantitative data from surveys (household, on-street, in-vehicle)
- Qualitative data from interviews or focus groups
- Qualitative data from diaries, journals, blogs, social media
- Modelling data to fill data gaps (see Figure 11 as an example for West Yorkshire)

The template for M&E plans suggests possible data sources for selected indicators. Further information on data sources and collection methods can be found in a variety of specialised handbooks and guidance manuals such as the CIVITAS guide for evaluation urban mobility measures (Dziekan et al., 2013) or COST-SHANTI guidelines for harmonising travel surveys (Armoogum, 2014).

3.2.3 How can barriers to getting data be overcome through institutional cooperation?

An area of concern for many planning authorities is the issue of data that is scattered around institutions. Access becomes a problem due to lack of information on existing databases, and because of reluctance to share the information, in particular when commercial operators are involved. Experiences in cities, e.g. in Dresden, have shown that early co-operation and involvement of other institutions in the planning process, potentially even starting with setting objectives can contribute to a higher willingness to co-operate and improve acceptance of the SUMP (see also CH4LLENGE Manual for Institutional Cooperation).

Figure 11: West Yorkshire Data from the Urban Development Model (UDM) to assess possible employment effects from transport interventions
Source: WYCA



3.3 Choosing the most appropriate data presentation, analysis and evaluation methods

After the selection of indicators, a choice has to be made on how the collected data will be presented, analysed and evaluated. Various methods are available to carry out programme and project assessments. Four principally different forms can be distinguished:

- the reporting and presentation of the original data, usually in condensed form, to identify problems and to assess whether given objectives are likely to be achieved,
- the statistical analysis of the data to identify project impacts and causations,
- the assessment of impacts against quantified targets, and
- evaluation methods that include some form of value judgement in the aggregation of data.

The choice of method will depend largely on external requirements, the size of the programme, technical expertise of staff and available data processing and software tools. In some cases, government or other funding bodies' regulations might require the application of a particular assessment technique such as cost-benefit analysis. At the minimum, regular reporting of data, either in paper form or through electronic media will be necessary. The following sections provide a brief overview of possible methods to provide some guidance. However, for more detailed advice on their usage, other information sources will need to be consulted.

3.3.1 How to present data and results to decision-makers and the public

The way monitoring and evaluation data is presented can have a significant influence on how the information is perceived. Decision makers in local authorities as well as business and local stakeholders often have limited experience with statistical analysis or evaluation and little time to read detailed reports or listen to extended presentations. Presenting results as numbers is often preferred over qualitative data because qualitative data is often perceived as less objective or less 'scientific'. However, qualitative information is generally appreciated as additional information. The following points need to be considered when choosing the data presentation format:

- Information needs to be clear and condensed; it should include a succinct summary, but offer the option to find more detailed data.

- Data needs to be presented in an easily understandable form. Data reporting methods are:
  - Summary tables
  - Visualisations of indicator developments (e.g. charts, maps)
  - Pictorial records (e.g. photos, videos)
  - Qualitative descriptions

- The key data presentations need to establish a clear link to objectives and values for the society and local administration.

Summary tables should be included for all quantitative data and the changes from the starting date and baseline illustrated by charts for key indicators. Maps are particularly valuable to illustrate regional differences and developments, in particular for accessibility, noise exposure or traffic flows and speeds. Pictorial records such as photos comparing before and after situations as shown in Figure 12 for a cycle friendly design in Örebrö can be a powerful tool to visualise changes in townscape after implementation of improvements to the built environment and are particularly useful for indicators dealing with perceptions of quality of transport supply.

Figure 12: Example pictorial record of before / after SUMP measure implementation
Source: Municipality of Örebrö, 2013, p. 14

Junction before being rebuilt

Junction with continuous cycle lane

LOCAL SPOTLIGHT:
Data presentation in Vienna

The Vienna City Administration is dedicated to strategic urban and transport planning for several decades. Monitoring of the performance and development of patterns in travel behaviour have been a part of Vienna's "Transport Master Plan 2003". The method of choice was recurring in-depth evaluations with 5 years between the publications. The full reports were published and are available for free on the city's website. Vienna considers this an important component of a transparent planning process.

The latest evaluation was finalised in 2013. Findings and conclusions provided the basis for the new "Urban Mobility Plan Vienna" which was adopted in December 2014 and sets the vision and tasks until 2025. This way Vienna addressed the SUMP cycle's essential steps "learn the lessons" and "prepare well/self-assessment".

Pedestrianised zone in Vienna
Photo: Magistrat der Stadt Wien

3.3.2 How to analyse indicators

Descriptive statistics, usually reported together with the summary tables, provide a summary of the main features for indicator data and are a way to identify changes over time. Trend estimations can be achieved using regression analysis. However, in order to be able to derive reliable conclusions from the analysis of the data, inferential statistical methods, e.g. hypothesis testing, need to be carried out. This is recommended only for the evaluation, not the monitoring of indicator data.

It is important to include comments on the statistical robustness of data and report any data issues that might have occurred during collection, e.g. changes or failures of monitoring equipment or skewed samples for surveys.

LOCAL SPOTLIGHT:
WYCA's SUMP Impact Reports

The production of 'Impact Reports' has been a theme of practice improvement in SUMP delivery for the West Yorkshire Combined Authority, WYCA. Impact Reports consist of a quantitative assessment of a project's' outcomes against SUMP objectives and targets, complemented by a qualitative evaluation or "lessons learnt". Impacts Reports are targeted at smaller scale interventions e.g. below £5 million in value, and are an attempt to gather intelligence in a proportionate, cost effective manner. They are produced for specific schemes for limited knowledge of impacts exists. Dedicated funding for the Impact Reports is included in the annual capital plan. The process is aimed at creating an evidence base of the impacts of a range of interventions, and using this knowledge to input to the identification and development of future delivery programmes.

3.3.3 Assessing impacts against quantified targets

The SUMP Guidelines (Rupprecht Consult, 2014) recommend setting measurable targets for the evaluation of impacts. According to these "Targets should be „SMART" (Specific, Measurable, Achievable, Realistic, Time-bound) and refer to the agreed objectives." Providing clear targets for each objective sets clear guidance for the direction of change and a way of measuring the extent to which objectives are achieved. If they are well defined, decision-makers and the public can easily understand them and they can be an incentive to aspire better results.

However, there is a risk that funding allocations from central governments or funders could be linked to target achievement which might incentivise local authorities to concentrate on a narrow set of indicators, neglecting wider impacts (Marsden et al., 2009, Marsden and Snell, 2009). A more flexible approach that leaves greater room for decision on targets at the level of the local authorities rather than applying a universal set targets is, therefore, preferable, as e.g. adopted for the latest rounds of local transport plans in the UK.

The following principles should be followed when setting targets:

- Targets should ideally be set for all objectives; otherwise there is a risk that those with a target implicitly receive larger attention than those without.
- Targets need to be (reasonably) equally cost-effective to achieve, otherwise the strategy will implicitly focus on those targets that cost least to achieve.
- Performance targets should be defined for core outcome indicators in the first step. Concentrating on those avoids inconsistencies that could occur between targets on output achievement and underlying objectives and reduces the burden of defining quantifiable targets for all indicators.

The development of SUMP indicators can then be monitored by comparing their development against the specified targets or directions of change in a checklist format. This can e.g. be illustrated by a traffic light system as in the SUMP for Lund (City of Lund, 2009), see Figure 13. This approach is useful in particular during monitoring if a limited number of indicators are observed or in the evaluation of SUMPS to assess whether the development of transport activity indicators follows the desired path.

Figure 13: Traffic light assessment example based on the SUMP for the City of Lund
Source: City of Lund, 2009, p. 14-15 (redesigned)

FULFILMENT **OF GOALS**

Goal		Goal 2013	Goal 2030	Outcome 2008 (base year 2004)	Signal
1	Increase proportion of inhabitants in the local authority who live in 'CP circles' within built-up areas. (CP circles = priority areas for expansion and utilisation according to the Comprehensive Plan).	increase	increase	increased	
2	District programme with development needs, proposed measures and focus will be produced for all built-up areas/districts.	all	-	follow-up in progress	
3	The physical traffic environment will be designed to increase the average speed of city bus traffic from 18 km/h to 22 km/h by 2013, and 23 km/h by 2030.	22 km/h	23 km/h	18 km/h	
4	Increase the number of pedestrian and cycle paths by 10% by the year 2013, and 30% by the year 2030.	+10%	+30%	+ 5%	
5	The proportion of safety-adapted pedestrian and bicycle crossings should be 30% by 2013 and 100% by 2030.	+30%	+100%	+ 46%	
6	Increase pedestrian traffic per inhabitant.	increase	increase	reduced	
7	Bicycle traffic per inhabitant will increase by 5% by the year 2013 and by 10% by the year 2030.	+5%	+10%	± 0	
8	Continually increase travel by public transport per inhabitant.	increase	increase	+15%	
9	Reduce motor vehicle traffic per inhabitant on the state and municipal road network	reduce	reduce	increased	
10	Reduce motor vehicle traffic per inhabitant on the municipal road network by 2% by the year 2013 and 5% by the year 2030.	-2%	-5%	+ 3%	
11	After new constructions, the travel time index for bicycles/cars will be less than 1.5 for journeys to district centres and built-up areas (relates to both housing and workplaces).	75% of future buildings	75% of future buildings	follow-up in progress	
12	After new constructions, the travel time index for public transport/cars will be less than 2.0 for journeys to district centres and built-up areas (relates to both housing and workplaces).	75% of future buildings	75% of future buildings	follow-up in progress	
13	Increase physical accessibility for disabled people, children and older people.	increase	increase	increased	
14	Reduce proportion of people who feel that the traffic environment is unsafe.	reduce	reduce	increased	
15	Reduce the number of serious injuries and deaths on roads by 25% by the year 2013 and 50% by 2030 (relates to both the municipal and state road network and the basic data comprises road accidents reported to police).	-25%	-50%	± 0	
16	Reduce emissions of carbon dioxide per inhabitant from traffic in the municipality by 10% by the year 2013 and 40% by 2030.	-10%	-40%	+12% (data from 2007)	
17	By 2013, all properties located along the municipal road network that are exposed to noise levels exceeding 61 dBA will have been offered grants towards noise reduction measures. By 2030, all properties exposed to noise levels exceeding 54 dBA will have been offered a grant. Noise levels relate to the Community Noise Equivalent Level, CNEL.	100 % with equiv. noise level exceeding 61 dBA	100 % with equiv. noise level exceeding 54 dBA	Offer according to plan. Since 2004 the number of residents affected by noise levels has decreased by 33%	
18	Increase the proportion of inhabitants in the City of Lund who state that they have been influenced by LundaMaTs.	increase	increase	+ 33%	

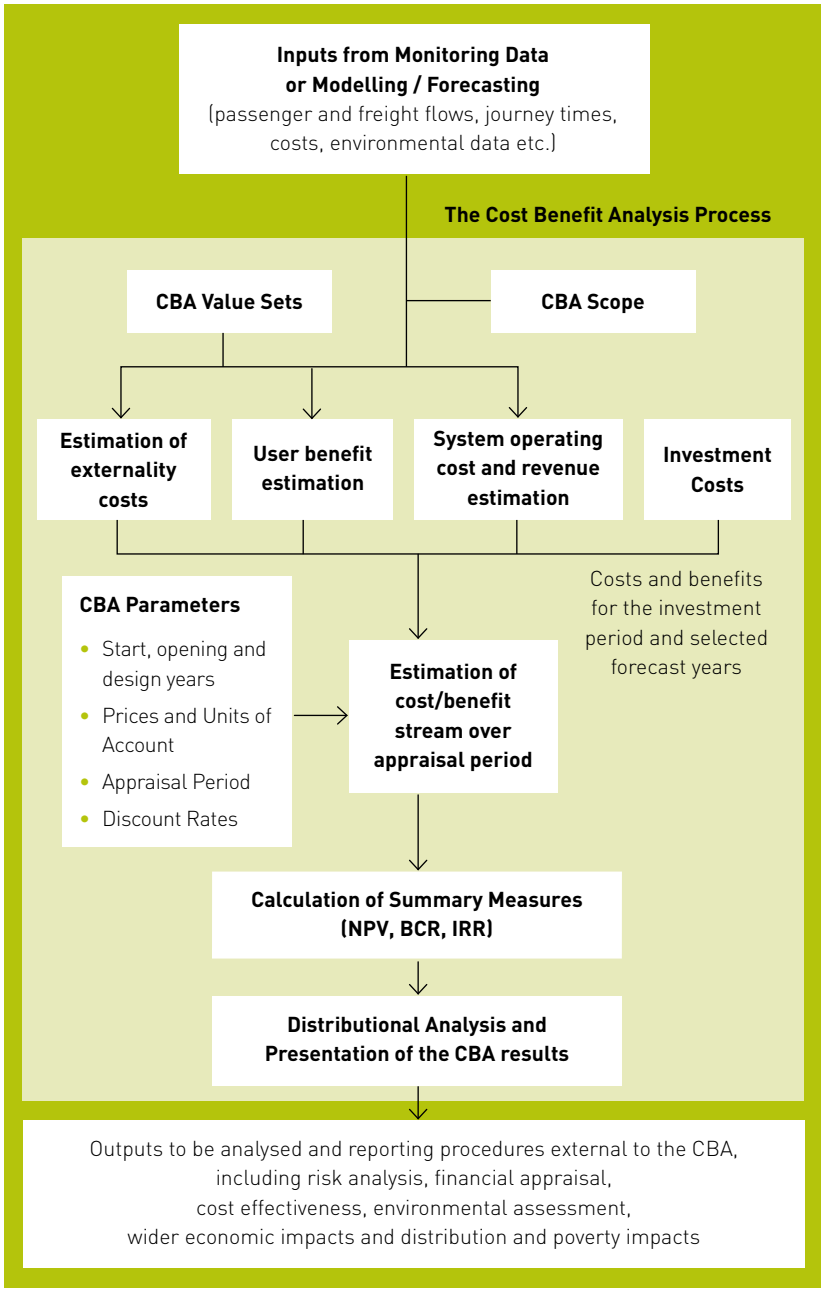
3.3.4 Evaluation methods

The previously described data driven statistical methods and comparisons against targets help to understand developments and indicate potential deviations from desired developments. In contrast, evaluation methods are judgemental techniques to present and aggregate data in a way that allows assessment of performance against multiple objectives. Formalised evaluation methods such as social cost-benefit analysis or multi-criteria analysis can be applied to provide decision-makers with information on how to weigh up trade-offs between the achievements of different objectives.

A social cost-benefit analysis (SCBA) adds up all positive and negative impacts of projects, expressed as monetary values, to a comprehensive measure of overall monetised welfare impacts of interventions on society. It is a widely used and accepted method, and standardised approaches for SCBA e.g. for the appraisal of transport infrastructure investments exist in many countries (Mackie & Worsley, 2013; Odgaard et al., 2005). Detailed web-based guidance that represents current state-of-the art in appraisal is e.g. available in the UK (Department for Transport, 2014). In addition, the HEATCO project developed a harmonised methodology for Europe based on national experiences (Bickel et al., 2004). SCBA provides decision-makers with a comprehensive and easy to understand measure of 'value for money'. A full SCBA should generally be carried out for large infrastructure investments, based on national guidance or, where this does not exist, the HEATCO methodology. Figure 14 illustrates the steps involved in the process of conducting a SCBA for appraisal of transport investments. For ex-post evaluation, actual data from monitoring will be used where possible, but might need to be complemented by outputs from transport models.

However, a significant shortcoming of SCBA is the necessity to provide monetary values for impacts that have no market price, in particular impacts on environment and equity. Generally, such monetary values exist for journey time savings, accidents and

Figure 14: SCBA process for the appraisal of transport measures
Source: based on World Bank, 2005, p. 7 (redesigned)

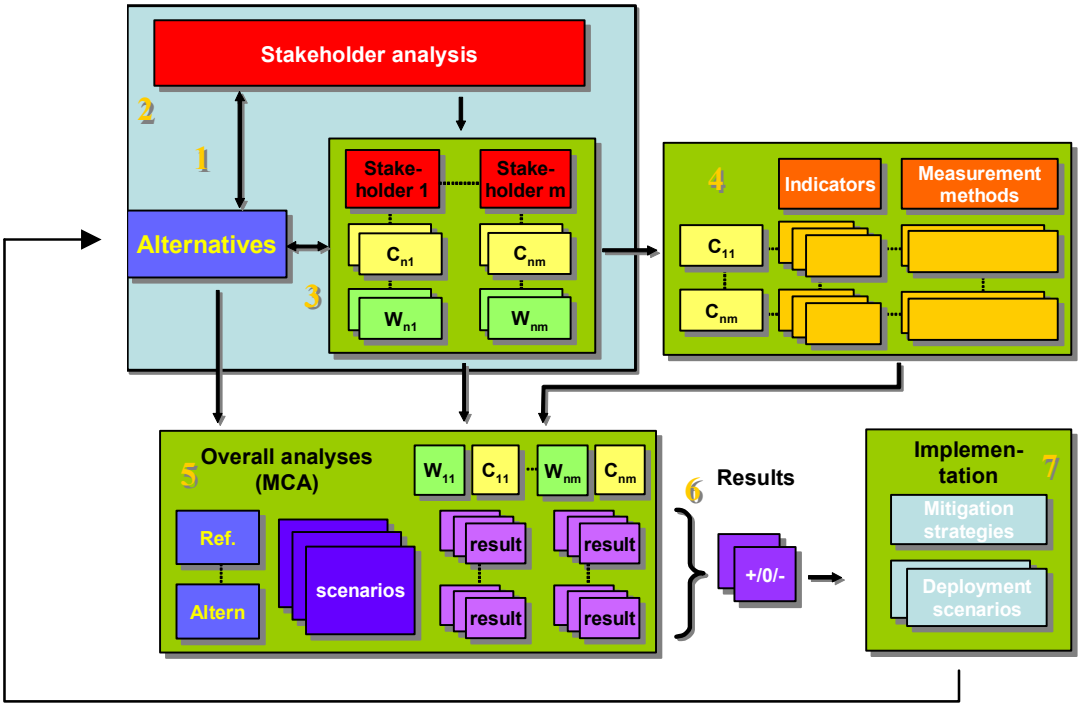


a limited number of environmental impacts such as greenhouse gas emissions, noise and air quality. In addition, SCBA assumes that all impacts can be traded off against each other and losses for some parts of the population today or in future can be compensated for by gains for others. In addition, a discount rate on future impacts is usually applied, assuming that the current generation prefers to have benefits now rather than in future. These assumptions can contradict the objectives of sustainable development, in particular for long-term, irreversible and socially unacceptable or unfairly distributed impacts.

Hence, for the evaluation of whole SUMPs, packages within a SUMP or individual measures for which SCBA is not well developed or incomplete, a multi-criteria analysis (MCA) approach is recommended which allows a more comprehensive inclusion of impacts. A comprehensive overview of MCA methods is provided e.g. in the Multi-criteria Analysis Manual by the Department for Communities and Local Government, UK (2009) or in Nijkamp & van Delft (1977). A simple form of MCA is the goal achievement approach which requires scoring the extent to which goals are achieved on a consistent scale for all impacts but does not weigh up objectives against each other. An example of such approaches is the Appraisal Summary Table as applied in the UK appraisal practice (Department for Transport, 2011). Other MCA methods apply a weighting to objectives and aggregate all impacts into a combined result. Different techniques are available to derive weights for objectives, e.g. ranking, rating, fixed point scoring, graphical scales or paired comparisons. It is recommended that stakeholders are involved in the development of weightings should these be applied in the city's SUMP, as illustrated in Figure 15. A sensitivity analysis needs then to be carried out on a range of weights in order to establish the robustness of results (see e.g. Gühnemann et al., 2012).

Other methods have been developed that mix MCA and CBA elements. Commonly the core of such an appraisal method is an SCBA that is complemented by non-monetary assessments of environmental or regional impacts. For SUMP evaluation, though, we recommend incorporating CBA results into the wider MCA framework through summary goal achievement tables or weighted approaches. Examples for such integrated methods are the Swiss NISTRA approach (ASTRA, 2003) or the approach applied for the Irish Secondary Road Needs Study (Gühnemann et al., 2012).

Figure 15: Method for a multi-stakeholder, multi-criteria analysis (MAMCA)
Source: Macharis et al. (2009), p. 187



LOCAL SPOTLIGHT:
SUMP evaluation of smaller Schemes in West Yorkshire

There are well-developed approaches in the UK for the appraisal of middle to large scale transport infrastructure schemes, prescribed and supported by central government. The approach to smaller scale interventions rests on a different evidence base and with local authorities and has not been so well developed. WYCA has been developing its approach to the evaluation of smaller schemes. An example is the approach to the "Bus Hotspots" programme - a collection of small scale interventions of approximately €50,000 to €200,000 to improve bus reliability and journey times. A simple evaluation process was developed, proportionate to the cost of the proposed schemes, which uses Bus Real Time data to measure the difference in peak and inter-peak journey times and service reliability at each proposed site. A template cleanses and collates extensive data into a concise two page summary. This approach allowed the prioritisation of those schemes that will potentially deliver the greatest impact. Scheme 'after' monitoring is now being undertaken to provide insight into impact. Further iterations will develop a full appraisal process that includes a value for money assessment.

Improved bus layover facilities in Wakefield, funded under the "Bus Hotspots" programme
Photo: WYCA

4 Expand your horizon

We hope you found this manual a helpful resource to learn more about monitoring and evaluation in sustainable urban mobility planning. If you want to expand your horizon even further we recommend having a look at the following material that complements this manual and is available on the CH4LLENGE website:

- **Quick facts brochure:** a concise summary of reasons for evaluation and monitoring and main steps in the process
- **M&E Plan template** that outlines the structure of local SUMP M&E plans with bullet points for expected content per section, including suggestions for M&E indicators.
- **Online learning course:** an interactive online course on how to develop an M&E plan, select indicators and carry out monitoring and evaluation for a SUMP
- **Deliverable 5.1:** a collection and summary of local M&E plans by CHALLENGE partner cities.

Many sections of the other three **CH4LLENGE Manuals** are also relevant, as indicated at several points in Chapter 3. These three manuals are listed at the start of Section 5.

If you are interested in even further material on monitoring and evaluation for SUMPs, you might wish to look at the following practice-based resources:

- The GUIDEMAPS handbook (GUIDEMAPS, 2004) provides helpful guidelines on project management as part of a successful transport decision-making process, including the planning of M&E activities.
- The CIVITAS guide for evaluation of urban mobility measures (Dziekan et al., 2013) **http://www.eltis.org/sites/eltis/files/trainingmaterials/evaluation_matters.pdf**
- An online network of transport professionals sharing knowledge on evaluation of transport schemes in the UK **https://khub.net/web/localmajorschemeevaluation**

Furthermore, CH4LLENGE has developed a great number of helpful resources on sustainable urban mobility planning that aim to assist mobility planners to initiate SUMP development and further optimise their mobility planning processes.

- **SUMP Self-Assessment:** a free, online tool that enables planning authorities to assess the compliance of their mobility plan with the European Commission's SUMP concept
- **SUMP Glossary:** a brief definition of more than 120 specialist words, terms and abbreviations relating to the subject of sustainable urban mobility planning
- **CH4LLENGE Curriculum:** an outline of key elements to be taught when organising training related to SUMP and the four challenges
- **Online course "SUMP Basics":** a comprehensive e-learning course for practitioners on the SUMP concept and the procedural elements of the SUMP cycle
- **Wikipedia article:** Join the Wikipedia community and contribute to the SUMP article that CH4LLENGE has published!

For more information join us on **www.sump-challenges.eu**

5 References

The other three CH4LLENGE manuals

May (2016) SUMP Manual on Measure Selection: Selecting the most effective packages of measures for Sustainable Urban Mobility Plans. Available from:
www.eltis.org and **www.sump-challenges.eu/kits**

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6 Key terminology

Term	Definition
Appraisal	Appraisal is the analytical process of judging the relative merits of strategies before they are implemented, using a structured methodology. Appraisals can involve both quantitative and qualitative approaches to analyse the likely effects of proposed policies and measures.
Assessment	Assessment refers to the act of judging the value, quality or importance of something.
Baseline	A comprehensive record of the current situation (e.g. existing infrastructure, modal split, congestion, air pollution levels, etc.) used to inform plan preparation. Establishing a baseline also allows for progress to be measured.
Evaluation	Evaluation is the systematic and objective assessment of an ongoing or completed plan, policy or measure, its preparation, implementation and results. The aim of evaluation is to determine the relevance and fulfilment of specified objectives and targets, i.e. evaluation reveals how well a plan, policy or measure has performed.
Indicator	Indicators enable us to measure the performance of a plan and therefore provide a basis for its evaluation. An indicator is a clearly-defined set of data that can be measured to allow for the monitoring of progress towards the achievement of a particular target. Indicators can be qualitative or quantitative and absolute or relative.
Measure	In the context of SUMP, the term measure refers to a policy, campaign or project that is implemented to contribute to the achievement of the SUMP's objectives and targets.
Monitoring	Monitoring is the systematic collection of data on specified indicators to provide authorities and stakeholders with an indication of the extent of the progress and the achievement of objectives in an ongoing plan. Monitoring provides information for potential adjustments and re-planning during the course of SUMP implementation in order to improve the final results.
Objective	An objective is a broad statement describing the improvements a city is seeking. Objectives specify the directions for improvement, but not the means for achieving it.
Strategy	A plan of action, comprising a combination of measures, designed to meet specified objectives. The selected measures should reinforce one another in meeting the objectives and overcoming barriers.
Target	Targets are the expression of a goal or aim in relation to an indicator. For example, if the indicator 'CO2 emissions from transport' is selected within a SUMP, a target could be to reduce the C02 emissions by 30% from the current level by 2025. Each target is therefore focussed on a specific topic (e.g. modal split; road safety) and defines what should be achieved by the end of the plan period in comparison to the current situation.

About CH4LLENGE

The EU co-funded project "CH4LLENGE- Addressing key challenges of sustainable urban mobility planning" (2013-2016) addressed four significant barriers for the development of Sustainable Urban Mobility Plans (SUMPs) in Europe.

Participation	Actively involving local stakeholders and citizens in mobility planning processes
Cooperation	Improving geographic, political, administrative and interdepartmental cooperation
Measure selection	Indentifying the most appropriate package of measures to meet a city´s policy objectives
Monitoring and evaluation	Assessing the impact of measures and evaluating the mobility planning process

Nine European partner cities were involved in CH4LLENGE and 30 cities outside of the consortium, all committed to improving their mobility planning and representing a diversity of cultures and contexts engaged in sustainable urban mobility planning. The CH4LLENGE cities were supported by a group of organisations with extensive experience of working on mobility planning and SUMPs.

For each challenge, the project cities analysed their local mobility situation, developed new strategies on how to tackle their urban mobility problems and tested solutions in pilot projects to overcome their barriers in participation, cooperation, measure selection and monitoring and evaluation.

Cities with extensive experience in integrated transport planning as well as cities aiming to initiate their first SUMP process should all benefit from the results of CH4LLENGE.

The CH4LLENGE Kits

Four CH4LLENGE Kits have been developed building on the results from CH4LLENGE training activities with local and national planning authorities, experience from further national and European SUMP initiatives, and from the CH4LLENGE pilot schemes conducted in the participating partner cities. Each kit addresses one challenge and consists of a comprehensive manual, a brochure and an interactive-learning course. Manuals and brochures are available in English, Czech, Croatian, Dutch, French, German, Hungarian, Polish and Romanian.

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www.eltis.org/mobility-plans

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