

The logo for SUMO consists of the letters 'SUMO' in a bold, dark teal, sans-serif font. The letter 'O' is replaced by a circular graphic element consisting of three concentric circles: an outer dark teal ring, a middle white ring, and a solid red inner circle.

**System for Evaluation
of Mobility Projects**

Based on MOST-MET

Document information

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Swedish Road Administration (SRA) preface

The transport of goods and people is a precondition if society, organisations and businesses are to work efficiently. At the same time, transports are responsible for a significant level of environmental impact and people are killed or seriously injured as a result of shortcomings in the road transport system.

We must work systematically to minimise these negative effects if we are to achieve a long-term sustainable transport system. Various types of measures are needed that influence transports, travelling habits, and road user behaviour. Information and communication are often effective in achieving change.

The aim of this report is to present a method for systematic planning, evaluation, and management of projects in this area. If evaluations are carried out in the same way it is easier to exchange experiences and compare similar projects. In the longer term this also offers opportunities to describe the correlation between communicative efforts and their impact on overall societal goals.

Soft parameters such as information and communication efforts are rarely followed up in the field of traffic. This often leads to unrealistic goals concerning the effects of specific projects. Only rarely can one directly evaluate how the number of fatalities or serious injuries is reduced or how carbon dioxide emissions are changed as a result of targeted information efforts. Instead, subsidiary targets are needed that reflect the work carried out within the project and the ability of the target group to assimilate the information. It may not be possible to differentiate between effects resulting from the project and effects as a result of overall changes in society. By using experiences from other fields, such as behavioural science and pedagogy, there are considerable opportunities to describe the efficacy of information and communication.

We hope that this report will have a widespread impact at the SRA, and among our customers and collaborative partners. We hope it will offer support to both individual projects and in efforts for sustainable travel and transport in general.

Borlänge July 2004

Per Lindroth, SRA
Head of Department
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Authors' preface

This report describes a tool for systematic evaluation of projects in the field of travel and transports, called SUMO, System for Evaluation of Mobility Projects. This is a further developed version of the evaluation toolkit MOST-MET and adapted to Swedish conditions in the field of road transport. MOST-MET¹ was drawn up 2000–2002 as part of the EU project MOST, MObility management STRategies for the next decades.

The report was commissioned by the SRA, but we believe its findings will be widely used as a result of the broad interest in this method from a large number of players in the Swedish transport and community sectors.

SUMO offers new opportunities to develop a system to collect results from evaluations in order to better understand the cause and effect relationship. The method can also offer improved project planning and help in setting relevant goals.

The contact persons at the SRA were Krister Wall and Camilla Åhman, SRA South-Eastern Region.

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Lund, July 2004

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¹ MOST-MET – *Toolkit for monitoring and evaluation, Guidance in analysis of Mobility management applications*, main author Timo Finke, Rheinisch-Westfälische Technische Hochschule Aachen – Institut für Stadtbauwesen und Stadtverkehr, ISB, Aachen, Germany, with contributions from Eric. N. Schreffler, ESTC, San Diego, CA, USA, Astrid Wilhelm, FGM-AMOR, Graz, Austria, Andreas Witte, ISB, Aachen, Germany, ISB, Klaus J. Beckmann, Aachen, Germany. Swedish translation by Trivector Traffic AB, SRA publication 2004:151.

Swedish Road Administration (SRA) preface	3
Authors' preface	5
1. Introduction to SUMO	8
2. Why monitor and evaluate?	10
3. What is SUMO?	12
3.1 Evaluation of mobility projects	12
3.2 SUMO analysis levels	13
3.3 When can SUMO be used?	13
3.4 The SUMO process	15
3.5 Examples in this guide	15
4. Describing the task and setting overall goals	17
4.1 Project description and overall goals	17
External factors (level Y)	17
Person-related factors (level P)	18
4.2 Setting targets	18
4.3 City-wide and site-specific projects have different target groups	19
4.4 Target groups	19
5. Description of working method	21
5.1 Choosing working method	21
5.2 Defining organisational planning	21
5.3 Description of mobility services and the expected effects	22
6. Formulating targets using the SUMO analysis levels	23
6.1 Setting targets at the different levels	23

7. Drawing up indicators and methods for the different analysis levels	25
7.1 Indicators that assist understanding	25
7.2 Methods for collecting data	25
7.3 Indicators and methods for the SUMO analysis levels	26
A – Useful achievements	27
B – Awareness of mobility service	27
C – Degree of use of mobility service	28
D – Satisfaction with the mobility service	28
E – Acceptance of the offer	29
F – Experimental individual behaviour	29
G – Satisfaction with the offer	30
H – Permanent individual behaviour	30
I – System impact	30
8. Evaluation is simple when the levels have been monitored	32
9. List of concepts	34
10. Suggested reading	35
About evaluating	35
About methods	35
APPENDIX	
Example 1 – Marketing and use of a travel policy at companies	38
Example 2 – Increased use of seat belts by employees at a haulage firm	40
Example 3 – Test traveller projects at companies	42
Example 4 – Combination of physical measures and mobility management	45

1. Introduction to SUMO

SUMO stands for System for Evaluation of Mobility Projects and is a toolkit for how this type of work can be run. Evaluation can be defined as assessing something in a systematic and well thought-out way. Mobility projects are projects that in various ways try to impact influence, travel habits and road user behaviour.

Monitoring and evaluation according to SUMO offers an opportunity to:

- compare with targets
- compare with others
- learn from results
- collect data for research and analysis of cause and effect relationships.

Project financiers, politicians and other players often want ways to measure short-term changes. It is unfortunately often difficult to show effects in the short term as much effort is invested in changing attitudes and behaviour, which is a process that takes time.

SUMO is based on an idea to measure effects at different levels. Targets, indicators, and results can be specified at these levels, which follow on from each other. This makes it possible to measure effects at an early stage in a project.

There is also much to be gained from using SUMO in project planning. Careful systematics is essential in the planning, implementation and evaluation of projects. By setting targets at the outset it is easier to achieve better results both for the individual project and for other projects that will benefit from experiences that have been recorded and monitored.

SUMO offers an opportunity to effectively plan, implement, and monitor mobility projects. By using this method you can measure the type of behaviour-changing projects that have previously been difficult or impossible to monitor. This report describes how to achieve this.

This toolkit for systematic evaluation can primarily be used in two cases:

- SUMO evaluation
- SUMO-inspired evaluation

The first case, SUMO evaluation, is described in this report. SUMO evaluation refers to an evaluation of mobility projects where the evaluation follows the definitions and levels of analysis advocated by SUMO. However, as illustrated later in this report,

this does not mean all levels must always be used. In the longer term this type of evaluation offers a basis for wider experience of the link between different types of behaviour-changing measures and their impact.

A SUMO inspired evaluation refers to an evaluation that has been inspired by SUMO. This means that thoughts, ideas and parts of the structure can be freely used; i.e., users can pick and choose suitable parts for the current evaluation. In this case, the field of application is much wider compared with recommendations for an evaluation according to SUMO. A SUMO-inspired evaluation can be used in many more fields of application, but there is less of an opportunity to obtain cause and effect relationships as the user makes adaptations to suit individual cases.

This report describes implementing an evaluation in accordance with SUMO. SUMO is designed to be used for mobility projects. As a user, you can choose to either carry out an evaluation in accordance with SUMO or a SUMO-inspired evaluation – you should however be aware of the differences and their consequences.

2. Why monitor and evaluate?

“Things you cannot measure cannot be changed”. This statement is true for most activities. It is important that we can demonstrate the benefits of different measures that can help to achieve the national transport policy goals. We must be able to:

- know that we are actually heading towards the goals
- show the benefits of our efforts and whether we are effective
- provide an opportunity for benchmarking
- provide input to enable a change in direction
- provide input for future investments
- share experiences from the project
- increase the knowledge base in order to produce cause and effect relationships.

To evaluate is to describe, explain and appraise a change or a result. The difference between monitoring and evaluation is not always clear. Monitoring involves measuring and describing what has happened, while an evaluation involves a deeper analysis of this change. Monitoring is therefore the foundation for evaluating the causes of a change.

In the short term the benefits offered by an evaluation are to show and understand the effects of an individual project. In the longer term there is a significant benefit in collecting experiences from several evaluations of individual projects to study cause and effect relationships.

Many projects are not monitored and evaluated. The reason is often, consciously or not, that we prefer to focus on the actual measures that lead to results rather than on monitoring. The problem is that we then cannot know whether the measures really led to a result.

To show a client that an activity is providing results is obviously important. It can be equally important to demonstrate actual achievements to the working team. This can influence job satisfaction and spirit.

Monitoring and evaluation offer an opportunity to compare results from one project with similar projects. This benchmarking can offer opportunities for knowledge building that cannot be attained by simply viewing individual projects.

Sometimes a change is necessary in the direction of a project. Perhaps the chosen method or parts of the procedure are not functioning as expected. Monitoring helps us to see where adjustments are necessary.

We live in a world where resources are scarce. To focus on the most cost-efficient measures is often an explicit goal for politicians and other clients. Monitoring and evaluation are important tools in steering towards cost-efficient measures.

We obviously wish to focus on measures that give the best results. Evaluation of implemented projects provides necessary knowledge for intelligent choices in future planning.

When experiences gained from your work are shared then there are greater opportunities for others to learn from these. This is a strategy that could be beneficial in the longer term. This includes both showing good examples and spreading experiences of things that did not work.

By better measurement, documentation, monitoring, and evaluation of projects we can increase insight into effects and the links these have with changed behaviour. In the longer term this offers significantly improved opportunities to produce verified cause and effect relationships, which can be used to calculate expected results of different measures. In this way projects can be directed and designed more efficiently with regard to the overall transport policy goals.

3. What is SUMO?

3.1 EVALUATION OF MOBILITY PROJECTS

SUMO stands for System for Evaluation of Mobility Projects and is a toolkit for how this type of work can be run.

SUMO is based on MOST-MET, which is a method to evaluate mobility management projects. Mobility management² can be defined as soft measures to influence a journey before it begins. MOST-MET³ was set up as part of the EU project MOST (Mobility Management Strategies for the next Decades), that ran between 2000 and 2002. MOST included about 30 partners in several countries in Europe. Swedish participants were Lund Municipality, with Trivector as MOST partner, and Karlstad Municipality. MET is short for Monitoring and Evaluation Toolkit. More information about MOST can be found at <http://mo.st>.

This report is a further developed version of MOST-MET adapted to Swedish conditions in the field of road transport.

We have chosen to use the work mobility project as a generic name for measures that in different ways try to influence transport, travel habits, and road user behaviour. This can of course concern mobility management, but also other types of project, including road safety projects (such as attempts to increase cycle helmet use) and changes at companies that work with transport as part of their management system. The SUMO thought model can also be used for evaluation in those cases where traditional physical measures are combined with information and collaboration with users at an early stage. However, this report mainly concerns evaluation of projects that aim to influence attitudes and behaviour. Various examples of applications are presented in the appendix at the end of the report. There are examples of pure mobility management projects, corporate-adapted measures, and projects where physical measures and mobility management have been combined.

The measurement of short-term changes is often requested by project financiers, politicians and other players. It is unfortunately often difficult to show this type of short-term impact as much effort is spent on changing attitudes and behaviour, which is a process that takes time.

For more information on MOST-MET, see the report "MOST-MET – Toolkit for Monitoring and Evaluation – A Guide to analysis of Mobility Management Applications".³

²Also see the definition of mobility management in Chapter 9, List of concepts.

³See Chapter 10, Suggested reading for more information on MOST-MET.

Much is to be gained by planning a project using the SUMO system. Careful systematics is essential in the planning, implementation and evaluation of projects. By setting targets at the outset of a project it is easier to achieve better results both for individual projects and for other projects which will benefit from experiences that have been documented and monitored.

3.2 SUMO ANALYSIS LEVELS

SUMO is based on tested methods and an idea to measure effects at different levels. The process that describes the evaluation procedure is illustrated in Figure 3.1. The design of SUMO is simple and the methods included are not significantly different from other guidelines for evaluations. However, SUMO is unique in how its targets, indicators, and results can be specified at different levels. The different levels follow on from each other. The system using levels enables the early measurement of the impact of the project. It is often useful to measure at several different levels, but not always necessary or even applicable. The type of project determines which analysis levels are applicable. Sometimes certain levels simply do not exist, sometimes these can be extremely difficult to measure.

The two upper levels are a description of the background and preconditions for the measures. The following levels in the model are measurable against different time horizons. Level A, “Useful achievements”, is measured within or as directly linked to a project, while the others are measurable retroactively as measures begin to have an impact. All levels may not be relevant for all types of measures.

The different *analysis levels* are the real core of SUMO. In addition, SUMO includes a description of the *process* that is required to be able to use and benefit from these levels.

SUMO also works from an organisational perspective. In a company or organisation that works with transports as a part of its management system, this could concern measuring:

- the number or percentage that are interested in a particular measure (level C)
- how well employees have understood decisions in the field (level D)
- the number or percentage that have accepted decisions and are planning to change behaviour (level E)
- the number or percentage that have changed behaviour based on decisions (levels F and H)
- experiences of those that have changed behaviour (level G).

(See Figure 3.1 on the following page.)

3.3 WHEN CAN SUMO BE USED?

SUMO can be used for most projects and measures that aim to influence attitudes and behaviour in traffic. MOST-MET was developed to measure the effect of mobility management measures, which concerned influencing attitudes and behaviour. The method can therefore be used for other projects and measures with a similar goal, such as road safety projects. The SUMO approach can also be used to evaluate traditional physical measures when these are combined with information, or for SUMO-inspired

evaluations in various types of projects (see also Chapter 1).

SUMO can be used as a method to find measures for the two first stages on the four stage principle⁴. It can also be used as a tool to concretise when a systematic method is needed to specify target groups or draw up different proposals when moving from project directives to project planning⁵.

SUMO can be used in both pre and post studies. Certain levels are suitable for both pre and post studies (Y, P and H, I), while the remainder are intended for post studies.

Four different examples of how SUMO can be applied are presented at the end of the report (see also Section 3.5).

SUMO analysis levels

Background	Y	External factors A description of the external conditions for the measures. These are the same for all users.
	P	Person-related factors Information about the personal situation for different individuals, in order to divide them into target groups etc.
Services	A	Useful achievements Describes the effort invested in the measure, to change behaviour, such as meetings, material distributed, data systems introduced, decisions on travel policy, etc.
	B	Awareness of mobility service Number/percentage aware of the measures or the project.
	C	Degree of use of mobility service Number/percentage that show an interest in the project or measures, and use the mobility services.
	D	Satisfaction with the mobility service Measures how satisfied users are with the services offered.
Option offered	E	Acceptance of the offer Number/percentage that have accepted the options on offer and intend to change behaviour.
	F	Experimental individual behaviour Number/percentage that test a new mode of transport/new behaviour.
	G	Satisfaction with the offer Shows if people that have tested the offer are satisfied with it.
Effects	H	Permanent individual behaviour Number/percentage that permanently change mode of transport or other behaviour in traffic.
	I	System impact Gives an estimate of how much vehicle mileage, emissions, accidents etc. have been reduced as a result of the change in behaviour.

Figure 3.1 The different analysis levels in SUMO

⁴See the definition of the four stage principle in the Chapter 9, List of concepts.

⁵See also the definition of project directives and project planning in Chapter 9, List of concepts.

3.4 THE SUMO PROCESS

In order to use the difference SUMO analysis levels, this must be planned from the very start of the project. This guide therefore includes a description of the process required to plan a project in accordance with SUMO.

Good monitoring and evaluation of a project start at the planning stage of a project. All too often thoughts about evaluation surface towards the end of a project. To think about evaluation at the outset in accordance with the SUMO process offers greater opportunities to target efforts and resources as efficiently as possible in a project.

The SUMO process (see Figure 3.2) describes the stages that must be carried out at the start of a project (drawing up the project description, targets, target groups, and working method) and studying the various analysis levels and deciding what is to be done. The targets and indicators that are to be measured, and how they are to be measured, is described for each analysis level. Then the process describes how analysis levels are used in monitoring and evaluation. In the SUMO process there are SUMO analysis levels in the steps that draw up targets and indicators and in monitoring and evaluation. Feedback from evaluation to improvements in an ongoing project or at the start of a new project, is a very important part of the process (to the right in Figure 3.2 marked symbolically with feedback arrows.) It is also at the evaluation stage that cause and effect relationships are drawn.

(See Figure 3.2 on the following page.)

Working with analysis levels at the outset of a project is necessary to be able to carry out monitoring and evaluation at these levels. This also helps steer the project in a systematic and methodical way towards the correct target group, organisation, and service (method for exerting an impact).

3.5 EXAMPLES IN THIS GUIDE

We will use an example to help describe how SUMO is used in the entire process, and at the different analysis levels.

The example chosen is a Test Traveller project. This project focuses on a defined target group, in this case employees at a company, who normally commute to work by car. These people are offered the opportunity to try travelling to work using public transport during a limited period. They are given information on travelling by public transport and a bus pass for the period involved if they promise certain things, such as taking part in various evaluations. This type of project has provided good results in many places.

The appendix includes other examples of how SUMO can be used.

Service and travel option on offer in the Test Traveller project:

Service: A test project where employees at a company could try travelling by public transport to and from work for 1-2 months. The service is a combination of "information and advice", "consultation", "information to increase awareness, training", and "transport-related products and services".

Option offered: To travel by another means of transport.

Procedure:

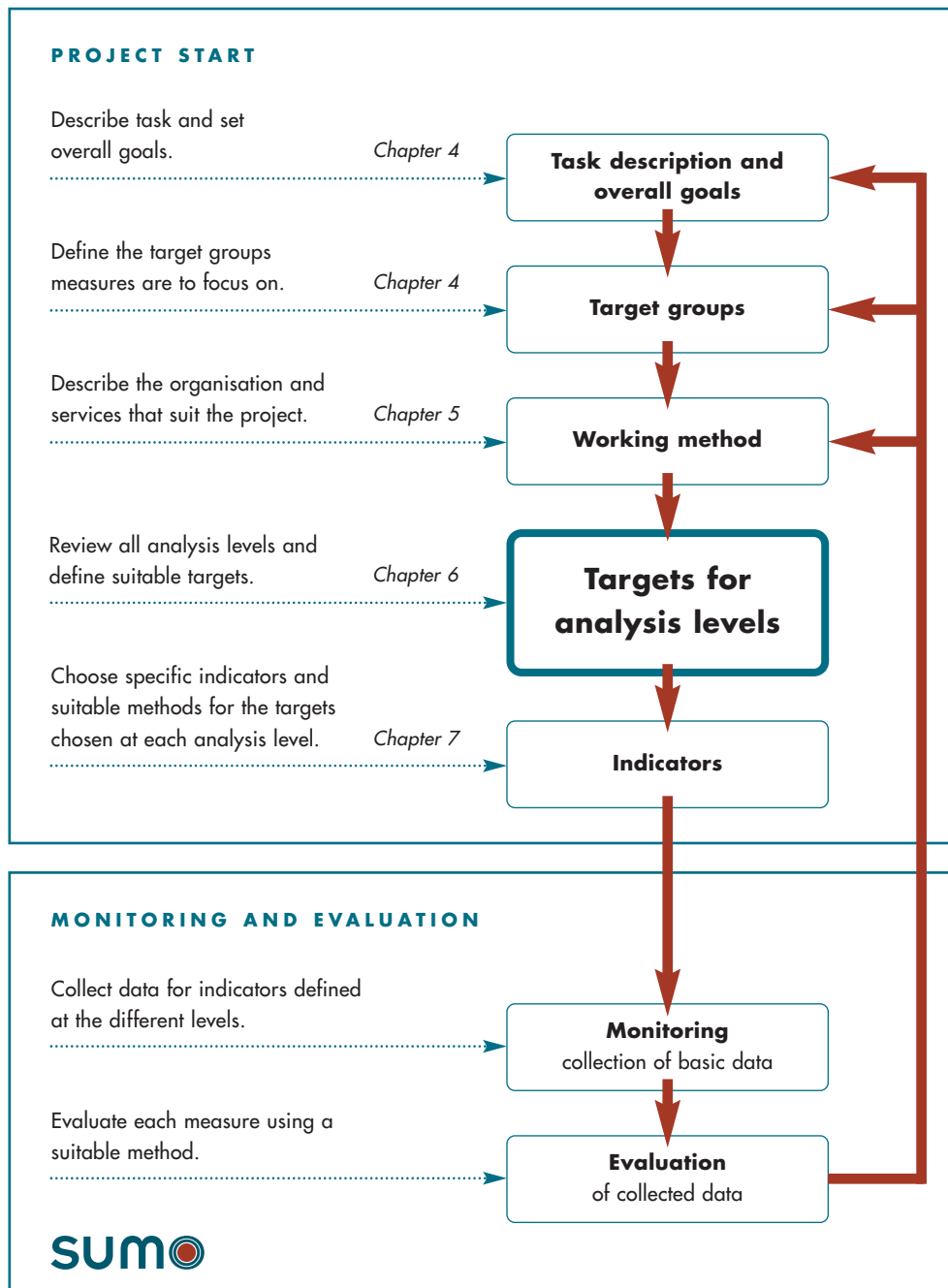


Figure 3.2 The SUMO process – a multi-step procedure initiated at the start when planning a project

4. Describing the task and setting overall goals

4.1 PROJECT DESCRIPTION AND OVERALL GOALS

In order to monitor and evaluate projects, it must be defined what a project is to achieve. It is important to formulate a project description. This should include a realistic and measurable target in addition to the overall purpose.

An example of a project description and overall goal for the Test Traveller project:

The project aims to persuade habitual motorists to change their habits and travel by bus to work in order to reduce environmental impact and congestion in the urban centre.

For county transport companies, the overall aim of the project is to increase opportunities to entice more people to travel by bus. It is interested in opinions from unaccustomed bus commuters to help improve commuter relations and to provide greater opportunities to increase the number of bus commuters in the longer-term.

The aim for the local authority is to reduce environmental impact and congestion.

Describe the task and draw up a schedule for when the different targets should be achieved and when measures (that should help to achieve them) are to be implemented.

The effects on behaviour resulting from the evaluated project should be discernable from other changes. It is therefore important to describe the background, i.e. the external factors (level Y) and the person-related factors (level P). In a comparison of pre and post data both external factors and person-related factors must be known to obtain fair results.

EXTERNAL FACTORS (LEVEL Y)

External factors are local conditions that are equal for all users. Examples of external factors include the location of a business, access to public transport, access to cycle paths, parking fees, legislation, and type of transport.

Knowledge can be found in secondary data, interviews with well-informed persons at the local authority, businesses and the preliminary assessment carried out as part of the project.

PERSON-RELATED FACTORS (LEVEL P)

Person-related factors refers to information about the personal situation for different individuals. Examples of person-related factors include age, gender, living and working conditions. This information can be used to sort individuals into target groups and to estimate the opportunities for individuals to change their current travel and behaviour patterns.

Several models are available to describe surroundings and carry out target group analysis. We recommend using a method that offers a systematic approach to describing background factors⁶.

Examples of external and person-related factors for the Test Traveller project are provided below:

Background	Y	External factors External factors that influence the possibility to travel by public transport include the location of the company and accessibility to public transport at different survey periods. The introduction of parking fees at a workplace is another external factor that can influence the result of the project.
	P	Person-related factors The person-related factors in this project include changed living or working conditions, such as moving to a new house, a new job, or changed working hours.

4.2 SETTING TARGETS

In order for measures and projects to achieve the desired effect, targets must be set in a suitable and constructive way.

Targets should usually be...

- clear and measurable
- challenging but realistic
- well established (understood and accepted)

...and preferably also...

- divisible into subsidiary targets
- both short and long term
- divided into stages for simple checking

A basic model that facilitates the development of these targets is called the SMART model. There are several different versions of SMART. The one we have chosen is:

S = Specific

M= Measurable

A = Ambitious

R = Realistic

T = Time-limited

⁶Concrete and useful methods and tools such as PEST and SWOT are described in Swedish in Projektverktyg – hjälpmedel för projektledare by Lena Börjesson, Gleerups Utbildning, Malmö, 2002.

Specific and clear goals should as far as possible specify what is to be achieved. “Cycle helmet use should increase” is far more specific than “Safety should improve for cyclists”. Even more specific would be “Cycle helmet use should increase among adults in town X”.

If the targets are not formulated to make them measurable then they are not binding. “Cycle helmet use among adults in town X is to rise from 10 per cent to 15 per cent” is one such measurable target. This target requires a preliminary assessment, so that one knows the starting point, in this case that cycle helmet use is 10 per cent.

Ambitious and demanding targets stimulate activities to achieve them, while targets that are easy to achieve do not give this effect. A target that “Cycle helmet use is to increase by 0.5 per cent” would not give an effect.

However, it is important that targets are not so ambitious that they become unrealistic. Many times one is so keen to achieve a result that the targets set are unrealistically high. This leads people to give up quickly as they are perceived as unattainable. The challenge is to make the targets both demanding and realistic.

Targets should also be time-limited. This is necessary if work is to be efficient. “Cycle helmet use among adults in town X is to rise from 10 per cent to 15 per cent between 2004 and 2006” shows how a time-limited target can be formulated.

4.3 CITY-WIDE OR SITE-SPECIFIC PROJECTS HAVE DIFFERENT TARGET GROUPS

SUMO can be applied to different forms of mobility projects for either a whole city (broad campaigns targeting all inhabitants, mobility offices etc.) or a specific place (i.e. targeted measures in a residential area, at a company etc.).

City-wide applications often include all inhabitants and visitors to a city or region, but could also concern a specific target group, such as young people in a city. Target groups are often heterogenic and it is therefore often necessary to identify several target groups with different needs. One general weakness with a city-wide application is anonymity among people included in the target groups.

Site-based applications of mobility management and other mobility projects concern individual journeys to or from a specific place, i.e. a company. Often the people included in target groups are known and mobility services can therefore be tailored for their individual needs.

4.4 TARGET GROUPS

It is important to define target groups for different measures in a project, in part to focus measures on groups that can produce the greatest effect. This concerns a description of level P in the SUMO model. The division of target groups can be based on various criteria, such as:

- the aim of the journey
- journey relations (i.e. different combinations of start and destination points)
- geography, such as living in a certain area, or a town (see above)

- mode of transport, such as car, public transport
- attitudes towards measures divided into age group or other characteristics
- various changes in life, such as people that have recently moved house, changed work or had children.

List possible target groups for defined measures. Target groups are used to divide the population based on typical characteristics relevant to the measures. Members of a target group have similar needs and travel patterns but often different ways of assimilating information.

Sometimes one can have primary and secondary target groups. such as corporate management or union representatives, who are in turn to reach employees.

Examples of city-wide and site-specific target groups for the Test Traveller project

City-wide target groups could be all work commuters.

However, in the Test Traveller project we want to focus on site-specific target groups, which are employees at three major workplaces who commute by car.

Describe the target groups also, including typical characteristics and how these target groups can be reached. Typical characteristics could include various travel habits.

Examples of target groups and descriptions of these target groups for the Test Traveller project

The project focuses on car commuters at three major workplaces, x, y, and z.

Of these the campaign particularly targets persons that live in towns with good bus connections to each workplace.

The people selected should be typical car commuters with an adequate public transport alternative.

Monitoring and evaluation must be carried out in such a way that one can identify and measure changes in the group's travel patterns. The size of the target group and the region's total population is important to place effect achieved in relation to the target group and total population or traffic volume.

5. Description of working method

5.1 CHOOSING WORKING METHOD

As previously stated, SUMO is based on MOST-MET that has been developed to evaluate work with mobility management. Mobility management often uses various instruments or organisational forms to offer services aimed at reducing the environmental impact of transports.

SUMO is expected to offer a broader application. The system could be used for different types of mobility projects, i.e. projects that in various ways aim to influence mobility. These could be both pure mobility management projects and other projects to influence attitudes and behaviour, such as road safety projects. Physical measures can also be evaluated when these are combined with information and communication.

The organisation and services should be chosen based on the defined aims and the identified target groups for the project. Experience from European research projects shows that the choice of a suitable organisation is an important success factor.

List and carefully describe the organisation and services that are planned in the project. This description helps to clarify exactly what needs to be planned. It can often be useful to base this on an existing organisation. It is suitable to create specific descriptions of the planned organisation and services including areas of responsibility. Expected effects of the services should also be described specifically for each target group.

5.2 DEFINING ORGANISATIONAL PLANNING

The organisation of work and responsibilities within the mobility project naturally depend on the aims of the project. There are several ways to organise work in mobility management, and a number of instruments⁷ exist for this. These include:

- mobility centres
- mobility offices
- mobility managers
- mobility advisors
- mobility coordinators
- mobility plans.

SUMO has a slightly broader approach and this could therefore include other ways to organise work and even other instruments for this; e.g., different types of road safety projects or efforts within a frame for quality and environmental management systems at a company or organisation.

⁷For definitions see: MOST-MET – Monitoring and Evaluation Toolkit.

Examples of a description of the organisation and instruments for the Test Traveller project

The Test Traveller project is run as a subsidiary project within the Mobility Office. Several mobility advisors are used in its implementation.

5.3 DESCRIPTION OF MOBILITY SERVICES AND THE EXPECTED EFFECTS

Mobility management uses the concept of the six pillars, which are six different “service areas”. These are also applicable to the broader approach where SUMO can be used. These are:

- information and advice
- consultation
- sales and booking
- information to increase awareness, training
- transport logistics and coordination
- transport-related products and services.

Information and advice is the very nucleus in efforts to change attitudes and behaviour. This concerns all information about sustainable transports, including road safety.

Consultation is a more extensive form of advice offered to customers. This could be direct action in public transport or advice on sustainable travel over-the-counter or at companies.

Information to increase awareness, training includes all activities that make people aware of sustainable travel. These activities could be campaigns, but could also be different types of training courses, such as in the fields of road safety or eco-driving.

Transport logistics and coordination is about efficient ways to organise sustainable transports. This could include coordinated goods transports and special public transport solutions such as buses to a disco, event or club activity, but also car pools and car sharing.

Sales and booking could concern booking car pool members and sales of tickets to various sustainable transport services.

Transport-related products and services could include cycle rental, cycle helmets, and other types of services.

Example of a description of services and their expected impact from the Test Traveller project

The Test Traveller project is a combination of “information and advice”, “consultation”, “information to increase awareness and advice”, and “transport-related products and services”. Car commuters are recruited through information meetings at three major companies to test public transport for two months. These commuters will be offered detailed advice, public transport passes, etc. The expected effect is to provide a good picture of the opportunities offered by public transport and an increase in public transport use among participants. Another effect is to increase awareness in the community of the opportunities offered by public transport through media attention.

6. *Formulating targets using the SUMO analysis levels*

6.1 SETTING TARGETS AT THE DIFFERENT LEVELS

Evaluation in accordance with SUMO analysis levels permits project monitoring both during and after the project and offers an opportunity to compare projects with each other.

Based on the overall goals for the project, detailed targets are defined for the different analysis levels. These targets should be realistic, measurable and time-limited. Sometimes it can be easier to formulate targets for the different analysis levels in reverse, based on the system effect goals for the project. As previously stated, it is not always applicable or desirable to use all levels for monitoring and evaluation of a project.

The table that is drawn up at the outset of the project with formulated targets for the different analysis levels can later be used as a template for monitoring. By adding the most important results to this during the project a clear summary of how far the project has progressed and of the results achieved is obtained.

Figure 6.1 shows examples of targets for the different analysis levels in the Test Traveller project. We have consciously chosen to formulate targets for each level. However, it is more common to choose one or a couple of levels where it seems most relevant to have targets. At the project planning stage, it is important to have thought through all levels to find the most interesting levels for each individual project. Further examples are presented in the Appendix.

Example of targets in the SUMO analysis levels for the Test Traveller project

LEVEL	TARGETS
Useful achievements	Information campaigns to recruit test travellers have been carried out at at least four different companies in March.
Awareness of mobility service	At least 80 per cent of persons at the company know about the project.
Degree of use of mobility service	At least 200 persons have participated in information meetings at the companies.
Satisfaction with the mobility service	At least 90 per cent of participants at meetings are satisfied with the information.
Acceptance of the offer	At least 50 persons agree to become test travellers.
Experimental individual behaviour	At least 45 persons test public transport at least 3 days per week for two months.
Satisfaction with the offer	At least 40 persons are satisfied with the tested public transport option.
Permanent individual behaviour	At least half of the test subjects (25 persons) continue to use public transport at least 3 times a week.
System impact	Carbon dioxide emissions are reduced by at least 20 tonnes per year.

Figure 6.1 Example of targets in the SUMO analysis levels for the Test Traveller project

7. Drawing up indicators and methods for the different analysis levels

7.1 INDICATORS THAT ASSIST UNDERSTANDING

It is often difficult in practice to directly measure travel habits and the impact on traffic for different measures. Indicators can be used instead. Indicators are data that are easy to measure and have been chosen or compiled to illustrate changes that cannot be measured directly.

Indicators are specified for each planned service and target group and for each of the analysis levels. Indicators are chosen to be consistent with the defined targets. For some levels and targets it is sufficient to register or measure numbers, while for others it may be better to describe indicators in terms of a percentage. The method or methods used to collect data is to be stated for each indicator.

It is not possible only to focus on quantifying changes, such as the number of motorised kilometres. It is also important to study why these changes have taken place. This means the list of indicators should also include reasons for the changes in behaviour.

Indicators used are slightly different for city-wide and site-specific projects.

7.2 METHODS FOR COLLECTING DATA

A large amount of different types of data can be interesting to study. However, data collection requires extensive effort and is often expensive. It is therefore important to carefully identify which data are necessary for monitoring and evaluation of the project for the chosen indicators. Before starting a project, one should carefully think through which behavioural measurements are required before the project begins. This is necessary to compare and measure the effects of implemented measures.

In principle, data collection should be carried out regularly (each year, month, week etc.) in order to monitor changes in user situation and behaviour, increased programme efficiency and the impact of this on the transport system. While planning the project one should decide how often data collection should take place. For the Test Traveller project, it is suitable to measure travel behaviour before the test period, during the test period, and 6 and 12 months afterwards. Documentation of useful achievements should be carried out continuously.

Examples of data that could be necessary for monitoring and evaluation of the Test Traveller project

- Number of contacted companies
- Number of people at the companies that are aware of the project
- Number of people that have attended information meetings
- Number of people attending information meetings satisfied with the information
- Number of people that have applied to become test travellers
- Number of people that actually become test travellers
- Travel patterns for test travellers before the test
- Number of test travellers satisfied with the test
- Number of test travellers that continue to use public transport after the project

There are many different types of data collection methods:

- Individual studies
- Site studies
- Documentation
- Calculations.

The choice of data collection method is dependent on the type of data of interest. Several different types of method can be used and the most common division is that one separates qualitative and quantitative methods. The methods are used to answer different types of questions.

Qualitative methods are used to acquire a deeper understanding of an occurrence. These can also be used to gain insight ahead of a quantitative study. Qualitative studies could be focus groups and in-depth interviews where the result cannot be used for quantitative descriptions.

Quantitative studies are carried out to gain statistically reliable results. This could be through questionnaires, telephone surveys or private interviews etc. Questionnaires are a popular method, often without sufficient knowledge on the part of the user. Experience and knowledge is necessary to draw up a good questionnaire. For larger studies, at least one pilot study should be carried out before the real study.

One special type of quantitative study is a travel habits survey, used to describe travel for a group of people. This material can be used to produce a wealth of different data.

If the necessary expertise is lacking, then we recommend that a professional market research firm is used. Experience from the MOST project indicates that this produces better survey data.

7.3 INDICATORS AND METHODS FOR THE SUMO ANALYSIS LEVELS

Overall goals for environmental and road safety projects are usually to reduce emissions and reduce the number of people killed and injured in traffic. Direct measurement of these targets is difficult and takes a long time. Using SUMO for measurements at a number of early stages in the project can provide valuable information as the project progresses.

It is often useful to measure at several different levels, but not always necessary or even possible to measure at all levels. The nature of the project determines which analysis levels are applicable. Sometimes certain levels simply do not exist, and sometimes these can be extremely difficult to measure.

A summary of indicators and results in the Test Traveller project is presented in Example 3 of the Appendix.

A - Useful achievements

Useful achievements are a measure of the basic effort within a project to influence attitudes and behaviour. This measure is particularly important in areas where a barrier must be overcome and where an initial phase requires major effort and investment in marketing, training, and setting up administrative routines. Examples of useful achievements include the number of meetings held with companies or businesses, the number of brochures distributed, the number of newspaper advertisements, TV spots, and radio reports.

Method

Useful achievements are measured by continuously noting what is being carried out and quantifying the volume of achievements using simple summaries to keep track of how many have been reached by certain information (documentation).

Start collecting data as soon as the project begins and continue during the entire project length.

INDICATOR	METHOD
Number of companies that have received an information letter, perhaps divided into different types of business.	Documentation
Number of meetings with businesses	Documentation
Number of brochures distributed	Documentation

B - Awareness of mobility service

A basic prerequisite for using the services on offer is that one is aware that they exist. This awareness could be achieved through marketing activities included in the useful achievements. Measuring awareness of the service provides a measure of how well-known these are.

Good awareness about a project has its own value even if this may not mean everyone can or wants to participate in the project. Awareness that schools in a town are working with a road safety project can highlight the issue and lead to valuable discussions at home. One clear example is a carpooling system at a company. This can only be a success if employees are aware that it exists.

Method

Interviews with employees (all or a selection) about their awareness of a carpooling system provides a measure of how successful the marketing of the service has been.

Examples of indicators and collection methods for awareness in the Test Traveller project are presented below.

INDICATOR	METHOD
Number and percentage of employees aware that the Test Traveller project is taking place.	Interviews/surveys

C - Degree of use of mobility service

The degree of use should reflect how many people utilise the services offered (such as getting information about the new travel option). The number of users is a measure of how popular the services are. However, using the services should not be confused with actually accepting the offer and changing behaviour.

Method

Utilisation of a carpooling service is measured by counting how many people have used the service, e.g. searched a central carpool database to find others interested. The number of people that came to the Home and School meeting on road safety at the school could be another similar measure.

Examples of indicators and collection methods for utilisation in the Test Traveller project are presented below.

INDICATOR	METHOD
Number of people that participated in information meetings about the Test Traveller project. This could be expressed as the percentage of employees who participated.	Documentation/registration

D - Satisfaction with the mobility service

Satisfaction with the mobility service is a measure that aims to reflect how well the project meets the need for the service. Satisfaction can be measured through interviews with a few people that have used the service. This provides useful information about how the service could be improved to better meet the needs present.

Method

In the example with the Test Traveller project satisfaction with an offered service can be measured through interviews or through questionnaires to all or a few of the those who attended information meetings, for example and how they perceived the information.

Examples of indicators and collection methods for satisfaction with the offer in the Test Traveller project are presented below.

INDICATOR	METHOD
Number of people attending the meetings who are satisfied with the information they received there.	Interviews / questionnaire surveys

E - Acceptance of the offer

The percentage of people who express willingness to accept the offer, i.e. said they are willing to test the offer (new travel option, receiving a cycle helmet, etc.), is a measure of acceptance of the offer. However, this does not mean that these persons actually test and use the offer. In a company or organisation acceptance can be expressed as a percentage of employees that accept management decisions governing travel choices at the company.

Method

Registering the number of people that contact a suggested carpooling group or who receive a cycle helmet with the intention of using it is a measure of acceptance for the offer. Note that acceptance of an offered service does not necessarily mean that people actually change their behaviour or even try the offer.

Examples of indicators and collection methods for acceptance in the Test Traveller project are presented below.

INDICATOR	METHOD
The number of people that after receiving information about requirements are interested in becoming a test traveller. Can be stated as a percentage of the employees who are interested.	Interviews / questionnaire surveys

F - Experimental individual behaviour

Many projects are run during a specific time, such as a campaign month. During this time, individuals are encouraged to test new behaviour, something that can be called experimental behavioural change. The temporary behavioural changes measured here should not be confused with permanent behavioural changes.

Method

To be able to assess the impact a measure has on individual behaviour one must have a measure of behaviour before the project is implemented. Behavioural changes for each project participant, or a selection of persons, are measured and compared before and during the project. These initial levels could have been identified earlier, perhaps as participants were chosen for the project, but if necessary these can be identified retrospectively with questions to people about what they used to do before the project started.

Examples of indicators and collection methods for experimental individual behaviour in the Test Traveller project are presented below.

INDICATOR	METHOD
Percentage of public transport days per week during the test period.	Interviews / questionnaire surveys
Distance travelled.	Interviews / questionnaire surveys
Number of people that travel by public transport at least 3 days per week during the test period. This could be expressed as a percentage of employees.	Interviews / questionnaire surveys

G - Satisfaction with the offer

Satisfaction among participants with the travel options, offer or new behaviour that they have tested is a prerequisite for a repeated and hopefully permanent behavioural change. Satisfaction with the offer is a measure of how well the alternative fits the existing needs. This is true for both pure mobility management projects and for efforts that are based on management decisions at a company.

Method

Satisfaction can be measured through interviews with all or a few of the people who changed their behaviour during the test period. This provides useful information about how the travel alternatives could be improved to better meet the needs present.

Examples of indicators and collection methods for satisfaction with the travel alternatives in the Test Traveller project are presented below.

INDICATOR	METHOD
Percentage of people satisfied with the public transport option in the test situation.	Interviews / questionnaire surveys

H - Permanent individual behaviour

The overall goal in mobility projects is that the change in behaviour becomes permanent at the end of the project. Through questionnaire surveys or interviews with those who took part in the project after its completion, information can be obtained about enduring changes. These surveys should take place several months, sometimes preferably one year, after the end of the project to enable a better overview of permanent changes.

Method

In the same way as for experimental behaviour, it is important to have something to base a comparison on. The behaviour of each project participant, or selection of persons, is surveyed about one year after the end of the project. This could concern how many people permanently carpool to work one or more days per week or how many use cycle helmets when travelling to work a while after a cycle helmet campaign was conducted at the workplace.

Examples of indicators and collection methods for permanent individual behaviour in the Test Traveller project are presented below.

INDICATOR	METHOD
Percentage of public transport days per week a while after the project.	Interviews / questionnaire surveys
Number of people that travel by public transport at least 3 days per week a while after the project. This could be expressed as a percentage of employees.	Interviews / questionnaire surveys

I - System impact

Measuring cause and effect relationships at a systems level is very interesting as this offers valuable feedback about the type of measure one should focus on.

Permanent behavioural changes can offer enduring changes to the road transport system, in the form of reduced emissions, less vehicle mileage, fewer accidents etc. The sum of these changes within a target group shows the impact each service or instrument has had at a system level. This total is estimated using data collected at previous levels.

A drop in vehicle mileage could be a measure at a system impact level and this can be converted into reduced emissions. Data collection must however ensure that one can see how vehicle mileage is distributed between the different modes of transport.

Method

Estimates of emissions are preferable to measurements of outdoor air, as it is often difficult or impossible to measure this type of change in the short term. In addition, measurements only note levels of emissions and not the quantity of discharged substances. For CO₂ emissions, it is only worth measuring the quantity of emissions while the content is less interesting.

To facilitate a comparison between projects it could be useful to focus on one or a few pollutants. As carbon dioxide is one of the most difficult issues to rectify, a report should at least include this. Other interesting substances could be emissions of nitric oxides and particulate matter, which are important for environmental quality standards.

It is more difficult to quantify the system impact in terms of fewer injured and killed in traffic for road safety projects that lead to an increased use of protection equipment, like cycle helmets, or a reduction in speeding offences.

The system impact is calculated by comparing the situation before and after a project. For some projects it could be interesting also to measure changes during the project.

Examples of indicators and collection methods for system effects in the Test Traveller project are presented below.

INDICATOR	METHOD
Reduced vehicle mileage in 10 km units	Calculations
Reduced carbon dioxide in tonnes	Calculations

8. Evaluation is simple when the levels have been monitored

If preparations have been systematic and methodical, in accordance with this report, and there is sufficient know-how about evaluation methods, the monitoring and evaluation stage is simple to complete. Overall the monitoring and evaluation in accordance with SUMO offers an opportunity to:

- compare with targets
- compare with others
- learn from results
- collect data for research and analysis of cause and effect relationships.

Evaluation can be defined as assessing something in a systematic and careful way. The difference between monitoring and evaluation is that monitoring involves measuring and describing events, while an evaluation involves deeper analysis and explanation of a change. Monitoring means the collection and storage and often compilation of data necessary later to interpret the impact of applied measures. Evaluation involves an analysis of collected data, such as estimates of reduced motorised vehicle mileage or changed transport habits etc. and to draw conclusions concerning cause and effect, etc.

Ideally in an evaluation one has or carries out a pre study that is followed by one or more post studies over a period of time that allow improvements to the application. Post studies should be carried out at regular intervals adapted to the planned measures.

If a retroactive evaluation of measures was necessary then the lack of a preliminary study (basic documentation/measurement of the initial situation) can to some extent be compensated for by asking questions retrospectively. However, this is not recommended as there is a high degree of uncertainty in such a method.

Time aspects in monitoring and evaluation are important. Changing attitudes and behaviour takes time. The last two analysis levels often take one or several years before they can be measured.

During the project, the results from the different levels are added successively as these become available or are measured. Examples of these are presented in Example 3 in the Appendix.

In order to estimate the cost-efficiency of various measures, it may be a good idea also to document and monitor costs for the different measures and services. This is not actually included in SUMO but can be registered together with other results for the different levels of the project. Examples of expenses could be costs for in-house staff or con-

sultants, printing and postage costs for information material, and rental costs for meetings.

One of the most important long-term aims of monitoring (measuring) and evaluating is to gain basic data for cause and effect relationships. By using SUMO, one can estimate the effects of specific measures at the different levels and over time create a system to collect these experience.

As SUMO enables a uniform monitoring process for mobility projects, it will be possible in the longer-term to know what action etc. is necessary to achieve a specific impact on the system.

If monitoring is carried out at the same levels for similar projects then the cause and effect relationships can be linked to these. However, project results must be collected and made available for research if they are to be used to study these relationships. In the long term, a common database is required to collect these data.

9. List of concepts

Offer

Refers to an option that mobility services aim to persuade target groups to use. The offer differs depending on the type of project. Examples of an offer include:

- following a travel policy
- using a seat belt
- travelling by a different mode of transport (such as the Test Traveller project)
- using a cycle path (a combination of mobility management and physical measures).

The four stage principle

An approach used by the SRA in action analyses for the road transport system. Stage 1 and 2 consider alternative measures that influence the demand for transport, the mode of transport and more efficient use of the existing road network prior to using stages 3 and 4 which consider road improvements or new construction.

Mobility projects

Measures that in various ways attempt to influence transports, travel habits, and road user behaviour, i.e. mobility.

Mobility services

A general term for the methods used in mobility management:

- information and advice
- consultation
- information to increase awareness, training
- transport logistics and coordination
- sales and booking
- transport-related products and services.

These methods are also applicable for a broader application of SUMO defined as mobility projects.

Mobility management

According to definition in the EU projects MOMENTUM and MOSAIC:

“Mobility management is primarily a demand oriented approach to passenger and freight transport that involves new partnerships and a set of tools to support and encourage change of attitude and behaviour towards sustainable modes of transport. These tools are usually based on information and organisation, coordination and require promotion. Mobility management addresses specific target groups and has developed a range of instruments, best known are the mobility centre and the mobility plan. Mobility management is in a constant process of development.”

A simpler definition could be: “Mobility management involves soft measures to influence travel before the journey begins”.

MOST

Mobility Strategies for the Next Decades, EU-projekt 2000–2002.

MOST-MET

Monitoring & Evaluation Toolkit – A Guide for the Assessment of Mobility Management Approaches. The method is described in a report that has been translated into Swedish by the SRA (see MOST-MET under Suggested reading in the next chapter).

Project directives

The SRA project model uses the concept for the client's assignment to project management.

Project planning

In the SRA's common project model, the project planning concept corresponds to the establishment phase and refers to the stage where the client and project manager reach agreement on how the project is to be implemented at an operational level. SUMO can then be used as an aid for making conscious decisions and to describe how the project manager intends to carry out the task. This is documented in accordance with the SRA project model in what is known as the project specification.

10. Suggested reading

ABOUT EVALUATING

MOST-MET – Toolkit for monitoring and evaluation, Guidance in analysis of Mobility management applications, main author Timo Finke, Rheinisch-Westfälische Technische Hochschule Aachen – Institut für Stadtbauwesen und Stadtverkehr, ISB, Aachen, Germany, with contributions from Eric. N. Schreffler, ESTC, San Diego, CA, USA, Astrid Wilhelm, FGM-AMOR, Graz, Austria, Andreas Witte, ISB, Aachen, Germany, ISB, Klaus J. Beckmann, Aachen, Germany, Swedish translation by Trivector Traffic AB, SRA publication 2004:151.

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Utvärdera – med klimatet i fokus, ISBN 91-620-8140-3, Naturvårdsverket 2002.

Utvärderingsboken, Kylén, Kylén Förlag AB, Stockholm, 1992.

Utvärdering av samhällsbetalda resor, Brundell-Freij m fl, KFB-Rapport 2000:20.

Utvärdering – mer än metod, Karlsson, Svenska Kommunförbundet 1999.

Följa upp, utvärdera, omvärdera – om arbetsmetoder i stads- och trafikplanering, Seger, Vägverket 2000.

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ABOUT METHODS

Fråga rätt vid enkäter, intervjuer, observationer och läsning. Kylén, Kylén Förlag AB, Stockholm, 1994.

Sociologisk metodik, Rosengren & Arvidsson, 2002.

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Trafiksäkerhet, En kunskapsöversikt, Englund Anders, Gregersen Nils Petter, Hydén Christer, Lövsund Per, Åberg Lars, 1998.

Projektverktyg: Hjälpmiddel för projektledare m. fl., Börjesson Lena, Glerups Utbildning, Malmö 2002

EXAMPLES OF SUMO APPLICATIONS

EXAMPLE 1:

Marketing and use of a travel policy at companies

The example illustrates how SUMO can be used when planning a project.

EXAMPLE 2:

Increased use of seat belts by employees at a haulage firm

The example illustrates how SUMO can be used when planning a project.

EXAMPLE 3:

Test traveller project at companies

The example illustrates how SUMO can be used when planning and monitoring a project.

EXAMPLE 4:

Combination of physical measures and mobility management

The example, which also provides a detailed description of background and planned activities, illustrates how SUMO can be used when planning a project.

MARKETING AND USE OF A TRAVEL POLICY AT COMPANIES

This subsidiary project is a step towards achieving the road safety goals set by a company in its long-term efforts to quality-assure business transports.

Service: The travel policy in itself, courses and information that the policy exists and is to be followed.	Option offered: Following the travel policy.
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The travel policy is a governing document that aims to provide support for employees when travelling. The travel policy contains requirements for:

- alternatives to travelling
- choice of mode of transport for different types of journey
- how journeys should be carried out in terms of speed limit compliance, seat belt use, cycle helmets etc.

To achieve the requirements set out in the travel policy, the company can use several measures, such as video conferences, procurement of vehicles for a car pool, and seat belt campaigns. All of these measures should be monitored using separate SUMO analyses (see Example 2 for seat belt use at a haulage firm). The example described here shows the overall effect of all measures included in the travel policy.

Target group

The travel policy has been drawn up by management and is established at this level. The target group for use is employees at the company.

Targets

Examples of targets for marketing and use of a travel policy could be:

LEVEL		TARGETS
B	Awareness	At least 95 per cent of employees at the company are aware of the travel policy and what this entails.
C	Use of the service	At least 95 per cent of employees have attended an information meeting where the travel policy was presented. At least 95 per cent of employees that travel on business at the company have applied the travel policy one year after its adoption.
H	Permanent individual behaviour	5 per cent of the travel by air in 2004 was replaced by rail journeys in 2005.

External factors

External factors that influence following a travel policy are the type of business (i.e. the need to make business trips), company location, and proximity to public transport. A move by a company from a central location in a town to an industrial park affect the opportunity to travel by train instead of car. The introduction of parking fees at a workplace could be another external factor.

Person-related factors

Person-related factors are gender, age etc. Any change in the age composition between pre and post measurements can influence results. In a comparison of pre and post data these factors must be known to obtain fair results.

SUMO analysis levels

	LEVEL		INDICATORS
Background	Y	External factors	<ul style="list-style-type: none"> – Type of business – Business location – Proximity to public transport
	P	Person-related factors	<ul style="list-style-type: none"> – Gender – Age
Services	A	Useful achievements	<ul style="list-style-type: none"> – Management decision* to accept the travel policy – Number of information meetings where the travel policy was discussed – Number of training sessions – Number of printed copies of the travel policy distributed
	B	Awareness of mobility service	<ul style="list-style-type: none"> – Number (percentage) of employees that are aware that travel policy training has taken place – Number (percentage) of employees that are aware of the travel policy and what this entails.
	C	Degree of use of mobility service	<ul style="list-style-type: none"> – Number (percentage) of employees that have taken part in training – Number (percentage) of employees that travel at the company that have adopted the travel policy
	D	Satisfaction with the mobility service	<ul style="list-style-type: none"> – Number (percentage) of employees that believe the information meetings and training was good – Comments** about the travel policy training
Option offered	E	Acceptance of the offer	<p><i>The travel policy should be followed by everyone, but experience has shown that this is often not the case, hence the need for this level.</i></p> <ul style="list-style-type: none"> – Number (percentage) of employees that say they are planning to follow the travel policy
	F	Experimental individual behaviour	<p><i>This can be difficult to measure. Possible indicators:</i></p> <ul style="list-style-type: none"> – Number (percentage) of employees that say they have tried to follow the travel policy requirements and recommendations and how often, the type of transport, and type of journey.
	G	Satisfaction with the offer	<ul style="list-style-type: none"> – Number (percentage) of employees that believe the travel policy offers good support for journeys – Comments*** about the travel policy
Effects	H	Permanent individual travel behaviour	<ul style="list-style-type: none"> – Number (percentage) of employees that answer in a survey that they follow the travel policy 12 months after the training. – Comparisons of the number of miles travelled using various means of transport (car, rail, flight, taxi, bicycle, bus) one year before and one year after the adoption of the travel policy.
	I	System impact	<ul style="list-style-type: none"> – Changes in vehicle mileage for each means of transport – Reduced emissions – Reduction in the number of accidents

*) The management decision can also be seen as a change in the external factors.

**) Can be identified using focus groups of employees that have attended information meetings.

***) Can be identified using focus groups of employees that have used the travel policy for a while.

INCREASED USE OF SEAT BELTS BY EMPLOYEES AT A HAULAGE FIRM

This subsidiary project is a step towards achieving the road safety goals set by a company in its long-term efforts to quality-assure business transports.

Service: Courses and greater control through monitoring seat belt usage.	Option offered: Using a seat belt.
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Target group

As work to improve road safety is part of quality assurance efforts, there are two different target groups for attempts to increase seat belt use:

- management
- drivers

Management has already understood the importance of greater seat belt use and has also formulated a target to increase seat belt use as part of its work to quality assure transports. The most important target group for this subsidiary project is therefore the drivers.

Target

Examples of targets for a seat belt project could be:

LEVEL		TARGETS
C	Use of the service	At least 90 per cent of employed drivers have participated in a course in which the use of seat belts was a theme.
H	Permanent individual behaviour	Seat belt use is to increase from 65 per cent in 2004 to 75 per cent in 2005, in terms of the percentage of drivers that say they always use a seat belt when driving lorries.

External factors

External factors that influence seat belt use include legislation and fines if seat belts are not used, as well as the type of transports: long stretches on country roads or short stretches with regular stops for loading and unloading in urban centres. In a comparison of pre and post data these factors must be known to obtain fair results.

Person-related factors

Person-related factors are gender, age etc. If the age composition has changed between pre and post after measurements then this can influence results. In a comparison of pre and post data these factors must be known to obtain fair results.

SUMO analysis levels

	LEVEL		INDICATORS
Background	Y	External factors	<ul style="list-style-type: none"> – Legislation, fines – Urban or rural driving – Deliveries with regular stops or long-distance driving
	P	Person-related factors	<ul style="list-style-type: none"> – Gender – Age
Services	A	Useful achievements	<ul style="list-style-type: none"> – Number of meetings held with management – Number of occasions aimed at increasing driver interest in road safety aspects of their working environment
	B	Awareness of mobility service	<i>Hardly relevant to measure separately, go directly to next level.</i>
	C	Degree of use of mobility service	– Number (percentage) of drivers that attended the course
	D	Satisfaction with the mobility service	– Number (percentage) of employees that think the course was good
Option offered	E	Acceptance of the offer	<p><i>In this case, the analysis level does not contribute anything and can be omitted.</i></p> <p><i>Possible indicators:</i></p> <ul style="list-style-type: none"> – Number (percentage) of drivers that say they are planning to follow a policy that includes seat belt use
	F	Experimental individual behaviour	<ul style="list-style-type: none"> – Number (percentage) of drivers that in a questionnaire say they always use a seat belt – Random checks to measure the actual level of seat belt use – Measurements before and after the course.
	G	Satisfaction with the offer	<p><i>In this case, the analysis level does not contribute anything and can be omitted.</i></p> <p><i>Possible indicators:</i></p> <ul style="list-style-type: none"> – Comments* on how the use of seat belts is working
Effects	H	Permanent individual travel behaviour	<ul style="list-style-type: none"> – Number (percentage) of drivers that in a questionnaire say they always use a seat belt – Random checks to measure the actual level of seat belt use Measurements are carried out 12 months after the course
	I	System impact	<i>National cause and effect relationships exist between seat belt use and the outcome of accidents. It is hardly possible to measure system effects at an individual company. At larger companies it may be possible to use insurance statistics or other accident and injury reports.</i>

*) Can be identified using focus groups of drivers.

TEST TRAVELLER PROJECT AT COMPANIES

This subsidiary project is part of a local authority's efforts to make transports in the municipality environmentally sound.

<p>Service: A test project where employees at a company could try travelling by public transport to and from work for 1-2 months. The service is a combination of "information and advice", "consultation", "information to increase awareness, training", and "transport-related products and services".</p>	<p>Option offered: To travel by a different mode of transport.</p>
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Target group

There are two main target groups for measures with test travellers at companies: management and employees at the companies who choose to participate in the test traveller project. Management is important as a target group to gain acceptance for the project at various companies. When management has decided to participate in the project, employees become the main target group for measures.

Target

Examples of targets for a test traveller project could be:

LEVEL		TARGETS	RESULTS
A	Useful achievements	Information campaigns to recruit test travellers have been carried out at least four different companies.	Achieved (see table level A)
B	Awareness	At least 80 per cent of employees at participating companies are aware of the ongoing project.	Not recorded
E	Acceptance	At least 50 persons agree to become test travellers.	Achieved (see table level E)
F	Experimental individual behaviour	At least 45 people travel by public transport to and from work at least 3 days per week during the test period.	Achieved (see table level F)
H	Permanent individual behaviour	At least half of the test travellers (25 of 50) continue to use public transport at least 3 days per week one year after the end of the test period.	Achieved (see table level H)
I	System impact	Carbon dioxide emissions are reduced by at least 20 tonnes/year.	Not achieved (see table level I)

*Light blue field = To be completed during project planning.
Darker blue field = Results from using SUMO during the project.*

External factors

External factors that influence the possibility and desire to travel by public transport include the location of the company, access to public transport, and introduction of parking fees at a workplace.

Person-related factors

The person-related factors in this project include changed living or working conditions, such as moving to a new house, a new job, or changed working hours.

SUMO analysis levels

	LEVEL		INDICATORS	RESULTS	TOTAL
Background	Y	External factors	<ul style="list-style-type: none"> – Business location – Public transport availability – Parking fee at workplace 	The introduction of parking fees at the company can have had a positive influence on the results.	
	P	Person-related factors	<ul style="list-style-type: none"> – Place of residence – Workplace – Working hours 	Two test persons have changed workplace and are therefore not included in the follow-up study after 12 months.	
Services	A	Useful achievements	<ul style="list-style-type: none"> – Number of companies that have received an information letter – Number of meetings with the company – Number of brochures distributed 	<ul style="list-style-type: none"> – Information letter: Team X, Hospital, Oles bageri, Sondera – Meetings: Team X, Hospital, Oles bageri, Sondera – Team X: 295 persons, Hospital: 170 persons, Oles bageri: 47 persons, Sondera: 30 persons 	<ul style="list-style-type: none"> – Letters: 4 companies – Meetings: 4 companies – Number brochures: 542
	B	Awareness of mobility service	– Number (percentage) of employees that are aware of the ongoing test traveller project	Not recorded	Not recorded
	C	Degree of use of mobility service	<ul style="list-style-type: none"> – Number of companies that have joined the project – Number of persons that have registered to become test travellers 	<ul style="list-style-type: none"> – Registered companies: Hospital, Oles bageri – Interested persons: Hospital: 47, Oles bageri: 10 	<ul style="list-style-type: none"> – 2 companies – 57 people
	D	Satisfaction with the mobility service	<p><i>Not relevant in this case</i></p> <p><i>Possible indicators:</i></p> <ul style="list-style-type: none"> – Percentage of companies that are positive to the offer 	Not recorded	Not recorded

Continues on the next page...

continuation SUMO analysis levels

	LEVEL	INDICATORS	RESULTS	TOTAL	
Option offered	E	Acceptance of the offer	– Number of people that sign up to become test travellers for 2 months and use public transport at least 3 days per week during the test period.	– Registered test travellers: Hospital: 44 Oles bageri: 10	– 54 people
	F	Experimental individual behaviour	– Number of public transport days each week before and after the test period – Number (percentage) of test travellers that use public transport at least 3 days per week during the test period	Percentage of public transport days: – Hospital: Before: 5%, During: 85% – Oles bageri: Before: 2%, During: 90% Number that travel by public transport at least 3 days per week: – Hospital: Before: 0%, During: 90% (40 people) – Oles bageri: Before: 0%, During: 100% (10 people)	Percentage of public transport days: – Before: 4%, – During: 86% Number that travel by public transport at least 3 days per week: – Before: 0%, – During: 91%
	G	Satisfaction with the offer	– Number (percentage) of test travellers that are satisfied with public transport	– Hospital: 86% – Oles bageri: 90%	– 87%
Effects	H	Permanent individual behaviour	– Number of public transport days per week 12 months after the test period – Number (percentage) of test travellers that use public transport at least 3 days per week 12 months after the test period	Percentage of public transport days: – Hospital: After 12 months: 35% – Oles bageri: After 12 months: 58% Number that travel by public transport at least 3 days per week: – Hospital: After 12 months: 64% – Oles bageri: After 12 months: 70%	Percentage public transport days: – After 12 months: 39% Number that travel by public transport at least 3 days per week: – After 12 months: 65%
	I	System impact	– Reduced vehicle mileage per year – Reduced carbon dioxide emissions per year	– Hospital: 64 000 km, 11 tonnes CO ₂ per year – Oles bageri: 37 000 km, 7 tonnes CO ₂ per year	– 110 000 km/year – 18 tonnes CO ₂ /year

COMBINATION OF PHYSICAL MEASURES AND MOBILITY MANAGEMENT

This example describes how SUMO can be used when a physical measure is combined with mobility management.

Comment 1:

MOST-MET was created for evaluating mobility management measures. We have extended this in SUMO to include other behaviour-changing measures, such as in the field of road safety, and have therefore used the term mobility projects.

With some thought, SUMO can also be applied to projects that combine physical measures and mobility management. This is interesting as a combination of physical measures and mobility management can result in significant synergy effects.

This example describes suggestions for indicators to measure how the combination of a physical measure “cycle path” and mobility management has worked. There are of course other effects of the cycle path that are not illustrated in this example, and it is not possible to get a comprehensive grasp of the factors behind the use of the cycle path by all cyclists. However, it is useful for evaluating the effect of mobility management measures in combination with a physical measure.

As in many other cases, one can evaluate both at an overall macro level, which sees all mobility management measures as a whole (sometimes the only possible), or to evaluate each measure individually. It is often difficult to know which of the measures has led to a result.

Problem description

Several companies in an industrial park are planning to expand and create new jobs. Most of the existing workforce and the new employees live in a town close by. The industrial park is 4 km⁸ from the town centre and along the “main road” that links the town with the main national road network, which runs about 10 km outside the town.

The business expansion, together with the general rise in traffic volume, is expected to lead to a rise in passenger car traffic between the town and the industrial park, even if attractive alternatives to single occupancy car travel are offered. Many claim that the existing road must be rebuilt with wider hard-shoulders and possible new lanes to meet the future rise in traffic.

There is currently no cycle path and cyclists and pedestrians share the same road space as motor traffic. The rise in car traffic is expected to result in shortcomings in road safety for cyclists and pedestrians and lead to further limitations for people that currently cycle or walk. Public transport is widely used but there is sufficient capacity to meet the expected increase in passengers that the planned new jobs is expected to generate. Cycle and public transport are therefore expected to complement each other in the future.

Local political leaders have very strong financial and environmental reasons to develop conditions for local industry and to create a community with a well-constructed environment, which should be attractive for a new workforce.

The businesses are interested in developing their environmental profiles and in external environmental issues. They also have strong economic incentives to become involved in their employees’ choice of

⁸Surveys have shown that cycling is an attractive alternative to cars for short journeys up to 5 km and that cycles are mainly used for journeys to school and work, and for recreation.

transport to and from work. If a single occupancy car is replaced by either cycling or walking, then the company will profit from healthier workers and a reduction in sick leave.

Comment 2:
This overall description of the problem should be intensified and supplemented at the planning stage of the project and be described at the analysis level External factors (Y).

Road manager approaches

The SRA adopted a national strategy in 2000 for increased and safer cycling (SRA publication 2000:8), which highlights the importance of increased bicycle traffic, developing cycle paths, and promoting the use of safety protection equipment. Safe cycle paths are important not to negate the positive health effects of cycling, and physical investments are therefore a prerequisite.

The SRA has carried out an action analysis in accordance with the four stage principle (SRA publication 2002:72) where it studied various types of measure ahead of the expansion of the industrial park. A pedestrian and cycle path is seen as socio-economically profitable if it successfully attracts new pedestrians and cyclists. A combination of measures that comprise stage 1 to 3 of the four stage principle is thought to be necessary to achieve the desired effects.

Stage 1: Measures that influence transport demand and choice of mode of transport:

- Early collaboration with users with information about the planned measures, and marketing of the pedestrian and cycle path as a means of transport
- Marketing of cycling as an attractive alternative to single occupancy car travel

Stage 2: Measures that make the existing road network more efficient:

- Integrated campaigns to increase cycle helmet use

Stage 3: Road improvement measures:

- Construction of the cycle path along the existing road

Comment 3:
The existing road does not need to be upgraded as the construction of a cycle path will separate cyclists and create more room for cars.

Description of the planned project

The project contains a mobility management section, which involves collaboration with users, information about measures, and marketing of the pedestrian and cycle path as a means of transport, and a physical measure which is an uninterrupted cycle path. Using SUMO terminology, this means:

<p>Service: Early collaboration with users, information about the planned measures, and marketing of the pedestrian and cycle path as a means of transport.</p>	<p>Option offered: Use of an uninterrupted cycle path.</p>
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Activities

Activities within the project are as follows:

1. Opportunities for a broad collaboration with workplaces and employees along the route at an early planning stage.
2. Cycle path analysis⁹ with widespread participation, both experts and everyday cyclists.
3. Information and marketing of the advantages of cycling as a mode of transport, and information about the planned physical measures, through information meetings in combination with supporting material, such as brochures, profile products, direct marketing, and media advertising.
4. Integrated campaigns to increase cycle helmet use.
5. Construction of cycle path.
6. Opening with marketing support activities targeting publicity.
7. Offers to test using the path. Walk or cycle for two months.

Comment 4:

Here the early consultation with users is considered to be part of the mobility service. This is an interesting and good example of how SUMO can be used.

Comment 5:

It is important that the road manager takes responsibility, considers comments from users and then makes a judgement based on its professional responsibility as road manager. The project requires a needs analysis to identify a suitable route for the cycle path both outside and within the town. Different potential routes can be proposed to see which offers the best coverage of key workplaces and residential areas, at the same time as proximity, speed and safety are prioritised for cyclists. Following a decision on a route for the cycle path, collaboration begins with workplaces along and near the planned route.

Comment 6:

If investments to increase pedestrian and cycle traffic are to have the intended effect, then other physical planning must be harmonised with these investments. Often, the effects of an investment are completely negated by the concurrent construction of more parking spaces or road improvements that make it faster to drive a car. (See the description External factors below.) These are however sensitive issues and it is important that priorities are marketed so they gain widespread support among users and taxpayers and to gain acceptance for the investment.

Comment 7:

Cycle helmet use should be monitored separately and is therefore not included in the following table. An offer to new cyclists to test the route should be followed-up in greater detail, see the test traveller example.

⁹According to a method developed at the Society for Promotion of Cycling in Sweden (Cykelfrämjandet) for analysing shortcomings in cycling environments (<http://www.cykelframjandet.se>).

Target group

The target group for the project’s marketing is business management and employees at the companies in the industrial park and along the cycle route. The primary target group is employees with up to 5 km between home and workplace. A target group analysis is carried out at the planning stage of the project and is described at the analysis level Person-related factors (P).

Target

Examples of targets for combination measures could be:

External factors

External factors that influence the opportunity or interest in cycling to and from work include the availability of a safe cycle route, parking fees at the workplace, access to public transport (for use when the weather is poor), and shower and changing room facilities at the workplace. In a comparison of pre and post data these factors must be known in order to obtain fair results as they could have either a positive or negative influence.

Person-related factors

Person-related factors are gender, age etc. If the age composition has changed between pre and post measurements then this can influence results. In a comparison of pre and post data these factors must be known to obtain fair results.

Indicators for the different analysis levels in SUMO

A selection of indicators that are interesting to measure is presented below. Positive regional development and improved urban environment are not measured in the same systematic way as environmental impact, but have an indirect impact on the system that is described verbally.

LEVEL		TARGETS
A	Useful achievements	Construction of an uninterrupted cycle route.
C	Degree of use of mobility service	At least 100 persons from companies along the cycle route have participated in collaborative and information meetings about the planned measures.
F	Experimental individual behaviour	At least 100 new cyclists take part in a test project where they agree to cycle to and from work at least 4 days per week for two months.
H	Permanent individual behaviour	At least 75 per cent (75 people) of the new cyclists that have tested the route continue to use it 12 months after the test period. The number of cyclists (new and old) on average between the town and the industrial park increases from 170 per annual average day in 2004 to 240 in 2006.

SUMO analysis levels

	LEVEL		INDICATORS
Background	Y	External factors	<ul style="list-style-type: none"> – Availability of cycle routes – Prevalence of parking fees – Public transport standard: routes, service frequency – Distance to bus stop – Shower and changing facilities
	P	Person-related factors	<ul style="list-style-type: none"> – Gender – Age
Services	A	Useful achievements	<ul style="list-style-type: none"> – Number of meetings offer opportunities for a broad collaboration at an early planning stage – Number of information meetings – Cycle path analysis completed – Number of employees invited to an information meeting at work – Number of posters at workplaces, along the planned cycle route and in local food stores – Number of articles in local press and other media – Investments in physical measures and the creation of an uninterrupted cycle route
	B	Awareness of mobility service	<ul style="list-style-type: none"> – Number/percentage of employees that are aware of the information meeting about the project – Number/percentage of employees that are aware of the project – Measurement of how people have been made aware of the project, to study which type of information is most effective (both quantitative and qualitative)
	C	Degree of use of mobility service	<ul style="list-style-type: none"> – Number/percentage of participants/employees at the various meetings
	D	Satisfaction with the mobility service	<ul style="list-style-type: none"> – Number/percentage of participants/employees at the various meetings that are satisfied with the information content and how it has been presented
Option offered	E	Acceptance of the offer	<ul style="list-style-type: none"> – Number/percentage of employees that state that the planned cycle route is good, and that when the route is complete they could consider leaving the car at home and instead cycling or walking to work one or more days per week
	F	Experimental individual behaviour	<ul style="list-style-type: none"> – Number/percentage of employees that test the new cycle route and walk or cycle to work for two months (in addition to those that already walked or cycled to work)
	G	Satisfaction with the offer	<ul style="list-style-type: none"> – Number/percentage of employees that are satisfied with the cycle route. Can be divided into sub-categories, such as standard of intersections, surface, lighting, road safety, security (survey both new and existing cyclists/pedestrians)
Effects	H	Permanent individual travel behaviour	<ul style="list-style-type: none"> – Percentage of employees that after 12 months still use the cycle route (survey both new and existing cyclists and pedestrians) – Number of cyclists per annual average day measured along the route – Number of parked bicycles at the workplaces on an annual average day
	I	System impact	<ul style="list-style-type: none"> – Number of km driven by cars that have transferred to walking or cycling – Reduction in CO₂ emissions – Reduction in sick leave (can be presented as commercial and social-economic benefit)


What is SUMO?

SUMO is a new system for the planning, monitoring and evaluation of projects that through “soft measures” such as organisational routines or information and knowledge-raising activities or communication, aim to influence attitudes and behaviour. SUMO can be used to describe how measures should be implemented. SUMO is adapted to evaluating measures and can be used to produce cause and effect relationships.

SUMO is a further developed version of MOST-MET, adapted to Swedish conditions in the field of road transport. MOST-MET is an evaluation toolkit that was developed within the framework of an EU project on Mobility Management 2000-2002.

SUMO is based on tested methods and an idea to measure effects at different levels. The design of SUMO is simple and the methods included are not significantly different from other guidelines for evaluations. However, SUMO is unique in how its targets, indicators, and results can be specified at different levels that follow on from each other. The system using levels enables the early measurement of the impact of a project where it is often difficult to show effects in the short term, as much of the work is spent on changing attitudes and behaviour, which is a process that takes time.

SUMO offers you an opportunity to effectively plan, implement, and monitor mobility projects. By using this method you can measure the type of behaviour-changing projects that have previously been difficult or impossible to monitor. This report describes how to achieve this.



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