



## **EXPECT**

### ***Stakeholders' Expectations and Perceptions of the future Road Transport System***

**Methodology for evaluating and prioritising stakeholder expectations in asset management**

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## Executive summary

The aim of this Work Package (WP3) was to investigate how social (or stakeholder) costs (and benefits) of road maintenance can be defined, how they relate to each other, how they can be taken into account in cost-benefit and multi-criteria analyses and how they can be used for evaluation purposes such as when/whether/where road maintenance is necessary.

The method chosen was a combination of literature research on methods for appraisal in infrastructure projects, the analysis of the results of previous work packages and additional semi-structured open interviews with experts in the field of transport policy, decision making processes, mediation and business modelling.

There is little information available on the translation of stakeholder expectations into monetary values so a cost-benefit analysis is less suitable when integrating different stakeholder expectations in appraisal of road maintenance. A Multi Criteria Analysis (MCA) has the potential to overcome this difficulty and therefore appears more suitable.

Through a MCA expectations of different stakeholders with regard to different asset types can be revealed and at the same time be used for weighting – and thus prioritising between different asset types. There are some limitations to this approach however. Firstly, stakeholders may not be able to assess technical aspects that are important for the functioning of the road such as drainage and foundation. Secondly this approach does not account for the motivations of the stakeholders and *why* they find certain asset types important. This is important when actually improving the state of a specific asset type, but it is not known whether this contributes to stakeholders' expectations. Thirdly, given certain maintenance budgets it might not be possible to serve all stakeholder expectations. The question that then arises is how to gain best stakeholder value for specific levels of investment: should the investment be in asset types that serve the largest group (car drivers) or should it be in asset types that serve the group that has a large political influence (e.g. disabled road users)? This requires a reference or means for justification when making choices between two options.

Research has looked at what aspects of the MCA could be enhanced. Therefore, semi-structured open interviews have been conducted with experts in the field of decision making processes, transport policy and mediation. The main results of the interviews were as follows. Firstly, a process of prioritising requires a clear understanding of the policy context: what are the policy or strategic objectives? That is the reference for making decisions on which stakeholders to involve, where they fit into the process and what their influence will be (of both serving stakeholders' expectations and not serving stakeholders' expectations). Secondly, if you want to prioritise between stakeholders' expectations and serve those expectations you have to know what the important drivers of the different stakeholders are and how they use the different asset types.

Based on these findings and on research with regard to decision making processes, transport policy and mediation the MCA has been enhanced into an Enhanced MCA (EMCA). The EMCA takes into account the following steps:

- The identification and relative importance of different road user groups from a National Road Authority (NRA) point of view;
- The translation from expectations of different road user groups into functional specifications for asset types;
- The relationship between asset types and functional specifications;
- Calculation and prioritisation.

The EMCA could be used to evaluate and prioritise different stakeholder requirements and support the decision making process for effective asset management. It is important to note that a (E)MCA has to be seen as more than an instrument. The process has to be clear for both the NRA and the stakeholders. It has to be clear what decision a NRA will take, what the decision making context is and to what level stakeholders expectations play a role. This has to be transparent and communicated to the stakeholders in a first step to serving stakeholders' expectations.

In order to include stakeholders expectations in asset management, stakeholders' expectations have to be part of the core business and processes of NRAs. For a NRA, the task is to set the right design standards and service levels for the combination of asset types to meet these expectations. It should be clear what service levels are to be met, what indicators will be measured and what the penalties are when those service level agreements (SLAs) are not being met. A measure for stakeholders expectations that comes close is 'stakeholder satisfaction'. This can be measured by asking stakeholders how satisfied they are – e.g. on a scale 1-10 - with certain asset types or services by means of a survey. It is difficult to know how much it costs to raise the level of service (e.g. skid resistance) or improve stakeholder satisfaction from, for example, a value of seven to eight. Further research could focus on how stakeholder satisfaction could be used as a performance indicator in a user oriented service level agreement on which NRAs can develop asset management strategies. Another topic of recommended research is investigating the relationships and effects between asset types and stakeholder satisfaction.

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## Abbreviations

Abbreviation	Definition
CBA	Cost Benefit Analysis
EMCA	Enhanced Multi Criteria Analysis
ERA-NET	European Research Area Network
EXPECT	Stakeholders' Expectations and Perceptions of the future Road Transport System
HGV	Heavy Goods Vehicle
MCA	Multi Criteria Analysis
MCE	Multi Criteria Evaluation
NGO	Non-Governmental Organisation
NIMBY	Not In My Back Yard
NRA	National Road Administration
PIARC	World Road Organisation Mondiale de la Route
PM	Pro Memoriam

# 1 Introduction

## 1.1 *EXPECT* overview

There is growing recognition that effective management of the road network requires road managers – besides serving the traditional engineering needs - to understand and address the needs and expectations of stakeholders' (i.e. all those who directly or indirectly interact with the system) economically, efficiently and effectively.

The aim of *EXPECT* is to develop methodologies to help National Road Administrations to determine the requirements of different categories of stakeholders and develop effective strategies that address stakeholder expectations. The key areas that are addressed within the project include:

- Establishment of who the “stakeholders“ are and their interactions with the different road assets;
- An understanding of stakeholders' perceptions and requirements of the different road assets and the overall network;
- Establishment of stakeholder priorities and levels of tolerance (e.g. for unacceptable condition);
- Translation of the stakeholders' needs into measurable parameters (e.g. engineering standards) for the identification of maintenance need;
- Development of methodologies to integrate these stakeholders within the overall asset management process to enable a customer focused efficient road network.

A cross-asset approach will be adopted to enable the optimal allocation of resources to the different asset components to address the short and longer-term requirements of the different stakeholders and deliver value for money.

### **EXPECT results**

The main output from the *EXPECT* project will be a generic methodology to help Road Administrations establish service levels, based on stakeholders' needs and expectations, incorporate these effectively within the asset management process and ensure development of effective maintenance strategies that meet financial, environmental and social requirements.

## 1.2 *Objective*

The aim of Work Package 3 of the *EXPECT* project is to define the social (or stakeholder) costs (and benefits) of road maintenance, how they relate to each other, how they can be taken into account in cost-benefit and multi-criteria analyses and used for evaluation purposes such as when/whether/where road maintenance is necessary.

This report is the principal output from Work Package 3 of the *EXPECT* project. It describes tools to evaluate and prioritise different stakeholder requirements and supports the decision making process for effective asset management.

The results will help NRAs:

- Select stakeholder groups to address
- Understand stakeholders' expectations regarding different asset types
- Prioritise and make trade-offs between stakeholder groups, their expectations and the maintenance requirements for different asset types

### **1.3 Method**

The following approach has been adopted for Work Package 3.

- 1) Desk research on methods for appraisal in asset management and how they can be used to serve stakeholder expectations;
- 2) Analysis of the results of Work Packages 1 and 2 on the selection of asset types and stakeholder groups, and how stakeholders prioritise between asset types
- 3) Development of a multi-criteria model to prioritise maintenance of asset types according to stakeholder priorities. The result is a model that delivers priorities for maintenance from stakeholder points of view
- 4) Interviews with experts on decision making processes, business modelling and transport policy research to explore how the methodology could be further developed.
- 5) Development of an enhanced multi-criteria model and process to integrate both the needs of road users and Road Administrations.

## 2 Appraising stakeholder expectations

### 2.1 Introduction

This section describes methods that are commonly used in the appraisal of infrastructure projects, in what situations those methodologies can be used and how different criteria are taken into account. We specifically consider how to incorporate stakeholders' expectations. We describe how we have used focus groups to get insight into different stakeholders' expectations with regard to different asset types. Based on the results of the focus groups and a trade-off exercise, where user groups have been asked to identify priorities between asset types, a methodology is presented that can help Road Administrations to prioritise the maintenance of different asset types from a stakeholder point of view. We first describe the content of the methodology and how the methodology can be used.

In the next section we show how this methodology can be used to describe a holistic and strategic asset management perspective – which integrates both the stakeholder point of view and the Road Administration point of view.

### 2.2 Common methods for appraisal

Transport infrastructure is both a social and economic asset. In terms of asset management the demand on effective and more specifically cost effective management methods and strategies is increasing. In recent years standardised methods have been developed for assessing transport infrastructure projects. Moreover societal costs and benefits are now being taken into account, as well as the valuation of economic impacts in new transport infrastructure projects. These kinds of evaluation are still not commonly used when assessing large maintenance works although these can easily be of the same size and level of complexity as new infrastructure projects. Methods commonly used are:

- Cost benefit Analysis (CBA)
- Multi-criteria analysis (MCA)

In practice, these two basic methods are often combined. In Austria, Belgium, Greece and the Netherlands, MCA is applied with CBA. All member states consulted, with the exception of Luxemburg, utilise CBAs in the appraisal of new or upgrading road/rail projects (EXPECT, 2011a).

#### 2.2.1 Cost-benefit analysis

Cost benefit analysis (CBA) is a method to determine, analyse and assess relevant costs and benefits, which are associated with the realisation of a project. Using this method, a systematic comparison of all (relevant) benefits and costs is feasible and projects showing benefits greater than costs will be viable. Cost benefit analysis helps to find suitable projects from a well balanced investment.

In a CBA costs (e.g. land acquisition, construction and maintenance) are compared with benefits (e.g. time savings, economy in the maintenance of vehicles, economy in fuel, reduction in traffic accidents and comfort benefits) discounted over a defined period of time.

Specifically, the validity of a transport infrastructure development project is fulfilled when the benefits exceed the costs by a specific amount and profitability is greater than that of other alternatives (Bekefi et al. 2003). If the ratio of benefits to costs is high, the project can be taken into account for the next steps of decision making. If the ratio is low, the project is likely to be rejected. In the case of either low or high ratios, the value and the needs of the project can be considered in more detail. A high ratio indicates that the money invested will provide a return to society in the form of the estimated benefits. Investments with high benefit cost ratios can be very worthwhile for public authorities.

The following steps are normally used when performing a cost benefit analysis:

- Define project alternatives (including investment and write off period and setting the time horizon).

- Identify the costs and the effects (internal, external) for each alternative.
- Monetize the effects into benefits for society.
- Compare the costs with the benefits using both a Benefit Cost Ratio and Return on Investment Rates.
- Based on the results a selection can be made for an alternative for the decision making process.

Kampf & Becková (date unknown) showed the basic principles of transport CBA as judging costs and benefits of all influenced groups, transferring effects from one group to another and calculating the social impact as a sum of impacts on individuals, using money as the overall basic unit. An important part of the appraisal is the expected willingness of individuals to “pay” for effects they experience (negative or positive). No real payments are made in this analysis but monetary values are used (e.g. for improvements in travel time). If an individual arrives an hour earlier at a destination this time saving is valued because the time saved can be used more productively.

An example of a CBA for a project concerning an upgrade and expansion of an existing road is described in Table 1.

Table 1: Example CBA (Van Wee en Dijst, 2002)

	Benefits/Costs	Value (Net Present Value, million euro, lifespan 30 years)
<b>Benefits</b>	travel time benefits (current road users)	<b>200</b>
	increase of welfare (new road users)	<b>60</b>
	improvement of traffic safety	<b>20</b>
	<b>Total Benefits</b>	<b>280</b>
<b>Costs</b>	construction costs	<b>-160</b>
	extra noise hindrance	<b>-20</b>
	air quality reduction	<b>-15</b>
	extra maintenance costs	<b>-10</b>
	damage to nature	<b>-PM</b>
	<b>Total Costs</b>	<b>-205 + PM</b>
<b>Benefit Cost Ratio</b>		<b>1.3</b>
<b>Net Present Value (Benefits – Costs)</b>		<b>75</b>

Some effects cannot be easily measured in monetary terms. For effects with no market or a non-functioning market, the amount of money suggests no association of the real value of products. An example of such an effect is the environmental impact of an infrastructure project. For some landscapes, a fixed price cannot be determined. Where quantitative results for impacts cannot be given, a 'Pro Memoriam' (PM) note is made in the CBA. These categories are not included in the CBA ratio. 'Pro Memoriam' notes can be included to explain the PM category in the CBA. These specific notes need to be part of the decision making process or can be further elaborated later in the assessment (e.g. in a multi-criteria analysis).

## 2.2.2 Multi-criteria analysis

MCA includes the effects that are valued in monetary terms as well as other effects that cannot be monetized. These effects are then weighted to provide an overall score for each alternative. The various weighted benefits are summed to reflect the relative importance of each of the objectives. The weights are derived by asking experts, individuals or decision makers (Bekefi et al. 2003).

There are a number of evaluation methods, which are covered by the term “multi-criteria evaluation methods” (MCE) that make up Multi-Criteria Analyses. In a MCA, the focus is on structuring monetary and non-monetary information within alternative choices. MCA aims to make optimal use of available information in order to compare different alternatives and to provide a ranking of all alternatives. A feature of MCA is that all relevant stakeholders can be considered.

A metric (1, 2, 3, etc) or relative (+, +/-, -) score of every effect of a project or measure is defined for a set of specified criteria. For example, the criteria might be grouped into environmental effects, congestion or accessibility. Projects can also be rated using qualitative scores. By assigning weightings, specific criteria will have a higher effect on the total rating of the alternatives compared to others. It is recommended that a MCA incorporates a sensitivity analysis using different weightings for stakeholders and the criteria.

A major difference between MCA and CBA is that with CBA the importance of the criteria are a choice of the ‘market’ and ‘consumers using the product’ (e.g. a consumer is the stakeholder ‘road user’ consuming the product ‘car trip’ at a certain price; in this case expressed as the value of time and vehicle operating costs), whereas the stakeholder weightings in MCA are chosen by analysing the importance of certain goals of policy makers or other stakeholders. Another difference is that in a CBA all requirements are monetised (measured in money) and in MCA all stakeholders can have different weightings. MCA has the option to modify the weightings to show the sensitivity of the analysis or to show the change in rating of alternatives for different stakeholders.

## 2.3 Appraisal framework for stakeholders’ expectations

The next sections describe how stakeholders’ expectations for different asset types can be rated and taken into account when making decisions in maintenance and road design with the aim of meeting stakeholder expectations. In general, the MCA method consists of establishing the stakeholder groups, asset types and the relative importance of the asset types for different stakeholder groups.

### What appraisal method to choose?

There is little information available on the translation of stakeholder expectations into monetary values so a cost-benefit analysis is less suitable when integrating different stakeholder expectations in appraisals of road maintenance. In particular, there is no information on the relationships between the investments in different asset types and the benefits of those investments in terms of stakeholder expectations. For example it is unknown what money invested in improving pavement condition delivers in terms of stakeholder expectations or benefits. A MCA has the potential to overcome this difficulty and therefore appears more suitable for this type of analysis.

### Process of MCA framework

A MCA for appraisal of stakeholders’ expectations is more than simply completing a framework. It is a structure for a process in which the following steps can be identified:

- 1) Identification of stakeholder groups: NRAs will have to identify and decide what stakeholder groups they want to consult. The choice can be depending on the strategic objectives of the NRAs.
- 2) Identification of asset types: NRAs identify the asset types they want to consult on. This can be decided in advance or be the result of the consultation (e.g. let road users decide what asset types are important).

3) Identification of relationships between stakeholders and asset types and weighting the asset types from the stakeholder point of view: Through a consultation the NRA can establish what asset types are important for different stakeholder groups. By letting stakeholders weight the different asset types, priorities among the asset types can be identified.

4) Aggregating and prioritising asset types: Based on the weights for the different asset types, a list of priorities can be determined for the most important asset types from a road user point of view. The NRA can consider these priorities in asset management.

The results of these steps can be summarised in a framework. Table 2 illustrates an example of a MCA framework. The rows show the different stakeholder groups. The columns show the asset types. For both asset types and stakeholders sub-categories can be used. Weighting of the asset types can be done for example by letting stakeholders allocate a given budget (in units or money) to the different asset types. The figure illustrates a hypothetical example of the allocation of 100 units to different asset types by car drivers and motorcyclists.

In the next sections of this section we describe how the different steps of the MCA framework have been applied in the EXPECT project.

Table 2: Example MCA Framework

Stakeholders		Asset Types										Land- scape	Rest Area
		Pavement		Structure			Equipment						
		Surface	Foundation	Bridge	Tunnel	Gantry	Signs	Road Markings	Lighting	Barriers			
Road Users	Car drivers	30	2	5	5	3	10	10	20	5	5	5	
	Motorcyclists	35	0	5	5	0	5	15	10	15	5	5	
	HGV drivers												
	Van Drivers												
	Cyclists												
	Bus drivers												
	Disabled people												
Pedestrians													
Decision makers													
Funders													
Owners													
Suppliers													
Neighbours													
Operators													

## 2.4 Identification of stakeholder groups

A stakeholder is a person or group affected by or responsible for organisational performance, success or the impact of activities (EXPECT, 2011a). For Road Administrations key stakeholders include owners (generally government and its agencies), suppliers, and the community from which it draws resources and customers (e.g. tax payers, the users and those affected by the transport networks). In EXPECT the focus is on 'road users' (who may be able bodied or not), and more specifically:

- Car drivers
- Motorcyclists
- HGV drivers
- Van drivers
- Cyclists
- Bus drivers
- Pedestrians

## **2.5 Identification of asset types**

In EXPECT Work Package 1 (EXPECT, 2011a) five asset types with a possible impact on user expectations in the road sector have been defined:

- Pavement
- Structure
- Equipment
- Landscape
- Rest areas

The Glossary describes how these asset types have been used in the EXPECT project.

As with the identification of the stakeholder groups, the asset types can be sub-divided. For example the asset type pavement can be sub-divided into the surface and the foundation; structures can be categorised into bridges, tunnels and gantries.

## **2.6 Relative importance of asset types for road user groups**

It is generally recognised that road users have different considerations and expectations with regard to different asset types. In general, there are three main areas of expectations (EXPECT, 2011a):

1. Safety
2. Efficiency (optimal travel time and costs)
3. Comfort (quality of ride)

In EXPECT Work Package 2 methods were investigated to improve the understanding of road users expectations. The method proposed was to perform focus group interviews, with a similar overall structure but some variations at the detailed level. In each focus group, different road user groups have been addressed to gain more information on the expectations of that specific road user group.

The key topics discussed were highways assets and their relative importance to different categories of road user, sources of information and power to influence (EXPECT, 2011b). One aim of the focus groups was to make trade-offs between the different asset types. Participants were asked to indicate which asset type was most important to them and how they considered the national road agencies budget should best be spent between the types of assets. The format used for the exercise varied between the three countries undertaking the studies.

Nine focus group interviews, typically lasting between 60 and 120 minutes, were undertaken in Austria, England and Sweden (3 each). In Austria, the groups consisted of cyclists, recreational motorcyclists and car drivers. In England, commuting motorcyclists, HGV drivers and car drivers were consulted. In Sweden, people from an organization of disabled road users, couriers and bus drivers formed the focus group.

In all cases, a clear outcome was that the road surface had the highest priority. Assets that could impact on the safety or ride quality such as road markings were also important. The surface of the road is of great importance to road users and the closer the user is to the road the greater the requirement for a smoother surface. Journey experience was important and another key aspect for user satisfaction is the provision of appropriate roadside equipment (e.g. signs, electronic message signs etc). Users concentrate on the assets which they see as most relevant to them. As long as the other 'invisible' assets are 'fit for purpose' then to a certain extent they are not considered by most road users. Often it seemed that the participants could not relate to the 'condition' of non-pavement assets. One possible reason

could be that these assets are already maintained to a standard that meets the users' needs.

In the rest of this section we describe the detailed results of the trade-off exercise conducted in the different focus groups.

### Austria

The participants at the focus groups were invited to present their views on five different highway asset types. The asset types were selected on the basis of the results from Work Package 1 and were: equipment, landscape, structures, rest areas and pavements. The participants identified aspects of these assets that were deemed to be important. Following this each participant was allowed 10 green (2 per asset for positive aspects) and 10 red (2 per asset for negative aspects) points to mark the most relevant aspects. Full details of the issues raised against each of the asset types and scores given by the focus group participants are listed in Annex B. Assets that were allocated three or more of the available points, i.e. those that appear to be of greatest importance to each group of stakeholders are discussed in this section. The group was then asked to distribute between the different assets a budget of either 100 Euros or 1000 Euros. The aim was to use the distribution as a means of judging user priority for the assets.

Based on the allocations made by the participants, Table 3 illustrates the weighting of asset types with a budget of 100 euros and Table 4 shows the weighting of asset types with a budget of 1000 euros.

Table 3. Allocation of a budget to different asset types in Austria (budget 100 euro).

		Asset Types				
		Pavement	Structure	Equipment	Land-scape	Rest Area
Stakeholders						
Road Users	Car drivers	80	8,3	8,3	3,3	0
	Motorcyclists	61,7	15	13,3	8,3	1,7
	Cyclists	25	36,7	21,7	6,7	10

Table 4. Allocation of a budget to different asset types in Austria (budget 1000 euro).

		Asset Types				
		Pavement	Structure	Equipment	Land-scape	Rest Area
Stakeholders						
Road Users	Car drivers	40	25	19,2	3,8	12
	Motorcyclists	32,5	17,5	10	27,5	12,5
	Cyclists	38,3	43,3	11,7	6,7	0

### UK

The trade-offs exercise was carried out in two parts in the UK. It was designed to try to get an understanding of the users' views of the relative importance of the different asset types, whether their views were similar or very different to that of the NRA and also whether their views were affected by the level of funding available. The participants were divided into 2 sub-groups and the two sub-groups worked independently from each other. Each sub-group was provided with 100 units representing the NRAs budget and a table which represented how the NRA currently distributes the budgets between the assets on the network.

For the first exercise, each sub-group was asked how they would like to see the existing budget redistributed amongst the existing assets;

For the second exercise, the sub-groups were told to imagine that an unlimited total budget was available and to allocate budgets to each of the assets (including any additional assets they wished to fund) on that basis.

The results are presented in Tables 5 and 6.

Table 5. Trade-off between different assets in England compared to NRA (budget 100 euro)

Stakeholders		Asset Types										
		Pavement		Structure	Equipment		Rest Area	Other				
		Surface	Foundation (earthworks)	Bridges, gantries tunnels	Lighting & Signs	Barriers		Drainage	Winter-maintenance	Safety schemes		
Road Users	Car drivers	35	4.5	20	10	6		6	5.5	13		
	Motorcyclists	45	3.5	20	1.75	4.5		11.25	8.25	6.25		
	HGV drivers	37.5	4.5	22.5	7	5.5		3.5	4.5	15.5		
NRA		30	5	30	5	6		5	4	15		

Table 6. Trade-off between different assets in England compared to NRA (unlimited budget)

Stakeholders		Asset Types											
		Pavement		Structure	Equipment		Rest Area	Other					
		Surface	Foundation (earthworks)	Bridges, gantries tunnels	Lighting & Signs	Barriers		Drainage	Winter-maintenance	Safety schemes	Design layout	Hard Shoulder	Extra lanes
Road Users	Car drivers	40	5	25	15	6		7.5	8	15	15	15	
	Motorcyclists	62.5	5	22.5	3.75	6		13.75	13.25	6.25			
	HGV drivers	40	6	25	11	5.5	27.5	3.5	7.5	17.5			
NRA		30	5	30	5	6		5	4	15			

**Sweden**

The participants were van drivers, bus drivers and disabled road users and were asked to allocate a budget of 100 units to the issues of greatest importance to them. The van drivers and bus drivers were in the same group. The weights for both groups are therefore the same.

For each road user group the results are presented in Table 7, illustrating the weighting of asset types by road users in Sweden.

Table 7 Allocation of budget to different assets by road users in Sweden

Stakeholders		Asset Types								
		Pavement			Equipment	Other				
		Surface			Foundation	Lighting (by cycle crossings)	Winter-maintenance	Remove gravel	Ability to reach buttons at traffic lights	Ability to cross roads before lights changes
Road Users	Van Drivers	25	15		15	5	25	15		
	Bus drivers	25	15		15	5	25	15		
	Disabled people	16	16	7	7	15	16		15	9

The results show that there are differences between the countries and this shows that the methodology to be developed needs to be able to accommodate these differences while also being able to be used by different stakeholders. Furthermore, different stakeholders have different requirements for the different asset types and this is something that needs to be taken into account within the methodology.

**2.7 Conclusion**

In this section we have explored common methods for appraisal such as CBAs and MCAs and the possibilities for using those methods for the appraisal of road users' expectations with regard to different asset types. Since there is little information on monetising road users' expectations at the time of this research, we conclude that a MCA approach currently best meets the EXPECT objectives.

The most important part of the MCA method is identifying the priorities between the asset

types from a road user perspective. We have shown that a focus group approach can be used to get insight in road users' expectations. Though the approach is relatively time consuming compared to, for example, a road user survey, it offers the advantage of getting more insight into the motivations, drivers and barriers. The focus groups have shown how trade-off exercises can be used to identify priorities between asset types from a stakeholder's point of view.

The focus groups showed that different road users have different expectations with regard to certain asset types. Disabled road users (including drivers), for example, have different expectations compared with professional HGV drivers.

The scores for the criteria for a particular road length, or a bigger network, are influenced by the state of the different assets. It might be hard for stakeholders to make the link between their view on the state of the infrastructure and the states of the different asset types. Road users might not distinguish between asset types. For example, users might see a road just as a connection that enables them to get from A to B for a specific purpose. When using the road their expectations could be that they want it to be smooth, with flowing traffic and with as high a level of service as possible. Also, users only see part of the road (e.g. car drivers may not see much of lane 1 on a motorway or cyclists would not see much of outer lanes). Also, different users have particular aspects of interest (e.g. cyclists and motorcyclists are particularly affected by potholes at the edge of the road or in slippery or sunken iron work)

User expectations and requirements are influenced by their experience, including particular events and occurrences (e.g. introduction of new technology, extreme weather events etc). Consultations with users will therefore need to be carried out at intervals sufficient to ensure that changing 'topical' issues are taken into account. It must be recognized that standards/service levels cannot keep changing. It is a slow process to update assets or for condition to deteriorate etc

With given maintenance budgets it might be not possible to serve all stakeholder expectations. The question that then arises is how to gain best stakeholder value for specific levels of investment: should the investment be in asset types that serve the largest group (car drivers) or should it be in asset types that serve the group that has a large political influence (e.g. disabled users)?

### 3 Broader perspective on appraising stakeholder expectations in asset management

#### 3.1 Introduction

Section 2 has indicated a methodology to get insight into road users' expectations and prioritise between asset types. In this section we will explore what aspects of the methodology could be further enhanced to assist Road Administrations to manage different expectations in the overall asset management approach. The basis for the enhancement lies in interviews conducted with experts on transport policy and appraisal, decision making processes, mediation between different stakeholder groups and business modelling. Within this part of the research we have also included other stakeholder groups, not road users, as one stakeholder group. We will use the results to describe an enhanced multi-criteria analysis in the next section where we will focus on the road users as one of the stakeholder groups.

#### 3.2 Basis for a broader perspective

In section 2 it was concluded that a MCA methodology in combination with focus groups could be used to weight the different criteria to prioritise between asset types. Certain limitations to this methodology were also identified (e.g. how to meet the different expectations of stakeholder groups and are stakeholders able to assess the different asset types?). In order to strengthen the methodology, interviews have been conducted with experts in disciplines that relate to the context of EXPECT: stakeholder expectations and decision making processes.

##### Method

Four semi-structured open interviews have been conducted with experts in related fields that are relevant to EXPECT. These experts have been selected based on their expertise. The experts are mutually exclusive and totally exhaustive with regard to both their expertise and the context of their work. Table 8 presents an overview of the interviewees.

Table 8: Expertise, domain of interviewees and their contribution to EXPECT

	Expertise	Domain	Relationship with EXPECT
<b>Interviewee 1</b>	Policy development and appraisal	Transportation	Developing methodology for MCA
<b>Interviewee 2</b>	Complex decision making processes	Defence and security	Broadening methodology for taking into account contexts of different stakeholder groups; identification of relationships between asset types and stakeholder expectations
<b>Interviewee 3</b>	Mediation	Spatial development, energy sector	Broaden methodology for taking into account conflicting stakeholders' expectations
<b>Interviewee 4</b>	Business modelling	Public-private sector; business innovation	Broadening methodology for including the private sector.

We have used a method of semi-structured open interviews with a duration of 60 to 120 minutes. The interviews have been conducted along a set of semi-open questions (Annex A). We started by explaining the EXPECT project and objectives. We asked the interviewees to explain their expertise on stakeholder expectations and processes, in what domain they are active (e.g. energy, defence, spatial development) and what methods they use to interact

with and prioritise between stakeholders<sup>1</sup> expectations. We then explored possibilities on how the expertise and methodologies could be used in asset management. The interview guidelines are shown in Annex A.

## Results

The results of the interviews are given in Annex B. The main results of the interviews were:

- Though interviewees 2-4 are working in different domains (not transport or asset management), they recognise the issue at hand: how to take into account the different stakeholders and their expectations. The interviewees all pointed out methodologies they use in their field of expertise and domain, that could be helpful for EXPECT;
- The interviewees mentioned that a process of prioritising requires a clear understanding of the policy context: what are the policy or strategic objectives? That is the reference for making decisions on what stakeholders to involve, where they fit into the process and what their influence will be (of both *servicing* stakeholders' expectations and *not servicing* stakeholders' expectations);
- It is important to see a methodology for prioritising stakeholders' expectations as more than an instrument, but as a process. The process has to be clear for both NRAs as stakeholders. It has to be clear what decision a NRA will take, what the decision making context is and to what level stakeholders expectations play a role. This has to be transparent and communicated to the stakeholders. A transparent process and communication of this process is a first step in serving stakeholders' expectations;
- To prioritise between stakeholders' expectations and serve those expectations it is important to know what are the main drivers of the different stakeholders and how they use the different asset types. This is the reference by which stakeholders determine their expectations or priorities with regard to the different asset types;
- It is necessary to translate stakeholders' expectations into an indicator (e.g. stakeholders' satisfaction). Based on the indicator, service levels and minimum requirements for different asset types can be set.

## Conclusion

From the results of the interviews and the results of the MCA described in section 2, the conclusion is that the approach could be further enhanced. The basis, or reference, for the approach begins with:

- Why should you involve stakeholders?
- What stakeholders to involve?
- How to serve stakeholders' expectations?

This then enables an approach that uses a methodology such as MCA, to prioritise and plan maintenance works.

It is essential to know stakeholders' expectations and understand them. Understanding the expectations is the first step towards defining how important stakeholders find an asset type and includes knowing about the context and *why* certain asset types are important to stakeholders. It is about knowing the stakeholders' needs and interests with regard to the infrastructure. Knowledge about stakeholders is the basis for planning maintenance: what measures to take and how they relate to the stakeholders' expectations.

The following sections focus on how the MCA methodology can be enhanced. We focus on enhancement of the following parts:

- Setting the reference as NRA
- Design: relating NRAs services to stakeholder needs

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<sup>1</sup> In the interviews we have focused on different 'stakeholders' and road users as one stakeholder Group.

- Asset management

The basis for the enhancement lies in the results of the interviews conducted within this Work Package. Furthermore we also will make use of the results of EXPECT Work Package 1 (EXPECT 2011a). We will use the parts of the interviews that have been conducted with National Road Administrations, with regard to the NRAs strategic objectives, what stakeholders are important and what methodologies are commonly being used when involving and prioritising stakeholders' expectations.

### 3.3 Setting the reference as NRA

Being able to understand and manage stakeholders' expectations means understanding users' needs. This understanding starts with clarity in what the NRA is trying to achieve, and is a transition from the current traditional strategic objectives towards more stakeholder oriented objectives.

During the interviews performed in Work Package 1, a wide variety of answers were obtained concerning the strategic objectives of NRAs. Some NRAs still use a classical approach to the work and focus on the supply of road infrastructure and maintenance of that infrastructure. Some NRAs use higher level objectives still focused on the infrastructure, such as the prevention of congestion and reduction of environmental impact. One NRA puts the satisfaction of road users as a primary objective of its activities. An interesting example here is the Swedish Transport Administration which formulated its objective as:

Satisfy the requirements and expectations of our clients, taking our responsibility for the efficient use of our infrastructure and promote safe and environmentally friendly transport.

In this objective the satisfaction of the stakeholder clients and their expectations is important. This means that the NRA must understand the added value provided to road users and that the users have needs. It is important to connect the external high level objective to the internal activities of the NRA and to identify the potential transition needed in the NRA internal organisation.

Understanding this objective leads to the next objective for asset management. The maintenance work should contribute to the higher goal. The difficulty is that the objective is not measurable and therefore difficult to translate. The objective from the Finnish Road Administration shows the objective can contribute to setting the boundaries:

The Finnish Road Administration core business is providing infrastructure for customers. Society expects:

- 1) To reach the overall societal goals: Protect the environment; provide traffic safety, help and facilitate the Finnish economy.
- 2) To achieve equality: Services are distributed evenly across the customer spectrum and give the same service level for all our customers<sup>2</sup>.

An interesting aspect of the Finnish interview, also used in other countries (e.g. Sweden) is that it refers customers and not road users. This apparent small change in name has quite an impact when approaching stakeholders. Considering stakeholders as customers implies a more service oriented approach (and at least a shift in focus towards understanding their needs) and their drivers as a customer. Putting clients first can be a refreshing method for identifying stakeholders. The previous reports in this project identified a large difference between the needs of road users when they are considered in different categories. These categories and their needs are discussed in the next section.

<sup>2</sup> Finnish Road Agency based on interview from WP1 (EXPECT, 2011a)

### 3.4 Identifying stakeholders

The next step after putting clients first in the objectives is to identify (as shown in section 2) the possible stakeholders for the service. Section 2 showed how the needs of the road users influence the decisions concerning asset types but there are other stakeholders that also influence the service a NRA provides.

From the results of the interviews<sup>3</sup> three other groups of stakeholders influence the objective of a NRA and need to be taken into account. These groups include the inhabitants alongside the roads, the stakeholders who determine the policy and the stakeholders who have financial interests. For each of these groups the following need to be identified:

- Who are these stakeholders?
- What are their processes/actions?
- What are their objectives?
- What are their indicators?
- What are their connections?
- What is their power/influence?

These questions will help answer the questions “How large are the stakeholder groups, how large are their interests and what is their local context?”

The first and most obvious groups of stakeholders is of course the road users but there are others. A large overview of potential stakeholders is provided for example in the PIARC handbook produced by the D1 Committee focusing on Management of Road Infrastructure Assets<sup>4</sup>. Figure 1 shows an overview of how many times different stakeholder types were referred to in the WP1 interviews, as this was one specific question in the interviews it provides an overview of the different stakeholders. Furthermore, a categorisation has been created which can be explored further.

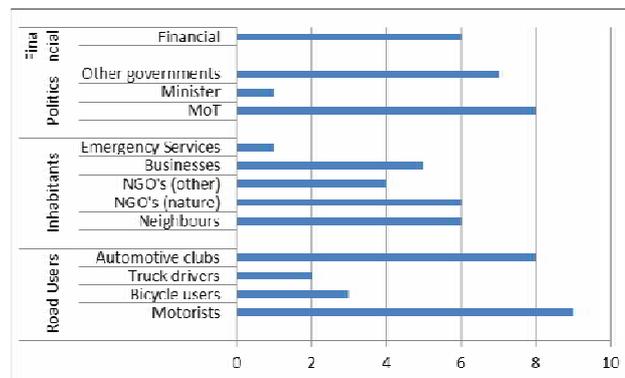


Figure 1 Frequency of references to stakeholders by interviewed road authorities

Road users were mentioned in the previous section, however it can clearly be seen that different groups of stakeholders can be created when looking at the different types of stakeholders. These groups are Inhabitants, Politics and Financial stakeholders.

Inhabitants are individuals, or their representatives (e.g. with nature concerns), with interests in the areas where roads are deemed to have an impact. Inhabitants' main concerns are generally the potential negative effects they experience from the roads, furthermore they bring in a lot of local experience which could reduce the amount of costly errors that tend to be made when planning works. For example, the famous Not in My Back Yard (NIMBY) effect reflects that people do not want a road or the negative impacts of the road near to them. These inhabitants might have the law on their side (especially when there are negative

<sup>3</sup> Interviews performed in WP1 (EXPECT 2011a)

<sup>4</sup> <http://www.piarc.org/en/technical-committees/committee-D.1/>

impacts). This effect is seen (e.g. in the interview with the Dutch Road Administration) as an important aspect that has a large influence. These users may be driven by psychological forces and will use the media whenever possible. They are, for much of the time, well organised, but can also operate individually and delay the progress of projects significantly. A proven methodology is to involve these stakeholders at an early stage in the planning process and take their concerns into account. Transparency about steps taken is a crucial precondition for these stakeholders. Their relationship to road management is not strong, but when considering the negative impacts of badly maintained roads their voice can be loud. This creates the strong argument for having these stakeholders involved early on in the process to also let them see their impact on the process.

The second group is the politically related stakeholders that include the policy makers that influence the role of the NRA. These stakeholders are influenced by both the road users and the inhabitants and have a way of handling these other stakeholders that is most of the time seen as opportunistic. Their decision making does not always follow logical lines of reasoning. Their drive is political where they can be difficult to manage. Two methods that can be used to handle these stakeholders are to follow the indirect line where both inhabitants and users are kept satisfied and therefore remove any negative influences on these political stakeholders. A second method is to get the political stakeholders to identify themselves with all or part of the objective.

The third group of stakeholders is made up of those stakeholders with financial interests. They are primarily concerned with ensuring the NRA money is well spent or should be spent on other aspects of maintenance. For these stakeholders, the 'evaluation' framework is based on the return on investment (for private stakeholders) or the benefit cost ratio when public money is concerned. If the business case for stakeholders from either sector is not properly covered, the flow of money could easily be stopped.

In various countries different distinctions are made for the different stakeholders and the role these different stakeholders take. The relationship they have with each other is important in that respect. One of the important distinctions that has been made more than once during the interviews<sup>5</sup> is that it is difficult to identify the fixed stakeholders since this strongly depends on the type of project, where it is situated and who will experience the impacts from the project.

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<sup>5</sup> Interviews in WP1 (EXPECT 2011a)

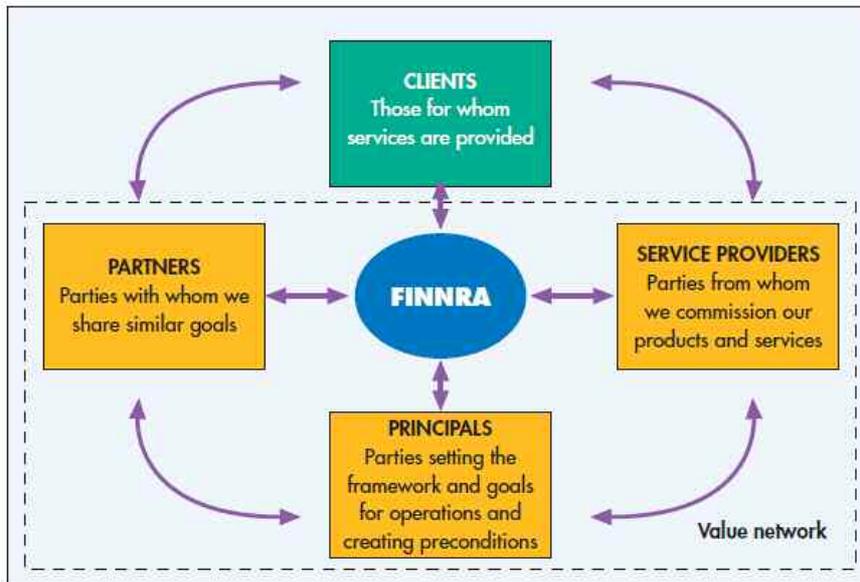


Figure 2 Example of Finnish Road Administration objectives and their relationship with stakeholders

The Finnish Road Administration creates a different distinction between stakeholders (see Figure 2). FINNRA puts the clients on top and looks for partners, principals and service providers. The main thing lacking in this structure is the inhabitants who experience the road and the maintenance. Principals show a strong overlap with the politicians and policy makers.

The choice for service providers is interesting, since the direction road authorities are taking is to steer more actively on Key Performance Indicators (also concerning road maintenance) and therefore not to undertake most of these activities. Putting these activities in the hands of service providers also creates a new way of operating for NRAs.

Further explanation is given from three different perspectives with respect to the influence of stakeholders and how they are taken into account in the process.

#### Netherlands

- Ministry of Transport and parliament set the budget and service level agreements and key performance indicators to be managed by Rijkswaterstaat, the NRA.
- Other stakeholders can influence the process (e.g. new infrastructure projects) by legal procedures.
- Rijkswaterstaat aims to involve the relevant stakeholders at the appropriate time(s) during the process (participative planning) in order to create support for the proposed project.

#### Finland

- Sometimes stakeholders are single citizens. Most of the time the larger groups of stakeholders are more active. Examples are city councils, businesses and NGOs.
- Some stakeholders, such as smaller cities, are less active but very important when planning projects that are relevant to them. If stakeholders are not active, they are encouraged to become more active.

#### France

- The need to involve stakeholders has been identified. A constructive dialogue is

built with selected representatives. Key elements are trust, motivation and a pragmatic approach, “working together”. This attitude must come from both sides (i.e. the Administration must be willing to listen to the stakeholders, stakeholders must be willing to cooperate in a constructive way).

- Indicators are used to assess and communicate the impacts of the choices objectively, so that the stakeholder expectations can be translated into policy choices.

These countries demonstrate different approaches which all have their strengths and weaknesses. What can be seen is that approaches vary also due to cultural and legal settings within the different countries and the ways used to cooperate with different stakeholders. The most important aspect is that the recommendations made in this study always need to be adapted for the local situation and the legal framework in which the work takes place.

As shown by the statements above, the focus on customers and their needs is currently taking place at NRAs. These general statements however need to be put into practice and include the differentiation within these groups of customers' needs that identify the importance for these stakeholders. Understanding the differences amongst the customers is one step. The next step is to match the goal and objective of the NRA to the needs of the stakeholders.

### ***3.5 Design: relating NRAs services to stakeholder needs***

Stakeholder needs (e.g. high standards of comfort, road safety, level of service and good protection of the environment) can be divided into subcategories such as a smooth ride, a road which is free from water, a low number of accidents, a low severity of accidents, a low and reliable travel time and a low disturbance of the habit of people and animals around the roads.

This report has already highlighted the important needs as:

1. Safety
2. Efficiency (optimal travel time and costs)
3. Comfort (quality of ride)

Not all stakeholders are affected equally by these criteria. For example, car drivers will be more interested in a high ride comfort and high road safety but people that live near the road will be more interested in the level of disturbance from the road. The direct relationship between the stakeholders and the ranking of these criteria makes it easy for the stakeholders to indicate the importance of each criterion. The importance of all the criteria can be deducted from a focus group or a survey. Each stakeholder group could indicate which criteria are important in relation to the infrastructure but the criteria must be defined using words which are easy to understand for the stakeholder group as the criteria are qualitative descriptions which describe the desired state of the infrastructure (e.g. a water free road, a low number of accidents and a low noise level).

Through a value web<sup>6</sup> a NRA can identify the ‘product’ and identify what stakeholders are relevant in ‘delivering the product’. One of the important stakeholder categories is the customer (i.e. the road users). This category can be subdivided, as shown by the Finnish Road Administration (FINNRA). FINNRA has identified the strategic customers, customers with special needs and ‘all customers’. For each of these categories it has stated how and when to engage with the groups and the service that is to be delivered to them (see Figure 3).

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<sup>6</sup> Set of activities that a product has to undergo in order to create value for a business or company and be of interest for the customer.

The Finnish Road Administration has developed a methodology to select the customers and understand their needs. There are specific groups involved at the different levels. The FRA first focuses on the customers with special needs (looking at specific road users). On the next level the strategic customers are identified. The focus of the Finnish Road Administration still appears to be on the road users, so other stakeholders need to be included.

Based on the needs of stakeholders, NRAs need to design and develop the road product in a way that delivers value for the customers (i.e. that fulfils stakeholders' expectations by the creation of the links between the stakeholders' criteria and the status of each asset type). This step can be made by experts in the field (e.g. a civil engineer working for the Road



Figure 3 Categorization of customers (Finnish Road Administration)

Administration in the position of asset manager) or an external party (e.g. a consultant). To indicate whether expectations are being met requires the definition of service levels and indicators to measure the expectations. For example, the Swedish Road Administration has developed and implemented a Satisfaction Index.

### **3.6 Asset management serving stakeholder needs**

In the end NRAs have to make the judgement on where, when and in what asset types to invest. There is a need to assess what benefits are to be expected when serving stakeholders' expectations. The questions are how can this be measured in terms of a satisfaction indicator and what does an increase in stakeholder satisfaction mean for a NRA? If stakeholder satisfaction is directly related to the level of funding, the benefits become very clear. By also assessing the costs of doing nothing the effect on stakeholder satisfaction of postponing maintenance of different assets can be assessed. Satisfaction can be measured by using results from previous analyses and by performing an ex-ante and ex-post evaluation. If the stakeholder satisfaction has increased then progress has been made.

However, NRAs also need to assess the costs of the maintenance and the effect of the investment in a certain asset on the stakeholder satisfaction.

To make those assessments requires advanced asset management knowledge. This goes beyond the level of the traditional technical approach of asset management, that is mainly focused on monitoring the technical state of the assets and assessing what investments are necessary to improve the status to a required technical level. The next step requires knowledge of the relationship between the technical status of the asset types, the level of stakeholder satisfaction and knowledge about what the effects of changes in technical measures are on stakeholder satisfaction.

An NRA has to develop a maintenance plan for all asset types, using the input from civil engineers and other experts. In this step, all factors need to be taken into account and methods such as CBA or MCA might be used to evaluate different options. A fair trade-off between different options also needs to take into account the relative importance, to the NRA and government, of each stakeholder group. This is part of the next section where the MCA is considered further.

## 4 Extended multi-criteria analysis

In Section 2 a multi-criteria analysis method for appraisal of different asset types from a stakeholder (road user) perspective was described. Section 3 explored the possibilities for enhancing that method. In this section the results of the earlier sections are combined into an enhanced multi-criteria analysis (EMCA).

The EMCA takes into account the following steps:

- The identification and relative importance of different road user groups from a NRA point of view;
- The translation from expectations of different groups into functional specifications for asset types
- The relationship between asset types and functional specifications
- Calculation and prioritisation

The classical MCA has been seen in Section 2 to be not fit to take into account the needs of all the different road users at once. Therefore an expansion of a classic MCA is necessary, adding the selection of road users as a first step to the process. Adding weights for these road user types is the second step in the process. The next step is to select the asset types and how they relate to the criteria that are important for road users (safety, comfort, efficiency). For each of these aspects a different table (sub-MCA) is needed. The EMCA then combines the different tables into an overall assessment that results in a prioritisation between asset types. Combining these will help manage the expectations of different stakeholder groups. This helps to derive the stakeholder total value which can be optimised allowing for the maximum stakeholder value.

In this section, the EMCA is described. A NRA must tailor the approach for its own use. This could include, for example, changes to the road user groups and aspects that are relevant for the NRA. In the following sections the EMCA is shown for different road user types within the stakeholder group 'road users'. The method is also suitable for incorporating other stakeholder groups.

### 4.1 Identifying road user groups

The first step is to identify road user groups and their relative importance to the NRA. Section 2 showed that different stakeholders may have different expectations with regard to certain asset types. These might be conflicting. For NRAs it is important within the processes to illustrate how they take into account these potential conflicting expectations. The first part of the EMCA could help to identify the weights to put on the expectations of the different road user groups.

In section 3 it has been described how the strategic objectives of the NRA form the basis for creating a value web that includes the stakeholder groups that are of importance to the NRA. The relative importance of different road users could be identified through different criteria, for example the population size of the group, their political influence and importance of the group.

Table 9 illustrates how the stakeholder groups and the relative importance of the different aspects to the stakeholder groups could be developed. In this hypothetical example we have used the road user groups as identified in section 2. The criteria that determine the relative importance of each road user group in this example are

- Population size: this criterion indicates the size of the group so differences in population size can be taken into account.
- Economic importance of the group for the area in which the NRA operates: the economic value of a group to an area could be a criterion to take into account. This could be for example HGV or bus drivers. They are professional drivers that contribute to the regional or national economy.

- Indicate the political importance of the group: from a political perspective certain minority groups – for example disabled or elderly - could be given special attention when developing policies.
- Influence of the group on the political debate: the political debate could influence the NRAs objectives and budgets. It is therefore important to take into account groups that have a well organised political lobby and could indirectly be of influence to the NRA. For example road user organisations or – in other stakeholder groups – environmental organisations.

Each of the criteria has to be weighted. In the example we used a relative scale in which 1=small, 2=medium and 3=large. The total weight for each road user is calculated through a weighted summation method. For each road user the average score is calculated (car drivers: 2,25). The average score for each road user is calculated relative to the total sum of average scores (total sum = 13,5). In the example in Table 9 the car driver has a score of 17% (2,25/13,5) road user group 'HGV drivers' has the highest score (19%) and the road user group 'pedestrians' the lowest score (11%).

It is for the NRA to complete the table and define the ranges for the weights and the actual weights for the different criteria for the different stakeholder groups. This could be achieved by a desk study of relevant policy documents and by organising a strategic discussion with experts and NRA representatives.

Table 9: Indication the importance of each road user (from a NRA perspective)

STAKEHOLDERS		total (%)	13.5	Population size (small=1, medium=2,large=3)	Economic importance of the group for the area in which the NRA operates (small=1, medium=2,large=3)	Political importance of the group (small=1, medium=2,large=3)	Indicate the influence of the group on the political debate (small=1, medium=2,large=3)
Category	Sub-category						
Road Users	Car drivers	17	2.25	3	3	1	2
	Cyclists	15	2	2	1	2	3
	Motorcyclists	13	1.75	1	1	2	3
	HGV drivers	19	2.5	2	3	2	3
	Bus drivers	13	1.75	1	1	2	3
	Disabled people	13	1.75	1	1	2	3
	Pedestrians	11	1.5	3	1	1	1

The EMCA uses this table to take into account differences in importance between stakeholders by using scores/weights in the later analysis in the EMCA.

## 4.2 Functional specifications from a road user perspective

The next step of the EMCA is to take into account what criteria road users find important

when using the road: what are the 'interests' or 'strategic objectives' of the road user groups. Section 2 showed the main categories that can be distinguished when identifying stakeholders' interests are 'comfort', 'road safety', and 'efficiency'. Adding the category 'environment' accounts for other potential stakeholder groups such as local inhabitants.

These categories can be translated into functional criteria. In the example in Table 10 ride comfort is considered as 'smooth ride', 'low angle of inclination' and 'water-free road'. Efficiency could be explained as 'reliable travel time' and 'high speed'.

This part of the EMCA is important as the functional criteria could be weighted differently by different road user groups. For example car drivers and HGV drivers could put more weight on high speeds and reliable travel times compared to disabled road users and cyclists. On the other hand a water free road could be more important for motorcyclists than for bus drivers. For the more vulnerable road users, safety could be more important than for the road users that drive vehicles such as cars, buses and trucks.

This part of the EMCA - the identification of main categories of drivers and translation into functional criteria - could be used by NRAs to put more focus into the information they gather from road users through for example road user surveys. When adding the functional criteria into the survey, specific information can be gathered from different road users with regard to 1) what functional criteria they find important and 2) how important these criteria are (and what weight to put on the different criteria for different road users.

Table 10: Indicating the importance of each functional criterion for each road user group

CRITERIA			Importance by stakeholder (low/medium/high: 1/2/3)						
			Road Users						
			Car drivers	Cyclists	Motorcyclists	HGV drivers	Bus drivers	Disabled people	Pedestrians
Category	Criteria	SCORE	17	15	13	19	13	13	2
Ride comfort	Smooth ride	2.2	3	3	3	2	3	1	1
	Low angle of inclination	1.7	1	3	1	2	1	3	3
	Large arch in curves	2.0	3	1	2	3	3	1	1
	Water free road	1.5	3	1	3	1	1	1	3
Road safety	Low number of accidents	2.2	2	3	3	2	2	3	3
	Low severity of accidents	2.1	2	3	3	2	1	3	3
Level of service	Reliable travel time	2.1	3	1	3	3	3	1	1
	High speed	2.0	3	1	3	3	2	1	1
Environment	Green surroundings	2.2	2	3	3	1	3	3	3
	Low noise level	1.5	1	3	1	1	1	3	3
	Low visual disturbance of construction	1.8	2	3	2	1	1	3	3

Table 10 illustrates an example which used the same range of weights for the criteria in which 1= small, 2=medium and 3=large. In order to calculate a score for each functional criterion a weighted summation method has been applied in which the weights for the different road user groups (previous step) have also been taken into account. For each functional criterion the weight of each road user is multiplied by the relative importance of the road user group (the weight for car drivers is 17; the weight for cyclists is 15, etc), summed and translated into a relative score. In this example the score for the functional criterion 'smooth ride' is 2.2. This is the average score from different road users in which the relative importance of the different road users has been taken into account.

### **4.3 Relating asset types to functional specifications**

The next step in the EMCA is to relate different categories of asset types - as identified in section 2 being pavement, structure, equipment etc – to the functional criteria - as identified in the previous step as ride comfort, road safety and efficiency. This involves translating functional specifications into technical specifications. As this is a more technical step it requires the use of technical experts that can help to establish the relationships and assess the level of each of these relationships. They will determine how the functional requirement of, for example, 'water free road', can be determined together with the minimum technical requirements for the asset types to provide a required level of service for the stakeholder groups.

This step could help NRAs to determine user oriented service levels or indicators for different asset types. In this step the relationship is established between the technical aspects of asset management and the stakeholders' aspects.

Table 11 shows an example of the next sub-MCA. In the rows, the functional criteria have been listed that are important to the different stakeholder groups. In the previous step the categories 'ride comfort', 'road safety', 'efficiency' and 'environment' have been translated into functional criteria, such as 'smooth ride' and 'large arch in curves' (each of these criteria have been weighted by the different road user groups).

In the columns the different asset types have been listed including the different sub categories. For example for the category 'pavement' the items 'surface' and 'foundation' have been listed. For the category 'structure' the items 'bridge', 'tunnel' and 'gantry' have been added.

For each 'asset type' it has to be determined what the contribution is to each of the functional criteria. For example it has to be determined what the contribution is from the item 'surface' to the functional criteria 'smooth ride', 'low angle of inclination', 'water free road', etc. Each relationship has to be weighted according to the level of importance. For example 'surface' may have a large influence on the functional criterion 'smooth ride' and could be weighted with 4 on a scale 1 to 5, low to high. The item 'foundation' may have a low influence on the functional criterion 'reliable travel' and may be weighted with 1.

The weights in this sub-MCA will be used when integrating the results from the previous steps into a total score for each asset type.

Table 11: Importance of asset types in relationship with stakeholders' criteria

CRITERIA		Importance by asset type (low to high: 1 to 5)								
		Pavement		Structure			Equipment			
		Surface	Foundation	Bridge	Tunnel	Gantry	Signs	Road Marking	Lighting	Barriers
category	Criteria									
Ride comfort	Smooth ride	4	3	1	1	1	1	1	1	1
	Low angle of inclination	1	1	1	1	1	1	1	1	1
	Large arch in curves	1	1	1	1	1	1	1	1	1
	Water free road	1	1	3	1	1	1	1	1	1
Road safety	Low number of accidents	3	1	1	4	5	5	2	1	3
	Low severity of accidents	1	1	4	1	2	1	1	5	4
Level of service	Reliable travel time	2	1	1	1	1	1	2	1	1
	High speed	1	2	2	2	2	1	2	1	2
Environment	Green surroundings	1	1	1	1	1	1	1	1	3
	Low noise level	4	1	1	1	1	1	1	1	3
	Low visual disturbance of construction	1	1	1	1	1	1	1	1	4

#### 4.4 Calculation and Prioritisation

In the final step the EMCA calculates the total scores for each asset type item (e.g. surface, foundation, bridge). Based on these scores the asset types and items can be prioritised according to the relative importance to the different road user groups and their expectations.

Table 12 shows an example of a calculation sheet. It brings together the scores and weights of the previous sheets or sub-MCA's. In the cells of Table 12 the importance of the asset

types (Table 11) are being multiplied with the score of the importance of the functional criteria for the road user group (as calculated in Table 10). In this example the relative importance of the item 'surface' for the functional criteria 'smooth ride' is 4 (Table 11) and will be multiplied with the score 2.2 for this criterion (Table 10) resulting in a score of 9. For each asset type the scores on the different criteria are calculated and summed into a total score. In this example the total score for asset type 'surface' is 39.2. For each asset type a total score is calculated in this way.

Table 12: Calculation sheet EMCA

CRITERIA			Pavement		Structure			Equipment		
			Surface	Foundation	Bridge	Tunnel	Gantry	Signs	Road Markings	Lighting
<b>Category</b>	<b>Criteria</b>		39.2	27.9	32.8	30.1	34.5	30.4	27.8	29.8
<b>Ride comfort</b>	<b>Smooth ride</b>	2.2	9.0	6.7	2.2	2.2	2.2	2.2	2.2	2.2
	<b>Low angle of inclination</b>	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
	<b>Large arch in curves</b>	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	<b>Water free road</b>	1.5	1.5	1.5	4.6	1.5	1.5	1.5	1.5	1.5
<b>Road safety</b>	<b>Low number of accidents</b>	2.2	6.7	2.2	2.2	9.0	11.2	11.2	4.5	2.2
	<b>Low severity of accidents</b>	2.1	2.1	2.1	8.4	2.1	4.2	2.1	2.1	10.5
<b>Level of service</b>	<b>Reliable travel time</b>	2.1	4.3	2.1	2.1	2.1	2.1	2.1	4.3	2.1
	<b>High speed</b>	2.0	2.0	4.0	4.0	4.0	4.0	2.0	4.0	2.0
<b>Environment</b>	<b>Green surroundings</b>	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	<b>Low noise level</b>	1.5	6.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	<b>Low visual disturbance of construction</b>	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8

The results of the calculation sheet can be used to present the overall prioritisation of the asset types and items. Table 13 presents the overall prioritisation based on the previous examples. In this example the highest priority is for the surface of the road, followed by the gantry and bridge. These results are an example and are not intended to show general conclusions.

*Table 13: Prioritisation of asset types*

<b>Asset Type</b>		<b>SCORE</b>
Pavement	Surface	39.2
Structure	Gantry	34.5
Structure	Bridge	32.8
Equipment	Signs	30.4
Structure	Tunnel	30.1
Equipment	Lighting	29.8
Pavement	Foundation	27.9
Equipment	Road Markings	27.8

## 5 Conclusions

The aim of this Work Package was to investigate how social (or stakeholder) costs (and benefits) of road maintenance can be defined, how they relate to each other, how they can be taken into account in cost-benefit and multi-criteria analysis and used for evaluation purposes such as when/whether/where road maintenance is necessary.

The method chosen was a combination of literature research on methods for appraisal in infrastructure projects, the analysis of the results of previous Work Packages and additional semi-structured open interviews with experts in the field of transport policy, decision making processes, mediation and business modelling.

This report is the principal output from this Work Package. It describes how an enhanced multi-criteria analysis could be used to evaluate and prioritise different stakeholder requirements and supports the decision making process for effective asset management.

### **Limitations in weighting asset types from a stakeholder's perspective**

The first step conducted in developing the methodology was an exploration of methods available. A cost benefit analysis would be suitable where stakeholders' expectations could be expressed or measured in a monetary value. In this way, infrastructure projects or asset management strategies could account for stakeholders expectations in the same way as other relevant and common aspects. Given this context, a more qualitative approach has been followed. A multi-criteria analysis (MCA) has been deemed to be most suitable.

Focus groups have been organised and different road user groups have undertaken a trade-off exercise in which they have weighted different asset types. In all cases, a clear outcome was that the road surface had the highest priority. Assets that could impact on the safety or ride quality such as road markings were also important. The surface of the road is of great importance to road users and the closer the user is to the road the greater the requirement for a smoother surface.

Organising focus groups could be a method for NRA to involve stakeholders' in the asset management process – and thus gaining support for their approach and decisions – and for gaining insight in stakeholders' expectations with regard to different asset types. More specifically this method could be used to weight different asset types that can be used in a MCA. However, this has to be put in perspective. Are stakeholders able to judge different asset types?

For example, a good drainage system will prevent (partial) flooding of the road. A car driver may say that it is important to keep the road free from water; but might not be able to make the link to a drainage system. The reason for this could be the lack of knowledge about a drainage system itself, or the influence of other factors such as the type of the surface (e.g. porous) or the width of the road (influencing the amount of water to be moved away). It could therefore be better not to discuss the different asset types directly with the stakeholders, but to only ask how important the different criteria (e.g. safety, comfort, accessibility) are for them. Also, certain users only see part of the road (e.g. car drivers may not see much of lane 1 on a motorway or cyclists would not see much of outer lanes). Also, different users have particular aspects of interest (e.g. cyclists and motorcyclists are particularly interested in potholes at the edge of the road or in slippery or sunken iron work)

### **Involving serving stakeholders expectations in asset management requires a strategic perspective**

In the focus groups different road user groups were asked to put weights on different asset types. The result of this exercise could be that interests could be in conflict. With given maintenance budgets it might be not possible to serve all stakeholder expectations. The question that then arises is how to gain best stakeholder value for specific levels of investment: should the investment be in asset types that serve the largest group (car drivers) or should it be in asset types that serve the group that has a large political influence (e.g. disabled road users)? This requires a reference or means for justification when making certain choices between two options. The basis therefore lies in the strategic objectives of

the NRA, in what the NRA is trying to achieve. Based on their objectives, NRAs will have to decide what stakeholder groups are relevant and what the relative importance is of the different groups.

Involving stakeholder expectations in asset management comprises more than organising focus groups or conducting road user surveys. These are important but are simply means of interaction or measurement. NRAs need more insight in what drives different stakeholder groups. It is not just asking stakeholders to weight different asset types, but understanding why they put a certain weight on certain asset types. The focus has to be on gaining insight in what use stakeholders gain from certain asset types and road use. Only then can investments in asset types be managed towards serving stakeholders expectations.

This study has confirmed previous research and shown that safety, efficiency and ride comfort are the most important criteria for road users. The next steps in research should focus on further translating these criteria into functional sub-criteria. For example, translating safety into more tactical or operational sub-criteria that define the level of safety. The sub-criteria are necessary for relating asset types to stakeholders' expectations. This is an important task for NRAs and engineers.

### **(E)MCA is more than a methodology**

In this report an Enhanced MCA has been developed in order to evaluate and prioritise different stakeholder requirements and support the decision making process for effective asset management.

A first version of the MCA established direct relationships between stakeholder groups and asset types. Based on additional research the methodology has been enhanced to account for differences in importance between stakeholder groups, stakeholders' criteria and the relationship between asset types and stakeholders' criteria.

An example of certain criteria and the weighting of the criteria to show how different steps could work and how priorities could be calculated has been developed. It is important to note that a (E)MCA has to be seen as more than an instrument. The process has to be clear for both NRAs and stakeholders. It has to be clear what decision a NRA will take, what the decision making context is and to what level stakeholders' expectations play a role. This has to be transparent and communicated to the stakeholders. A transparent process and communication is a first step in serving stakeholders' expectations.

### **Perspective on further development in asset management involving stakeholders expectations**

In order to involve stakeholders' expectations in asset management, stakeholders' expectations have to be part of the core business and processes of NRAs. For a NRA, the task is to set the right design, standards and service levels for the combination of asset types to meet these expectations. With the EMCA a methodology has been developed that could help translate stakeholders' expectations into functional criteria and relate them to asset types. There are still many further improvements possible, for example in translating expectations into functional criteria and defining the right scales on which the criteria have to be weighted.

Furthermore, it should be clear what service levels are to be met, what indicators will be used as measures and what the penalties are when those SLAs are not being met. A measure for stakeholders' expectations that comes close is 'stakeholder satisfaction'. This can be measured by asking stakeholders how satisfied they are (e.g. on a scale 1-10 for different asset types or services by means of a survey).

It is difficult to know how much it costs to raise the level of service (e.g. skid resistance). Users may want improved standards but not know what the cost or impact of that is. The next challenge for further research is to gain insight into the effects of investing in certain asset types on stakeholder satisfaction. Further research could focus on how stakeholders' satisfaction could be used as an indicator in a user oriented SLA and to investigate relationships and effects between asset types and stakeholder satisfaction.

## **6 Acknowledgement**

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## Glossary

### Asset types

#### Pavement

Pavements include everything needed to create a running surface for road users (i.e. the surface and the foundation). The surface of the pavement is the contact layer (surface course) between the road and the various categories of road users. Different structural and surface properties of pavements are needed to meet the different requirements (e.g. traffic loads, vehicle speeds, vehicle handling).

The foundation is the layers below the surface and can consist of stone, concrete (cemented) mixed material or a bituminous mixed material.

Pavements play major roles in road asset management due to the costs of construction and maintenance (Falls et al 2001).

#### Structure

Structures are civil engineered objects which are designed to cross another infrastructure (e.g. other roads, railways) or natural barrier (e.g. valley, mountain, river). Examples of structures which belong to this category are bridges and tunnels.

Structures play major roles in road asset management due to the costs of construction and maintenance (Falls et al 2001).

#### Equipment

Equipment includes a variety of devices that are installed on the roadside, in the median of the road or above the road. Road markings which are placed on the road surface are also included in this category. Other examples are signs, lamp posts, guard rails, barriers, gantries and variable message signs.

An important function of equipment, or road furniture, is to improve road safety, guide the traffic and assist the driver. Road furniture items provide users with the necessary information and warnings to enable a safe and efficient journey. The types of road furniture used to improve the welfare of drivers include road signs, safety barriers, light and utility poles, boundary fences, raised road markers. Road furniture can also include non-essential road elements, such as telephone booths, mailboxes, tourist information signs and waste receptacles.

#### Landscape

In the scope of transport asset management, the term landscape defines the area beyond carriageways or railways. In this study, the term landscape comprises the physical elements of landforms, water bodies, vegetation or agricultural land use. The character and appearance of landscapes depend on the geographical area and often reflect the cultural identity of different regions. Therefore, the expectations for landscapes may differ from region to region. However, the expectancy discussed in this report focuses on the design of the roadside and visible elements of land near roads or railways considering common best practice in Europe.

#### Rest area

A rest area is a public facility, located next to a large thoroughfare such as a highway, expressway, or freeway at which drivers and passengers can conveniently rest, eat, or refuel. These may also include service areas, service stations, service plazas, service centres, and motorway services. Facilities may include park-like areas, fuel stations, restrooms, and restaurants. A rest area or rest stop with limited or no public facility may be simply a parking area or scenic area. Along some highways there are rest stops known as wayside parks, roadside parks, or picnic areas. Rest areas are common in the United States, Canada, Australia and parts of Europe and Asia.

#### Other asset types

Other asset types, which are not categorised for this study, may be associated with the winter maintenance of roads, drainage systems and earthworks.

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## Annex A: Interview guideline

### Involving and prioritising between stakeholder expectations – Practices from other disciplines.

#### Introduction

General introduction, project description and research objectives, methods (semi-structured interview, short definitions of stakeholders (users, neighbours, financial institutions, the society) general questions + 1 topic.

- General Questions
  - What is your specific expertise?
  - In what domain do you deploy your expertise?
  - In what setting of your expertise/domain are stakeholder expectations/involvement relevant?
- How could your experience and expertise be used for 'involving stakeholder needs into asset management?'
  - What methods do you use to involve stakeholders?
  - How do you prioritise between stakeholders?

## Annex B: Interviews

### Involving and prioritising between stakeholder expectations – Practices from other disciplines.

Interview with: Prof. Dr. Ir L. Tavasszy (TU Delft/TNO)

Date: 23.08.11

EXPECT partner: TNO: Teije Gorris and Michiel Muller

- General Questions
  - What is your specific expertise?
    - Professor in freight transport at TU Delft (Netherlands)
    - Principal scientist at TNO
    - Expertise in transport policy methods for appraisal. Such as societal cost benefits analysis and multi criteria evaluation.
    - Worked on projects as HEATCO and INFRONT which where about methods for appraisal of amongst others societal aspects.
  - In what domain do you deploy your expertise?
    - Transport in general and freight transport in specific.
  - In what setting of your expertise/domain are stakeholder expectations/involvement relevant?
    - The essence of policy making interaction with different stakeholders. It is about understanding what are stakeholders' needs and how that translates into demands with regard to certain transport policy issues such as planning new infrastructure.
    - In order to choose between different policy alternatives often societal cost benefit analysis (CBA) or multi criteria analysis are being used. These methods include costs or criteria that account for impacts on different stakeholders. We use CBA in the Netherlands to account for all impacts of major infrastructure projects and policies, but the CBA emphasises societal aspects such as travel times, safety, CO2 emissions and economic growth. These impacts can be monetised. CBA is more difficult to use for aspects as distributional effects between stakeholders or soft factors such as drivers convenience. Here different forms of MCA are an alternative. .
- How could your experience and expertise be used for 'involving stakeholder needs into asset management?'
  - What methods do you use to involve stakeholders?
    - Societal cost benefit analysis and multi criteria analysis.
  - How do you prioritise between stakeholders?
    - A CBA prioritises based on the contribution of a stakeholder to the economy. In essence this puts the weights automatically on selected stakeholders and their preferred criteria, using an efficiency based reasoning for optimality. More flexible approaches that are less strict in economic terms, like the MCA, allow different weights for stakeholders but have the danger that the weights may not be mutually consistent or economically useful. But prior to choosing a method for evaluation, there

should be an understanding of the relations between the design parameters and the satisfaction of the users (and non-users) of the system. For EXPECT I would suggest to proceed in a number of steps.

- First, indicators for the demands/needs of the stakeholders are needed. You should know what are the specific demands or needs from stakeholders with regard to the road/combination of asset types. You would have to specify criteria and indicators to measure to what extent stakeholders' needs are being met. Also a preliminary idea of the willingness to pay for improvement should be available.
- Second, once the service level indicators are established, stakeholders demands/needs should be translated to required service levels. For example 'highest acceptable unreliability of travel times' or 'allowed height of bumps in the road'.
- Third, the NRA should then organise road design in a way that it meets the service levels. The service levels should be translated into functional and technical criteria for the different asset types. Also these may provide constraints to the design process in terms of how assets should be integrated.
- Fourth, the indicators for the user needs should be used in a cost benefit analysis or a multi criteria evaluation – e.g. leading to a total score on stakeholder 'happiness' or 'satisfaction'. Depending on the contribution of a service quality indicator to the overall satisfaction level, stakeholders would be more or less willing to pay for a certain level of service.
- Fifth, the presentation of the evaluation should include not just the overall improvement of asset management measures, but also a division by stakeholder of costs and benefits (a benefit incidence table, see e.g. [www.iasonproject.eu](http://www.iasonproject.eu)). Government would know what it would cost to increase accessibility, and travellers would understand what share of the benefit of road projects they would pay for themselves.

## Involving and prioritising between stakeholder expectations – Practices from other disciplines.

Interview with: Frank Berkers MSc. (TNO)

Date: 9.06.11

EXPECT partner: TNO: Teije Gorris

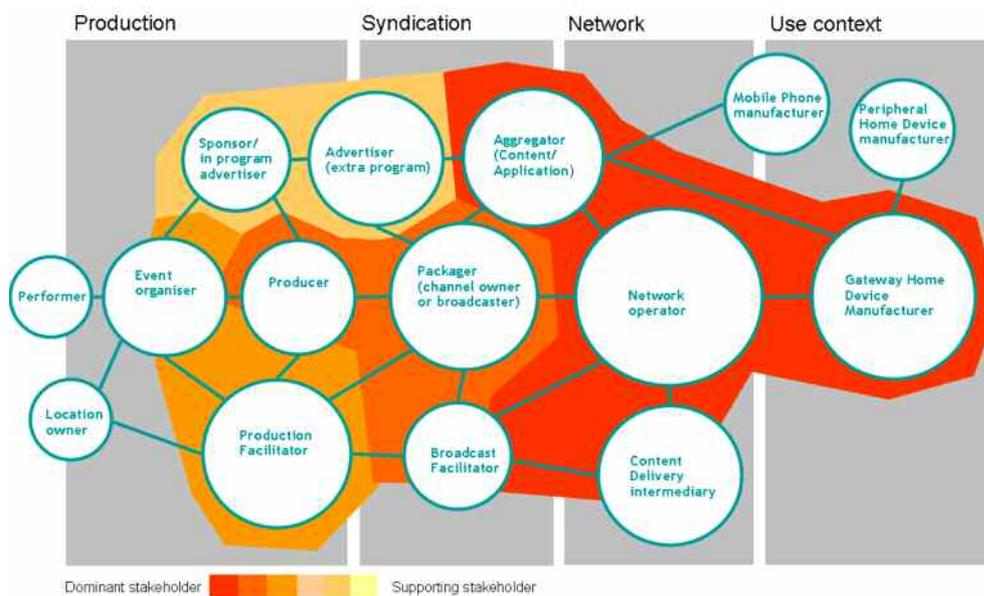
- General Questions
  - What is your specific expertise?
    - Scientist/consultant at the Strategic Business Analysis section of TNO.
    - Business modelling of innovative concepts, products and services. Specifically in the public-private domain such as the mobility domain.
    - Quantifying qualitative aspects.
  - In what domain do you deploy your expertise?
    - ICT and mobility
  - In what setting of your expertise/domain are stakeholder expectations/involvement relevant?
    - When developing innovative concepts and bringing them to market you are being confronted/relying on different stakeholders and issues. These are complex interactions and decision processes that are interdependent between stakeholders. In order to make the best investments (best value for money) you have to know for whom you are investing and what benefits can be expected. For certain qualitative aspects you have to make them quantitative. You have to translate the object to function for specific stakeholders and then translate that function into value.
- How could your experience and expertise be used for 'involving stakeholder needs into asset management'?
  - What methods do you use to involve stakeholders?
  - How do you prioritise between stakeholders?
    - Creating a value web could be a first step.
      - You identify what stakeholders are relevant and why (based on the strategic objectives of the NRA)
      - Determine what the relationship is with each of the stakeholder groups identified (e.g. enabler, supplier, client, etc).
      - Determine how important each of the stakeholder group is by determining what kind of influence they could have on the NRA in reaching their strategic objectives by identifying risks and opportunities. Based on the previous steps you decide on what stakeholders to focus and what activities to deploy. We distinguish active and passive stakeholders; ones you have to involve and others you need to not counter-act.
      - To determine effects and quality you should develop some kind of service level agreements and key performance indicators. NRAs for example could introduce an indicator to measure customer satisfaction. Note that this is not easy – as setting up the wrong indicator leads to false incentives. Next step should be to monetise the indicator. With the service level agreements and indicators as a reference, activities could be categorised in 'must haves' and 'nice to haves'.

- The business modelling canvas (on the next page and [www.businessmodelgeneration.com](http://www.businessmodelgeneration.com)) is a helpful framework for making a business model for an organisation. Though NRAs are mostly publically funded it provides a structured way to create a reference. It helps to determine what value you are delivering for what stakeholders, through what channels to communicate what resources are to be committed and what revenues can be expected.

In addition to this canvas we use a cube to indentify different types of value.



And we also will consider the role of a specific party in an ecosystem by value network analysis:



The Business Model Canvas

Designed for:

Designed by:

Ch:

Iteration:

 <h3>Key Partners</h3> <p>Who are the partners? Who are the suppliers? Which key resources do we acquire through our partners? Which key activities do our partners perform? Which key channels do our partners use? Which key customer relationships do our partners use? Which key revenue streams do our partners use?</p>	 <h3>Key Activities</h3> <p>What key activities do we perform to make our business model work? What key resources do we need to perform these activities? What key channels do we use to reach our customers? What key customer relationships do we use to reach our customers? What key revenue streams do we use to reach our customers?</p>	 <h3>Value Propositions</h3> <p>What value do we deliver to the customer? Which one of our activities provides most value to the customer? What bundles of products and services are we offering to each customer segment? Which customer needs are we satisfying? What are the channels through which we can create value? What are the channels through which we can reach our customers? What are the channels through which we can reach our customers? What are the channels through which we can reach our customers?</p>	 <h3>Customer Relationships</h3> <p>Which type of relationship do we build with our customers? Which type of relationship do we build with our customers? Which type of relationship do we build with our customers? Which type of relationship do we build with our customers? Which type of relationship do we build with our customers?</p>	 <h3>Channels</h3> <p>Through which channels do we get our Customer Segments? What is our channel? How do we reach our customers? Which type of relationship do we build with our customers? Which type of relationship do we build with our customers? Which type of relationship do we build with our customers?</p>	 <h3>Customer Segments</h3> <p>For whom are we designing our business model? What are our target customer segments? Which type of relationship do we build with our customers? Which type of relationship do we build with our customers? Which type of relationship do we build with our customers?</p>
 <h3>Key Resources</h3> <p>What key resources do we need to perform our key activities? What key resources do we need to perform our key activities? What key resources do we need to perform our key activities? What key resources do we need to perform our key activities? What key resources do we need to perform our key activities?</p>			 <h3>Revenue Streams</h3> <p>How do we generate revenue? How do we generate revenue? How do we generate revenue? How do we generate revenue? How do we generate revenue?</p>		
 <h3>Cost Structure</h3> <p>What are the most important costs to our business model? What are the most important costs to our business model? What are the most important costs to our business model? What are the most important costs to our business model? What are the most important costs to our business model?</p>			 <h3>Revenue Streams</h3> <p>How do we generate revenue? How do we generate revenue? How do we generate revenue? How do we generate revenue? How do we generate revenue?</p>		

www.businessmodelgeneration.com

## **Involving and prioritising between stakeholder expectations – Practices from other disciplines.**

Interview with: Nanne le Grand (TNO)

Date: 14.06.11

EXPECT partner: TNO: Teije Gorris and Michiel Muller

- General Questions
  - What is your specific expertise?
    - Consultant/researcher at the Networked Organisations section of TNO
    - Complex systems and decision making processes
  - In what domain do you deploy your expertise?
    - Defence, military and security
  - In what setting of your expertise/domain are stakeholder expectations/involvement relevant?
    - When operating in conflict zones, for example in peace keeping operations in Afghanistan you have to develop a strategy that best fits the local context. You want to know what interventions you could deploy, what interventions are the most effective and what interventions not to take. In order to assess your interventions you have to have understanding of local circumstances.
- How could your experience and expertise be used for 'involving stakeholder needs into asset management?'
  - What methods do you use to involve stakeholders?
  - How do you prioritise between stakeholders?
    - The essence is to get to know your stakeholders. That means you have to get to know the stakeholders themselves and to understand their context. The context of the stakeholder comprises drivers, barriers, objectives, moral beliefs, etc. Stakeholders actions, processes, acts, expressions etc. are in essence a result of their context.
    - One of the instruments we use is a so called knowledge web. We use that method as a process to involve stakeholders – if possible - to fill the web and to identify what actions to take and on what stakeholders to focus those actions.
    - We collect the available information and develop a so called knowledge web focused around a central issue or area. For each stakeholder group we develop insight in their perspective on the issue. We do that by building up intelligence about their culture, processes, connections etc. We estimate how strong certain relations are, if the relations are positive or negative. Based on this network we can estimate what kind of interventions to take, where to take them and what the expected effects are.

## **Involving and prioritising between stakeholder expectations – Practices from other disciplines.**

Interview with: Marc Rijnveld and Mario Willems (TNO)

Date: 06.06.11

EXPECT partner: TNO: Teije Gorris and Michiel Muller

- General Questions
  - What is your specific expertise?
    - Consultant/researcher at the Innovation and Environment section of TNO.
    - Marc: perform research and provide mediation services for organizations operating in the public domain. I help my clients to involve stakeholders and experts in decision making about controversial issues. Projects have been in areas such as local governance, spatial development, river basin management and environmental policy.
    - Mario: developing so called Learning Histories. These are narratives on certain issues that are being built up from both stakeholder point of view and from an external expert point of view. Unravelling processes and writing them down in narratives in this kind of way, helps stakeholders to develop understanding and commitment to issues at hand.
  - In what domain do you deploy your expertise?
    - Spatial development, soil, energy, water management, construction.
  - In what setting of your expertise/domain are stakeholder expectations/involvement relevant?
    - In the domains mentioned both public and private interests are at stake. In densely populated areas such as The Netherlands chances are great that these interests might be conflicting. We deploy our expertise in order to come to agreements between stakeholder, e.g. in finding win-win situations.
- How could your experience and expertise be used for 'involving stakeholder needs into asset management?'
  - What methods do you use to involve stakeholders?
    - Mediation, negotiation and conflict resolution
    - Scenario building and analysis
    - Joint-fact-finding
    - Knowledge mediation
    - Learning histories
    - Co-creation and -valuation of policy options
  - How do you prioritise between stakeholders?
    - We do not have off the shelf solutions. Some suggestions:
    - The process of interaction with stakeholder is more important than methodologies for prioritisation or appraisal itself. Their added value comes from the variety of values they bring into the process.
    - You have to know your stakeholders: how large are the different stakeholder groups? What are their roles? What is the local context? What are their interests and how big are those interests? How measures fit to

those interests? What asset management measures are within reach of NRAs? Measures have to fit stakeholders' preferences. You have to translate preferences to criteria and translate asset types to fit those criteria.

- You have to communicate and explain to stakeholders what asset management is and what decisions NRAs have to take. You have to communicate consequences of certain measures and alternatives. We call this 'informed decision making' (which is not the same as stakeholder involvement).
- Multi criteria analysis (MCA) or societal cost benefit analysis (SCBA) could help to weight and prioritise between measures and stakeholders. Important to mention is that these tools are not just tools, they have to be seen as processes. Processes in which to involve relevant stakeholders and together score the criteria. These processes have to be fit in a overall approach or strategy. A NRAs strategy should be the basis for developing measures and interacting with stakeholders.