

concept

Petter Næss with contribution from Kjell Arne Brekke, Nils Olsson and Ole Jonny Klakegg

## Improved planning of public investment projects

Vurdering av behov, mål og effekt i tidligfasen

Concept report No. 9



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**Improved planning of public investment projects**  
**Making up-front appraisals of needs, objectives and affects**

Bedre utforming av store offentlige investeringsprosjekter.  
Vurdering av behov, mål og effekt i tidligfasen

*Petter Næss, with contributions from Ole Jonny Klakegg, Nils Olsson and Kjell Arne Brekke*

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*Summary:* This report covers needs analysis, formulation of goals and targets and impact assessments in the front end phase of major public investment projects. The study discusses the connections between these measures, gives definitions and advice on best practice based on existing research and experience. The purpose of the study is to contribute to a high quality basis for decision securing that the concept chosen is the one that, under given circumstances, will give the best deployment of resources, value for money and benefit for society.

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Institutt for bygg, anlegg og transport  
Norges teknisk- naturvitenskapelige universitet  
Høgskoleringen 7A  
7491 NTNU – Trondheim

*Tel. 73594640*

*Fax. 73597021*

*<http://www.concept.ntnu.no>*

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# Summary

*Petter Nass, with contributions from Ole Jonny Klakegg, Nils Olsson and Kjell Arne Brekke*

**Improving design of major public investment projects.** Up front assessment of needs, goals and impact

Concept Report 1050-05

This report deals with need analysis, goal formulation and impact assessment in connection with large-scale governmental investment projects. Together with the design of alternative technical solutions, these activities make up key elements of a rational planning process. They may be carried out at different phases of a project. However, the early period is the phase in which the overall type of technical solution (the *concept*) is chosen. The early phase is usually the period when possibilities are highest to influence the project's need fulfillment, economy and amount of side effects.

Need analysis, goal formulation and impact assessment are separate activities, but also to a high extent mutually dependent. When we say that there is a need for a measure, we imply that the measure will have certain effects, viz. such effects that lead to need fulfillment. When formulating goals, we select which needs among those identified we aim to fulfill. On the other hand, goal formulation presupposes the existence of measures with the desired effects. Besides, goal formulations and identified needs have a bearing on the selection of the types of consequences on which the impact assessment should focus. These conditions underline the necessity of tight connections between need analyses, goal formulations and impact assessments in project planning. Moreover, when designing conceptual solutions – a topic not focused on as a main topic in the research project on which this report is based, but nevertheless decisive for the transition of needs and goals into measures with desired effects – opportunities exist to cater for flexibility to a higher or lesser extent.

## General challenges and recommendations

Needs, goals and impacts can be defined at different levels. The less generally a need is defined, the stronger ties will be established towards specific types of solutions. It is important that planning in the early phase of large-scale public works projects does not start at a too low level in the chain of needs, goals and measures. If so, there is a risk that the projects do not contribute to achieve the goals of the highest political priority in society. However, a number of Norwegian and foreign examples exist, where need analyses have described a particular technical solution as the need, and goals and impact analyses have been confined to concern the implementation of a given main concept.

In the early-phase planning of large-scale investment projects, other needs, goal and impacts than those directly associated with the main purpose of the project are often neglected. A possible measure to counteract this tendency is to require a structuring of need analyses, goal formulations and impact assessments with separate sections about needs, goals and impact assessment related to, respectively, the main purpose of the project, negative side effect, and positive side effects.

Large-scale public works projects are carried out within sectors of society where higher-level political goal formulations almost always exist. Often, cross-sector objectives, e.g. concerning environmental protection and sustainable development, will also be relevant to the projects. Yet, need analyses and goal formulations in project planning relatively often omit important and relevant societal needs and objectives. In particular, this is unfavorable in situations where there are political goals of changing the course of development to a direction different from the one indicated by present trends and market demand. Moreover, in many cases, early-phase project planning has been too closed a process, resulting in ignorance of the needs of different parties and lack of ability to take these needs into consideration.

Experience from a number of large-scale investment projects has shown that forecasts, cost estimates and social and environmental impact assessments have often been encumbered with serious deficiencies. Inaccuracy in the analyses may partly stem from inadequate modeling tools or insufficient knowledge about relevant causal relationships. However, to an alarming degree, forecasts systematically depict projects in a more favorable light than their subsequent actual performances. In order to counteract this, situations where “the ram is the guardian of the bag of oats” must be avoided. The analysis should be conducted by an agency providing as “neutral a turf” as possible, with a broad, interdisciplinary staffing. Public meetings, citizen juries etc. should be organized to make it possible for interest groups and civil society to express criticism against or support to the analysis. The analysis should be made subject to independent scientific evaluation (peer review). Moreover, professional sanctions should be enforced against planners who repeatedly produce seriously misleading forecasts.

Based on identified weaknesses and deficiencies in the planning of a number of previous large-scale public works projects, this report includes specific recommendations about need analyses, goal formulations, concept design and impact assessments in the early-phase planning. Some of the key recommendations are summarized below.

### **Better needs analyses**

In order to ensure that investment projects really contribute to fulfill high-priority societal needs, which may differ from the needs perceived within a delimited sector or among the proponents of a certain technical solution, the analysis must not start at too low a level in the chain of needs, goals and measures. The main need analysis must be carried out at the early stage of project planning, before decision-making on the choice of a concept solution.

Methods for need analyses could be classified into three main categories: Normative, market oriented and interest group oriented. By combining different methods, the deficiencies and weaknesses of one method may be compensated by the strengths of a different method. The methods chosen should together enable an identification of all relevant needs – “project-triggering” needs as well as needs in connection with side effects – and an assessment of their importance and relevance to different population groups.

Because of the societal nature of the relevant needs in connection with large-scale governmental investment projects, the need analysis should take general governmental objectives within relevant sectors of society as their point of departure. However, the need analysis should not be based on pre-formulated quantitative technical standards. In order to facilitate interdisciplinary exchange of

knowledge and the possibility for different sectors to influence on the analysis, and because needs may vary across population groups, the need analysis should be organized with participation from different interest groups, including different sectors (and possibly levels of administration) within the civil service as well as different population groups.

In need analyses taking higher-level governmental goals as their point of departure, forecasts based on present trends should not stand alone. By comparing the future situation resulting from present traits of development within a policy area with a normatively desirable situation, any need for measures to change the current development may be identified (“backcasting”).

In need analyses of transport infrastructure projects, the appropriateness of using transport model computations should be seriously considered. Such models should only be used after having been quality controlled by independent experts covering a wider range of disciplines than that of the model makers. As an alternative, traffic forecasts might be based on simpler and more transparent assessments of relevant factors that may contribute to increase or reduce traffic.

When presenting the main conclusions of the need analysis, all significant needs must be included, both “project triggering” needs and needs related to side effects of the project, and quantified as well as non-quantified needs. The documentation material should in an easily accessible way give an account of the criteria, assumptions and weightings on which the conclusions are based.

### **Better goal formulations**

In connection with public works projects, goals may be subdivided into three categories, anchored in the perspectives of different groups of actors: *societal goals* reflecting higher-level societal concerns across the needs of different parties, *effect goals* reflecting the perspective of the users, and *result goals* formulated from the perspective of the deliverers. Goals in the early phase of the project are formulated to govern the choice of main concept solution and include societal goals and effect goals. The goals should reflect the project-relevant and politically prioritized needs that a proposed investment project aims to meet, and should include goals related to the main purpose of the project as well as goals related to important side effects.

Large-scale public works projects are complex and often include several goals which, to a higher or lesser extent, depend on each other. In order to visualize the relationships and interdependencies, it is recommended to produce a *goal hierarchy*. The goal hierarchy is a specification of higher-level goals into partial goals, increasingly concrete the lower the level of the hierarchy on which they are situated. The goals must not be logically incompatible, but may to a varying degree be in conflict with each other, depending on the specific solutions chosen. The goals on one particular level of the hierarchy may be of different importance. This may be expressed by attaching different weights to the goals. In order for such a mutual prioritizing between goals to be politically legitimate, it must be carried out by a relevant political decision-making body.

The *main goals* of the project make up a concretizing of what the purpose or intention of the project implies to society and the users, and which side effects are important to avoid or limit. Each main goal must be related to the impacts of the proposed project, be relevant and be of a certain permanence. The main goals should be ambitious, but realistically attainable. Their formulation

should be unambiguous and without any prejudice concerning the preferable solution. They must also to a sufficient extent clarify what is to be attained, how much and when.

The *partial goals* make up a concretizing of what is to be obtained through the project. All the partial goals must be appropriate contributions to realize the main goals of the project. The partial goals should comply with the requirements of the acronym SMART, i.e. be specified, measurable, accepted, realistic and time-related. The requirement of measurability does not imply that all partial goals must necessarily be quantified, and must not lead to the omitting of important and relevant goals.

### **Development of alternative concept solutions**

Concept development implies the identification, elucidation and concretizing of possible solution concepts. This work should be carried out by an interdisciplinary team. Planning at concept level implies that principally different ways of meeting the needs and achieving the goals are elucidated. It is therefore crucial that genuinely different concept solutions are developed (including a description of the zero alternative).

The process of transforming concept ideas into concrete concept solutions should continue until the project team considers the developed solutions as reasonably good realizations of each concept idea's potential for goal achievement and satisfaction of needs. There is reason to warn against working seriously with only one of the concepts at the cost of competing concepts dealt with only superficially.

Uncertainty about the basic conditions and consequences of a project implies that a decision to implement the project involves a certain risk, economically as well as in terms of goal achievement. Flexibility is a possible strategy to meet uncertainty. The degree of flexibility should be a topic decided on at the same time as the other frame conditions of the project. Such a pre-planned flexibility may be obtained by designing concept alternatives that are flexible with respect to time schedule and composition of components. This may, e.g., apply to large construction programs including several more or less dependent partial projects, of which some are based on each other and some are mutually exclusive. The solutions chosen may also to a varying degree be flexible with respect to ways of utilization and possibility for refurbishing.

### **Better impact assessments**

The purpose of impact assessments in the early phase of project is to provide a base for prioritizing between alternative concept solutions. The impacts of a large investment project include effect related to its prime purpose as well as side effects. They include positive and negative, expected and non-expected effects directly or indirectly attributable to the project. The effects may also be of different importance to different population groups, thus involving important distributional issues.

The knowledge relevant to such impact assessments is seldom context independent. It must therefore be adapted and modified according to the situation at hand. Both for this reason and because society is continuously undergoing changes, predictions about the influences of investment projects on human patterns of activity can never be very precise.

The most ambitious methods for comparison of project alternatives presume the quantification and economic valorizing of all effects included in the analysis. The impact analysis must, however, not be confined to the most easily measurable effects or those impacts that may most readily be valorized in economic terms. The various effects should be dealt with at a level of measurement appropriate for the specific effect. Direct construction costs and benefit effects that may reasonably be expressed in monetary terms should be priced with error margins. Effects that are difficult to measure, or where what is measured has no unambiguous relationship with the values affected by the effect, should be made subject to more qualitative descriptions, or be assessed from a combination of qualitative and quantitative indicators. In such cases, too, a certain degree of quantification of the total effect may be possible, e.g. by placing the effect on a certain level of a goal achievement scale.

Decision tree, cost-effectiveness analysis, cost-efficiency analysis and cost-benefit analysis are examples of methods for comparison of alternatives and selection of the one to be recommended. The choice of method depends, among others, on the occurrence of important distributional effects, the number of consequences we find it professionally defensible to valorize in monetary terms, and the extent to which ethically difficult issues are involved. Often, a combination of several methods will be suitable.

Uncertainty analyses and sensitivity analyses may give indications about the ways the alternatives of action will perform under different conditions and for different affected groups. Based on such analyses, strategies should be developed, focusing on how different situations – in particular the most unfavorable ones – could be met. Uncertainty and risk can also be reduced by postponing irreversible decisions, e.g. on the implementation of the entire project or parts of it. Real option analysis is a tool for judging the optimal time of implementation under conditions of uncertainty about key assumptions. This approach may also be used to estimate option values created through a project (e.g. an opportunity for profitable supplementary investments) or affected negatively by the project (e.g. a possibility to experience unspoilt nature).

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