



Grant Agreement No: No TREN/FP7TR/233681/"OPTIC"

Project Co-ordinator: Institute of Transport Economics (TØI)

Website: optic.toi.no

Deliverable 6

Best practices and recommendations on policy packaging

Authors: Institute of Transport Economics (TØI), Norway
AustriaTech GmbH (ATE), Austria
German Aerospace Center (DLR), Germany
Technical University of Denmark (DTU), Denmark
Karlsruhe Institute of Technology (KIT) Germany
Royal Institute of Technology (KTH), Sweden
Swedish National Road and Transport Research Institute (VTI), Sweden
Transport Studies Unit, University of Oxford, UK
Centrum dopravního výzkumu, v.v.i. (CDV) Czech Republic

Date: August 2011

Dissemination level: PU

Quality assurance checklist

Quality Assurance item	Name of responsible	Date reviewed	Date accepted
External WPL QA	Florian Kressler	15 July 2011	22 Aug 2011
Coordinator QA	Silvia Olsen	7 July 2011	15 Aug 2011
WPL internal QA	Nils Fearnley	8 July 2011	22 Aug 2011

Preface

This report is the final deliverable of the Optic project. It is a result of two years' collaboration between nine transport research organisations from seven European countries and excellent cooperation with EU project officer Frederik Rasmussen and external reviewer Stef Proost of Katholieke Universiteit Leuven. We are particularly grateful for their active and constructive cooperation which has contributed to improving this Deliverable in many ways. In writing this final deliverable we have also benefited from insightful and helpful feedback from participants of a workshop organised by the Optic project in Brussels, 30 May 2011.

The roles of this Deliverable are manifold:

- Most prominently, it presents condensed and practical project conclusions and policy recommendations, which we have chosen to place in the beginning of this report, as an executive summary, in order to make them more accessible to readers. The recommendations are mainly based on the framework developed in Chapter 3
- It provides an overall synthesis of the entire project in Chapter 1
- It presents best practices with respect to the various stages of a policy packaging process. Best practice examples are used throughout this Deliverable to illustrate points and to show how our recommendations may translate into real life policy packaging
- It outlines the basic rationales for policy packaging and also some basic assumptions and premises for the Optic framework in Chapter 2
- Issues relating to transferability of best practices and barrier management are addressed in Section 4.2, and with respect to tools and methods in Section 4.1.1
- It contributes to closing the gap between quantitative modelling and qualitative assessment. In Section 4.1, the different tools' potential and limitations are presented and recommendations given as to when in the policy packaging process they are most appropriate
- It synthesises and evaluates indicators and tools to cover the main elements (economic, social and environmental) that need to be considered in a holistic assessment, including the important issues of uncertainty, risk, and irreversibility, in Section 4.1

To make this Deliverable more accessible to the uninitiated reader, an "Optic glossary" is provided in the appendix.

It is the aim, and our hope, that this report will serve as a practical tool for those involved in complex policy making. While our recommendations are meant to be general and applicable to any transport mode, different administrative and geographic levels, great efforts have been made to ensure that our recommendations are still specific enough to be relevant. Our recommendations are related to the various stages of a policy packaging process and will help structuring the approach to activities that often appear irrational and chaotic.

Abstract

This report, which is the final deliverable of the Optic project (Optimal Policies for Transport In Combination), summarises two years of collaborative research into the policy process of combining individual measures into policy packages.

Six stages of the policy process are identified. This report gives practical and general advice for each of these stages:

1. Define objectives and targets
2. Create an inventory of measures, identify potential primary measures and detect causal relationships
3. Assess policy package
4. Modify package
5. Package implementation
6. Evaluate effects, introduce remedial actions

In addition, this report explores in further detail indicators and tools for the assessment of policy packages; the management of barriers; and issues of transferability.

Table of contents:

Quality assurance checklist	2
Preface	2
Abstract.....	3
Executive summary – a toolbox for policy packaging.....	5
Issues in policy packaging and implementation	5
Toolbox	7
1 Introduction and core concepts of policy packaging	15
1.1 Background, aim and structure of report.....	15
1.2 Policy packaging: definitions, tools and practices.....	17
2 Background for and key assumptions in policy packaging	23
2.1 Rationale for policy packaging – from isolated to coordinated policies	23
2.2 Packaging process: context and content	24
2.3 Packaging ideals and reality	27
3 Towards a generic framework of policy packaging	29
3.1 The generic framework: processes ex-ante.....	29
3.2 The generic framework: processes ex-post.....	39
4 Assessment tools, barrier management and need for adaptive approach.....	43
4.1 Methods and tools for assessment	43
4.2 Barrier management	64
4.3 Mapping adaptive planning	70
5 Concluding remarks.....	75
5.1 Optic’s contributions to state of the art.....	75
5.2 Further research needs.....	76
Acknowledgements.....	79
References.....	80
Appendix 1: Optic glossary	87
Appendix 2: A note on Optic recommendations in view of the EC Impact Assessment Guidelines.....	94

Executive summary – a toolbox for policy packaging

This executive summary provides condensed summary of conclusions and recommendations of the Optic project. Background material and rationale behind the recommendations can be found both in this Deliverable and in Optic Deliverables 1 through 5. Here, we solely focus on the policy recommendations and guidelines. We first give a brief introduction to Optic *framework* and its related issues. Then, we offer a *toolbox* for policy packaging and policy implementation in the form of *factsheets*. While it is clear that real life policy making rarely follows any idealised process exactly, the framework can support policy makers in the different stages of the policy making process. In every stage, the recommendations must be applied in a flexible manner and, if needed, adjusted to meet specific demands.

Issues in policy packaging and implementation

The overall objective of Optic is to give guidance for the design and implementation of optimal policy measures in combination (i.e. policy packages) to reduce adverse effects and/or provide positive synergies. A practical way to combine the most important design and implementation related recommendations for policy packaging is in form of factsheets which together represent a useful toolbox for policy packaging. Each one of these factsheets addresses a specific stage of the Optic policy packaging process (Figure 0.1).

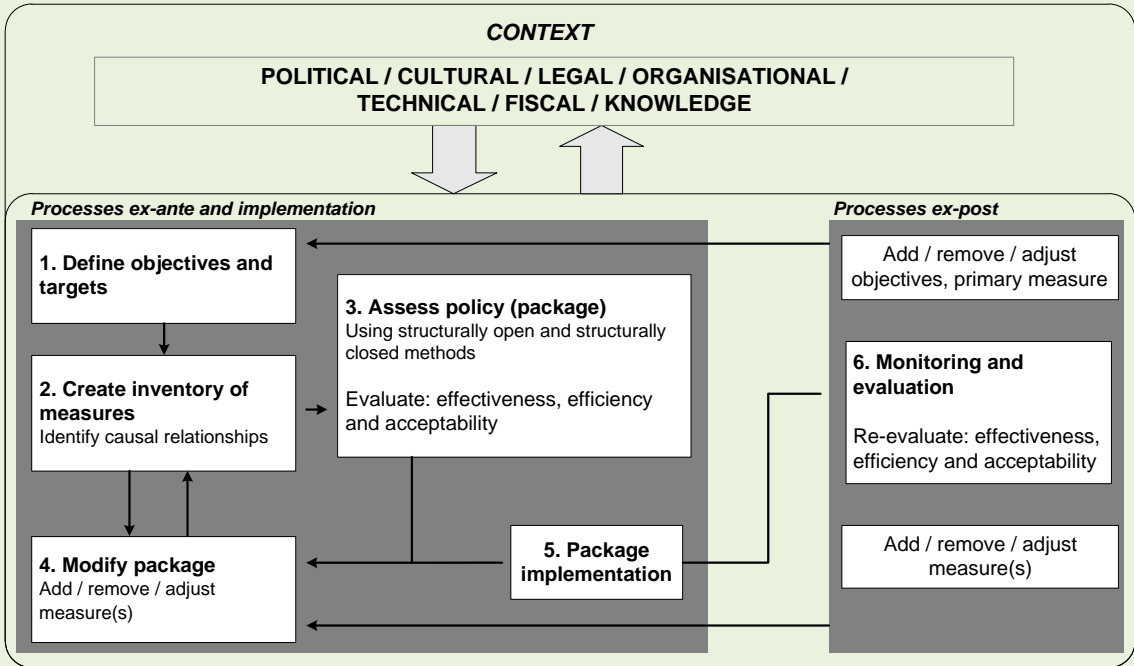


Figure 0.1: Optic policy cycle

For analytical purposes and to help structuring the approach, six stages are distinguished.

- 1. Definition of objectives and targets.** Here the objectives and targets of the policy intervention are defined. The more concrete these definitions are, the more tangible their assessment in later stages can be. Ideally, targets are connected to specific target

values, or indicators. If objectives and targets remain vague, it becomes difficult to define suitable and effective policies

2. **Creating an inventory of possible policy measures:** Once objectives and targets have been agreed upon, an inventory of suitable measures can be set up (stage 2). Each of these measures must be evaluated with respect to acceptability, effectiveness, efficiency, potential barriers and their causal relationship to other measures. The output is a decision on one or more primary measures that function as the core foundation of the policy package
3. **Assessment of policies and policy package:** The primary measure is assessed here, with the aim to predict in as much detail as possible impacts and to quantify effectiveness
4. **Expansion of package and amendment of measures:** If the primary measure is considered insufficient in any respect, further ancillary measures can be supplemented into a policy package. Based on further assessment (stage 3), the policy package can be further refined. This process iterates until a satisfactory output is reached
5. **Implementation of package**
6. **Monitoring and evaluation:** Once the package has been implemented, the effects must be monitored and evaluated and, if necessary, corrective actions taken

In real life, the boundaries between the stages are evidently not that clear and, importantly, a policy packaging and implementation process does not necessarily follow any fixed order. As explained above and seen in Figure 0.1, a policy packaging process will likely include some iterations between these stages before a final policy package can be established. The number of these iterations will depend, inter alia, upon the complexity of the policy package in question.

Besides implementation, stages 3 and 4 are likely to be the most demanding with regards to necessary time and resources. However, careful work in stages 1 and 2 will help improve the whole packaging process.

The toolbox provides recommendations for each of the stages. The recommendations are based on theoretical elaborations and empirical evidence analysed in the Optic project, and they are associated with a higher likelihood of arriving at a satisfactory outcome.

The reason for adopting such an approach is twofold. One is to avoid negative unintended consequences of a policy action. An adequate assessment – including both quantitative and qualitative methods – and revision of a policy package should help minimising this risk. Appropriate tools and methodologies must be chosen for the assessment of the policies. Quantitative assessment, like modelling, is usually necessary. More qualitative approaches (e.g. causal mapping) can support this assessment, especially for identifying aspects that should be part of the quantitative analysis. Appropriate indicators have to be defined in order to determine acceptable results of the assessment. Depending on the outcomes and on the complexity of the policy package this will require iterations when adding, adjusting or removing different policy measures of the policy package.

The second reason is to deal with barriers during formation and implementation of a package. Depending on the type of policy package, more or less barriers can be anticipated. A useful categorisation building on Lowi (1964; 1985) helps identify potential barriers which were discussed in further detail in Optic (2011b):

- *Regulatory policies* dealing with legislation and sanctions to influence the activities of citizens and companies (in this context, e.g. road traffic acts)
- *Distributive policies* including most resource policies, research and development and business policies (in this context e.g. infrastructure policy)
- *Redistributive policies* which imply redistribution of income by taxation. Welfare state programmes represent traditional examples (but in our context, examples could be congestion charges and heavy vehicle fees)

- *Constituent policies* imply establishment of governance institutions. Changes in the constitution but also other institutional changes in public administration are considered constituent policy (in our context, e.g. establishing a new transport agency)

It can be generally expected that public and political acceptance is more likely in the case of distributive and constituent policies than for regulatory and redistributive policies, because the former confer powers and privileges, while the latter impose obligations or positions. However, constituent policies are more likely to experience opposition from existing public organisations than the other types.

Another categorisation of public policy emphasises that the extent of likely success or failure for formation or implementation of a policy or package depends on whether advantages and disadvantages of the policy are spread or focused. Wilson (1980) discusses under these premises the potential of four policy types:

- *Majority policy*, where both advantages and disadvantages are spread, is not likely to be decided and implemented because no specific group cares sufficiently
- *Entrepreneur policies* are least likely to be decided and implemented since groups affected negatively by the policy have incentives to organise and struggle against the policy
- *Client policy* is most likely to be decided and implemented since groups benefiting are likely to mobilise, while those carrying the burden will not
- Whether or not *Interest group policies* are decided and implemented can depend on the relative strength of the parties. Strong mobilisation from both sides can be expected, reducing the likelihood of implementation

During implementation and once a policy package has been implemented, it is of great importance to ensure regular monitoring of the results. There is always some degree of uncertainty over the outcome of a policy, and the degree of goals achievement often changes over time – making adjustments necessary. Monitoring and evaluation of a policy package during and after implementation can help identifying unintended effects and secure long-term effectiveness of a policy package. Still, unfortunately, while significant resources are often directed at ex-ante evaluation of policy interventions, less is usually devoted to official ex-post evaluation.

In terms of ex-post monitoring of a policy package, there is a range of approaches and tools in use. Straightforward comparisons of pre- and post- intervention indicators represent a valuable, although simplistic, base for ex-post analysis. Cost-benefit analyses help assess whether interventions have generated their expected benefits efficiently. Complementary modelling or multi-criteria analysis approaches enable incorporation of non-monetary impacts.

There are four broad categories of remedial actions that can be considered should the outcome not be as expected: policy intensity; compliance adjustment; character adjustment; and scope adjustments. Section 1.2 will introduce more detail the concept of adjusting policies, which is treated in detail in Section 3.2.1.

Long term monitoring is especially important, as examples have shown that short term successes can deteriorate over time, making adjustments necessary.

Toolbox

Figure 0.1 illustrates the stages of the Optic policy package process. This process is dynamic and includes stakeholder interaction, iterations between individual stages, and policy modifications depending on the complexity of the policy package.

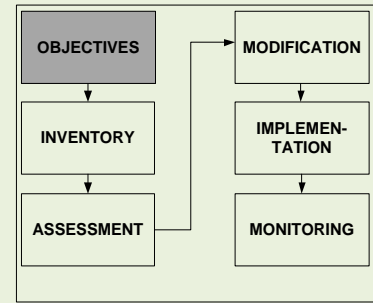
Each stage is described on a *factsheet* with a short description, followed by a number of recommendations that are derived from this and previous Optic Deliverables. The recommendations help policymakers to identify ways to detect unintended effects, and to reach a high degree of effectiveness, efficiency, and acceptability of policy packages.

The recommendations highlight the degree of different actors' involvement in the different stages of the process. While in real life many actors and stakeholders participate in and influence all parts of the policy making processes, we can only provide normative recommendations. The extent to which single actor groups are involved in each stage is indicated using a "degree-of-involvement"- scale: very low; low; medium; high; and very high. We pay particular attention to the following groups of actors:

- **Politicians / decision makers:** Those who set objectives and make decisions. They are typically politicians who state overall goals, and who may play important roles in adoption and implementation phases as well. In real life they can be anything from absent to actively involved in all stages;
- **Public administration:** In our context, the public administration executes politicians' decisions and makes them happen. Public administration could be the administrative staff of a department or public bodies like for example a civil aviation authority. They prepare the decision basis for politicians (either themselves or make it happen – e.g. they give direct advise or they gather advice from external experts);
- **Stakeholders:** Those who have an interest in, or are affected by, a policy. This includes users and their interest groups, suppliers, affected industries and their interest groups, and the general public. Stakeholders' role would primarily be to respond to hearings, but in real life they are also likely to try to influence objective settings, targets, policy measures, package design, implementation and so on;
- **Independent experts:** Independent and unbiased consultants or researchers. They normally work (on a contract) for a public administration.

OBJECTIVES AND TARGETS

DESCRIPTION: Clear definition of objectives and targets of the policy intervention, acknowledgement of other objectives and targets (within the same or in other policy domains), description of how target achievement will be monitored. More concrete and measurable targets enable proper ex-post assessment. Ideally, quantitative targets (a number or a range) are set for each objective. A vague focus, ambiguous definition and setting objectives without viable targets can undermine the rest of the packaging process.



RECOMMENDATIONS

- Clearly state objectives and document them in official publications
- Set and define a number of alternative targets to be met representing different ways to measure objective achievement and set high, medium and low 'achievement' thresholds
- Identify a mechanism and data requirements to monitor level of objective attainment over time
- Acknowledge objectives and targets of other policy domains

TOOLS AND METHODS (THOSE COMMONLY USED)

- Policy communication: formal (e.g. green/white paper) and less formal (e.g. EU briefs)
- Structurally open methods (involving mainly policy makers and policy analysts)

CHECKLIST QUESTIONS

- Have the targets and objectives been clearly defined?
- Have targets and objectives of other policy domain been considered?
- Is there an agreement which objective is 'more important' if contradiction arises?
- Can the targets be realistically measured and monitored?

PRACTICAL EXAMPLE

The EU White paper (European Commission, 2011b) explicitly mentions that a reduction of at least 60% of GHGs by 2050 with respect to 1990 is required from the transport sector. This objective is translated into 10 concrete and measurable targets, which include:

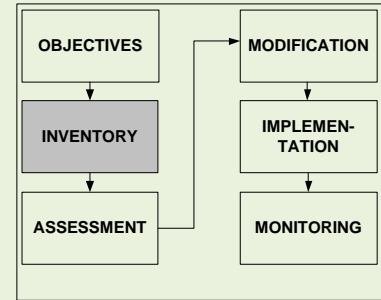
- Low-carbon sustainable fuels in aviation to reach 40% by 2050
- 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030
- By 2050, connect all core network airports to the rail network, preferably high-speed
- Halving road casualties by 2020

ACTOR INVOLVEMENT

Actor Group	Degree of involvement	Recommended tasks
Politicians / decision makers	<i>Very high</i>	<ul style="list-style-type: none"> • Initiate and steer the process of setting objectives and targets • Decide upon objectives and possibly define targets
Public administration	<i>High</i>	<ul style="list-style-type: none"> • Establishes resource plan • Assist in setting objectives • Acquires relevant background data for objective setting
Stakeholders	<i>Medium</i>	<ul style="list-style-type: none"> • Consulted to validate targets and objectives
Independent experts	<i>Between low and medium</i>	<ul style="list-style-type: none"> • Could be consulted for information which might be relevant for later policy development process • Ensure that early decisions are sensitive to the objectives and targets.

INVENTORY OF MEASURES

DESCRIPTION: Set up a comprehensive list of individual measures that are expected to directly affect the objective set (i.e. primary measures) and assess each of these measures individually against two criteria: its likely effectiveness (on the objective) and its implementability. One or two primary measures are chosen as the foundation of the policy package.



RECOMMENDATIONS

- Evaluate a broad range of possible primary measures ensuring a mix of different types of measures (regulatory, economic, infrastructure, technological etc.)
- Do not consider (almost) any measure as infeasible or not effective at this stage
- Identify and draw (literally) the tacit causal assumptions underlying the expected effect of a measure on an objective
- Involve stakeholders and conduct open discussions to assess a) the causal assumptions made, b) identify likely unintended effects and barriers to the implementation of each individual measure

TOOLS AND METHODS (THOSE COMMONLY USED)

- Data management: for establishing the inventory of measures
- Causal Mapping: “diagrammatic representation or visual aid to explain causal relation between policy measures.
- Cost-benefit Analysis, Multi-Criteria Analysis or other appraisal techniques to estimate (mainly) each measure’s effectiveness
- Policy analysis to appraise the implementability of each measure

CHECKLIST QUESTIONS

- Has a sufficiently broad range of policy measures been identified for the inventory?
- Has a set of selection criteria been transparently defined to appraise/evaluate each primary measure?
- Is a broad range of stakeholders involved in the inspection of the causal relationships?

PRACTICAL EXAMPLE

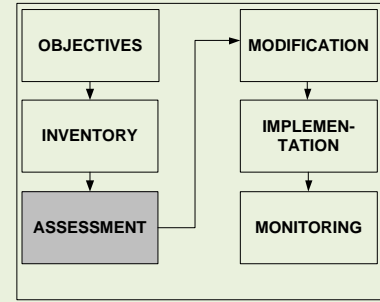
The VIBAT-London study identified over 120 individual measures to combat climate change challenges in London (Hickman et al., 2009); the Policy Scenarios for Sustainable Mobility project (Banister et al., 2000) identified close to 100 measures to advance sustainable transport in Europe.

ACTOR INVOLVEMENT

Actor Group	Degree of involvement	Recommended tasks
Politicians / decision makers	<i>Between low and medium</i>	<ul style="list-style-type: none"> ▪ Consultation of experts, choice of primary measure(s) ▪ Delegate development and maintenance of inventory to civil servants
Public administration	<i>Very high</i>	<ul style="list-style-type: none"> ▪ Evaluate the input needed from external stakeholders to develop measures and prepare the causal relationship assessment ▪ Responsible for establishing the inventory ▪ Conduct the operational causal mapping and prepare results as input for inventory of measures
Stakeholders	<i>High</i>	<ul style="list-style-type: none"> ▪ Are involved in open discussions about possible effects ▪ Help identify relevant policy consequences
Independent experts	<i>Anything between very low and very high</i>	<ul style="list-style-type: none"> ▪ Expert review on feasibility, causal assumptions and cost effectiveness ▪ Assessment of cost effectiveness of policy package using appraisal techniques

POLICY PACKAGE ASSESSMENT

DESCRIPTION: Enabling a comprehensive but efficient assessment of the effects of a policy intervention inside the transport system and beyond. Structurally open methods are used as qualitative approaches to receive external insights to the measures and thus detect effects. Structurally closed approaches are applied to assess possible effects with mainly quantitative models. The aim of both approaches is to evaluate the policies' effectiveness, efficiency and acceptability. Part of policy package assessment is also the definition of indicators to measure the policy package's performance and comparison of ex-ante assessment with ex-post measurements.



RECOMMENDATIONS

- Apply structurally open and explorative methods in the beginning of setting up a policy package. Then use structurally closed approaches in order to quantify effects. Finally, use structurally open methods for the interpretation of results
- Prioritise which measures from the inventory of measures should be subject to a resource-intensive model-based assessment; identify risks and uncertainties already prior to the actual assessment
- Consider communicating assessment results to a multi-actor group to reflect again on the appropriateness of policies.
- Analyse distributional effects based on clear concepts and definitions
- Consider the degree of consensus on targets and certainty about measures

TOOLS AND METHODS (THOSE COMMONLY USED)

- Apply a sequential approach of assessment where first primary measures are analysed in isolation using structurally closed methods and then step-by-step add more measures with the focus on inter-measure interaction
- Mixed approaches (structurally open *and* structurally closed) for the assessment of complex policy packages are recommended.
- The appropriate design and integration of structurally open methods can help anticipating and thus, reducing the number of potential (unknown) unintended effects

CHECKLIST QUESTIONS

- Are all available (structurally open and closed) methods and tools identified?
- Is a strategy developed to evaluate aspects not covered by the deployed models?
- Are risks and uncertainties related to the package's measures revised prior and after the assessment?
- Has an open and broad view on potential effects been applied and does the methodological approach cover relevant unintended effects, effects beyond the transport system as well as potentially affected societal groups?
- Are there sufficient budgets to cover necessary cost and time resources for the assessment?
- Has a set of selection criteria for primary measures been transparently defined?

PRACTICAL EXAMPLE

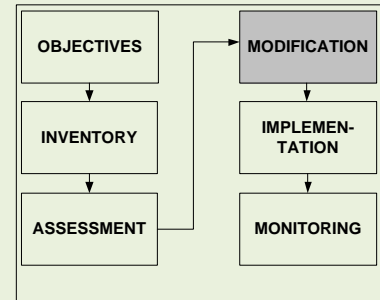
In Germany a vehicle scrappage scheme was introduced (so-called "Umweltprämie") which gave new car buyers a bonus when an old car was handed in for scrappage (under certain restrictions). This measure was supposed to reduce the stock of high emission cars among other objectives. The intended effect of an increased number of newer cars with fewer emissions and also the respective shift within the vehicle stock can be reproduced with structurally closed methods. An unintended effect, namely the illegal export of scrapped cars to other countries, for which enforcements were not considered sufficiently beforehand, was not covered by quantitative approaches but could have been detected with additional structurally open methods (involvement of stakeholders).

ACTOR INVOLVEMENT

Actor Group	Degree of involvement	Recommended tasks
Politicians / decision makers	<i>Medium</i>	<ul style="list-style-type: none"> ▪ Request assessment and agree on milestones for the assessment ▪ Decide on changes on the policy package if required
Public administration	<i>Medium to high</i>	<ul style="list-style-type: none"> ▪ Assist in operational tasks ▪ Execute (acquire) assessment and hereby influence choice of methodology ▪ Decide on resources to be spend for external involvement
Stakeholders	<i>Very high</i>	<ul style="list-style-type: none"> ▪ Are consulted during workshops, discussions (open explorative assessment methods) ▪ Identification of not yet detected effects
Independent experts	<i>Very high</i>	<ul style="list-style-type: none"> ▪ Choice of tools and methods for assessment ▪ Perform quantitative and qualitative assessment

MODIFY PACKAGE / AMEND MEASURES

DESCRIPTION: Improving the policy package regarding its effectiveness, efficiency and acceptability by adding or removing measures, and addressing unintended effects and barriers identified during the assessment. After introducing additional measures further effects from inter-measure interaction may appear which have to be assessed. Hence, this stage is essential regarding the decision of whether to implement or to iterate the process by amending measures, i.e. going back to stage 2 or 3.



RECOMMENDATIONS

- Decide whether additional measures and barrier management strategies are required to address unintended effects and to improve efficiency, effectiveness or acceptability
- Identify how barriers can be managed by package expansion and/or amendments
- Consider if changing or adding new primary measure(s) raise the overall policy package's effectiveness, efficiency and acceptability
- Consider if additional, secondary measures improve the package mitigating encountered barriers
- Consider expanding the policy scope and in that case consider new, additional interests of stakeholders
- Communicate benefits of additional measures if expanding the package

CHECKLIST QUESTIONS

- Have potential barriers been identified?
- Have unintended effects been identified?
- Does the inventory of measures include additional measures that may assist managing barriers and unintended effects?
- Is it necessary to remove or amend measures?
- Will the transaction costs related to an adjustment of the package exceed the gain in efficiency and effectiveness obtained due to the changed package?

PRACTICAL EXAMPLE

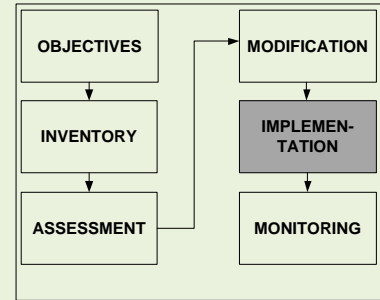
There exist today several economic policy instruments aimed at reducing heavy vehicle transport on roads and sometimes also promoting a modal shift to rail and sea transport. An example of such an initiative is the heavy vehicle fees in Switzerland and Germany. The heavy vehicle fee in Switzerland is included in a large policy package of other measures. The main aim of the package was to push for a modal shift for freight transport from road to rail and to reduce the number of heavy vehicles crossing the Alps. The package was negotiated and amended as regards allocation of the fee revenue, subsidisation of combined transport and inclusion of emissions in the calculation of the fee.

ACTOR INVOLVEMENT

Actor Group	Degree of involvement	Recommended tasks
Politicians / decision makers	High	<ul style="list-style-type: none"> ▪ Decide upon the usage of barrier management strategies ▪ Consider changing or adjust the package character to increase the effectiveness and efficiency and acceptability
Public administration	High	<ul style="list-style-type: none"> ▪ Overview resources and additional expenses due to barrier management strategies
Stakeholders	High	<ul style="list-style-type: none"> ▪ In case major changes are necessary an additional iteration with new stakeholders is advisable. This might occur if e.g. the policy scope is widened
Independent experts	High	<ul style="list-style-type: none"> ▪ Deliver information on the policy package effectiveness, efficiency, risks and uncertainty ▪ Recommend modifications of the policy package

PACKAGE IMPLEMENTATION

DESCRIPTION: To ensure that the policy package is implemented so that the final outcome, as far as possible, is in accordance with the objectives of the package. However, implementation of policy packages will often run into numerous barriers. Before and during implementation of a policy package different barriers must therefore be taken into account and managed. The number of expected barriers often depends on the type of policy to be implemented.



RECOMMENDATIONS

- Identify already in the policy formation stage potential implementation barriers with a high inertia and initiate a way of either managing these, or reconsider the chosen policy measures
- Ensure continuous communication with stakeholders during the early implementation, and possibly already during policy packaging to pave the ground for successful implementation
- Allow room for adjustments of details in policy package, expanding the scope and showing flexibility.
- Apply a clear communication strategy, and communicate benefits
- Consider organisational responsibility and set-up for implementation. This may preferably be started already during formation of package phase
- Early assessment of technical problems that may be encountered. If there is a limited window of opportunity available for implementation, go for proven technology
- Consider a set of barriers management strategies before implementation of the package

TOOLS AND METHODS

- Consultation of stakeholders through “open house meetings” or “dialog seminars for key stakeholders”. Supporting tools may be chats , blogs to receive instant comments on adjustment

CHECKLIST QUESTIONS

- Have potential barriers been identified already during policy package formation?
- Have the stakeholders been prepared for the implementation?
- Have all technical systems been sufficiently tested?
- Are benefits communicated clearly?
- Have the organisational responsibility and set-up for implementation been considered?
- Is an actor assessment (identification of types of actors, to what degree they may be affected, and their political resources) required to ensure that intentional bias is reduced given the nature of lobbying?

PRACTICAL EXAMPLE

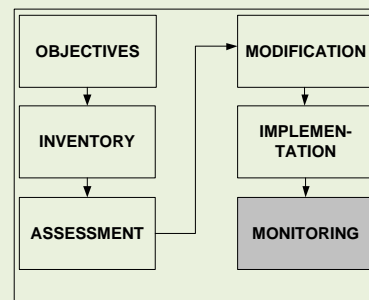
The implementation of the Stockholm congestion charging scheme is an example of a process where a flexible approach was applied and extensive dialogue with stakeholders took place. A clear information strategy was included in the process, which implied profound and professional communication of results. The organisational set-up was considered consciously, involving a shift of responsible authority between the phases of policy formation and policy implementation. This case was eventually successful, despite the fact that legal barriers were found at a rather late stage.

ACTOR INVOLVEMENT

Actor Group	Degree of Involvement	Recommended tasks
Politicians / decision makers	<i>High</i>	<ul style="list-style-type: none"> ▪ Need for a consistent and transparent communication strategy to make benefits clear to parties involved ▪ Initiate analysis of technical difficulties which might occur during or shortly after the implementation (e.g. infrastructural obstacles) ▪ Consider small changes to the package as possibility to avoid failures of policy targets.
Public administration	<i>Very high</i>	<ul style="list-style-type: none"> • Documentation on the first implementation phase, feedback to policy makers
Stakeholders	<i>Between low and medium</i>	<ul style="list-style-type: none"> ▪ Consulted about their first impressions after policy is implemented (with regard to opposition on policies in early stages)
Independent experts	<i>Very low</i>	<ul style="list-style-type: none"> ▪ Needed to analyse causes for implementation difficulties and for policy re-calculation.

MONITORING, EVALUATION AND EX-POST ADJUSTMENTS

DESCRIPTION: Monitoring and evaluation of a policy package after implementation is crucial for the long-term effectiveness of a policy package and must already be foreseen during the design process. The goal is to examine if the objectives and targets have been achieved, within the planned timeframe and within budgets, and to identify any unintended effects. Deviations must be examined and, if necessary, adjustments made to the policy package. Monitoring and evaluation should be carried out in regular intervals, as agreed upon during the design process. This agreement must also include the methods used for monitoring and evaluation and the relevant indicators.



RECOMMENDATIONS

- Identify a set of indicators that continuously measure achievement of objectives and targets
- Consider both qualitative and quantitative approaches for monitoring and evaluation
- Methods and procedures must be agreed upon before evaluation/monitoring takes place
- Consider adjusting the policy intensity (impact on targets), compliance (towards policy impacts), policy package character (changes of measures) and the package scope (geographical, operational).
- Establish impact monitoring strategies to assure cost effectiveness, transparency and accessibility of the process

TOOLS AND METHODS (THOSE COMMONLY USED)

- Multi-Criteria Analysis and Cost-Benefit-Analysis
- Signposts: indicators showing to what extent the pre-set objectives and targets are reached after the implementation phase. These signposts identify critical points in time when adjustment of policies should be considered

CHECKLIST QUESTIONS

- Is there an agreement on the indicators to be used for evaluation and monitoring?
- Have the methods been agreed upon, including the timing of monitoring activities?
- Are the methods flexible/adaptable enough to take situations in to account that were not anticipated before the policy intervention?
- Have resources been made available to carry out monitoring and ex-post evaluation?
- Have the responsibilities for monitoring, evaluation and reporting been clearly defined?

PRACTICAL EXAMPLE

Transport for London invested heavily in ex-post monitoring of the London Congestion Charge. The organisation closely adheres to an 'Impact Monitoring Strategy', which is founded upon the following five principles:

- (1) Monitoring should robustly detect and characterise the main expected effects of congestion charging', which reflects a commitment to comparative analysis of ex ante and ex post appraisals ("with/without analysis")
- (2) Monitoring should enable unexpected or unanticipated effects to be determined', which is designed to ensure that the monitoring approach remains sensitive to the presence of non-intentional effects
- (3) Monitoring should seek to understand, as well as measure', which reflects the need for qualitative methods
- (4) Monitoring should aim to meet the legitimate needs of all stakeholders for information', it should be designed to ensure that the monitoring process remains democratic, transparent and accessible to a range of individuals, organisations and economic sectors
- (5) Monitoring should provide best value', which aims to ensure that the monitoring procedures remain cost-effective

ACTOR INVOLVEMENT

Actor Group	Degree of involvement	Recommended tasks
Politicians / decision makers	Medium	<ul style="list-style-type: none"> ▪ Adjustment of policy package if needed ▪ Assignment of monitoring responsibilities between civil servants and experts
Public administration	Very high	<ul style="list-style-type: none"> ▪ Manage, monitor and control indicators and inform policy makers on changes
Stakeholders	Between medium and high	<ul style="list-style-type: none"> ▪ Are not necessarily required during the monitoring stage, should rather be consulted if monitoring shows strong deviations from initial targets to identify causes
Independent experts	Very high	<ul style="list-style-type: none"> ▪ Define those target achievement indicators which are implemented in the monitoring strategy ▪ Application of qualitative and quantitative methods for policy monitoring ▪ Assessment of changes in costs and benefits compared with calculations in earlier stages

1 Introduction and core concepts of policy packaging

1.1 Background, aim and structure of report

This report, which is the final output of the Optic project, synthesises Optic and provides a practical guideline in policy packaging for policy makers at European, national and local levels. By identifying best practices when it comes to package design, package optimisation and policy implementation, this synthesis addresses explicitly the problem of bridging the gap between quantitative modelling and qualitative assessment.

The overall objective of the Optic project is:

To help identify in advance possible adverse effects of transport policy measures taken in isolation, and to develop methodologies for the design and implementation of optimal combinations of policy measures which reduce adverse effects and/or provide positive synergies.

The ultimate aim of this report is to develop a practical guide – the Executive summary with the 'toolbox' – to policy package design for decision makers at different levels. The guideline provides a structured approach to policy packaging, by pinpointing knowledge requirements and highlighting policy considerations to be made at different phases of the packaging process. The guide stresses, inter alia, the role and importance of transport models. It acknowledges their strengths and weaknesses related to addressing unintended effects and specifies where and how they need to be supplemented by other assessment methods in order to address issues of uncertainty, risk and acceptability. In addition, the synthesis reflects on experiences made in real world policy packages and lessons learnt during their set-up and implementation and compares them with the policy packaging framework developed in Optic. In reflecting on both the theoretically driven packaging framework and the real world packaging experiences, this report provides a comprehensive overview and pragmatic guide for adaptive policy package design. The guide also focuses on how to cope with implementation barriers and issues of transferability when it comes to the introduction of policy packages in the context of different EU member states.

The main contribution of the Optic project in general, and this report in particular, is to improve policy making with respect to combining individual policy measures into a *package* in an iterative process where individual measures are added, removed or adjusted. Recommendations and guidance in this respect is provided in stage 4 in the generic framework. See chapter 3.1.3 and the Executive summary where the guidelines are made operational.

As shown in Figure 1.1, this deliverable draws on the contributions from all previous Work Packages of the Optic project.

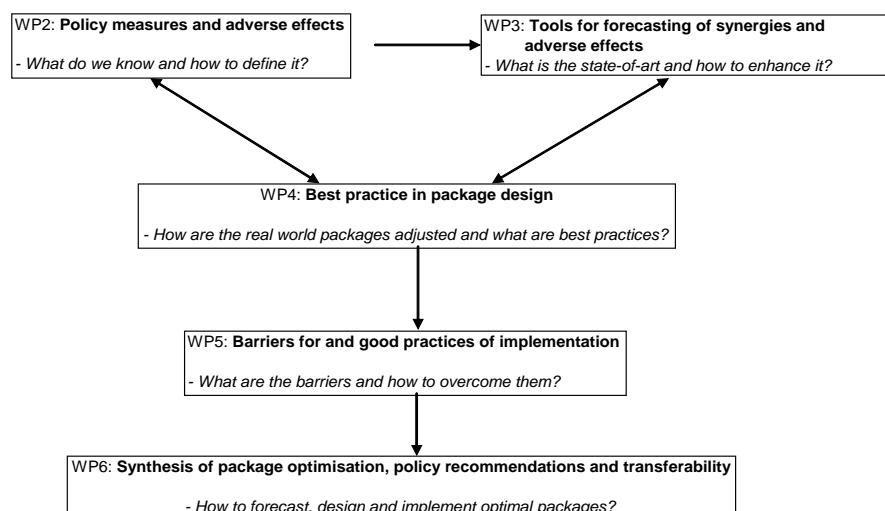


Figure 1.1: Structure of Optic project

The main references used in this section are the previous Optic deliverables:

- Deliverable 1: Inventory of measures, typology of non-intentional effects and a framework for policy packaging. (Optic, 2010a)
- Deliverable 2: Inventory of tools and methods for early detection of adverse effects (Optic, 2010b)
- Deliverable 3: Ex post identification and remedies of adverse effects (Optic, 2010c)
- Deliverable 4: Best practice in policy package design (Optic, 2011a)
- Deliverable 5: How to manage barriers to formation and implementation of policy packages in transport (Optic, 2011b)

This concluding report from Optic has two main parts:

The first part, the toolbox for policy making which constitutes this report's executive summary, provides a condensed summary of the conclusions and recommendations from the Optic project and how these can be applied in actual policy packaging. This part can be read as a document in its own terms, and is intended to be an easily accessible text for policy-makers and others who are primarily interested in a short version of how our framework and findings can be applied in actual packaging processes. We first give a brief introduction to Optic *framework* and then offer a *toolbox* for policy packaging and policy implementation in the form of *factsheets*. These factsheets provide recommendations for what to do in different stages in the packaging process, tools and methods available in these stages, a checklist of questions policy-makers should ask themselves at each stage, and practical examples.

The second part, Chapters 2 through 5, provides the theoretical and empirical support for these policy recommendations and the toolbox, but it can also be read as a broader theoretical analysis in its own terms: In this first chapter we provide an executive *summary* of the Optic research and findings from earlier deliverables in the project. The following chapters provide a theoretical and empirical *synthesis* of these deliverables; extending and revising the framework based on empirical findings and theoretical reconsiderations.

Chapter 2 outlines the basic rationale for policy packaging. It also outlines some basic assumptions and premises for the Optic framework; that policy packaging can be prescribed as a rational process that takes place within a given context, and that it is fruitful to distinguish between policy content (i.e. the actual combination of measures in a given

package) and the policy process. In the end of the day, the goal of the policy packaging process is that the content of the policy package is effective, efficient and feasible in relation to the policy objectives. This chapter concludes by pointing at situations where these assumptions may be invalid, recognising that the potential discrepancy between the idealised model and real life policy packaging should be taken into consideration in the application of the framework.

Chapter 3 provides an elaboration of the Optic framework, presenting in more detail the different stages in policy packaging processes, the key issues that need to be solved in these stages and the anticipated output at each stage. This chapter presents the key elements that need to be in place in policy packaging, and can be seen as the backbone for the policy recommendations and the toolbox.

Chapter 4 is, firstly, a more precise description of two main elements in the framework, 1) tools and methods for assessment of packages and 2) tools for removal of barriers that may occur in the policy packaging process. Secondly, this chapter also addresses situations where key assumptions in the framework (e.g. barriers can be removed; consensus on policy objectives can be achieved; uncertainty about effects of measures is low) do not hold, and how to cope with such situations.

1.2 Policy packaging: definitions, tools and practices

The transportation sector faces major challenges in terms of providing efficient mobility of people and goods in times of energy supply volatility, increasing congestion, and environmental concerns. The immense growth rates predicted for the transport sector in Europe represent a great challenge for the transport policy. Efficient transport is key to a thriving Europe, but the transport sector is at the same time a major contributor to climate change. The recent EU White Paper (European Commission, 2011b; see also 2011a) demonstrates the importance of both concerns – mobility and climate – in a way that makes the goals conflict quite explicit. Optic (2010a) identified complex sets of transport policy objectives at local, national and European levels. Many of them are inherently conflicting like we have seen in the mobility-climate problem area.

In addition, many of the challenges are in themselves complex and multifaceted. Environmental objectives and traffic safety, for example, are policy concerns that cannot be reduced to one single goal. Neither can they be entirely solved at one political level. Coordinated action involving local, national and supranational authorities, individuals and firms is likely to be needed. Further, the transport sector can be regarded as a socio-technical system, or open and complex system.

The situation facing transport policy makers is, in total, a set of highly multifaceted challenges that are to be addressed on a complex system. This fact requires a battery of policy interventions (or measures) to reach policy goals combined with a range of policy assessment methods to evaluate them. Clearly there is no quick fix.

In spite of these complexities, policy analysis has predominantly been concentrated on the partial analysis of the impacts of changes in one input variable on travel behaviour. The multifaceted and often conflicting objectives that relate to European transport combined with the complexity of individual policy areas, suggest that packaging of policy measures is the most likely way to successfully address and solve the many challenges facing European transport. Packaging of policy measures can help locking in benefits, reducing adverse and rebound effects, secure higher levels of goal achievement and, not least, be a strategy to manage implementation barriers.

The challenge of the Optic project is to investigate this complex issue with the goal to structure the way these matters are being attended to by policymakers. We examine combinations of policies where packages of measures are considered and implemented

together. Policy packaging also addresses the outcomes of policy interventions that might seem unintended or counterintuitive, and it provides means to address the problem of adverse and rebound effects. However, coordinated policy measures inevitably increases the complexity of actors involvement.

A policy package is defined in Optic (2010a):

A 'policy package' is a combination of individual policy measures, aimed at addressing one or more policy goals. The package is created in order to improve the impacts of the individual policy measures, minimise possible negative side effects, and/or facilitate measures' implementation and acceptability.

There exists no shortcut to policy packaging. Rather, relative to a single policy measure, policy packaging imposes further complexities with regard to planning, assessment and implementation. In order to increase the chance of a successful policy package, every phase of the process must be carefully planned and executed.

Optic (2010a) and (2010b) investigated impacts of policy measures with a special view to their unintended, or counter-intentional, effects. The limitations and unintended consequences of isolated transport policy measures have been illustrated by the fact that a large number of policies described in Optic (2010a) were associated with limited success in achieving the goals set, and often exhibited adverse unintended effects. There is a clear need to better understand such effects in order to improve both the extent to which individual measures contribute towards achieving a certain policy target, and the way models and tools are used in the assessment phases.

Optic (2010a) develops a comprehensive typology of unintended effects that are liable to exist as a result of (well-intentioned) policy interventions in transport systems. The typology establishes conceptual clarity and provides a useful categorisation of types of non-intentional policy effects and supports the design of policy packages. It demonstrates the importance of actors' situational knowledge, the accuracy and breadth of their causal assumptions and the real and perceived range of their jurisdictional influence. Furthermore, and importantly, the typology brings the issue of non-intentional effects to the fore: it acknowledges their existence, and defines their characteristics. Figure 1.2 reproduces the main categories of non-intentional effects.

		CONSEQUENCE DIMENSION		
		A. Expedient / Intentional	B. IN-EXPEDIENT	
			B1. COUNTER INTENTIONAL	B2. SECONDARY
KNOWLEDGE DIMENSION	W. KNOWN	INTENDED CONSEQUENCES	ANTICIPATED COUNTER-INTENTIONAL EFFECTS	ANTICIPATED NON-INTENTIONAL EFFECTS
	X. UNKNOWN	NOT ANTICIPATED POSITIVE EFFECTS	NOT ANTICIPATED COUNTER-INTENTIONAL EFFECTS	NOT ANTICIPATED NON-INTENTIONAL EFFECTS

Figure 1.2: Consequences versus Knowledge. B1 are negative effects. B2 are negative effects that influence other policy objectives. Source: Table 3.1 of Optic (2010a).

The decision-making about single policies or policies in combination is ideally accompanied by high quality assessment approaches. There exists a large variety of models and methods that provide helpful support for the evaluation of policies. Given the availability of tools and methods, the challenge remains to choose the adequate 'assessment package'. Optic (2010b) goes into great detail in this respect. Firstly, it provides an inventory of relevant tools and methods for the detection of unintended effects. Secondly, it explores when and where along the policymaking process their application is most expedient. A categorisation of tools and methods is introduced and the main distinction is made between structurally open and structurally closed approaches. The former refers to approaches such as workshops, focus groups or stakeholder consultation; the latter to mainly quantitative, analytical transport and emission models as well as cost benefit analyses or multi criteria analyses. There are examples of mixed approaches which fall between these categories, like scenarios.

Quantitative models are in many cases not able to anticipate unintended effects. The integration of structurally open methods¹ at an early stage of the policymaking process can help anticipating such effects and in this way help reduce the number of unintended effects. The structurally closed methods need, therefore, to be embedded in a broader framework for analyses, including the structurally open methods.

Optic (2010b) recommends using structurally open methods and to include a broader group of involved actors in an explorative phase at the beginning of the policymaking process. Only after this should structurally closed, or mainly quantitative, methods be applied and the objective is to quantify as much as possible of the expected effects. Towards the end of the policymaking process, once again structurally open methods or discursive tools² are recommended for the interpretation of results. This is because it can be expected that with an increased number of policies in combination assessed, the likelihood increases that non-quantifiable measures build part of the package and require for expert interpretations.

Optic (2010c) documents that policymakers in the transport sector are often required to make decisions in the face of risk and uncertainty³. Most evidently, this stems from a lack of information concerning a particular transport problem, the inability of existing modelling tools to accurately encompass the range of variables and causal relationships involved and the messy, intractable nature of the policy process itself. Risks and uncertainties are particularly pertinent to the context of policy making at an EU level, where an extraordinarily diverse array of technologies, markets and political, institutional and socioeconomic contexts are present. Contemporary European transport systems can therefore be considered to represent complex socio-technical systems, prone to conditions of path-dependency and lock-in effects⁴.

Although contemporary transport systems are inherently characterised by significant risks and uncertainties, a variety of approaches are available to policy makers that may facilitate the development of effective and efficient policy interventions which minimise the propensity for non-intentional, adverse effects (Optic, 2010 c). This may, however, be resource-draining. The core consideration that emerges from Optic (2010 c) is, therefore, the importance of

¹ See Table 4.1 for a more in-depth description of structurally open/closed methods.

² Discursive approaches are methods that allow for an exchange of arguments in a structured dialogue, e.g. workshops or focus groups.

³ *Risk* involves effects for which knowledge and parameters are available to assess the likelihood of an outcome; *Uncertainty* refers to a more genuine lack of systematic understanding of causal relations.

⁴ *Path-dependency* means that the sequence of historical events influences future possibilities; *Lock-in* means that once a solution is reached, it is difficult to exit from it.

adaptive and flexible policy-making. Indeed, without such flexibility, ex-post activities such as monitoring or remedial actions simply become worthless and obsolete, respectively. Coping with complexities plays a crucial role in planning process; in general, a high degree in complexity goes along with a high degree in uncertainty (see Optic, 2010b; Grunwald 2007). Thus, there is an urgent need to address these uncertainties by embedding flexibility in the design of policy measures (see also Walker et al. 2010). Flexibility is important in the context of policy intervention irreversibility (e.g. investment in heavy infrastructure) or irreversibility associated with the problem that the policy package itself aims to mitigate (e.g. anthropogenic climate change).

The formulation and implementation of a policy package can be anything from fairly straightforward to highly controversial. Optic (2011b) suggests that the nature of a package to a large extent explains the differences in barriers. The more spread its advantages and the more focused its disadvantages, the more opposition can be expected. And the other way round: a policy package whose advantages are focused and whose disadvantages are spread will likely experience less resistance during implantation. Put in other terms, Optic (2011b), building on Lowi (1964; 1985), distinguishes between four types of policies:

- *Regulatory policies* dealing with legislation and sanctions to influence the activities of citizens and companies (in this context, e.g. road traffic acts),
- *Distributive policies* including most resource policies, research and development and business policies (in this context e.g. infrastructure policy).
- *Redistributive policies* which imply redistribution of income by taxation. Welfare state programmes represent traditional examples (but in our context, examples could be congestion charges and heavy vehicle fees).
- *Constituent policies* imply establishment of governance institutions. Changes in the constitution but also other institutional changes in public administration are considered constituent policy (in our context, e.g. establishing a new transport agency).

It is expected that public and political acceptance is more likely in the case of distributive and constituent policies rather than regulatory and redistributive policies, because the former confer powers and privileges, while the latter impose obligations or positions. However, constituent policies are more likely than the other types to experience opposition from existing public organisations.

The strategies for addressing and managing barriers consist of an array of measures. The packaging of policy measures is itself a strategy to manage barriers: various agents give and take (e.g. toll road and public transport support); one measure helps finance another; and so on. Optic (2011b) lists a total of nine strategies to manage barriers in policy formation and implementation:

1. Combining sticks and carrots
2. Trials – a way to create legitimacy and acceptance
3. Communicating benefits clearly
4. Using good examples
5. Preparing for windows of opportunity
6. Organisational responsibility and set-up
7. Applying state funding to instigate municipal investments
8. Selection of established or innovative technical solutions
9. Learning from best practice

It is evident from Optic (2011a; and also (2011b) that the positive effects of policy packages can deteriorate over time. Due to general traffic increase, for example, the congestion relief effects of a policy measure like the London congestion charging is undermined over time. Another problem, which may arise, is when a package composition is designed such as to reduce opposition in a way that is counterproductive in the long run. Earmarking of road

charges to invest in more or better roads, for example, can be a compromise which is necessary to secure implementation, but whose effects in the longer run are counterproductive, as they tend to create new traffic.

Various kinds of ex post monitoring are necessary in order to avoid unintended effects and to secure long term achievements. If ex post monitoring suggests any such problems, remedial actions may be needed. Macmillen and Givoni (2010) address such ex-post package adjustment and optimisation. Drawing on selected Optic WP4 cases, they consider four key types of ex-post adjustments which appear to have been variously undertaken across the cases, and which correspond well with the theoretical remedial action framework presented in Optic (2010c):

- *Policy intensity adjustments*, which refers to the strength and depth to which interventions seek to impact upon their corresponding policy target(s), for example the price level of a congestion charge.
- *Compliance adjustments*, which seek to support a package's ability to bring about intended effects through ensuring relevant actors adhere to the demands of the intervention (e.g. seal legal loopholes; improve clarity of a regulation).
- *Character adjustments*, which shift the character or nature of the package: alteration or removal of original measures in the package and/or the incorporation of new measures.
- *Scope adjustments*, which can refer to 1) the *geographic range* of packages' intentional effects; 2) the *actors and/or objects* that the measures included in a package are designed to have an 'operative influence' upon; and 3) the *policy objectives and/or targets*. This latter can happen when, e.g., the infrastructure for one policy measure (a congestion charge) is proposed as a means to pursue another policy objective (a CO₂ tax).

An example of improving clarity of a regulation is the EU rail interoperability scheme. In this case study, the complexity and rigidity of the Technical Standards for Interoperability (TSIs) first set out in Directive 96/48/EC proved a barrier to the uptake of specific interoperability measures as the TSI guidance was difficult to interpret consistently across member states and thus compromised the effectiveness of the overall interoperability package. Decision 2001/260/EC and Recommendation 2001/290/EC sought to clarify and simplify the guidance accompanying the TSIs in order to facilitate their adoption within member states.

An important strategy for improving policy making and policy packaging processes is to look to successful processes elsewhere.

Optic (2011a) promotes good examples of policy packaging processes. Based on the evidence collected and summarised, the Directive on the promotion of clean and energy-efficient road transport vehicles fulfils most of the indicators for best practice, as do the Directive on Rail Interoperability and the Swiss heavy vehicle fee. However, each eight policy packages studied in detail in Optic (2011a) exhibits aspects of best practice in more than one of the stages of a policy packaging process.

The empirical evidence represented by the eight case studies studied in Optic (2011a), suggests that there are aspects beyond the Optic policy packaging framework that have important bearings on a policy package's success; such as window of opportunity; entrepreneurship or specific actor constellations; the role of referenda and trials; trade-offs between dimensions, e.g. between effectiveness and acceptability; and agreement on, and stability of, the primary measure.

Window of opportunity seems to be one of important aspects in successful policy packaging. As shown in the case of Stockholm congestion charging, the right timing can enable the introduction of such policies, which are normally fairly conflictive and hardly acceptable. In the Stockholm case, a shift in political power both on local level in Stockholm and national level in Sweden in 2002 offered a chance to push for a decision to implement congestion taxation (OPTIC 2011a).

2 Background for and key assumptions in policy packaging

2.1 Rationale for policy packaging – from isolated to coordinated policies

The rationale for policy packaging is to increase the probability for policy makers to achieve their objectives and goals, to improve the impacts of the individual policy measures, minimise possible non-intentional effects, and facilitate the measures' process during policy formation and implementation. Therefore, two of the main concerns and criteria in policy packaging is the need for policy interventions to be *effective* and to be *efficient* (see Bemelmans-Videc *et al.*, 1998). The Optic project interprets both of these concepts in a more holistic sense than typical in public policy circles.

Effectiveness commonly refers to degree of goal achievement. In this sense, for example, a regulatory measure which stipulated that cyclists must wear helmets at all times would be regarded as effective if it led to a decrease in the rate of cycling-related head injuries. However, for our purposes, we hold such 'immediate effectiveness' to be only one determinant of interventions' net effectiveness. Recognising the significance of unintended effects, and following Nicholson's (1997, p. 248, emphasis added) broader definition of effectiveness as 'the extent to which the objectives of a policy have been achieved and *the relationship between the intended and actual effects of outputs in the achievement of objectives*', we also hold net effectiveness to be partly determined by what we term 'collateral effectiveness'. This refers to interventions' wider influence on exogenous objectives, across timescales, policy domains and geographical boundaries. For example, although mandatory cycle helmet legislation may prove immediately effective with respect to its intended objective, the regulation may have the perverse effect of reducing cycling rates *per se*, in turn reducing the wider health benefits to a given population (Robinson, 1996).

In turn, the efficiency—or cost-effectiveness—of an intervention usually describes the relationship between its immediate effectiveness and the financial costs incurred during its design and maintenance; or, more formally, the 'input-output/outcome ratio of policy instrumentation' (Bemelmans-Videc *et al.*, 1998, p. 7). As with effectiveness, our interpretation of efficiency is a broad one. Specifically, we resist limiting discussions of efficiency to 'immediate effectiveness/financial cost' and extend the concept to include a concern for 'transaction costs', defined as:

'the costs of deciding, planning, arranging and negotiating the action to be taken and the terms of exchange when two or more parties do business; the costs of changing plans, renegotiating terms, and resolving disputes as changing circumstances require; and the costs of ensuring that parties perform as agreed' (Milgrom and Roberts, 1990, p. 60).

Table 2.1: Principal determinants of interventions' net effectiveness and net efficiency

	Net effectiveness (E_x): $E_x = f(e_i, e_c)$	Net efficiency (E_y): $E_y = E_x / (c_d + c_t)$
<i>Determinants:</i>	<p><i>Immediate effectiveness (e_i)</i> [operative influence upon specified objectives]</p> <p><i>Collateral effectiveness (e_c)</i> [operative influence upon exogenous objectives]</p>	<p><i>Net effectiveness (E_x)</i></p> <p><i>Direct costs (c_d)</i> [inherent programme costs]</p> <p><i>Transaction costs (c_t)</i> [incurred through exchange and negotiation]</p>

Our emphasis on 'transaction costs' implies focus on barriers to policy implementation, issues of public and political legitimacy and acceptability, and interventions' technical/economic feasibility.

Lack of acceptability may rise from two sources. Firstly, that the process is considered illegitimate because of lack of transparency, accountability and inclusivity. Indeed it is the process, rather than the outcome in terms of types of interventions and measures introduced, that is the hallmark of democratic legitimacy. On the other hand, lack of acceptability may rise from important stakeholders anticipation that a policy package includes measures contradictory to their beliefs or interests, e.g. because it has negative economic consequences for them. Stakeholder opposition against a package that contains measures that they see as being at odds with their interests may lead to situations where the package does not have the necessary support.

2.2 Packaging process: context and content

In order to analyse and promote policy packaging that increases the probability of effective, feasible and acceptable combination of measures we will, in Chapter 3, develop a generic framework for policy-packaging. By using the term 'framework' we follow definitions by Ostrom that distinguishes between framework, theory and model, considering framework as the least demanding of the three concepts as regard inherent explanatory potential (Ostrom, 1999, here from Hupe and Hill, 2006: 18). By 'generic' we mean that it is a general and comprehensive framework for decision-making, i.e. that it should include the significant factors affecting policy-packaging.

There are two main types of elements in the framework, one referring to *the policy making process* and another type referring to *the context* within which the process takes place. Our framework of the policy packaging process is quite similar to what has become standard textbook understanding of the stages in the policy process (see e.g. Ham and Hill, 1993). It is also strongly related to the notion and model of rational decision-making (Simon, 1955; see also March, 1994, on different models of decision making).

The output and outcome of the policy making process is influenced by features of the process itself, the context of the packaging process as well as the content of the package. An intricate linkage exists between content, context and process. Hence, a specific content of a package might provoke some actors to oppose a package during the process, and the context provides these actors with some power resources, which enable them to influence the process.

Barriers for formation and implementation of policy packages arise as specific combinations of process, context and content. We distinguish between two types of barriers for the realisation of intended outcomes of the policy making process. Alterable barriers are barriers that can be managed within the specific policy making process in question, whereas

unalterable barriers are barriers that in one way or another cannot be influenced and adjusted for actors involved in a certain process. In the last instance policy making as regards to this specific measure or package has to yield, because the barrier and the hindrances it establishes are unalterable and do not allow the policy to go forward. However, since hardly anything in policy making is stable, these hindrances might be altered later on due to other processes or circumstances. Exactly which factors are alterable or not may vary from one situation to another

2.2.1 Packaging context

The context refers to the cultural, political, legal, organisational and economic institutions as well as the technical possibilities and the available type of knowledge and information that influence the packaging process. We use context in order to address that these are elements 'outside' the packaging process that may influence the process, yet participants in the packaging process do not necessarily control or influence these elements. For example; certain measures do not have a legal foundation, or the fiscal framework does not enable a specific type of measures, or the rules of the policy-packaging process favour actors which are veto players, i.e. actors that are in a position to and has the ability to decline a choice of certain measures (Tsbelies, 2002).

We use the concept of institutions⁵ in the traditional broad sociological sense, cultural institutions refer to deeply rooted values or sentiments in a given population; political institutions refer to the political architecture regulating a given policy area (e.g. party system); legal institutions refer both to the rules and regulations affecting a given policy process and the characteristics of the legal system; organisational institutions refer to organisational procedures and structures in public administration; and economic institutions refer to characteristics of the economy or the financial structure a given policy process is embedded in that creates an incentive structure and available funding for policy makers. Such institutions are the results of earlier conflicts and developments in transport policy and surrounding policy fields (e.g. economic policy). They constitute the 'rules of the game' that give some actors more valuable cards in the political play than others. Technical conditions, on the other hand, refer to availability of certain technological solutions of relevance for choice of policy measures, and knowledge types refer to the types of knowledge and information that is available or not for the policy making process. Hence, some types of knowledge and information might not be available and not possible to provide during the packaging process. The context may facilitate intended output and outcomes.

2.2.2 Packaging content

Our assumption is that differences in *policy content* (i.e. combination of policy measures) lead to different degree and different types of barriers, not the least because some measures may be considered unacceptable by important stakeholders, because they are at odds with their interests and values.

There have been numerous academic efforts directed at developing a typological classification of policy measures. One effort is the distinction between different types of policies, based on Lowi (1964; 1985), described in Chapter 1 above: Redistributive policies and constituent policies are, *ceteris paribus*, more likely to meet opposition than distributive policies (see Optic, 2011b). Moreover, the acceptance of a policy package is likely to depend

⁵ This "simple" understanding of institutions draws on its traditional use in sociology, for a broad discussion the development of institutional theory; see e.g. Greenwood et al., 2008.

on its distributional effects in terms of whether advantages and disadvantages are concentrated to a small group or divided among a larger population. See Chapters 3 and 4.

Another comprehensive and theoretically-informed typology was provided by Vedung's (1998), based upon a governmental application of Etzioni's (1975) classification of authoritative power. Defined as 'an actor's ability to induce or influence another actor to carry out his [*sic.*] directives or any other norms he supports', Etzioni (1975, p. 5) suggests three forms of such power: (1) *coercive power*, resting on the application of physical sanctions, or threat thereof; (2) *remunerative power*, resting on the control of resource allocation; and (3) *normative power*, reliant on persuasion, manipulation and suggestion. For Vedung (1998), this stands as a useful analytical dimension upon which to map policy measures' core characteristics. Specifically, depending on the corresponding power underlying their function, measures may be classed as (see also Howlett and Ramesh, 2003)

- *regulatory measures* (coercive),
- *economic measures* (remunerative)
- *informative measures* (normative)

This interpretation further corresponds to Hill and Hupe's (2002) threefold conceptualisation of governance, as: authority, transaction, and persuasion. Applied on our project, we can see that Vedung's (1998) typology is at once relatively straightforward, comprehensive and theoretically fruitful when applied to transport policy.

Regulatory measures

Although frequently used as a synonym for authoritative intervention *per se*, regulatory measures are here specifically understood as rules, directives and standards which oblige certain actors to behave in a certain manner. Importantly, the nature of such measures may be either repressive or stimulative, with the former pertaining to explicit proscriptions and prohibitions (e.g. motorists *must* wear seat belts and *must not* drive through a red light), and the latter pertaining to various forms of bilateral commitment between state and non-state actors (e.g. statutory quality partnerships between private public transport providers and local authorities) (van der Doelen, 1998). Regulatory measures may also vary with respect to their conditionality, with some expressly forbidding certain activities (e.g. underage driving), while others incorporate concessionary elements (aircraft may land outside designated time-windows in the event of an emergency). They may also concern 'obligations to notify', where certain activities are forbidden without prior notice being given to the relevant authorities (e.g. taxi licensing) (*ibid.*).

Economic measures

Importantly, economic measures are to be broadly interpreted as involving 'either the handing out or the taking away of material resources, be they in cash *or in kind*' (*ibid.*, p. 32, emphasis added). Thus, while this class would evidently include fiscal measures such as fuel taxes or public transport subsidies, it also covers the allocation of non-monetary material resources, such as the provision of transport infrastructure. As with regulatory measures, economic measures can also be stimulative or repressive in character. The principal difference between the two classes being that while regulatory measures are obligatory, economic measures seek to influence actors through incentives and disincentives—both of which are widespread in transport policy, in in-cash and in in-kind terms. Road pricing, for example, functions as an in-cash disincentive, seeking to discourage motorists from driving in particular locations at particular times. Whereas the state provision of free bus passes for a particular demographic group would act as an in-kind incentive.

Informative measures

Finally, informative measures are those characterised by attempts to influence actors through the use of no more than ‘intellectual and moral appeals’, reasoned argument and persuasion (*ibid.*, p. 30). These measures may involve the straightforward dissemination of knowledge in relation to a particular policy problem (e.g. public awareness campaigns relating to anthropogenic climate change), or may further advise actors as to certain voluntary actions that might alleviate or mitigate the problem (e.g. encouraging car sharing). Additionally, informative measures may also be directed at the provision of information relating to the existence or function of one or more other (regulatory or economic) measures. Informative measures may constitute ‘fact-based’ efforts at knowledge dissemination, or normative pronouncements reflecting authorities’ judgements. However, leaving aside the thorny debate on fact-value distinctions (see Putnam, 1985; Smart, 1999), both aspects are likely to be evident. This neatly illustrates the fact that we can see both stimulative and repressive variants of informative measures, with knowledge dissemination corresponding to the former, and manipulative, propagandist measures to the latter (van der Doelen, 1998).

The relevance of Vedung’s typology is that different types of measures may invoke different types of responses, also that one type of measure may invoke different responses in the policy formation and the policy implementation process. E.g. introduction of an environmental motivated fuel tax may be fiercely opposed before being implemented, but, partly due to its character (it is “covered” in the fuel prices), it becomes taken for granted. Moreover, different types of measures or combination of measures may have different preconditions for being effective (regulations must be obeyed, information listened to) as well as for being accepted.

2.3 Packaging ideals and reality

The Optic framework is analytical (a tool for analysing policy packaging) as well as prescriptive (a tool for improving policy packaging). As a prescriptive tool it is strongly linked to models of rational decision-making, where the task is to select the alternative that results in the more preferred set of all the possible consequences. This model is based on the assumption that actors have clear preferences and objectives, knowledge about the alternatives and their consequences and that they are able to act instrumentally and efficient in order to pursue these objectives (Simon, 1947). This rational model of policy packaging faces two types of challenges. One challenge is that transport policy and policy packaging is essentially about taking decisions in situations characterised by *risks, uncertainty and irreversibility*. One can broadly distinguish between two types of uncertainty and irreversibility. The first type originates from the complexity and characteristics of the transport system and regards modelling and analysing of relations between measures and effects. Managing these types of uncertainties goes to the core of the Optic project, and is further discussed in Chapter 4.

An anarchic packaging process

In Denmark a so-called Urban Transport & Environment Scheme was established by the State in the 1990’s. The packaging process has been analysed by the Optic project, and it reveals a process characterised by actors muddling through the process which step by step and by applying significant windows of opportunity finally is established as a coherent package (Optic, 2011a).

A power determined packaging process

During the first decennium of the new millennium the EU decided to include aviation in the EU Climate Emission Trading System, a process that has been analysed in the Optic project. A significant feature of the process and reason for the outcome is a power play among the EU Commission, the aviation industry, European governments as well as environmental NGOs (Optic, 2011b).

The second type of uncertainty and irreversibility stems from the complexity and characteristics of the policy packaging process. This type of problem also touches on a broader question about how realistic the assumptions of the Optic -framework are. In real world politics and policy making, actual processes are to different degrees similar to the characteristics of this framework. In organisational theory and political science it has been pointed out that many processes are characterised by bounded rationality (Simon, *ibid.*) and *anarchic* rather than rational, i.e. that people have inconsistent preferences, they have unclear understanding of adequate measures and participation is fluid (actors come and go with limited attention) (Cohen, March and Olsen, 1972). Others have maintained that political processes are first and foremost to be analysed in terms of *power relations*, and that politics is at its very core about conflicting interests. In many cases these conflicts can be observed, but in other cases they are not manifest; some actors can define the agenda whereas other actors and possible measures are ruled out of the process, some actors control what is seen as adequate symbolic perceptions of an issue whereas other understanding are considered inadequate (Lukes, 1974; Bourdieu, 1991).

The implications of this discrepancy between our generic framework and observed political processes as well as the adequacy of other models analysing policy processes (and seeing them as less rational) are twofold: Firstly, we recognise that actual processes may be quite different from what our framework suggests, and the prescriptive character of the framework implies that we use our framework to locate when significant deviances between ideals and reality occur and to prescribe alternative strategies and choices in these situations. In this sense we use the framework as an ideal that in most policy packaging processes can inspire policy makers to pass by at least some of the stages, though not following the framework in detail, and for choosing barrier managing strategies. Such strategies are further outlined in Section 4.2, which also contains a discussion of adaptive planning as a tool for managing risks and uncertainty in policy packaging. It follows from this implication that we find the framework and the cases analysed in the Optic deliverables to be transferable to other policy packing processes.

Secondly, we acknowledge that at the end of the day what is of vital importance is not the process itself, but the *output* (the content of the policy package in terms of actual measures implemented) and the *outcome* (the actual effects of these measures in the transport system, e.g. as altered travel behaviour or reduced emissions). Our recommendation of a certain framework and design of the packaging process is based on the assumption that it increases the probability of reaching intended combinations of measures and intended outcomes. Our evaluations of best practice design (Optic, 2011a) has provided support for these assumptions, but it has also shown examples of policy packaging processes that in several respects differ from the Optic framework (e.g. by being more incremental and muddling through (Lindblom, 1959)), but yet providing satisfying if not optimal output and outcomes.

The question of *satisfactory output* may be seen as a criterion of importance when one is to decide whether a given policy package should be implemented or not. The knowledge about the anticipated effects of a given package is a result of the assessment. Hence a key question coming at the forefront at the implementation stage is whether one has sufficient knowledge to implement a package, and whether this knowledge implies uncertainty about or strong evidence contrary to implementation. These questions, referring to the transferability of Optic on the criteria for implementation, will be further discussed in Section 4.2 and are also treated in the toolbox about policy recommendations (Executive summary).

3 Towards a generic framework of policy packaging

In the following we introduce the so-called generic framework of policy packaging. We divide the packaging process in six stages, starting with the definition of objectives and targets (1), creating an inventory of measures (2), the assessment using methods and tools for analysis (3), and the modification of the package via adding or removing measures (4). These four stages refer to ex-ante processes prior to the implementation stage (5), which stays in-between the actions of assessment taken ex-ante and ex-post. Finally is the monitoring and evaluation stage (6), which refers to actions taken after the implementation (ex post).

This framework is a further elaborated version of the one initially presented in Optic (2010a), based on the ‘lessons learnt’ by the Optic Deliverables that followed. Figure 3.1 depicts the generic framework and introduces terms and stages described in more detail in the upcoming sections.

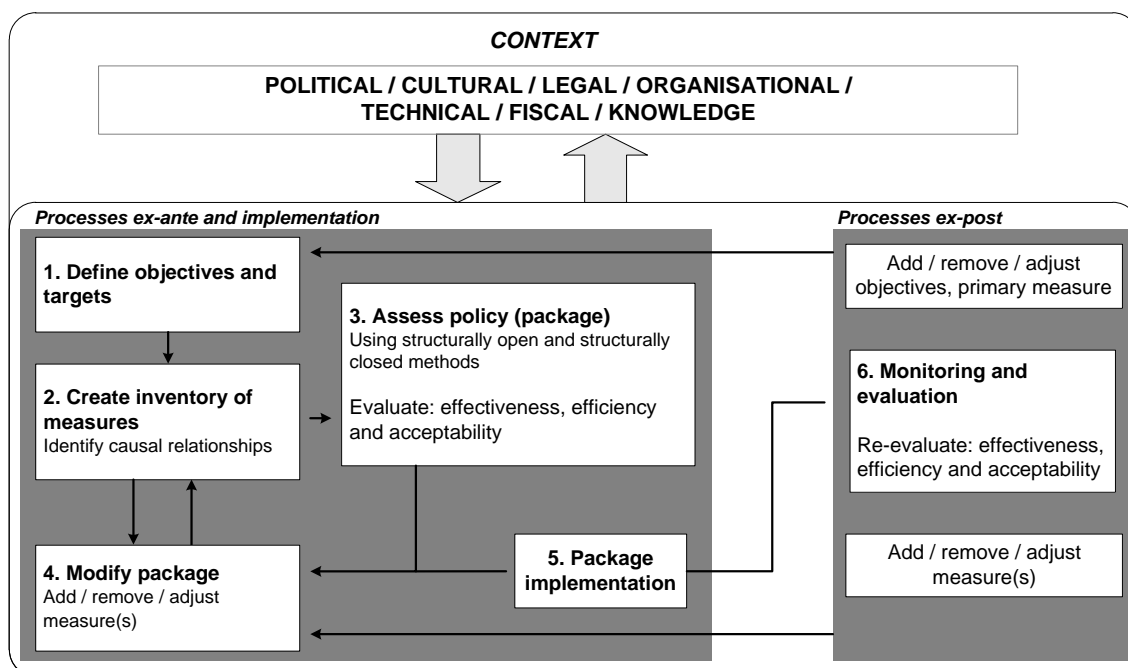


Figure 3.1: Generic Framework of Policy Packaging

3.1 The generic framework: processes ex-ante

3.1.1 Stage 1: Define objectives and targets

Politics and policies are about particular ‘phenomena’ which are perceived as ‘undesirable’ (in our case a particular problem within the transport sector) which therefore requires some type of policy intervention. The development of common objectives of how to confront and solve certain problems is a democratically organised process, which implies that a broad range of actors and stakeholders are involved. This includes (mainly but not exclusively):

- Politicians / Decision makers
- Public administration (with potential help from independent, external experts)
- Stakeholders: Citizen, NGOs, commercial representatives, public authorities

Conflict between parties may arise when policy consequences are perceived differently: some may see them as positive or beneficial and other actors may see them as negative or

adverse. Policymakers have a responsibility to manage different opinions and views in such a way that common objectives are agreed upon and the highest possible acceptance towards this target is reached.

Those mainly responsible for the initiation of the process are authorised political actors or policy makers who are elected officials, including the civil servants they delegate policy making responsibilities to. Expert knowledge can be a valuable resource at this early stage but is normally requested at later stages of the policy packaging process. Nonetheless, analysts may cover the role of observers, assuring that initially defined policies correspond to the defined objectives and targets. Stakeholders should be consulted in this early stage but not involved to a large extent in finding an objective or target to avoid immediate opposition.

It is important that objectives and targets are clearly defined (find respective examples in the subsequent box):

Objective: “We intend to significantly reduce carbon dioxide emissions from passenger transport in the EU.”

Targets: “We will increase public transport use by 5% of all realised trips within the city.”

There are different perceptions of what are exact definitions for objectives, targets and measures. In our case objectives indicate the direction of an intended action but not yet the action itself. In the example above the objective includes the area in which policy action is pursued (here: passenger transport in the EU) and – still in a relatively rough manner – what is the intention (here: reduce CO₂). Objectives should be specific (i.e. precise and concrete enough not to be open to varying interpretations), achievable, realistic and time-dependent (related to a fixed time-period). They should also be measurable, i.e. define a future state in measurable terms that can be made operational and concrete in terms of targets. Targets differ from objectives as they are much more concise. Ideally they even include a concrete quantification. In our example, the target said to “increase public transport use by 5% of all realised trips within the city”. Finally, measures represent the actual policy action, thus what is underdone to achieve a specific target that contributes to the overall objective(s) (e.g. to increase taxes for the use of inefficient cars).

The more concrete targets are formulated, the more precisely they can be assessed in later stages. Ideally, targets are connected to specific target values or indicators that quantify the target which one tries to reach. A common error made at this stage is the setting of objectives without actually defining viable targets, which makes it difficult to assess and evaluate policies. The definition of clear (preferably quantifiable) targets also eases the communication between decision-makers and analysts. It reduces the risk of misunderstandings leading to assessment bias and uninformed situations of decision-making.

In our framework, this first stage in the packaging process is strongly simplified. It is seldom the case that politicians and other stakeholders analytically outline and rank their different objectives and define the targets in accordance with these objectives. Policy making processes, not the least at the EU-level, are complex processes and subject of the interplay of institutions, personal and political beliefs, public opinion, etc. The setting of policy objectives is a result of continuous discussions, negotiations and compromises between many stakeholders and the outcome of democratic processes. However, our main concern at this point is that once values and objectives are defined, it is of crucial importance that decision-makers determine targets they aim at as precisely as possible.

OUTPUT: Clearly defined policy objectives and targets.

3.1.2 Stage 2: Create an inventory of measures, identify potential primary measures and detect causal relationships

Stage 2 is about the identification of potential primary measures – with measures representing the actions undertaken in form of policy interventions (see above) – and a preliminary evaluation in order to detect major causal relationships underlying the measures. This stage is divided into a number of sub-stages: At first, an inventory of potential primary measures needs to be created. Within OPTIC we define primary measures as those that respond in an effective and direct manner to some given externality or policy objective (see Optic, 2010 a). Measures in addition to those of primary character may be identified or necessary to enhance both the effectiveness and efficiency of a planned intervention, or to facilitate it in other ways. Generally a major policy intervention will create synergetic as well as contradictory relationships which are dealt with via bringing in additional measures. Correspondingly, the inventory of measures reflects a list of possible policy interventions. There are no exclusive criteria for the definition of measures at this point, both well-experienced ‘best practices’ are part of the list as well as rather innovative ideas without any practical testing. In addition, the creation of a comprehensive inventory of measures is supposed to be an open process including many actors and opinions. The list functions as a ‘base of knowledge’ because it includes a comprehensive overview of transport policies, their characteristics and expected effects. Such an inventory depends on the actual knowledge and experience available, but the following questions should be kept in mind when creating the inventory:

Policy objective: What is the *major objective and concrete targets* one tries to achieve with the policy?

Policy type: What type of policy do we refer to? This is important, as the type of policy tells something about potential unintended effects, e.g. a reduced acceptance.

Expected effects: What is the *direction of effects* (e.g. stimulate use of public transport, restrain the use of cars, i.e. both resulting in a different modal split) and are there experiences with the *expected (or observed) effectiveness* of the policy?

Dependent on the specific situation more information might be included, especially if experiences from case studies are available. Generally, the inventory serves as source from which one or more primary measure(s) are selected according to the policy objectives (and targets) defined in stage 1.

There are different typologies available for classifying policy strategies. In Optic, we introduced categories of *regulatory* (coercive), *economic* (remunerative) and *informative* (normative) measures (see Section 2.2.2). Furthermore, each policy part of the inventory should be labelled whether it is of *stimulative* or *repressive* character, since it allows addressing the issue of policy acceptability at an early stage. For instance, an *economic* policy of *repressive* character (e.g. a charging scheme) tends to create public resistance, while a policy of *stimulative* character (e.g. a subsidy) confers power and privileges. The typology introduced earlier is helpful because it supports anticipating potential opposition when it comes to the implementation stage, let it be from the public or from stakeholder

groups. This is important since *effectiveness and efficiency* may be evaluated (eventually quantified) using available assessment tools (methods and models), whereas acceptability is more difficult to measure. An analysis of the policies types is recommendable as it allows early identification, whether acceptability concerns may imply a threat for the overall policy (package) feasibility. The consideration of policy types is then a first step towards the recognition of unintended effects, the integration of additional measures – explained below – a concrete action to cope with them.

Stage 2 also includes an *exercise on the detection of causal relationships* constituent to the measure(s) found as appropriate to meet the objectives/targets. One possibility to create awareness about causal relationships – applied and tested during the course of Optic – is the exercise of ‘causal mapping’. In facilitating a diagrammatic representation of knowledge, causal maps function thus as a ‘form of visual aid to enhance our understanding of the thoughts of an individual, group or organisation’ (Pinch et al., 2010, p. 377). The added-value related to the examination of causal relationships, is illustrated by the following exercise (Figure 3.2) analysing the effects of a vehicle scrappage scheme representing the primary measure.

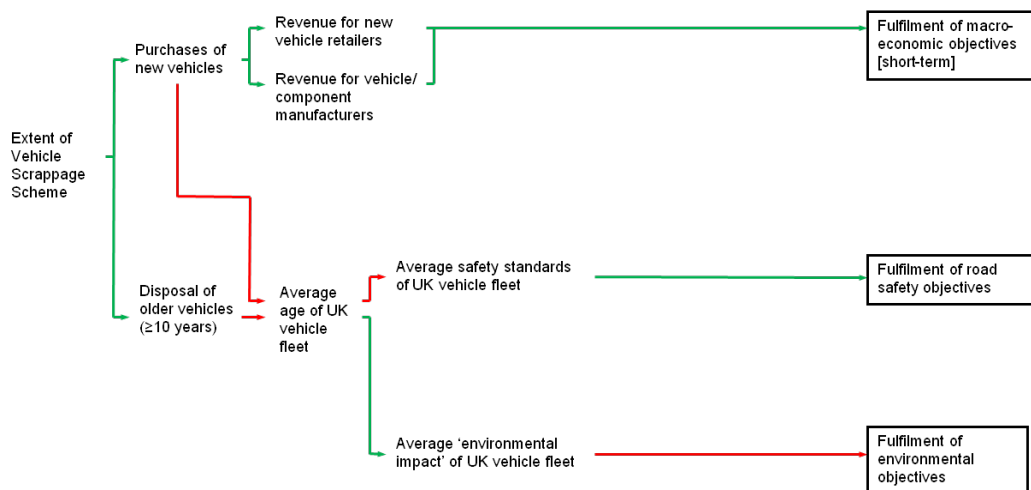


Figure 3.2: Causal map showing the assumptions underpinning the UK Vehicle Scrappage Scheme (Green lines indicate positive causal relationship, red lines indicate negative causal relationship, arrows indicate direction of causality).

In this example, the vehicle scrappage scheme (primary measure) leads to the purchase of new vehicles and the disposal of older vehicles. In the diagram the focus is on effects inside the transport system, for instance on those for vehicle retailers. However, it is likely that additional impacts occur, also outside the transport system, for instance, the effect on energy (fuel) demand or orders for car garages. This shows that the mapping of causal relationships has its limitations, as interrelations rapidly become complex, trans-sectional and thus difficult to draw or estimate. Nonetheless, visualising the cause-effects relations of single primary measures is important, as it supports the development of a common vision of policy effectiveness and creates awareness of where acceptability for the policy becomes problematic.

The success and outcome of stage 2 is dependent on the involvement of external actors. Policy makers have to consult stakeholders and coordinate the process of detecting causal relationships. The inventory of measures may be improved by involving different stakeholders and experts, and thus different opinions about appropriate policy interventions. Any exercise conducted to identify causal relationships and estimate the effectiveness and

efficiency of measures should be accompanied by the review of experts in the field. The inclusion of expert knowledge already at this early stage of policy packaging allows discussing potential public reaction on the measure as well as intended and unintended effects. The highest risk in this stage is related to errors in defining the causal relationships of primary measures. It might be the case that relevant variables or relationships are overseen or even omitted on purpose. Another risk emerges from wrong weighting of an actually correct causal relationship.

OUTPUT: The output of stage 2 is the decision about one or more primary measures that may function as the core foundation of the policy package. All primary measures entering the subsequent assessment were subject of analysis of a structurally open method (e.g. the causal mapping exercise). A number of expected outcomes (intended, unintended) are already identified and potential threats (low acceptance, less effectiveness or efficiency) acknowledged.

3.1.3 Stages 3 and 4: Assess and modify the policy package

Stages 3 and 4 represent the assessment of the policy package and are decomposed into a set of sub steps which are all related to evaluation of the policies' *effectiveness*, *efficiency* and *acceptability*. It is in stage 3 that modelling and a more detailed analysis of expected impacts come into play. Generally, both structurally open (mainly qualitative) as well as structurally closed (mainly quantitative) methods may be applied (see Section 4.1, methods and assessment). The starting point for assessment is the primary measures identified in stage 2 that were found appropriate for an in-depth assessment. Here, the aim is to predict expected impacts of the measure(s) in order to determine, or at best quantify, its net effectiveness, thus also the expected direct and transaction costs (see Section 2.1).

The impacts of the initially defined primary measure(s) should preferably be predicted making use of structurally closed methods (e.g. analytical transport models, such as TransTools) in order to determine the intervention's effectiveness and efficiency. We exclude acceptability at this point, as this aspect is not covered by transport models. Acceptability should be subject of subsequent evaluation, once the expected effects regarding effectiveness and efficiency are quantified, and is most likely analysed by applying a structurally open method, i.e. an appraisal of qualitative character (see Section 4.2).

If the assessment indicates that the package is insufficient to fulfil the initially set objectives and targets, potential courses for package improvement need to be defined. There may be many reasons for altering the set of primary measures (remove/add) and incorporating additional measures, for example that additional measures may improve immediate effectiveness; that acceptability may be improved by an additional policy that reduces public hostility; that further information may help to increase the effectiveness of those primary measures that rely on a certain degree of public knowledge. It can also be the case that unintended effects become apparent and need to be addressed by additional policy action. However, when additional primary or ancillary measures are suggested, the policy package ought to be evaluated again. The criterion to decide whether a potential additional measure is to be included in the package is whether the total marginal benefits resulting from its inclusion outweigh the total marginal costs. This distinction between individual marginal benefit and total marginal benefit is vital, due to the presence of synergetic and/or contradictory effects.

The number of iterations between altering the package and assessing the refined package will remain limited in real-life policy making, due to limited time and resources. Hence, local policies with relatively small budget and spatial scope may never enter the cycle of

quantitative assessment related to stage 3 and the evaluation techniques most likely remain related to stage 2. This is different for large-scale infrastructure projects on an EU level where iterations between the stages of 2, 3 and 4 appear necessary to identify the 'best' policy package. However, the generic framework presented here offers advice for the distinct levels of policy making, combining less resource-intensive evaluation methods (stage 2) with more complex and challenging methods (stage 3) to evaluate the package.

Iterations of stages 3 and 4 may require additional resources such as knowledge of public administration, experts and analysts or further interaction with stakeholders. Although it is a political responsibility to control the process and decide on early package modifications, the public administration, with possible help from external experts and analysts, are the most important actors in stages 3 and 4 and are supposed to provide information on the package effectiveness, efficiency, risks and uncertainty. Based on their findings policy makers decide on the feasibility of the package and about further iterations. If the policy scope has shifted or is widened it is recommendable to consider new insights from additional stakeholder groups making use of structurally open approaches.

In the following we further concretise the iterative character of stages 3 and 4, briefly highlighting issues perceived as being of major relevance. In summary these are:

- Definition of indicators
- Definition of an assessment inventory
- Application of tools and methods
- Considering measure interaction
- Actor involvement
- Evaluation of acceptance
- Identification of unintended effects
- Altering the package

Define indicators: Ideally, the assessment of a policy package is realised along a set of *indicators*. These indicators allow evaluating the effects of a set of policies in accordance with the initially set targets. We may illustrate the role of indicators once again using an example:

Let us assume that a congestion pricing scheme (including some flanking measures) led to modal shift of 3% in favour of non-motorised modes. The indicator we analyse in this example is then the modal split of say, an urban area. If the politically defined target of modal shift in favour of non-motorised modes were 5%, the *distance-to-target* is the 2% not achieved. This rather trivial way of measuring the *level of success* using indicators is a first step towards concretising the need for altering the policy package.

Without the definition of a set of indicators, it is likely that the evaluation of effectiveness, efficiency and acceptability remains vague. The example above is related to measuring effectiveness, but other indicators addressing efficiency and acceptability should be considered, too. The definition of indicators is important not only for the current assessment but also to be able to compare ex-ante assessment results with ex-post measurements, e.g. through results of monitoring. Ideally, a set of indicators addressing the assessment categories of effectiveness, efficiency and acceptance is defined and maintained throughout the design, implementation and monitoring of the policy package.

Define the assessment inventory: It is unlikely that one single model is capable of capturing and quantifying all causal relationships. For instance, a strategic transport model such as TransTools is designed to predict aggregated traffic flows by mode but will not be

able to determine socio-economic impacts at a spatially disaggregated level. Hence, it is recommended to reflect at an early stage – in between stages 2 and 3 – on the primary measure(s), the expected impacts and the assessment methods and tools needed for the appraisal. Experts in charge of the analytical assessment should be involved at this stage to discuss the methods' abilities and define the tools/methods finally used for assessment. It has to be determined to what extent structurally closed and/or structurally open methods are required. This intermediate step prior to e.g. actual model runs, opens up the possibility to reflect on required resources with respect to time, personal and financial resources.

Applying tools and methods: As already mentioned, the application of assessment tools and methods is primarily done by experts in this field, i.e. modellers and analysts. To make such assessments, we assume that the following conditions are fulfilled:

- primary measure(s) are identified and clearly shaped (e.g. the cost/km and the fare collection system in the case of a pricing scheme)
- the methods and tools available for assessment have been identified and proved to be capable of reproducing the main cause-effect relationships associated to the measure (e.g. expected modal shift due to the increase of comparative attractiveness of other modes)
- required resources (time, monetary expenditures) for the assessment are estimated against the available resources

Measure interaction: As soon as two or more policies compound a policy package, the issue of measure interaction becomes apparent. Generally the assessment of a number of policies at a time creates uncertainty regarding the presence of synergetic and/or contradictory effects. The evaluation of complex policy packages represents a true challenge, and because of the number of effects both inside and outside the transport system, it seems unrealistic that synergetic and contradictory effects can be identified entirely. However, there exist strategies to cope with measure interaction as long as the number of measures 'interacting' remains limited.

For instance, it is recommended first to analyse primary measures separately. Each individually analysed measure, respectively the quantified effects, should be subject of an individual assessment, comparing (validating) the obtained results against other experiences and/or measurements. Once the individual assessment is done, we may analyse policies in combination to get an indication of the interaction between measures. Ideally, this process is sequential as well where first the most important measures – those expected to be the driving factors for achieving the goals – are analysed in combination. As long as quantitative assessment is possible (e.g. applying transport models), it is a rational approach to analyse the effect of one single primary measure and then, based on the results, conduct the combined assessment including additional measures and so on. A trade-off needs to be found between the number of combinations analysed and the resources available, but (again and similar to the discussion above) this is context-dependent and may not be described in a generic way.

Actor involvement: Actor involvement plays a crucial role for policy making and in particular in this stage, where analysts have to interact with decision-makers and/or public and private stakeholders. The coordination of this process requires a certain dynamic (e.g. explicit consideration of different actor groups, re-definition of measures and power relations) since conditions are changing continuously. It is important to notice that the spatial range influences the character of the policy making process. Evidently decision-making processes are different on a European and national/local level, but in both cases depend on the heterogeneity of the actors involved. A serious threat to the success of the policy making process appears if actors are not willing to share knowledge or information due to strategic interests. In such a situation, policy makers are forced to decide on the basis of incomplete

information and/or analysts have to conduct their assessment methods on a biased basis. The interplay between assessment analysts and the respective stakeholders is crucial, as a reliable assessment of policies is only possible if they are clearly defined and the necessary information transparently provided.

Evaluation of acceptance: A challenge for any decision making process is to influence the public's behaviour in a desired way. Beyond formal modelling, the importance of appraising interventions' acceptance implies that it is vital to consider which actors will be affected, the dimensions of how they might be affected, at what time during the policy package implementation they are affected, and how much political capital these actors possess. Of particular interest are those groups expected to be adversely affected by a policy intervention. One systematic way to identify to what degree the policy package will create rejection by the different actors involved and/or affected is a procedure termed 'actor assessment'. The value of such a procedure is that it supports decision-makers and analysts in developing tailored strategies for coping with the varying interests, beliefs, positions and power held by affected stakeholders. An actor assessment aims to identify how and to what degree actors may be affected by the policy intervention. For instance, it can be expected that opposition is stronger if a redistributive policy of repressive character is introduced (e.g. a pricing scheme). In such cases the opposition can imply a threat for the acceptance and implementation of the entire policy (package), especially if those stakeholders affected represent large groups of common and opposite interest. The character of a policy measures and thus the total package are highly dependent upon the considered acceptance by a range of stakeholders. It may be politically and socially more acceptable to initiate measures which allow for a degree of freedom and innovative response from affected actors. The actor assessment also supports the identification of additionally required measures to cope with negative externalities.

Identification of unintended effects: There are essentially two moments where unintended effects become explicit. Firstly, conducting the exercise on causal relationships as explained in stage 2 allows for a reflection on unintended effects by examining expected effects of a policy carefully. Especially the involvement of a variety of different experts and/or stakeholders working on causal relationships appears to be a rational strategy to identify unintended effects in advance to implementation. Secondly, in the assessment stage, the use of assessment methods (e.g. a transport model) may detect other unintended effects that were unknown. Again we illustrate this along an example:

An often cited unintended effect that might be overseen at the beginning but detected using model techniques is the following: the introduction of a pricing scheme is supposed to ease congestion of, say an urban area, at the same time creating revenues for public transport improvement. These intentional effects are likely to be identified correctly during the qualitative work on causal relationships (stage 2). However, the application of a transport model (stage 3) might predict the congestion decrease effect correctly, but to a lower extent than expected. The unintended – not foreseen – effect would be that less congestion eases car travel, thus making it more attractive, resulting in a reduced effectiveness of the pricing scheme.

Altering the package: Modifying the package can be a rational strategy to improve overall package performance, e.g. via the adjustment of a primary measure. This can be favourable with regard to acceptability – for instance that concerns of a specific stakeholder group are taken care of – but eventually at the price of higher opportunity costs. For instance, the introduction of a pricing scheme may be done gradually, starting with relatively low fares that steadily increase reaching the actually planned level. The opportunity costs are represented by a less efficient system at the beginning, e.g. losing some environmental benefits of less intensive resource consumption (here due to reduced driving). However, without the

concession to the specific stakeholder group, the measure eventually would maybe not have been introduced at all and costs in the long term (pollution, resource consumption) would outweigh the loss in efficiency due to the concession. Consequently the adjusted primary measure ideally runs again through stage 2 ('identify causal relationships') and stage 3, the assessment. However, given the evaluation efforts related to stages 2 and 3 and the resources it implies it is unlikely that an only slightly adjusted primary measures is assessed all over again.

Empirical evidences from practices in policy packaging indicate that additional measures are often applied to improve the package's effectiveness or acceptability, and it is often the case that right from the beginning primary measure(s) are accompanied by additional, ancillary measures. However, it can be expected that the first feedback loop (adding ancillary measures after testing a set of primary measures) only sometimes occurs in practice. On the contrary, it seems that often the initial package already includes ancillary measures. The stages that compose the generic framework represent this, as the sequences of selection, assessment and modification of the package as shown in Figure 3.1 may interact in the following ways:

- Ideally, within stage 2, one or more primary measure(s) are defined and assessed in the subsequent stage 3. The evaluation of the assessment results serve then as an indication whether or not a modification of the package is necessary (reflected by stage 4). If additional measures are added, once again the qualitative assessment via stage 2 ('causal mapping') is realised, followed by stage 3, the assessment, and so on
- A different loop may look as follows: after stage 2 and the selection of one or more primary measures and their evaluation through the exercise on the identification of causal relationships, it is likely that directly additional measures are added via stage 4 without conducting the demanding assessment represented by stage 3. The assessment using sophisticated tools and methods is then recently started once a comprehensive package is built as result of the interaction between stages 2 and 4

The recognition of different feasible loops between stages 2, 3 and 4 is important as they represent more adequately the variety of decision-making and assessment in policy-making. In addition, in some cases the omission of stage 3 might be forced due to limited resources or a lack of access to assessment instruments, i.e. models. In these cases the direct iteration between stages 2 and 4 is an option as with the exercise on causal relationships at least expected intended and unintended effects are discovered using a structured method.

An additional aspect concerns the eventual adjustment of initially set objectives and targets. In our generic framework we indicate the possibility to adjust objectives/targets in response to the evaluation of the policy package. Even though we argued that concrete objectives and targets are necessary, in particular at an early stage of building the package, the entire process should be flexible in the sense of allowing for an adjustment of objectives/targets. For instance, in case a quantified target is almost reached it is not recommended to invest an immoderate amount of resources to achieve the missing minimal percentage to meet the initially set objective/target. Nonetheless, this decision requires for a careful evaluation of the costs of not achieving the set of objectives/targets. If costs with regard to a reduced efficiency, effectiveness and acceptability of the policy package appear to be minor, it is rational to adjust the target/objective.

OUTPUT: Summing up, stages 3 and 4 (and in iteration with stage 2) represent the heart of the policy packaging approach. It is here the actual package is created applying an iterative process where the detection of an unsatisfactory outcome regarding effectiveness, efficiency or acceptance results in the need to alter the package. We discussed that barriers may appear both inside the packaging process (e.g. the targeted modal shift is not met) as well as outside (e.g. strong opposition by an important stakeholder group is expected). In both cases a modification of the package considering ancillary measures is the strategy to improve the policy package performance.

3.1.4 Stage 5: Package implementation

Stage 5 describes the concrete action of implementing the policy package. With regard to the generic framework the implementation is neither part of processes ex-ante, nor of those of ex-post. However, it is here where the package is brought into action, thus stage 5 characterises the transition between processes ex-ante and ex-post. Even though we assume that the policy package in question was subject of profound analysis as described in the previous stages, once it comes to implementation, again the challenge of managing barriers may arise. For instance, even effective policy packages tend not to be accepted due to public opposition. This becomes a problem if the issue of acceptance was not properly addressed during the assessment phase. Thus, stage 5 is also about the identification of what makes policies successful in order to use insights for a successful implementation. In Optic, we identified success factors and defined them as any factor contributing to an eased introduction of policies in combination, while barriers represent any factor impeding or hindering their implementation.

Policy barriers can take many different forms (political, technical, cultural etc.) and do influence the achievement of objectives and targets in various ways. The likeliness of barriers to appear in either formation or implementation stages makes it necessary to analyse them carefully. As was mentioned before, the policy package may confront a lack of acceptance. In addition an unclear legal basis can imply a significant barrier for implementation. A lack of communication of expected benefits can lead to decreasing transparency and avoidable resistance by those affected. Barriers can also occur if financial resources are not sufficient and/or technical equipment inadequate to actually carry out the policy. Especially to the latter point one strategy was already introduced above (iterate between stages 2 and 4 of the generic framework, skipping stage 3).

The character and composition of the policy package strongly influence the barriers for implementation. It was found that policies that aim at achieving profound changes in the transport system are more likely to confront difficult barriers (this happens for instance through strong opposition from stakeholder groups and the public) than policies that primarily aim at increasing operational effectiveness within a certain mode. In Optic, general features and strategies which assist a successful policy formation and implementation are identified:

- **Combining sticks and carrots:** the idea behind this strategy is that measures expected to encounter resistance should be combined with other, more popular measures. This strategy is a key feature in policy packaging.
- **Expanding the policy scope and developing flexibility in negotiations:** to consciously expand the policy scope and/or to develop flexible approaches in negotiations with stakeholders.
- **Trials – a way to create legitimacy and acceptance:** trials should be used in combination with referendum in an integrated approach; a referendum can then be a key measure to break a political deadlock.
- **Communicating benefits clearly:** participatory and communication strategies are essential parts of the policy implementation process.

- **Preparing for windows of opportunity:** there might appear unexpected but favourable situations for policy implementation that perhaps allow to implement unpopular measures that at different points in time would create strong (public) resistance.

At best policy-makers decide on possible barrier management strategies *before* the implementation of the package, i.e. *ex-ante*. Alternatively, they should reconsider the chosen policy package and allow the adjustment of packages. It is important to recognise that barriers not met will most likely end up in impeding the implementation of the entire package, potentially closing the “window of opportunity” for an unforeseen time period.

3.2 The generic framework: processes *ex-post*

After stage 4 we expect that an assessed policy package is brought into practice, and we enter stage 5, ‘package implementation’. We assume that monitoring – the continuous assessment of whether initially set targets are still met by the policy package in implementation – is an integrative part of the entire policy packaging process. This implies that the actors who initially decided upon the package, have to be willing and able to change its nature once targets are no longer met. Another quite probable motivation for remedial action is that initial policy objectives have changed and make *ex-post* remedial adjustments of the package necessary, e.g. because of a change in the political constellation (such as a new party or mayor in power).

3.2.1 Stage 6: Evaluate effects, introduce remedial actions

In stage 6 and the monitoring, indicators play an important role. They are ‘signposts’, indicating the distances to initially set policy objectives and targets. Based on these signposts, the monitoring process implies decisions on whether primary measure(s) and/or ancillary measures need to be adjusted or even removed. In accordance with the generic framework we essentially identified two possibilities for action. One option is to address and/or change initial objectives, targets as well as remove/adjust the related primary measure(s). A more likely situation and option, is that the primary measure is kept or only adjusted but not entirely removed. As for additional measures, it is more likely that an entire removal is considered as well as an adjustment or consideration of new, additional measures. This is primarily due to the high costs (time, efforts, gain for acceptability) associated with a removed and newly installed primary measure. An efficient *ex-post* monitoring of a policy package also takes the costs of reversing decisions into consideration.

The role of politicians here is to decide on the adjustment or removal of measures. Such decisions should be based on monitoring strategies which are explained further below. The actual monitoring is most likely carried out by experts as often data and models once again play an important role in assessing the current effectiveness and efficiency of the package. *Ex-post* monitoring requires for instance knowledge on changing ratios between costs and benefits compared to earlier calculations and analysing target achievement indicators.

The introduction of remedial actions is dependent on flexibility from involved actors and ability to act in accordance with that flexibility. In *Optic*, several strategies of adaptive or flexible planning procedures were described, based on the understanding that adaptive policies are designed to function more efficiently in complex, dynamic and uncertain conditions. A flexible planning process takes the worst possible policy outcome as a starting point and strives for an efficient reaction on unintended effects in case they occur at a later point in time. The following five methods can provide policy makers with a basis of decision-making (*Optic* (2010c, p. 63):

1. *Scenario planning techniques:* using participatory methodologies at the outset of policy planning to ensure that opposition is detected at an early stage of policy formulation

2. *Implementing and testing a variety of policies*: the consideration of opinions of many different actors and the use of structurally open and structurally closed assessment methods to test the effectiveness and efficiency of different policy packages
3. *Establishment of signposts*: identifying critical moments of policy reformulation, i.e. the openness of reformulating policies once a trade-off between actors is difficult to achieve and the realisation of the entire package is threatened
4. *Further elaborated monitoring system*: an automatically policy performance check using relevant performance indicators; i.e. defining early the set of indicators that are used for the ex-post evaluation of the package's performance
5. *Phasing in policies*: Testing policies in a smaller environment before adapting them in the larger context; this comprises both the temporal and spatial aspects, e.g. the timely gradual introduction of a fare or a spatially restricted test site for a large-scale pricing scheme

Especially point three and four represent elements of an ex-post monitoring, while the other points more generally characterise elements of 'good policy packaging' and are important also at earlier stages of the packaging process. Accordingly, the focus in ex-post assessment should lie on the establishment of signposts, i.e. the revision of indicators defined at an earlier stage and their monitoring and evaluation using tools for assessment. However, in practice there exist several reasons why adaptive planning and ex-post monitoring techniques are not yet considered a standard strategy for evaluation:

- Many administrative levels need to be involved which makes it difficult to harmonise decision-making; this is both the case for actions taken ex-ante and ex-post
- Monitoring and adjustments require continuous resources for planning and analysis, which is often not foreseen during the policy implementation stage

In the following we will focus on concrete methods related to an ex-post monitoring strategy. In Optic, four different types of ex-post adjustments were identified and illustrated by using two examples: the London congestion charge and EU rail interoperability (Macmillen and Givoni, 2010). However, these examples provide more general lessons regarding the type of adjustment actions undertaken by decision makers. They include,

- Policy intensity adjustments
- Compliance adjustments
- Character adjustments
- Scope adjustments

Policy intensity adjustments refer to the calibration of, or change to, a policy's strength or 'depth' in circumstances where its observed impact somehow fails to correspond with its original objectives and/or targets. This adjustment is of relevance both before and after the implementation of the policy package, and the necessary actions make such adjustments similar, too. In both cases the adjustment – reinforcing the policy's strength – is the strategy. Instead of changing the set of measures – keeping in mind that we deal with policy packages – this adjustment strategy will increase or decrease the performance of the intervention already in place. The overall objective remains increasing the policy package's effectiveness. The process of policy monitoring supports the provision of the necessary information on which adjustment strategies are justified. A slight calibration of a measure – for instance raising city congestion fees over time – is an example for changing a policy's intensity. Besides aiming for an increase in effectiveness, an ex-post policy adjustment may also be applied to raise the policy acceptability. Whereas the economic effect of congestion charges is calculated rather reliably (e.g. using CBA or economic models), the level of acceptance of such an intervention is difficult to foresee. Adjusting the intensity may be necessary if the acceptance towards the policy has shown to be low after the policy implementation. In sum, we may say that policy intensity adjustments affect primarily the aspects of policy

effectiveness and/or acceptability of the single primary measure or one of the ancillary measures. It is not assumed that the general (technical-economic) feasibility of the policy is questioned. The evaluation of policy intensity ex-post is generally the result of an evaluation of performance indicators used during the stage of monitoring. The analysis of indicators, such as 'signposts' and/or 'threshold values' reveals a need for calibrating the policy intensity ex-post.

The second type of adjustment concerns the extent to which actors follow the policy's rules. Such **compliance adjustments** are necessary, for instance, when a monitored policy is shown to exhibit loopholes that decrease its effectiveness and/or efficiency. Such loopholes may have been overlooked by the policy makers in earlier stages of the policy planning process and imply a risk of lost revenues or additional costs at later stages. A hypothetical scenario shows the actors finding ways to bypass regulations or use them in a way which was not intended by the decision makers, decreasing the policy effectiveness. In this case, target values of indicators initially set are not reached to a desired extent. Besides individual evasive actions not complying with policy rules, also communicative limitations inside the decision-making entity may lead to the necessity of compliance adjustments. A lack of a common understanding among stakeholders may lead to a decrease of policy effectiveness when actors – intentionally or otherwise – follow a different strategy than the one initially agreed on.

The third ex-post adjustment strategy is called **character adjustment**. Hereby the actual quality or nature of the package is revised. Quality in this context means the potential to fulfil the policy targets and objectives. A policy package may lose performance if its character is not adapted over time. Due to rapid technological progress, new efficient means of putting measures into action might be available. For instance, the mean of collecting congestion charges can be changed afterwards from manual payment to automatic charging via associated technologies. Available technological developments may increase the effectiveness of the original package and provide the opportunity to adjust the policy character to meet the current standards. Developments from car manufacturing (OEMs, e.g. hybrid engines) and Intelligent Transport Systems may, for example, reveal possibilities to improve policy packages ex-post. On the other hand, primary measures might get obsolete due to out-dated technologies and may be replaced by new ones. Therefore, a decision has to be made if the policy character should be adjusted or if removing a measure is a more efficient option. Incorporating additional measures is also a possible means to change the package character into a more efficient form. Changing the character of a measure is, however, a rather resource intensive adjustment strategy as it implies to reiterate the stage of assessment.

Finally, **scope adjustments** are relevant in the context of ex-post policy package optimisation. Such adjustment may refer to changes in the geographical scope of measures. It might be useful to extend the area of impact or reduce it so as to increase policy effectiveness. The scope may, on the other hand, refer to the direction of the policy impact. One single policy measure of a policy package may turn out to be a sort of best practice and thus it might be worthwhile to extend efforts – or the scope – of this specific policy. Further scope adjustments also pertain to the adaption of policy objectives ex-post. This should not be confused with the adjustment of the policy character itself. After making the decision to adjust the policy objective, a step back to stage 1 of the policy packaging cycle needs to be performed. As it was the case with the character adjustments, scope adjustments are also necessary as soon as advanced technological standards result in updated targets and objectives (e.g. lower emission thresholds resulting from cleaner engines).

It is important to not interpret ex-post adjustment strategies as independent from the previous stages defining processes ex-ante. All adjustment types (intensity, compliance, character, scope) result in a changed policy package, and thus alter the expectation of the package's performance. Naturally, the impact of an adjustment can vary substantially, from, for

example, a slight calibration of a toll due to decreasing effectiveness of the measure, to a broad extension of the measure's geographical scope. In both cases the generic framework suggests to reiterate previous stages of 'identifying causal relationships' and 'conducting an assessment applying tools and methods'. This important link between processes ex-ante and ex-post assures a continuous and coordinated monitoring and/or adjustment of the policy package.

4 Assessment tools, barrier management and need for adaptive approach

One of the main outcomes of Optic is the framework for policy packaging which is described in the previous chapter. The policy framework aims at making policy processes more structured and transparent. It integrates rather different element and aspects of the policy making process. Some of these elements are highly crucial for the success or failure of policy packaging, and have therefore been dealt with in different deliverables during the Optic project. This chapter goes through some of these crucial aspects in more detail.

Assessment of a policy package (policy option) for the realisation of policy objectives is, in Optic, based on the following evaluation criteria: efficiency, feasibility and acceptability. These concepts were briefly described in the previous two chapters. Section 4.1 describes methods and models for the identification of the impacts (in quantitative or qualitative terms) as well as method and tools for aggregation of these impacts. This section also covers the potential impacts of a policy intervention and indicators for capturing the impacts (ex-post or ex-ante).

Section 4.2 is on barrier removal and relates to acceptability. For a successful implementation of policies the identification of barriers as well as strategies to overcome these barriers is playing a crucial role. As it is outlined in this section acceptability of measures by different societal groups is of utmost importance in this context.

Section 4.3 is on adaptive planning. Optic (2010b) explored the complexities of policy making environment. Adaptive planning can be regarded as a tool in dealing with policy formulation under risk and uncertainty, and when there is no consensus on goals and/or on means.

4.1 Methods and tools for assessment

Optic (2010b and 2010c) illustrated that policy making in the transport sector is always faced with risks and uncertainties. Transport is deeply embedded in society and interrelated with a broad range of factors. As it is for other socio-technical systems, the transport system is characterised by a high degree in complexity. Transport is basic pillar of economic growth and quality of life, and at the same time the negative consequences of transport activities (congestion, noise, pollutants etc.) have the potential to adversely affect economy and quality of life. Governing the transport system also means mediating between various objectives such as economic development, environmental protection, human health, safety or social equality. Transport policy making is of the confronted with societal controversies, since it has to cope with different interest.

Because of this high degree in complexity and conflicting interests political interventions, as well as innovations, unintended, unknown, adverse or unexpected effects cannot be avoided. It is widely acknowledged that it is not possible to fully avoid the incidence of unintended effects due to policy interventions (see for example Gifford, 1994; Mander, *et al.*, 2007; van Asselt and Rotmans, 2002). Transport policymaking requires an integrated view; it has to take into account various alternative options, their possible consequences for the transport system and beyond, and societal conditions for implementation (see Marchau, Walker and van Wee, 2010; Walker, Rahman and Cave, 2001). 'Real world' decision-making is always performed under uncertainty. But tools and methods exist, that are able to reduce risks and uncertainties, thus unintended effects of policy making. It is crucial, however, to apply this tools and methods in an appropriate manner in the process of policy packaging.

4.1.1 Structurally open and structurally closed methods in the packaging process

Optic (2010b) provides a discussion of methods and tools for the early detection of unintended effects. A broad range of tools and methods can be applied to anticipate unintended effects in transport planning. Approaches of rather different character are used by the actors in the process of decision making. For example, there are computer-based modelling efforts to quantify trends and their interrelations but there are as well methods based on discussions and participation, which intend to examine alternative possibilities, generate visions of desirable futures or explicitly try to anticipate unintended effects of policies. While the fast progress in quantitative methods has traditionally shaped transport planning, in particular over the last decades, discursive tools and methods became more prominent in planning processes.

Foresight tools are never able to systematically reproduce the full complexities of the transport system in scope or in depth. All the tools and methods have their pros and cons, they have areas or contexts where they are useful and there are areas and contexts where they should not be used. However, due to the huge variety in tools and methods it is not easy to use and combine them in a proper and accurate manner, in particular when it comes to the assessment of not only single policies but of packages of policies. Against this background, in Optic (2010b) a rather simple categorisation of tools and methods was developed to help understanding the advantages and disadvantages of the different tools and methods, to make the limits of different tools more transparent and to increase the awareness for risks and uncertainties in transport planning. The categorisation is strongly linked to a typology of unintended effects which is introduced in Optic (2010 a). Here, a differentiation is made between unintended effects that were known and those that were unknown to decision makers. Going one step further, in Optic (2010 c) the different sources of unintended effects were discussed. Reference is made to a differentiation between risks and uncertainties introduced by Knight already in 1921:

- Risk: knowledge and parameters available to assess the likeliness of an outcome
- Uncertainty: more genuine lack of systematic understanding of causal relations

Or, as Grunwald puts it: “While risk is a quantifiable parameter where there is both significant scientific knowledge about the probabilities of the occurrence of certain effects and reliable knowledge about the nature and extent of possible harm, uncertainty is characterised by a limited quantifiability, a lack in knowledge, epistemic uncertainty / or unresolved scientific controversies” (Grunwald, 2007, p. 246). This differentiation between risks and uncertainties widely corresponds with the categories of unintended effects: known effects are rather related to risks; unknown effects are related to uncertainties. For dealing with risks, methods that have pre-defined setting are an appropriate tool. For dealing with uncertainties, more open methods are needed since the underlying cause-effect relations of the phenomena are not well understood.

Against this background, key-criteria for the categorisation of tools and methods are their ability in detecting different types of unintended effects. On this basis, in Optic (2010b), a general distinction between two groups of tools is made along the following criteria: Does the structure of the method allow for a high degree in openness concerning variables, their interactions and parameters or is the method rather characterised by a pre-defined variables and their interactions and set parameters. Accordingly, we introduce one category that is called ‘structurally open methods’ and one category called ‘structurally closed methods’. In reality, there is rather a continuum than a clear border line between these two categories. Table 4.1 illustrates that it is possible to define clear characteristics for both of them.

Table 4.1: Categorisation of tools and methods

Structurally open methods	Structurally closed (pre-defined) methods
<ul style="list-style-type: none"> • no fixed setting • mainly explorative • never purely quantitative, strongly shaped by qualitative elements • in principle open to detect effects beyond the system boundaries 	<ul style="list-style-type: none"> • pre-defined setting • mainly for analyses of specific situations • more or less clear understanding of the relevant parameters and causal relationships represented by the linkages between these parameters • mainly quantitative • focus on effects inside the pre-defined system • effects outside the system cannot be detected
Examples: brainstorming, open space, expert workshops, explorative scenarios, focus groups	Examples: quantitative models, cost-benefit analyses, multi-criteria analyses

This categorisation clearly overlaps with the distinction between qualitative and quantitative approaches. One of the main criteria to distinguish between tools and methods is whether they use and/or produce qualitative or quantitative data. The range of quantitative approaches may vary between simple trend extrapolations up to analytic behavioural models that predict transport demand based on the explicit and data intense reproduction of variables that determine (travel) behaviour. But we prefer to use ‘structurally closed’ and ‘structurally open’ as main categories, since their underlying structure, seems to be highly important for the type of unintended effects that can be anticipated. The categorisation should make transparent that applying a closed method means that a decision was made on what to include or what to exclude. The decision was prepared on an explicit or implicit prioritisation, and thus, on a step that is based invariably on normative positioning. In this sense, Grunwald points out: “The basis of quantifications in theoretical measurements is inseparable from preferences, values, norms, and their changes over the course of time, and this is what differentiates all social domains, not only economics, from the domain of the natural sciences. In the social domain quantifications are dependent on the normative assumptions that enter into the method of quantification.”(Grunwald, 2009: 1129) For transparent procedures, it is crucial to make preferences, values and normative assumptions visible as far as possible. The categorisation suggested above helps rising awareness for this step of including and excluding factors and thus makes it more transparent. Further, the categorisation should increase awareness for a more careful design and integration of structurally open methods.

For example, most economic thinking uses closed methods such as models to understand the world. These models will capture the essence of the process and help us understand it, but in doing so things are left out. The alternative to this simplification is a set of very complicated dynamic models with many variables and different lags. This in turn might easily become a black box limiting, rather than helping our understanding of the processes involved. In other words, transport systems are difficult to model precisely. Typical models applied for the evaluation of the impacts of transport policies such as REMOVE or TRANSTOOLS are simplifications of a highly complex system. These types of models could prove extremely helpful in situation where there is already a good knowledge of the important cause-effect relations of selected variables that are included in the model. On the other hand, it is not possible to detect any effect left outside the modelled interaction of the variables in the model with their associated parameters. Other tools with a different and/or broader focus are needed.

As it was mentioned above, no tools or methods are able to anticipate the full range of potential unintended effects. They all have their strength as well as their blind spots. Therefore, a combination of methods in the planning process is needed for dealing with risks and uncertainties in a successful way. Furthermore, limited resources require an efficient combination and application of tools and methods.

In Optic (2010b), a generic rule was proposed for the application of foresight tools and methods from the structurally open and closed approaches. Given that there is a consensus on the objectives of policy intervention, the generic rule should give orientation for the application of methods in different phases of the planning process and allocates tools and methods to the following three phases:

1. Structurally open methods should rather be used in an explorative phase **at the beginning**; also simple pre-structured approaches can be applied to exclude unrealistic options at an early stage. Stakeholder and citizens should be involved in this phase.
2. Structurally closed methods should rather be used **in the middle** of the planning process where quantifications are the main task (work dominated by experts and the application of analytical models).
3. Structurally open methods should again be used **to the end**, discursive methods for the interpretation of the results; potentially affected groups should be involved.

This categorisation is strongly related to the epistemic basis of decision making. It should increase awareness for the knowledge that is available and should help to select the appropriate tool or methods. (In the next chapter, a stronger focus is put on normative elements in decision making processes.)

For this rough 3-steps scheme in particular, and for structurally open and structurally closed methods in general, the question of transferability is of crucial importance. This question concerns e.g. the transferability among national contexts, data availability and nation-specific (travel) behaviour, issues of different degrees in complexity, between socio-technical sectors (energy, transport, water infrastructure) or as transferability between political levels (local, national, EU). It goes beyond the scope of this report to provide a thorough discussion of these dimensions of transferability. For example, empirical analyses would be needed to assess whether the proposed transferability of the three steps scheme (beginning - middle - end) works for different socio-technical sectors equally well. Regarding political levels, it seems as if at the local level a direct participation of the affected citizens should be stronger emphasised when a structurally open method is chosen. On EU level, there will be stronger emphasis on the involvement of stakeholders representing different interest groups rather than individual opinions. Regarding the transferability between countries, formal aspects such as the political or institutional system can hamper the conduction of specific methods, for instance due to strong resistance by decision-makers. Further, informal aspects such as communication cultures are relevant as well. For example, an open discursive approach only makes sense if all participants act, more or less free of hierarchical thinking. If this is not possible, interviews or surveys might be more suitable, since they guarantee the anonymity of answers.

For both structurally open and closed methods, the availability of knowledge and data plays a decisive role. The issue of data quality and availability is even more relevant for detailed, data-hungry transport and/or emission models used to evaluate policy impacts. In the previous Optic Deliverables the focus was on the role of EU transport and emission models TRANSTOOLS and REMOVE. Both models serve as good examples to illustrate challenges coming along with their application on an EU level. The heterogeneity of data and methods to collect data imply a serious barrier of transferability of the approaches. In addition data collection and maintenance of statistical data bases is often done in irregular intervals. Some further specific aspects were discussed in Optic (2010b), and were related e.g. to the issue of different zoning systems among EU countries or the lack of comparable survey data on travel behaviour. This situation is similar for emission models often based on

comprehensively attributed vehicle stocks. For instance, information for vehicle statistics is differently collected for vehicles categorised in different manners. It was also discussed that observations regarding behavioural changes in response to transport policies, i.e. derived elasticities, may vary substantially among countries due to factors beyond the typically collected information about socio-economic attributes of persons and households (e.g. cultural beliefs, traditional preferences). One solution to deal with these issues is to conduct EU wide data collection initiatives. As long as geographically large-scale models depend on country-specific data bases, inconsistencies within the models will remain and lead to biased results. On the other hand, one advantage of the respective models is that underlying methodologies (so far free of data) are transferable and normally not dependent on the geographical context. Other aspects easing the transferability are comprehensive documentations of the methodological backgrounds as well as the practical issues of actually running the model. In practical terms missing documentation can signify a considerable obstacle for the use of these tools, and hamper their transferability.

4.1.2 Coping with different degrees in consensus

The structurally open methods can be used for exploration of the important variables and their interactions as well as development of consensus on the objectives of a policy intervention. Figure 4.1 shows a framework for analysis objectives and means. On the vertical axis is the level of uncertainty about the impacts of a particular policy action. On the horizontal axis is the level of consensus on objectives for policy intervention. Policy formulation in cell 1, where there is low level of uncertainty about the policy measures impacts and high consensus on the policy intervention to achieve the objective “Predict and Act” is the norm for policy intervention. The known techniques can be applied by assuming that the future can be predicted well enough to develop a static policy with acceptable outcomes (Gifford, 2003; Marchau et al., 2010).

Figure 4.1: A framework for objectives and policy intervention

		Level of consensus about objectives of policy intervention	
		High	Low
Uncertainty about measures to achieve objectives	Low	1. Predict and act Known techniques	3. Negotiated Ex ante assessment
	High	2. Dynamic approach Ex post assessments	4. Adaptive discovery Explorative combinations of ex ante and ex post assessments

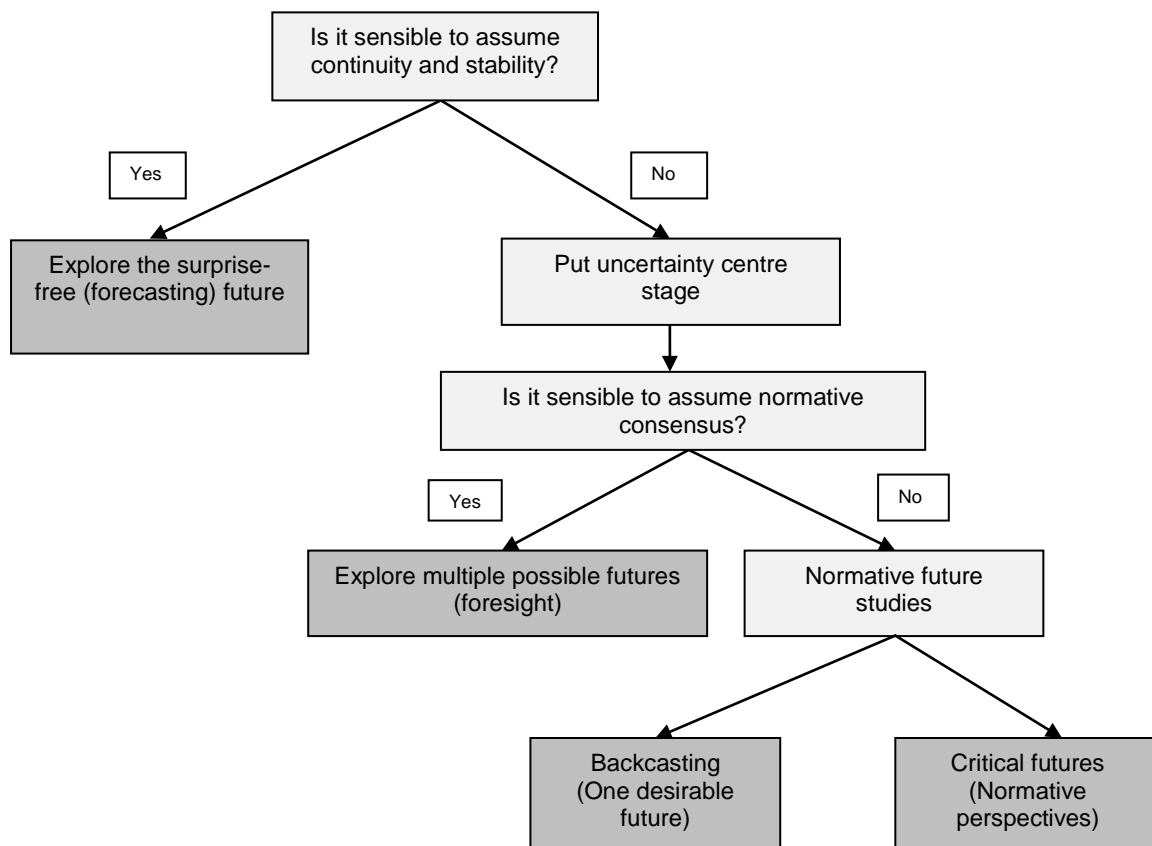
When there is high consensus on the objectives for policy intervention but impacts of measures are highly uncertain, policy intervention can be designed through flexible use of measures, fine-tuning or adjusting the measures when necessary over time (cell 2). The developments in outcomes can be monitored, and policy measures can be changed in response. This implies that the choice of policy instrument as well as policy intensity can be optimised over time.

A “Negotiated Approach” is appropriate for a situation with low consensus about the objectives of policy intervention and low uncertainty about the impacts of the policy measures (cell 3). Ex ante assessments, in the form of scenario planning, back-casting, and multi-stakeholder deliberation are likely to produce a consensus on policy objectives.

When there is a lack of consensus on objectives for policy intervention and a high level of uncertainty associated with the impacts of policy measures (cell 4) an “Adaptive Discovery” is called for. This approach requires ex-ante assessment to bring about consensus on the objectives and to formulate a strategy to clear the way for implementation of policy measures. Ex-post assessment is necessary in this situation to adjust or fine-tune policies measures.

Figure 4.2 also shows how structurally closed and open methods can be applied to develop insight into the important variables and their interactions as well as bringing about normative consensus, consensus on objectives of policy intervention (adopted from WRR, 2010).

Figure 4.2: An example of the application structurally closed and open methods



4.1.3 Impact assessment of policy intervention

In an impact assessment there should be clear answers to a number of key questions. Among these are the main policy options for reaching the objectives and the likely economic,

social and environmental impacts of the options (see European Commission, 2009⁶). The analysis of impacts consists of three major steps:

1. Identification of economic, social and environmental impacts
2. Qualitative assessment of the more significant impacts
3. In-depth qualitative and quantitative analysis of the most significant impacts

The following section provides potential economic, social and environmental impacts (Sections 4.1.3.1), followed by tools for the assessment of quantitative and qualitative impacts of a policy intervention. For more discussions and recommendations of tools for assessment and discussion and recommendations of some important parameters used in these tools see Heatco (2006).⁷

4.1.3.1 Economic, social and environmental impacts

European Commission (2009) provides extensive lists of potential economic, social and environmental impacts for screening options. Tables 4.2 to 4.4 are the modification of the lists catered to the transport domain. Note that these lists are fairly comprehensive and covers wide range of impacts of transport policies at local, national and EU levels.

⁶ Appendix 2 provides a short note on Optic's recommendations in relation to the European Commission's Impact Assessment Guidelines.

⁷ Heatco provides a set of harmonised guidelines for project assessment and transport costing on the EU level in the areas; Value of time and congestion, Value of accident risk reduction, Costs from health impacts and costs of other nuisances due to pollutants and noise, Wider economic effects, i.e. indirect effects, Infrastructure costs and General CBA aspects; e.g. inter- and intragenerational distribution, risk and uncertainty. While these guidelines relate to EU level and mostly to the evaluation of infrastructure projects, the different deliverables of this project provide fairly good discussion on the general CBA aspects as well as how different parameters in CBA should be selected.

Table 4.2: Economic Impacts

ECONOMIC IMPACTS	KEY QUESTIONS
Level of transport activity	<ul style="list-style-type: none"> – Will it increase or decrease the demand for transport (passenger or freight), – Will it influence modal split?
Consumers and households	<ul style="list-style-type: none"> – Does the option affect the prices consumers pay? – Does it have an impact on the quality and availability of the goods/services they buy, on consumer choice and confidence? – Does it have significant consequences for the financial situation of individuals / households, both immediately and in the long run?
Operating costs for firms	<ul style="list-style-type: none"> – Will it impose additional adjustment, compliance or transaction costs on businesses? – How does the option affect the cost or availability of essential inputs (goods, labour, etc.)?
Productivity and relocation of economic activity	<ul style="list-style-type: none"> – Does it impact on productivity? – Does it provoke relocation of economic activity? – Will it lead to new or the closing down of businesses?
Administrative burdens on businesses	<ul style="list-style-type: none"> – Does it affect the nature of information obligations placed on businesses (for example, the type of data required, reporting frequency, the complexity of submission process)?
Public authorities	<ul style="list-style-type: none"> – Does the option have budgetary consequences for public authorities at different levels of government (national, regional, local), both immediately and in the long run? – Does it bring additional governmental administrative burden? – Does it require the creation of new or restructuring of existing public authorities?
Property rights	<ul style="list-style-type: none"> – Are property rights affected (land, movable property, tangible/intangible assets)? Is acquisition, sale or use of property rights limited? – Or will there be a complete loss of property?
Specific regions or sectors	<ul style="list-style-type: none"> – Does the option have significant effects on certain sectors? – Will it have a specific impact on certain regions, for instance in terms of jobs created or lost? – Is there a single region or sector which is disproportionately affected?
Macroeconomic environment	<ul style="list-style-type: none"> – Does the option have consequences for economic growth and employment?

Table 4.3: Social Impacts

SOCIAL IMPACTS	KEY QUESTIONS
Employment and labour markets	<ul style="list-style-type: none"> - Does the option facilitate new job creation? - Does it lead directly or indirectly to a loss of jobs? - Does it have specific negative consequences for particular professions, groups of workers, or self-employed persons? - Does it affect particular age groups? - Does it affect the demand for labour? - Does it have an impact on the functioning of the labour market? - Does it have an impact on the reconciliation between private, family and professional life?
Social inclusion and protection of particular groups	<ul style="list-style-type: none"> - Does the option affect access to the labour market? - Does it lead directly or indirectly to greater equality or inequality? - Does it affect equal access to services and goods? - Does it affect access to placement services or to services of general economic interest? - Does the option affect specific groups of individuals (e.g. the vulnerable or those at risk of poverty, children, women, elderly, the disabled, unemployed or ethnic, etc.), firms or other organisations (e.g. churches) or localities more than others?
Gender equality, equality treatment and opportunities, non-discrimination	<ul style="list-style-type: none"> - Does the option affect the principle of non-discrimination, equal treatment and equal opportunities for all? - Does the option have a different impact on women and men? - Does the option promote equality between women and men? - Does the option entail any different treatment of groups or individuals directly on grounds of sex, racial or ethnic origin, religion or belief, disability, age, and sexual orientation? Or could it lead to indirect discrimination?
Governance, participation, good administration, access to justice, media and ethics	<ul style="list-style-type: none"> - Does the option affect the involvement of stakeholders in issues of governance? - Are all actors and stakeholders treated on an equal footing, with due respect for their diversity? Does it affect the autonomy of the social partners in the areas for which they are competent? Does it, for example, affect the right of collective bargaining at any level or the right to take collective action? - Does the implementation of the proposed measures affect public institutions and administrations, for example in regard to their responsibilities?
Public health and safety	<ul style="list-style-type: none"> - Does the option affect the health and safety of individuals/populations, including life expectancy, mortality and morbidity, through impacts on the socio-economic environment? - Does the option increase or decrease the likelihood of health risks due to substances harmful to the natural environment? - Does it affect health due to changes in the amount of noise, air quality? - Does the option affect lifestyle-related determinants of health such as physical activity? - Are there specific effects on particular risk groups (determined by age, gender, disability, social group, mobility, region, etc.)?
Crime, Terrorism and Security	<ul style="list-style-type: none"> - Does it affect law enforcement capacity? - Will it have an impact on security interests?
Access to and effects on social protection, health and educational systems	<ul style="list-style-type: none"> - Does the option have an impact on services in terms of quality/access for all? - Does it have an effect on the mobility of workers? - Does the option affect the financing / organisation / access to social, health and care services?
Culture	<ul style="list-style-type: none"> - Does the proposal have an impact on the preservation of cultural heritage? - Does the proposal have an impact on citizens' participation in cultural manifestations, or their access to cultural resources?

Table 4.4: Environmental impacts

ENVIRONMENTAL IMPACTS	KEY QUESTIONS
The climate	<ul style="list-style-type: none"> – Does the option affect the emission of greenhouse gases (e.g. carbon dioxide, methane etc.) into the atmosphere? – Does the option affect our ability to adapt to climate change?
The use of energy	<ul style="list-style-type: none"> – Will the option increase/decrease energy and fuel needs/ consumption? – Does the option affect the energy intensity? – Does the option affect the fuel mix? – Does it increase or decrease vehicle emissions?
Air quality	<ul style="list-style-type: none"> – Does the option have an effect on emissions of acidifying, eutrophying, photochemical or harmful air pollutants that might affect human health, damage crops or buildings or lead to deterioration in the environment (soil or rivers etc.)?
Biodiversity, flora, fauna and landscapes	<ul style="list-style-type: none"> – Does the option reduce the number of species/varieties/races in any area (i.e. reduce biological diversity) or increase the range of species (e.g. by promoting conservation)? – Does it affect protected or endangered species or their habitats or ecologically sensitive areas? – Does it split the landscape into smaller areas or in other ways affect migration routes, ecological corridors or buffer zones? – Does the option affect the scenic value of protected landscape?
Soil quality or resources	<ul style="list-style-type: none"> – Does the option affect the acidification, contamination or salinity of soil, and soil erosion rates?
Land use	<ul style="list-style-type: none"> – Does it affect land designated as sensitive for ecological reasons? – Does it lead to a change in land use?
The environmental consequences of firms and consumers	<ul style="list-style-type: none"> – Does the option lead to more sustainable production and consumption? – Does the option change the relative prices of environmental friendly and unfriendly products? – Does the option promote or restrict environmentally un/friendly goods and services through changes in the rules on capital investments, loans, insurance services etc.? – Will it lead to businesses becoming more or less polluting through changes in the way in which they operate?

The lists of the impacts provided in Tables 4.2 to 4.4 are useful for the identification of impacts and quantitative assessment of the more significant impact. In-depth quantitative and qualitative of the most important impacts require extensive use of “structurally closed” model and methods (cf. Section 4.1.1).

4.1.4 Tools for integration of impacts of policy intervention

Crucial to policy design and choice are the aggregation over consequences

- (i) within generation,
- (ii) over time, and
- (iii) according to risk.

Hence decision making involves integrating indicators that measures environmental, social and economic impacts of projects, plans and policies over these dimensions.

4.1.4.1 Welfare economics approach for aggregation

The underlying ethics of welfare economics focuses on the consequences of a policy for the consumption of goods and services by individuals in a community. The perspective sees individuals as having, preferences, and their utility, or welfare, arising from consumption. In this perspective anything is a benefit that increases human well-being and anything is a cost that reduces human well-being⁸.

Goods and services can be defined in a broad way to include education, health, and goods appearing at different dates and in different circumstances. Thus the theory covers time and uncertainty. Aggregating social utility across individuals to come up with a measure of social welfare has its problems. Different value judgements can lead to different rankings of possible outcomes, and deciding what values should be applied is difficult in democratic societies⁹. The standard welfare-economics framework has a single criterion, and implicitly, a single governmental decision-maker.

The ethical framework of standard welfare economics looks only at the consequences of actions, i.e., it has a consequentialism approach. Hence there is no room for ethical dimensions concerning the processes. Processes are important in other notions of ethics, including those based on concepts of rights, justice and freedoms.

4.1.4.2 Cost benefit analysis

The objective in cost-benefit analysis is to work out the policies that would be set by a decision-maker acting on behalf of the community and whose role it is to improve, or maximise, overall social welfare. CBA functions on the basis that a better allocation of resources is one that meets people's preferences.

Aggregation over individuals

The overall social welfare depends on the welfare of each individual in the community. Fundamental to cost-benefit is the aggregation of individual preferences into collective ones, i.e., summation of costs and benefits over all the individuals in a society.

A main problem in CBA arises over the measurement of cost and benefits in one scale to be able to end up with numerical values for summation. There are two central problems with this approach. One is related to the valuation of costs and benefits for an individual. This implies individual's values of cost and benefits should be the basis. The problem of solicitation of individual's values based on response to hypothetical questions or on the basis of actual behaviour is acute and poses a central problem in CBA. In other words there are qualifications on willingness-to-pay for benefit or avoid the cost as a good measure of values. The questions on the validity of valuations of health and the environment are even more serious due to their significant inherent difficulties.

The other problem is related to the aggregation of individual preferences (costs and benefits). Aggregating social utility across individuals to come up with a measure of social welfare has its problems. Different value judgements can lead to different rankings of possible outcomes, and deciding what values should be applied is difficult in democratic

⁸Economic theories and ideologies are founded on the principle that consumers have well-defined preferences, and consistently behave to advance their self-interest (McFadden, 2006).

⁹Sen (1982) points to a number of limitations in identification of group preferences (in addition to the obvious problems of time).

societies. How the welfare of people with very different standards of living should be assessed and aggregated in forming judgements on policy.

Aggregation over time

Cost and benefits occur over long periods of time. People do care about when the costs and benefits occur. They have time preference. Since CBA is based on preferences, it is essential to take account of time preferences (discounting). Policies and plans involve costs and benefits that occur over long periods of time. Long-term effects involves uncertainty, irreversibility and even catastrophic. Assessing impacts over a very long time period emphasises the problem that future generations are not fully represented in current discussion. Hence Long-term evaluation, explicitly, or implicitly is based on a “social contract” for intergenerational equity. How should future generations be represented in the views and decisions of current generations? This is captured by the discount rate in cost benefit analysis, by the application of option theory to address risk, uncertainty and irreversibility or by Precautionary Principles or Safe Minimum Standards.

The “correct” procedure to the evaluation of the social desirability of a project would have been in relation to its total effect on the economy, with it and without it. The total effect includes those concerning future generations. Without any market imperfection and failures and lump-sum redistributive taxation, it would have been possible to evaluate a project on the basis of its costs and benefits using market prices. The problem of finding shadow prices including the social rate of discount is related to the second-best world, where different market failures make market prices to deviate from the relative marginal social costs. Some of these market imperfections relate to social rate of time preference. Hence the question of social rate of discount involves a discussion of intra- and intergenerational distributional issues (Stiglitz, 1994). See Portney and Weyant (1999) for different views and discussions around discount rate.

Aggregation over risk

There is a great deal of risk and uncertainty associated with the long-term effects of an action or policy. The risks and uncertainties around the costs and benefits of environmental policies are particularly large. Hence the analytical framework should be able to handle risk and uncertainty explicitly.

Most actions such as provisions of infrastructure, changes in land use have uncertainty associated with their social benefits and costs, and are irreversible. Their impacts on environment are also associated with uncertainty that can be irreversible, even catastrophic. Technology adoption is another example where investment decisions are made under uncertainty and irreversibility.

Other researchers have applied option theory for environmental risk regulation and evaluations (Sunstein, 2005). The simple concept is that when dealing with an irreversible loss, and when uncertain about the timing and likelihood of that loss, one should be willing to pay for an option in order to maintain flexibility for the future (see Optic, 2010c).

4.1.4.3 Multi-criteria decision analysis and CBA

A summary of problems of CBA to aggregation is incommensurability, discounting the future, distributional issues and measurement problems. Furthermore, the reality of living in societies with diverse and complicated political decision-making processes, many layers of interdependencies, many sources of well-being and ill-being, wide disparities in distribution,

and very little likelihood of the sorts of compensating transfers hypothesised in cost-benefit models ever occurring.

An alternative approach is the multi-criteria decision approach (MCDA)¹⁰. A quality of MCDA is the ability to consider large volumes of data, relations and objectives that are present in a real-world policy situation. The analytical framework in MCDA allows for qualitative data and quantitative data. MCDA is based on incommensurability principle as alternative to the traditional cost-benefit analysis. Incommensurability implies the absence of a common unit of measurement across plural values; it does not mean incomparability. However for the same reason weak comparability is associated with the philosophical base of a MCDA while strong comparability is associated with CBA.

CBA is compensatory by definition. By using the same (monetary) scale in the measurement of cost and benefit, the approach allows substitution between different impacts and consequently substitution between different capitals, human and capital. In contrast MCDA methods can highlight the potentials for non- compensation. MCDA can be structured on a weak commensurability using ordinal scale of measure for ranking of options in contrast to a cardinal scale in CBA. Alternatively in MCDA built on a strong incommensurability, alternative options can't be compared.

MCDA does not offer a solution by optimising over all the criteria and hence can't solve all conflicts. It can however provide an insight into the nature of conflicts by increasing the transparency of the choice process and facilitate political compromises. It should be viewed as a tool for structuring the problem and evaluating the decision-making. It provides an insight into the nature of conflicts, and by increasing transparency it facilitates political compromises and the development alternative plans and policies. When there is no unique "correct" policy, the focus is on the quality of the process. It is at the end the task of decision-makers to find a compromise solution.

The results of a MCDA approach depends on

- The available data
- Structured information
- The chosen aggregation method
- Decision makers' preferences

It is possible to integrate elements of cost-benefit analysis and cost effectiveness measures in a multi-criteria decision analysis. The debate on conventional CBA analysis and MCDA tends to regard these approaches as complementary rather than competitive analytical tools.

4.1.5 Indicators for ex-ante and ex-post evaluations

4.1.5.1 General concepts and functions of indicators

Indicators are types of variables used in policy, planning, and management, and in particular for appraisal, monitoring, evaluation and communication. Indicators seek to represent (measure) some phenomenon or activity that is determined to be of particular significance or desirability, such as 'sustainable development', 'safe traffic', or 'efficiency of service delivery in distribution area X'. T Data – quantitative or qualitative; measured,

¹⁰ The "official" starting point of MCDA, the conference on "Multiple Criteria Decision Making" organised in 1972 by Cochrane and Zeleny at Columbia University in South Carolina (Cochrane and Zeleny, 1973). Many important technical aspects of MCDA are linked to classic works in economics; in particular, welfare economics, utility theory and voting oriented social choice theory (see Stadler, 1979).

calculated or simulated – provide *values* that allow the variables to serve as indicators for practical assessment.

Performance measures are indicators that are connected to objectives, goals or targets of an organisation. This can be in a wide sense, for example a road agency, a bus company, a city, or the entire European Union.

Indicators and performance measures can support a number of different tasks in a policy process, including policy packaging and package evaluation. Overall, indicators can inform *ex ante* assessment, e.g. provide variables to simulate effects of policy measures in advance; *ex post* assessment, e.g. to allow evaluation of results and accomplishments after a period of time, or, not least, inform on ongoing monitoring of systems or policies as they operate or are deployed.

Indicators can have a range of functions in policy making ranging from simple ones, such as provision of general information, to more specific analytic or prescriptive functions needed to design decision making. Examples of key general indicator functions include the following (Journard and Gudmundsson, 2010):

- To *describe* a system or a problem in a particular context, e.g. illustrate the number of road fatalities in the European Union over time
- To *assess* a situation with regard to a desired state of affairs, e.g. comparing the number of fatalities to a political target, or to the costs of reducing them further
- To *diagnose* a situation, or analytically unpick what has caused it; e.g. using methods such as regression, decomposition, or data envelopment analysis (DEA) to identify which measures contribute how much to fulfil a traffic safety target
- To *support a decision*, such as pointing to the most cost-effective traffic safety measure using indicators such as costs per Disability Adjusted Life Years (DALY's) saved
- To hold entities or persons *accountable* for results, by measuring performance in terms of what the particular entity has delivered to fulfil an objective; for example if a Police agency has undertaken the number of speed controls assumed necessary to reduce accident rates

Correspondingly, more or less complex types of indicators can be deployed for the different functions. An indicator can consist of equations, for example to calculate financial risks, or measure impacts of road networks on biodiversity. Several typologies of indicators exist. Table 4.5 provides a general typology of some indicator formats used in environmental policy assessment. These generic types of indicators are relevant for other types of assessments.

Table 4.5: Types of indicators used in environmental policy assessment. Adapted from (EEA, 1999)

	Definition	Typical uses	Example
Descriptive	Simple illustration to describe situation or trend over time	Illustrate problems, justify and communicate policies	Change in modal split of passenger transport
Relative	Ratio between two or more variables (X/Y)	Compare across units of different size; evaluate efficiency of technologies or programs	Average fuel efficiency of the vehicle fleet (km/l)
Normative (or performance)	Comparing data with norm, average or target	Measure performance; Evaluate results; Allow benchmarking	Distance from reaching national 'Kyoto' target
Composite	Index of several underlying data streams	Aggregate and communicate information for a large topic	'Ecological Footprint'

Table 4.6 provides a typology of indicators as often used in organisational performance measurement. Note that the concepts of efficiency and effectiveness here are simpler than the concepts of net effectiveness and efficiency recommended for the assessment of policy packages in Chapter 2, and to be discussed again further below.

Table 4.6: Typical types performance measures.

	Definition	Typical uses	Example
Input	Resources used	Manage costs, personnel, resources	Investment in new roads (monetary unit)
Output	Products, services or actions delivered	Verify activities; document delivery	Km road lane constructed
Outcome	Impact of actions on external system	Evaluate results	Reduced congestion in corridors with new road lanes
Efficiency	Ratio Input/output	Manage programs or from an 'internal' point of view	Km road lane completed per invested monetary unit
Effectiveness	Ratio goal/outcome	Manage programs from an 'external' point of view	Reduced congestion (hours) compared to objective

Indicators are usually applied together, in *sets or systems* of indicators. This enhances their relevance and capacity in connection with assessment or evaluation of policies and packages, which usually involve a range of themes and objectives and may refer to complex overall concepts such as 'sustainability', 'competitiveness', or 'cohesion'.

Frameworks seek to provide a logical structure to such indicator sets, connecting the concepts and objectives involved, and linking the indicators to their specific function or role (Pei et al., 2010). The two indicator typologies shown in Tables 4.5 and 4.6 are also somewhat indicative of the wider frameworks they belong to, e.g. for environmental policy review and organisational performance assessment, respectively. A well-known, but rather loose indicator framework is the so-called 'DPSIR' (Driver-Pressure-State-Impact-Response) system used in environmental planning also for transport (EEA, 2010). The idea is that to manage an environmental problem indicators are needed for different stages in logic of causation: 'Driver' indicators can give early warning or explanation for subsequent 'Impacts', and 'Response' indicators can measure the effectiveness of the adopted policies. A rather developed framework for the organisational level is Kaplan and Nolan's so-called 'Balanced Scorecard' (BSC) approach¹¹ adopted also in several transport organisations. This framework aims to balance for example short-term and longer-term objectives, financial measures versus operational measures, and internal performance versus obligations to external stakeholders (Basu et al., 2009). Here, performance indicators are key elements.

4.1.5.2 Indicators in the context of European transport policy evaluation ('Stage 6')

Indicators are necessary elements in the evaluation and adjustment of policy packages. Indicators are most easily adapted and applied if specific, measurable, and time-dependent policy objectives are defined. Indicators can also help to make vague objectives more specific and measurable.

¹¹ See for example: <http://www.balancedscorecard.org/>

A universal set of indicators fit to be used in all transport policy package evaluations cannot be defined, since the relevant aspects to monitor to a large extent depend on the specific aims of the package and the context in which it is set (e.g. the type of transport considered, the objectives, the types of measures included, the stage in the decision making process, the jurisdiction, etc.). On the other hand there are certain overall concerns that are widely shared across many transport policy situations (for example considering 'sustainability' in economic social and environmental terms), and often an overarching already existing set of objectives, targets and performance indicators will provide the basis also for the assessment, monitoring or evaluation of a specific package (as to be discussed further below). As a minimum indicators measuring effectiveness, efficiency and – ideally - acceptability should be applied to assess results of all policy packages as noted in Chapters 2 and 3 respectively.

Several European level projects have comprehensively dealt with construction, selection and use of indicators for various dimensions of transport policy assessment. Among the projects addressing indicators to broadly measure the sustainability of transport systems and policies are SUMMA (Rahman and Van Grol, 2005), and REFIT (Sessa et al., 2007), (see also Dobranskyte-Niskota et al. (2007). The HEATCO project (Bickel et al., 2005) provided a comprehensive review of project assessment methods used in European Member States and gave recommendations for measures; PROSPECTS (Minken et al., 1999) considered indicators at the urban planning level, and IMPACT (Maibach et al., 2007) made a wide review of methods to measure external costs particularly in connection with pricing policies, building on previous projects such as GRACE, MC-ICAM and UNITE. More specific studies address topics such as detailed indicators for environmental assessments of transport systems (COST Action 356, (Joumard and Gudmundsson, 2010)), Strategic Environmental Assessments (COST Action 350 (Calderon et al., 2009) and BEACON (European Commission, 2005)); Key Performance Indicators for National Road Administrations (CEDR, 2010), composite indicators for road traffic safety assessment (Gitelman et al., 2010), and the 'Eureka Logchain Footprint' on performance indicators for impact of individual vehicles on road pavements (Poulikakos et al., 2009).

Building on the results of such previous research and review projects can help avoid pitfalls often associated with indicator use, such as irrelevance, excessive detail, blind spots, or duplication.

The specific way to measure each impact and possibly aggregate results to one or a few main indicators will depend on the actual package and its context.

4.1.5.3 Indicators of effectiveness, efficiency and acceptability

As emphasised in the Optic framework indicators to measure efficiency, effectiveness and acceptability are particularly pertinent in almost every case.

Concerning efficiency and effectiveness Optic adopts the notions of *net effectiveness* (immediate as well as collateral effectiveness), and *net efficiency* (including direct costs and benefits as well as transaction related ones) (see Chapter 2).

Effectiveness indicators basically consist of ratios of two component variables, one describing the goal and one describing the level of accomplishment for the goal achieved by the measure or package (specified for each goal in a goal vector, including relevant exogenous goals for net effectiveness). The scope, topic and level of detail of the goals obviously determine which specific variables to measure. The indicator itself is rather straightforward.

Efficiency indicators compares the associated input costs with measures of a certain output or a certain level of outcome effectiveness ('cost-effectiveness'). Efficiency generally refers to the best allocation of scarce resources. According to Delle Site et al. (2010),

“Measures of efficiency indicate the extent to which changes in infrastructure and service provision and in trip choices by shippers, carriers and travellers have been successful in reducing the amount of expended resources per trip supplied or made.”

In the context of socio-economic policy assessment efficiency has to encompass all social costs and benefits, including external costs such as accidents, congestion or pollution. Also transaction costs (costs of planning, negotiating and deciding etc) should be included in net-efficiency. Individual preferences are usually the basis for measuring socio-economic efficiency. Efficiency should be measured at the margin where a resource is used by the individual who is willing to pay the most for them (where marginal social cost equals marginal social benefit) (Maibach et al., 2007). This requires the transformation of non-monetary costs to monetary values.

While the concept of the efficiency indicator may be well-specified in theory it may not always be simple to establish input values to operationalise it. The GRACE project for example concluded that there is no standard methodology to estimate all marginal costs of transport policies, and that the available methods are strongly influenced by data availability and by the type of transport mode under examination (Nash et al., 2008). However, the IMPACT project found a wide consensus on overall methodological issues for defining external costs in the areas of traffic congestion, air pollution, noise and climate change (see Table 4.7).

Table 4.7 Types of methods to establish indicator values for selected external costs, adapted from the IMPACT project, see details for each method in Maibach et al. (2007)

Issue	Recommended methods
Congestion costs	Speed-flow relations; value of time studies; demand elasticities
Pollution, Noise	The impact pathway approach, using Values of Statistical Life based on Willingness to Pay
Accidents	Risk elasticity approach, also using Values of Statistical Life
Climate Change	Avoidance costs

For other external costs such as energy dependency, and impact on biodiversity no consensus was found.

Transaction costs in connection with policy measures have been discussed in a number of projects, such as MC-ICAM and there are case studies providing some details (see e.g. Prud'homme and Kopp (2005) on congestion charging, and Sager and Ravlum (2005) on strategic transport policy, but indicators to measure transaction costs as part of net efficiency have not been systematically addressed. It will sometimes be possible to extract measures of transaction costs associated with administration, implementation, and enforcement of policies from program level budgetary accounts, internal performance reporting of agencies, or contracts with external operators and providers. A problem can be to attribute costs for individual measures within general accounts. Public accounts would not include transaction costs borne by the private sector. Regulatory Impact Assessments may sometimes be a source of information on transaction burdens for private actors.

There is no simple definition of an ‘acceptability’ indicator, as ‘acceptance’ is a highly contingent and volatile notion. Pridmore and Miola (2011) discuss many aspects involved in acceptability. Key observations include that acceptability of a policy measure varies among user groups, suggesting that rather disaggregate ways to measure acceptance are required. It is also noted that acceptability of measures tends to vary strongly over time, possibly following an ‘acceptance cycle’ (Goodwin, 2006). For example there can be low acceptance before the motivation for a certain intervention is widely understood. As the understanding

grows, so may the acceptance. However, it can drop significantly again when details about the actual implications (e.g. specific restrictions or price levels) become imminent. Specification of how revenues will be distributed may be at least as important as the acceptance of the levying the tax itself. The level of trust in policy makers and in the behaviour of fellow transport users, and the role of the media are other noted factors. Several of these factors can be monitored using various types of surveys, opinion pools, etc but overall it is not easy to establish a robust leading indicator of acceptance.

Ways to gauge acceptability would in practice often involve measuring the degree of satisfaction with or support to a particular package, measure or program, among users and stakeholders.

4.1.5.4 Indicators and policy adjustments

The four types of *policy adjustment* envisaged in the Optic framework can all be informed by and benefit from indicators that measure and distinguish various aspects of policy performance results. However, it is not necessarily straightforward to apply indicators to evaluate policy packages where several stimuli to change transport systems or behaviours are supposed to be given at the same time.

Adjusting the *policy intensity* can draw on indicators that are able to distinguish the effects of one adopted policy from other effects influencing the achievement of targets, which corresponds to the 'diagnostic' function of indicators. An example is the monitoring of congestion levels in London undertaken by Transport for London, which has been applied to distinguish the effects of an increase in charges in 2005, from other confounding factors such as seasonal variations.

Adjusting for *compliance* depend on indicators that monitor the behaviour of a regulated target group, for example police checks of the use of seat belts, or the using tachographs to monitor truck drivers behaviour. Compliance can also be measured more indirectly, e.g. by indicators of assumed *effects* of compliance or non-compliance (e.g. number of complaints over nightly noise from car horns in cities where a ban has been issued). Again a distinction between cause and effect indicators can help to pin down the significance of compliance.

Concerning *character* adjustment indicators that generally monitor technical performance in an area e.g. may be useful, for example monitoring the average driving range compared to price for battery-powered electric cars would be relevant in the case of reviewing government tax subsidies or other incentives. On the other hand technical development may also debase certain indicators. For example the measurement of lead in the air is no longer a relevant environmental performance indicator in Europe.

Finally the *scope* adjustment can be informed for example by indicators measuring impact in a wider geographical context that the measure applies for. If goals are successfully met within the area, but not outside, it may be advisable to extend the scope, e.g. a congestion tax or a speed limit. Benchmarking performance across entities, e.g. different national road agencies may also help to identify effective practices, in say, road pavement management, allowing the scope of this practice to be extended to other districts. Indicators will only be one element in such efforts, as they have to include consideration such as transferability of practices.

4.1.5.5 Indicators in open and closed methods

From a *methodological* point of view, indicator based monitoring contributes elements in a number of other methods, as well as being a method in its own right. Indicators are included in structurally open as well as structurally closed methods; they can serve as guideposts in, for example, explorative analyses, expert workshops and scenario building; while certain

indicators are also core components in the application of closed methods such as Cost-benefit analysis, where for example Net Present Value (NPV) can indicate the total expected discounted net costs of a project.

As a tool in its own right one must consider indicator based monitoring as a predominantly structurally closed method, since it aims explicitly at focusing attention and measuring selected variables, at the possible expense a range of other information. The regular reporting of indicators is dependent on some structural closure to be effective; however, new indicators brought into a field may also serve to 'open' it to new discourse such as by introducing the notion of 'footprint' to the transport assessment field (Amekudzi et al., 2009; Poulidakos et al., 2009). This is a two-edged sword capacity of indicators: to help reduce complexity of policy evaluation to fewer parameters, while inevitably losing details and deviating perspectives that may later emerge as significant. T

The 'structural closure' of indicator based monitoring underscores why it is important not to focus only on indicators of relevance for a single policy package. The package may have effects that are not intended, but impinge on other important, collateral goals. Indicator sets and systems would therefore often not be defined for each policy measure or package alone, but for broader sets of measures referring to a broader policy framework.

In any case it may be infeasible to provide sufficiently accurate and timely 'ad hoc' indicators for a specific program; data collection and analysis takes time, and the resources may be wasted if new sets of indicators are to be established 'from scratch' for each new initiative. A compromise will usually be needed between relying on existing indicators and frameworks, and designing new ones of particular relevance for a novel policy measure or package.

4.1.5.6 Ex-ante indicators

Indicators to monitor the results of the policy package must be established in connection with or before ex ante assessment is undertaken. The chosen indicators have to comply with and represent as accurately as possible the values, objectives and goals of the specific policy package. However, they also need to cover wider, or collateral, values, objectives and goals in the area of policy making, even if these are not directly included in the policy aims of the package. This is to detect possibly unintended effects of importance for general policy, and also to allow evaluation of the wider relevance of the package in its proper policy context. Specific requirements in legislative or other mandatory frameworks for assessment obviously have to be considered.

Ex ante indicators generally have to be relatively simple, since the effects of the policy by nature cannot be measured directly with real-time data or subsequent analysis. Ex ante assessment has to rely on simulations or hypothetical choices, which can limit the available indicators to what available methods and models can support, introducing a risk of methodological bias.

Table 4.8 shows an example of ex ante assessment in connection with the Mid-Term review of the European Commission's White Paper on Transport Policy from 2001 'Time to Decide' (De Ceuster et al., 2006). As can be noted the set of indicators is comprehensive in accordance with the very broad scope of the Transport White Paper, but most of the specific indicators provide relatively crude measures of each impact.

Table 4.8: Impact indicators in the ASSESS study. Source: De Ceuster et al. (2006)

Indicator	Scope	Unit
Transport volume	Freight	Tkm
	Passengers	Pkm
Modal share	Freight	% of tkm
	Passengers	% of pkm
Transport intensity	Freight	pkm/population
	Passengers	tkm/ton
Economic growth		GDP
Employment		Working places
Spatial distribution of economic impacts		GDP/capita
Transport growth and decoupling	Passengers	pkm/GDP
	Freight	tkm/GDP
Accessibility		Hours
Vehicle stock and ownership		(number)
Safety	Road	# fatalities
Energy consumption		Ktoe
Climate change		ton GHG
Air quality		ton NOX, PM, SO2
Noise exposure		% Ln > 55dB(A)
Land take and fragmentation	Road	km ²

4.1.5.7 Ex-post indicators

Ex post indicators are used to review policies after planned or actual implementation has taken place. Ex post indicators first of all verify results of the policies, and may allow analysis of underlying aspects such as actual effectiveness and efficiency, accountability, and validity of causal assumptions. Indicators should only be considered as one element in an ex post evaluation, as it is very important to interpret the results in the context of possible modifications to the policy compared to original design and the effect of intervening factors and circumstances. Ex-post indicators should for the most part be prepared and selected in advance (that is in connection with policy design and adoption). This can help the policy design to be made more specific and measurable, and will allow collection and reporting of results from the outset or before the package is implemented in order to ensure a proper time series. It can also be necessary to maintain monitoring of indicators that were used in ex ante assessment, to ensure consistency with the assessment results, and to verify for example the effectiveness of countermeasures against negative impacts or external costs that were included in the package to increase effectiveness, efficiency or acceptance.

A long term horizon is surrounded by a significant degree of uncertainty, especially for such a complex system as transport. Whereas some parameters such as population growth can be projected with a reasonable degree of confidence, the projection of other key factors like economic growth, oil prices or technological developments over a long period of time incorporates a higher amount of uncertainty. The inherent modelling limitations require treating the modelling results with caution. This needs to be taken into account in the subsequent assessment of impacts. Ex post evaluation can thus serve to adjust already adopted policy measures with regard to scope or intensity, supplement with new measures, or even revise the objectives and targets in accordance with experience gained.

Table 4.9 shows the set of key or 'core' transport indicators which the European Commission plan to monitor on a regular basis in connection with the implementation of measures in the

most recent White Paper 'Roadmap to a Single European Transport Area' (European Commission, 2011b). These indicators will be used to measure to what extent the implemented policy package meets the objectives.

Table 4.9 Core indicators to monitor the implementation of the European transport policy White Paper (European Commission, 2011b).

Monitoring the environmental performance of transport	
Key indicator	Definition and relevance
Share of renewable energy in transport:	Share of energy from renewable sources in gross final energy consumption for transport. This indicator monitors the progress achieved in reducing oil dependency of transport
GHG emissions from transport:	Greenhouse gas emissions expressed in terms of CO ₂ equivalents. This indicator shows trends in the greenhouse gas emissions from transport by mode of transport.
Emissions of particulate matter from transport	Aggregated particulate-forming potential of emissions of particulate matter (PM10), nitrogen oxides, sulphur dioxide and ammonia from transport. This indicator shows trends in emissions of PM10 from transport.
Fragmentation due to transport infrastructure	Calculated on basis of the mesh size of un-fragmented areas, related to the construction of new or improved transport infrastructure. This indicator shows the state of fragmentation of land and ecosystems due to transport infrastructure
Average CO₂ emissions per km from new passenger cars	The average emissions of carbon dioxide per kilometre by new passenger cars sold in a given year. This indicator measures the CO ₂ efficiency of new vehicle fleet
R&D intensity in transport	Business expenditure in R&D in transport(manufacturing) as % of value added in the transport sector This indicator measures R&D intensity in transport
Monitoring the overall efficiency of the transport system	
Modal split of passenger transport	The percentage share of each mode of transport in total inland transport, expressed in passenger-kilometres. (It includes transport by passenger cars, buses and coaches, and trains). This indicator monitors the achievement of a balanced shift towards environmentally friendly transport modes for passengers
Modal split of freight transport	The percentage share of each mode of transport in total inland transport expressed in tonne-kilometres. It includes transport by road, rail and inland waterways. This indicator monitors the achievement of a balanced shift towards environmentally friendly transport modes for freight
Investment in transport infrastructure to GDP	The ratio between total gross investment expenditure and GDP. (Infrastructure expenditures cover new construction, extension, reconstruction and major repairs for transport infrastructure for road, rail, air transport, sea ports and inland waterways). Investments are one way in which the objective creating a single transport area can be realised
Road safety	Number of fatalities caused by road accidents include drivers and passengers of motorised vehicles and pedal cycles as well as pedestrians, killed within 30 days from the day of the accident This indicator monitors the trend in road safety

Indicators are types of variables used in policy, planning, and management. They are basic and essential tools for the monitoring and evaluation of individual policies as well as policy packages.

Indicators can be defined and used in themselves for informative functions such as problem description, evaluation, or accounting but they are often embedded within more elaborate methodologies such as assessment frameworks, monitoring systems, scorecards, or socio-economic efficiency appraisal. Each framework may require particular types of indicators.

In general indicators to measure effectiveness, efficiency and acceptability are needed to comprehensively assess and evaluate policy packages, whereas more simple performance indicators may sometime be used for real-time monitoring.

A universal set of indicators to capture all relevant effects of any transport policy package cannot be defined. The selection of indicators for the evaluation of package effects needs to consider both the general policy context and the specific features of the package.

The capacity of indicators to deliver valuable and productive information increase when the uncertainty about cause and effect relations is low, the consensus about policy direction is high, and specified goals are correspondingly clear, specific and measurable.

4.2 Barrier management

Whether a policy package is accepted or not, is at the end of the day, a key question in policy packaging, particularly in the policy formation but also in the implementation phase. Acceptability is often closely related to the distributional effect of a package, i.e. who benefits from it, who is harmed and who is indifferent. However, also other aspects influence acceptability – for instance lack of support for the policy goal due to low correspondence to overall social norms and main issues at the policy agenda. Low acceptance may also be explained by generally low ‘trust’ of experts and policy makers as capable of designing effective policy packages (Jones, 1998; Jakobsson et al., 2000; Schade, 2003; Whittles, 2003).

Also public attitudes towards a certain measure may affect acceptance. And the perceived effects of a certain measure, in particular ex ante anticipations, may differ from factual effects. The discrepancy may be caused by lack of knowledge and inadequate communication and information, but also from the interests of involved actors: when it comes to policy packages with a radical or challenging content, there tend to be strong interests engaged for or against, and actors and stakeholders of course try to influence public opinions through campaigns and media reporting (Flyvbjerg et al., 2003; Gullberg and Isaksson, 2009). In other words, lack of acceptance may often be a result of power relations. Moreover, as Jakobsson et al. (2000) underlines, even if clear information about the aim and expected consequences of a certain policy measure may increase people’s awareness and positive attitudes, it won’t necessarily increase their acceptance (ibid).

A core issue when assessing acceptability and hence barriers for support of a certain measure or policy package, is to consider which actors will be affected, how they will be affected, when they will be affected, and how much political capital these actors possess (Feitelson, 2009; Rietveld and Verhoef, 1998; OECD, 2007). For Feitelson (2009), a systematic approach to the analysis of interventions’ distributional effects involves a procedure termed ‘actor assessment’. The value of such an approach is that it supports decision-makers and analysts in developing tailored strategies for coping with the varying interests, beliefs, positions and power held by affected stakeholders and so-called ‘formal

authorities'. The actor assessment implies to map *what types of actors/stakeholders* are affected and involved (e.g. car-users, hauliers, bureaucrats), *what types of interests* they have (economic, e.g. profit, lower costs; value-based, e.g. environmental protection), *what types of beliefs* they hold (e.g. about the effects of a packages), *what position* they take towards a given measure/package (pro, against, indifferent) and *what political resources* they possess (see Optic, 2010a, pp 64).

Surely, not all policy packages meet problems regarding acceptance. In Optic (2011b) a typology was developed that helps to distinguish between different policies and to single out those that may face difficult challenges in policy formation and implementation. It can be seen that policy measures with regulatory (dealing with legislation and sanctions to influence the activities of citizens and companies) or redistributive (which imply redistribution of income by taxation) content (Lowi, 1964; 1985) tend to be controversial (see also Chapter 2 in this deliverable). The same can be said for entrepreneurial policies (where advantages are spread and disadvantages focused) (Wilson, 1980). A general principle for policy formation might thus be to try to add more distributive and/or client policy features to policy measures (single or packages).

4.2.1 Barrier management strategies

In order to cope with the variety of barriers that may be at hand in policy practice, we have developed a broad repertoire of *barrier management strategies*, i.e. strategies for removing or circumventing barriers or for mitigation of the effects of such barriers. Optic (2011b) was aimed at identifying strategies for managing barriers to successful formation and implementation of policy packages in transport. Table 4.9 shows the key strategies to manage barriers that were identified. Some of the strategies are more relevant for barriers in the policy formation phase (e.g. lack of acceptance by the public or key stakeholders), while some are aimed at successful implementation of decided policy packages. It is also shown in the table which strategies that are most relevant to consider for different *types of barriers* (cultural, political, financial, legal, organisational, knowledge, financial technological). The success of a policy package is always dependent of a range of uncontrollable contextual aspects. Nevertheless, a conscious application of these strategies may contribute to successful formation and implementation of policy packages needed to achieve even rather challenging objectives.

Table 4.9: Strategies to manage barriers in policy formation and implementation

Strategy	Cultural /public and stakeholder acceptance	Political	Legal/regulatory	Organisational/Institutional	Knowledge/Information	Financial	Technological/technical
1.Combine sticks and carrots	x	x				x	
2.Expand the policy scope and develop flexibility in negotiations	x	x					
3.Trials – a way to create legitimacy and acceptance	x	x			X		
4.Communicate benefits clearly	x	x			X		
5.Use good examples	x	x			X		
6.Prepare for windows of opportunity		x	x				
7.Organisational responsibility and set-up				x			
8.Apply state funding to instigate municipal investments	x	x		x		x	
9.Select established or innovative technical solutions							x

The Strategies in Table 4.9 may be applied in various phases of the packaging process developed in Chapter 3 (see Figure 3.1). The identification of barriers is ideally, according to this model, carried out in stage 3, in relation to the *assessment of the policy package* in question. In real life however, as illustrated clearly by the empirical cases studied in Optic (2011a) and Optic (2011b), barriers often appear (or are identified) already at the very beginning of a policy packaging process, and is thus closely intertwined with the whole process – affecting every step from the definition of the key policy goal to the design and implementation of the package in question. There may thus be a need for strategies for managing barriers throughout the packaging process.

In some cases the strategies are affecting the policy content of intended policy packages, that is they are applied in Stage 4 (see Figure 3.1). An example of a character adjustment (see section 3.2.1) was to add measures to improve public transport in order to complement the congestion charges proposed in London and Stockholm. That is, strategy 1 (Combining sticks and carrots) was applied in order to enhance acceptance. However, in many cases the strategies are not directed towards adjusting the policy measures as such. Instead they include “supplementary actions” intended to facilitate the acceptance and/or implementation of the policy measures. Strategies 3-5 in Table 4.9 belong to this category. They function to increase the knowledge about the consequences of the proposed policy package, or they are used to reduce the gap between perceived effects and actual effects. This kind of action may be applied anywhere in the policy formation phase as part of a public debate on goals and measures. Another example of a supplementary action is Strategy 7, which consists of designing an appropriate organisational set-up for implementation.

A third option (Strategy 2) might be to broaden the scope of the policy objective, in order to satisfy a sufficient number of key stakeholders. This strategy is illustrated by the Swiss heavy-vehicle fee package (Optic, 2011b), in which issues outside the transport sector was included in the bargaining process. Finally, Strategy 6 may be applied even before the regular policy packaging process is started.

4.2.2 Different policy objectives

What kind of barriers that are likely to occur and what management strategies that might be applied depend on what policy objective that is pursued, together with the specific context/situation at hand. We will here roughly distinguish between three main types of policy objectives in accordance with the White paper (European Commission, 2011b).

The first type of objective concerns a greater share for modes, which entail less negative externalities in terms of pollution, congestion etc, that is, for buses, coaches, rail transport and waterborne transport. As is shown by empirical evidence from Congestion charging in London and Stockholm, and from Heavy vehicle-fees in Switzerland (Optic, 2011b), such policy objectives will often face substantial barriers in the policy formation phase. This is not least due to the fact that strong actors in the car/truck/oil business might mobilise a strong opposition. In these cases, obviously a combination of sticks and carrots is crucial (Strategy 1), that is a combination of improved public transport/rail freight and pricing measures. It is also important to narrow the gap between the perceived outcome and the actual (projected) outcome by supplementary actions, like Strategies 3-5 (Table 4.9). For instance it might be communicated that not only do public transport users gain from such policies, but so do, at least some of, the remaining car travellers since congestion will be lower than in a reference scenario.

The second type of policy objective concerns improved traffic management within a certain mode. Important examples relate to the integration of railways in Europe and to Single Sky/SESAR regarding aviation. These policies seldom meet public opposition, but may meet organisational and institutional barriers in the implementation phase due to acceptance problems among key professionals in the organisations involved and due to underestimation

of the efforts needed to implement such complex international objectives. The sheer complexity of these tasks in combination with benefits arriving only in the long-term perspective adds to the inertia. Yet another barrier regarding the opening of railway markets is that such processes have the character of social dilemmas.

The third main type of policy objective concerns the development and deployment of new and sustainable fuels and propulsion systems. Here financial barriers and barriers related to underestimation of technological problems (compare to optimism about fuel-cell cars around the year 2000) are in the forefront.

4.2.3 Conflicts between barrier management and other criteria

Previous work (Optic, 2011b) shows that conflicts between effectiveness (target achievement) or economic efficiency on the one hand and acceptance of policies on the other hand is often present in practical policy making. In practice this may imply that it is not possible to agree on targets for a certain sector (e.g. transport) or a certain geographical area (e.g. a city or a country) that are consistent with the overall EU-target for all sectors. It may also imply that consistent targets are set up, but that appropriate measures are not put in place. It is clear from literature and the cases studied in Optic (2011a; 2011b) that strong stakeholders in many cases oppose policies that are effective in reaching more demanding overarching targets, while policies only reaching less ambitious targets are likely to face less fierce opposition. This means that the value of a barrier management strategy must be judged against the target used in that specific case. Strategies leading to “success” in relation to less demanding targets may not necessarily be applicable when more demanding targets – with more substantial barriers – are to be met. In this context it is crucial to simultaneously keep a long-term perspective, so that long term development paths are not sacrificed for acceptance of short term (insufficient) policy packages. This holds in particular for structures with long lifetime and strong structuring effects, e.g. roads, railways and the built environment in general.

Strategies to manage barriers to acceptance may also conflict with economic efficiency and even in some cases feasibility. As mentioned in Section 1.2, whether advantages and disadvantages of a policy package are spread or focused greatly affects the likelihood of acceptance. Thus, a strategy to increase acceptance may be to make advantages focused rather than spread or to make disadvantages spread rather than focused (or both). This strategy was used in the congestion charging cases in London and Stockholm, as well as in the heavy-vehicle fee in Switzerland, where 2/3 of revenues were used to finance two specified railway tunnels. This kind of ‘earmarking’ of revenues is, however, not optimal for economic efficiency, and many economists would prefer that revenues were channelled to the general public budget. Therefore the benefits of getting acceptance for a specific policy need to be weighed against a somewhat reduced economic efficiency.

4.2.4 Transferability of barrier management strategies

One key issue in relation to the results of the Optic project is related to the question of transferability; how transferable are our findings on barrier management strategies to other policy contexts and –situations than the ones explored through our empirical case studies? Within policy transfer literature, the issue of transferability is commonly referred to as:

“the process by which knowledge about policies, administrative arrangements, institutions and ideas in one political system (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political system” (Dolowitz and Marsh, 2000, p.5).

Policy transfer literature often distinguishes between different forms of policy transfer, thus transfers can be coercive, voluntary or mixtures of these two. Mixed transferability can e.g. be the case when politicians or managers consider how to improve legitimacy in the institutional environment by image cultivating – the resulting efforts are neither fully coercive, nor fully voluntary. For the Optic project, focusing on transferability of barrier management strategies, we are dealing with voluntary or mixed transferability. The policy that is to be transferred can, furthermore, stem from the past, from within a nation or from abroad (Dolowitz and Marsh, 2000).

Generally speaking, a key point of departure for current research on policy transfer is that policies, administrative arrangements, institutions and ideas in one political setting is often – and to an increasing extent – being used as inspiration and/or applied in other political settings. Hence, the frequency of policy makers looking to neighbour municipalities or abroad for inspiration is increasing (Dolowitz, 2003). As pointed out by Dolowitz and Marsh (2000), it is however important to think critically about the increasing expectations of policy transfer. They suggest eight questions to think of in relation to transferability, namely:

1. Why transfer – what is the aim of the transfer process?
2. Who is involved?
3. What is being transferred?
4. From where?
5. What is the degree of transfer?
6. What are the constraints?
7. How is transfer demonstrated?
8. Does it succeed?

These questions are always relevant to reflect upon when discussing transferability. When it comes to the first of these questions, we just note that for our work in the Optic project, we have assumed that high transferability of the barrier management strategies mentioned above will be beneficial for transport policy processes (involving formation and implementation) in other cases and contexts. The question is however what driving forces there are for policy transfer and also how, more specifically, transferability can be supported.

In the policy transfer literature, there are no decisive answers to these questions. From the literature it is however clear that cultural and institutional traditions are key aspects that may hamper or enhance policy transfer. A recent study by Marsden et al. (2011), which investigates issues of policy transfer within transport policy, underlines the importance of having an organisational culture that is “supportive of learning from elsewhere” (Marsden et al., 2011, p. 501). There are several studies that points out the importance of academics and consultants, of funding opportunities and information exchange programmes as key catalysts for exchanging policy ideas (Timm, 2011 and Rye et al., 2011). Marsden et al. (2011) however underline that of uttermost importance is the role of local officials and their networks:

“most examples of policy transfer are bottom-up actions driven either by identified short-comings in urban strategies (which will not be solved by applying current tools) or by curiosity and desire for continual improvement amongst staff.” (Marsden et al., 2011, p. 510).

The policy transfer literature also suggests different degrees of transferability, thus, distinguishing between **copying** (copying without change), **emulation** (rejecting copying but accepting that a strategy provides the best standard for designing local strategies), **hybridisation** (combining different strategies) and **inspiration** (studying strategies in a familiar setting to expand ideas about local strategies). As noted by Ison et al. (2011) policies are seldom transferred in their entirety. Instead, practice often seems to be most about inspiration: it is often a combination of ideas from several sites that are being implemented at a certain place. For instance, existing policy packages to combat congestion, have been

developed and designed in relation to very local conditions in the cities in question (not only in terms of the local transport situation but also in relation to cultural, political, legal, institutional and technical aspects etc). To a certain extent, existing policies will therefore never fit another city, region or nation perfect, and thus transfer can (and should) only be partial (ibid.).

Policy transfer is not always successful. Dolowitz and Marsh (2000) find three frequent reasons for policy failure due to transfer: Uninformed transfer (insufficient information about the operation of the strategy in the place from which it is transferred), incomplete transfer (crucial elements have not been transferred) and inappropriate transfer (insufficient attention paid to the differences in the transferring and borrowing place).

This served as a key input for how we thought about the barrier management strategies presented above. The more complex a strategy is, the harder it will be to transfer (Dolowitz and Marsh, 1996). The Optic barrier management strategies are formulated in a fairly general way. In principle, we think of the strategies proposed within the Optic project as transferable and relevant to most countries and transport policy situations. Keeping the strategies on a general level thus increases the relevance for various kinds of policy situations, and various national, regional and urban contexts. Barrier management strategies at such a general level will, however, never be sufficient on their own to create a successful process. The magnitude of a certain type of barrier may vary considerably between different cities, regions or countries. For instance, there seems to be stronger stakeholders opposing heavy-vehicle fees in Sweden compared to Switzerland, which is probably explained by several factors like industrial, economic and geographical structures.

In terms of transferability, all the barrier management strategies suggested in Optic are transferable but, as all other policy recommendations, they need to be adjusted to specific policy situations and –contexts. In that process specific actors within the policy process will always be decisive. It is important to acknowledge the necessity of more substantial and specific insights into the policy context at hand, to be able to develop a more precise strategy for policy formation and implementation.

4.2.5 How to cope with inadequate barrier management?

The general approach in Optic has been on the policy process, i.e. our focus has been on how to establish a generic framework for policy packaging. However, as pointed out in 2.3., actual policy-packaging processes may differ, in some cases substantially, from the rational model we have prescribed here, e.g. when the packaging process is, to a greater extent, similar to an anarchic process or a power determined packaging process (see 2.3. for a description of such processes). Or it may be the case that barrier management strategies have shown to be inadequate. In such cases we may be in a situation where the outcome of a packaging process is that a negotiated package is unlikely to lead to an outcome in accordance with the objectives and goals set early in the packaging process. (e.g., important measures have been excluded during the packaging process due to lack of acceptability or other barriers). In the worst cases, the negotiations and power play in the actual packaging process may lead to content (a combination of policy measures) whose net effectiveness or net efficiency (see 2.1) is marginally positive, neutral or even negative. This implies that the implementation of the package, not the least if the transaction costs are high or highly uncertain, is not worthwhile.

Moreover, one may distinguish between two types of situations where the net effectiveness or efficiency is negative/neutral/marginally positive. In one type of situation this is an unintended effect of the process (often as a result of anarchic processes). This can be seen as typical examples of social traps (see e.g. Hardin, 1968, Rothstein, 2005), i.e. involved actors have pursued their short term individual interests and been unable to cooperate to achieve joint benefits (establish a policy package that would make them better off than today)

that exceeds their individual short-term benefits. In the other type of situation (often as a result of a power determined packaging process) this is an intended result of strategic actions from stakeholders that have had a key role that have had a key role in the packaging process or as vetoplayers (Tselias, 2002). In this situation, those actors, whose net benefits from the package exceeds their benefits if the package is not implemented, will have an interest in and possible a position when decisions about implementation is to be made.

In both situations the best alternative, seen from an overall perspective, is to decide not to implement the package, but rather to go back to earlier stages in the packaging process in order to improve the package. To ensure that this is done, there need to be established rules and agreements that this is the only viable option, and these rules and agreements must be made before entering this stage in the policy packaging process, otherwise powerful actors are likely to press for implementation. Such rules imply that experts and their assessments of the package has the final word as to whether a package is to be implemented or not. Such pre-established rules, which can be seen as a self-binding strategy (Elster, 1979) and making of institutions for collective action when facing social traps (Ostrom, 1990), may also represent a barrier against power play in earlier stages of the packaging process, since powerful actors have to acknowledge the probability that if they do not consider the general effect of the package and only pursue their own short-term interests, it is likely that they will not succeed to get a package at all.

4.3 Mapping adaptive planning

4.3.1 Introduction

In complex policy making environments, where policies are formulated under risk and uncertainty, “adaptive” or “flexible” policy planning has become a highly recognised strategy. This relates to the understanding that policies have unintended impacts, and must continue to perform even in dynamic and uncertain settings (Swanson et al., 2010).

In practice however, no uniform definition of adaptive or flexible policies exists. The concepts have been linked to system responsiveness in organisation literature; been labelled a strategic response in strategy management literature; and used as a characteristic of production systems in operations management theory (Fellenz, 2000). In the widest sense, adaptive policy approaches take into account the need to take immediate actions and create a framework for future actions that allow for adjustments over time (Marchau et al., 2010). Authors have also been addressing the concept pragmatically, suggesting that policies should be adaptive in the sense that they are “devised not to be optimal for a best estimate future, but robust across a range of futures” (Walker and Marchau, 2003). Fellenz (2000) finds that the frequent use of these concepts, despite their shortcomings as far as analytical clarity is concerned, is because they are positively laden terms that are intuitively easy to understand.

In addition to the multitude of definitions, the actual elements of adaptive policy addressed in the literature also differ. One group of authors predominantly addresses ex ante policy assessments, in particular scenario planning (Volkery and Ribeiro, 2009; Lempert and Groves, 2010). Ex ante assessments are often used as indirect decision support, through agenda- setting or issue- framing. Other authors mainly focus on the construction of ex post policy assessments; specifying anticipating actions to unforeseen consequences and establishing signposts (Marchau et al., 2010). Ex post assessments are generally applied to improve the degree of policy success. Finally, some authors have developed a diverse array

of adaptive tools, comprising of ex ante as well as ex post elements (Swanson et al., 2010)¹². These tools are meant to be used in combination, collectively helping a policy achieve its intended purpose.

The application of adaptive policies generally faces at least two main challenges. First, when applied uncritically, the different elements of adaptive planning might add unnecessary complexity, economic cost, or time lag to project progress. This is due to the overlapping or even internally conflicting nature of various ex ante and ex post assessments. Hence, considerations on how much adaptation policies might cost, compared to how large their benefits might be, are becoming increasingly relevant (Agrawala and Fankhauser, 2008). Very few systematic studies on this subject do however exist. Second, adaptive policies generate a fundamental dilemma for the organisation of public institutions; a highly challenging balance between institutional capacities for flexibility on the one hand, and institutional capacities for stability on the other (Gifford, 1994). Furthermore, institutional capabilities of flexibility are challenged by demands on multiple actor involvement and multi-level decision-making. These dilemmas are relevant both for the present size and responsibilities of an institution, and for the future capability of institutions to exist and develop over time. In institutional literature, some authors appear to hold a static notion on what constitutes a good institution (see for example Keefer and Knack, 1995), while others stress the importance of dynamic institutions (North, 1995). Few thorough analyses on achieving a balance between institutional stability and flexibility exist¹³. The challenges of economic costs and institutional organisation may also work in combination; while institutions themselves tend to be path-dependent, changing institutional structures also require additional costs, and hence both economic and institutional features might be inherently favouring a static policy-making.

In this deliverable, we do not aim to establish a uniform definition of adaptive planning. Rather, a dynamic approach is presented, addressing how different degrees of uncertainty in policy making impact on the selection and use of adaptive planning methods, as well as the design of public institutions. The paper is based on adaptive planning literature reviews.

4.3.2 A typology of policy goals and measures

In this section, a typology of policy goals and measures will be presented, illustrating how specific methods of adaptive planning might help policy makers overcome different kinds of uncertainties. The purpose is to provide analytical clarity in the overarching discussion of how to address uncertainty and irreversibility. In other words; when should adaptive planning be applied, and what adaptive elements should be used?

The point of departure for this typology is the degree of uncertainty on policy goals and policy measures respectively¹⁴. Agreement on policy goals implies establishing a clear and common identification of policy objectives, through systematic issue identification and prioritisation. Conflicting policy goals are often related to different political values or

¹² Swanson et al. (2010) proposes seven tools for creating adaptive policies; 1) integrated and forward-looking analysis; 2) built-in policy adjustments; 3) formal policy review and continuous learning; 4) multi-stakeholder deliberation; 5) enabling self organisation and social networking; 6) decentralising decision-making; and 7) promoting variation.

¹³ Davis (2005) provides a model of economic growth that takes into account the distinction between institutional quality and institutional flexibility. While establishing that institutional flexibility plays a central role for growth, however, Davis does not provide concrete recommendations on institutional design.

¹⁴ This logic builds on the works of Gifford (2003) and Stout (1980).

ideologies. Agreement on policy measures implies forming common strategies for policy implementation, involving for example laws, regulations, or programs. Conflicting views on policy measures reflects how policy decisions are taken under risk and uncertainty; the impacts of particular courses of action are not fully known. Uncertainties can affect policy design in at least three fundamental ways; the choice of policy instrument; policy intensity; and timing of policy implementation (Pindyck, 2007). Different combinations of uncertainty of policy goals and measures impact on the desired selection and use of adaptive planning methods, as well as the design of public institutions. This is illustrated in the table below.

Table 4.10: *Uncertainty about goals and means*

		Low	High
Uncertainty about measures	Low	<u>Predict and act</u> <i>Known techniques</i> <i>No inherent institutional change</i>	<u>Negotiated approach</u> <i>Ex ante assessments</i> <i>Large, stable institutions</i>
	High	<u>Dynamic approach</u> <i>Ex post assessments</i> <i>Single- purpose institutions</i>	<u>Adaptive discovery</u> <i>Explorative combinations of ex ante and ex post assessments</i> <i>Internally conflicting requirements on public institutions</i>

The Predict and Act Approach. If the level of uncertainty is low on policy goals as well as means, problem solving will predominantly be based on known techniques to achieve recognised ends (Gifford, 2003). This is often called the “predict and act” approach, assuming that the future can be predicted well enough to develop a static policy that will produce acceptable outcomes (Marchau et al., 2010). This approach has been widely used in most kinds of policymaking, and involves fine- tuning of known techniques.

The Predict and Act approach does not inherently demand a change of the institutional structure, but it might be a “side- effect”, dependent of the nature of the policy measures applied. For example, when introducing a new tax, a separate institution might be necessary in order to collect it.

Problems of this approach might arise if “certainties” turn out to be “uncertainties”, leading to unforeseen consequences and policy failures. This implicates that the labelling of a policy as Predict and Act should be restrictive.

The Dynamic Approach. If the policy goals are set, while the effects of the measures are uncertain, policy implementation can be applied through a flexible use of policy measures, adjusting to developments along the way. This implies firstly, that a combination of policy instruments (hybrid system) is a desirable approach¹⁵. Secondly, it implies a short policy planning phase. In fact, several authors¹⁶ argue that an important benefit of a dynamic approach is that implementation does not have to be delayed until all uncertainties are resolved. Instead, developments in uncertain factors can be monitored, and policy measures can be changed in response. This implies that the choice of policy instrument as well as policy intensity can be optimised. According to Gifford (2003) urban transportation policies have mainly been developed through a Dynamic Approach.

¹⁵ This is a frequently raised argument; see for example Pizer (2002) and Jacoby and Ellerman (2004).

¹⁶ See for example Marchau et al. (2010) and Swanson et al. (2010).

The dynamic adjusting to policy measures are likely to happen through ex post assessments. These assessments are done through various systems of *built-in policy adjustments*; monitoring and continuously learning throughout the lifetime of the policy. The *establishment of signposts* is a widely recognised monitoring system technique, using defined indicators to recognise the need for policy adjustment if values move outside of a desirable range. *Formal reviews* are also recommended; detecting emerging issues that can impact on the policy's performance.

Authors addressing Dynamic Approaches generally seem to be advocating flexible institutions, responding quickly to unforeseen changes (Swanson et al., 2010). Size and administrative level are commonly seen as institutional features impacting on its flexibility. The main task of a Dynamic Approach institution is likely to be the monitoring of policy development. Such a task is rarely controversial, and hence demands on party participation and multi-level involvement are likely to be modest. This implies that Dynamic Approach institutions can be designed as small, single-purpose organisations; having few entities and actors involved, which in turn makes them more likely to adapt quickly to change. The main challenges of the dynamic approach appear to be the designing of well-functioning monitoring systems, and institutions that sufficiently support these systems.

The Negotiated Approach. If there are disagreements about goals but relative certainty about the impact of policy measurements, agreement on goals do, to some degree, have to be reached in order to start policy implementation. One possible example of a policy requiring a Negotiated Approach is reducing the number of parking spaces in cities; while this measure has a solid documentation of significantly reducing car traffic; it is nonetheless highly politically controversial.

Ex ante assessments, in the form of scenario planning and multi-stakeholder deliberation, are likely to be useful in order to reach a common perception of policy goals. In early phases of decision-making, scenario planning can support policy issue-framing and agenda-setting; i.e. highlighting the societal relevance of the problem and underline the need for a response. It may function as a space to visualise, rehearse and test the acceptability of different strategies without being implicated by the actual constraints of day-to-day policy-making (Volkery and Ribeiro, 2009)¹⁷. Closely related is multi-stakeholder deliberation; a collaborative public effort to examine an issue from different points of view (Swanson et al., 2010).

The notions of policy issue-framing and multi-actor involvement indicate that Negotiated Approach institutions should be broadly designed, and that different decision-making levels should be integrated in the processes. This institutional design improves the relevance and legitimacy of the exercise (Volkery et al., 2009). Furthermore, long-term stability in these organisational structures seems necessary in order to carry the process through. A broad, multi-level organisational structure raises an issue as far as the timing of policy implementation is concerned, as well as the question of economic cost.

The Negotiated Approach does face the risk of locking policy-making into the assumptions and beliefs of today's stakeholders. This may limit the future scope of solutions.

Adaptive Discovery. When neither policy goals nor policy measures are certain, decision-makers are indeed facing a highly challenging situation. Climate policies in the transport sector represents an example of such a situation; while politicians appear to share a general understanding that GHG emissions must be reduced, the extent to which this could and should be done is uncertain, and there is risk and uncertainty over the future benefits (and

¹⁷ Volkery and Ribero (2009) label this type of scenario planning indirect, as opposed to direct forms of scenario planning that require delivery of more targeted information of candidate policies.

often costs) of the policies. Furthermore, climate policies are partially or completely irreversible.

An Adaptive Discovery will inherently include ex ante as well as ex post assessments, but the balance and succession between the two is not clear cut. Initiating ex ante assessments, in order to establish certainty about policy goals, and then move on to implementation and ex post assessments, initially appears a feasible strategy. But ex ante and ex post assessments both have considerable shortcomings, and combining the two methods also implies adding up the shortcomings.

Several strategies have been suggested to limit the aggregated shortcomings of ex ante and ex post assessments. These include 1) implementing and testing a variety of policies when applying assessment approaches; 2) phase in policies, i.e. introducing a policy in a smaller geographical area to test it; and 3) buffering, i.e. enhancing the ability to absorb disturbances to a certain extent. Also, Gifford (2003) suggests that the traditional long-term planning horizons should be abandoned and replaced by shorter, more manageable timelines.

The succession of ex ante and ex post assessments does not necessary have to be linear. Marchau et al. (2010) argue that dynamic approaches can respond to a change of policy objectives, and that new policy deliberations can benefit from previous experiences, which will accelerate new policymaking processes.

Nevertheless, however, the ultimate performance of an Adaptive Discovery policy appears to remain highly uncertain.

4.3.3 Some concluding remarks on adaptive planning

This presentation has illustrated that different levels of uncertainty in policy making should impact on the selection and use of adaptive planning methods, as well as the design of public institutions. Addressing different levels of uncertainty concerning policy goals and measures provided a fruitful discussion on how elements of adaptive planning should be used, and how institutions should be designed, in the Predict and Act approach, the Dynamic Approach and the Negotiated Approach. Potential weaknesses of each approach were also addressed. This indicates that different adaptive approaches can and should be used in a carefully selected combination to fulfil particular policy needs¹⁸.

In a situation where uncertainty is high regarding policy goals as well as policy measures, however, it did no longer appear possible to provide a clear-cut strategy in the selection and use of adaptive elements or institutional settings. This implies that in such a situation, the type of policy addressed requires further elaboration. It might for example prove useful to distinguish between large-scale and small-scale policies, or reversible and irreversible policies. To establish useful typologies including such specifications represents a future challenge in this field.

¹⁸ A similar argument has been articulated by Wardekker et al. (2010).

5 Concluding remarks

Conclusions of this report, which also form the final recommendations of the Optic project, are provided in the executive summary at the beginning of this report. These concluding remarks therefore reflect on Optic's contributions to state of the art and on further research needs.

5.1 Optic's contributions to state of the art

A point of departure of the Optic project was that single policy measures are not sufficient to address complex policy matters within the transport policy arena. Therefore, the focus of the Optic project has been on policy packages, i.e. various policy measures in combination. The scope of the analysis in Optic has not only been on the intended effects, but also on adverse and unintended effects of such policy measures and packages. Moreover, effective individual measures, such as pricing and congestion charging, have often proved to be politically difficult to implement. A key challenge has therefore been to examine combinations of policies where packages of measures are considered and implemented together, and where the package is created in order to improve the impacts of the individual policy measures, minimise possible negative side effects, and/or facilitate measures' implementation and acceptability.

From this departure point Optic started to investigate approaches to understanding intended and unintended effects of policy measures; approaches, tools and methods to improve design of combinations of measures so as to avoid negative effects and lock in the positive outcomes; and strategies to address implementation barriers. All these are inputs to Optic's final recommendations, as presented in this report.

The contributions from the Optic project to state of the art include the following.

- Optic has established and elaborated the framework for policy packaging, which define core elements of a policy package and the process of policy packaging.
- Optic has also developed a typology of unintended effects of policy measures, differentiated effects according to knowledge (known – unknown) and consequences (positive/negative, primary and secondary). The relevance of this typology is demonstrated with respect to 1) the choice of appraisal tools and methods, where it has been shown that *mainly qualitative* (or structurally open) and *mainly quantitative* (or structurally closed) approaches have quite different potentials and limitations when it comes to detection of unintended effects, and, hence, different roles in the appraisal and process; and 2) with regards to the need for adaptive approaches to policy making, both ex-ante and ex-post, since risk and uncertainty is ubiquitous. This also suggests the need for comprehensive ex-post monitoring and ex-post package optimisation, which Optic has explored in detail.
- Optic has identified real world examples of best practices with respect to the different stages of the policy packaging framework. Even though case specific factors are always important, the Optic project has identified commonly occurring barriers to the formation and implementation of policy packages, and listed strategies for managing them. A key conclusion here is that policy packaging is itself a way to reduce barriers, since the package of policies may often consist of measures designed to reduce barriers, like, for example, the lack of public or stakeholder acceptance.

All of these research contributions are synthesised in this report, which also expands on some important aspects of policy packaging: issues of transferability related to barrier management and with respect to tools and methods for appraisal; and indicators and tools that need to be considered in a holistic assessment.

Altogether, Optic has contributed to bridging the gap between quantitative modelling and qualitative assessment. The different tools' potentials and limitations have been scrutinised and recommendations have been given as to when in the policy packaging process which kind of methods are most appropriate. As a result it can be argued that there actually is no "gap" between qualitative and quantitative methods: Optic (2010 b) showed that a high degree in quantification needs a good understanding of the situation. Corresponding methods, such as models, allow for a detailed analyses and for a high degree in reproducibility. These tools are named "structurally closed methods". For questions where there is a higher degree in uncertainty other methods are needed. In general, these are mainly based on qualitative elements; they have a less pre-defined structure, thus, they are more open as regards their ability in integrating "new" knowledge. To put it simple: the more open the structure of a method is, the more it is able to cope with uncertainties and surprises but the less detailed and reproducible are the results. Hence, Optic suggests that there is a continuum of different degrees in openness or closeness. However, it is highly crucial for successful policy making to increase awareness for the limits and the potentials of the different methods. Optic has contributed to this, too.

Overall, Optic has contributed to extending state of the art in transport policy making by its explicit treatment of *combinations of measures* all the way from policy formation, via policy package appraisal, to implementation and to ex-post monitoring and ex-post optimisation.

5.2 Further research needs

The work carried out in the Optic project has led to new insights and recommendations. In addition to these, we would suggest continued research which focuses on:

1. *Developing the approach and model further, to increase the relevance for other types of policy situations – contextualisation*

The approach developed in Optic assumes a relatively rational and orderly procedure for the design of policies and building packages. In some cases such a procedure is actually pursued (e.g. in the design of major programs in European transport policy), in other cases the process is more anarchic, or ad hoc, for example because an arisen situation calls for urgent action, because the policy is closer to the 'messy' implementation phase, or because a window of opportunity to pursue a certain agenda opens. Swift, or ad hoc actions can increase the risk of unintended effects or subsequent implementation barriers occurring. We thus see a need to develop the Optic framework further, to address these types of policy situations more clearly. Even if Optic studied many real cases, there is a need to continue to analyse practical policy cases with regard to their unintended effects, and barriers encountered, in order to help build a more rich and robust scheme for such situations. This includes further development of the typology of barriers for adoption and implementation.

2. *Real life policy packaging*

Due to strong contextual dependence of many transport policy measures and packages, it is relevant to develop full scale policy experimentation as an evaluation and packaging tool. In contrast with for example medical research where controlled experiments is the main method applied to evaluate new treatments, and systems of knowledge such as the Cochrane Collaboration is based cumulatively on such studies, a different or modified approach may have to be considered in the development of evidence-based policy packaging in the transport area; an approach where contextual elements are built into and tested in the experiments rather than abstracted away, while assumptions of transferability and cumulatively are correspondingly reduced. Such an approach could be studied in further research.

In Optic, an element that is found to be crucial for the long-term effects of policy packages is regular reviews after the implementation. There is a need to create a framework for such regular ex-post reviews (and communication of results) of policy packages. The results of such reviews should help improve the package, if necessary, and provide insights for use elsewhere, as well as help ensure a long-term commitment of those affected by the package. Guidelines would help set up such a review process and support communication.

Within Optic we categorised and analysed different assessment options for policy package evaluation. We integrated them into the framework of policy packaging suggesting where and when different assessment methods are most effectively applied. However, there is need for further research of real life experiences with the purpose of investigating the type of assessment methods applied at different levels of policy-making (local, national and trans-national level). For instance, it is of interest to generate empirically verified recommendations on the type of assessment methods to apply in cases of small-scale, local projects where only limited resources of time and money are available.

A further main challenge for future work is to take it to the 'field'. That is, to translate the Optic framework and findings into a usable approach which policy makers can rely on while attempting to build a policy package for real. This means the researcher assists policy makers, in a real life situation, build a policy package using the proposed check-list. This kind of approach will allow real insights into the usefulness of the Optic project and allow modifications to a refined Optic tool.

3. Improvement of tools, models and software

Research is needed on how to model and highlight (the often non-linear) dependencies of different policy measures. As the number of measures increases, the modelling complexity increases even more. Related to this is the need to identify the limits of policy packaging. How complex can a policy package be before it becomes impossible to identify the influence each measure has on the outcome of the package (and communicate these effects with a certain degree of certainty to the stakeholders)?

There is a need for further development of models themselves. One result of the Optic project was that unintended effects often occur beyond the transport sector, in other policy areas. These effects are often not foreseen by the transport models applied for the assessment. There remains a need to further develop integrated models able to discover cause-effect relationships, for instance between transport and land-use, transport, energy and emissions or transport and effects of social in/exclusion. At the same time there is a need for aggregated, meta-level models that allow for a quick analysis of interdependencies between different areas but at the cost of less detail. These models would be primarily based on experiences (e.g. elasticities) obtained from past model runs in different policy and spatial contexts. With regard to the Optic framework these strategic models may supplement qualitative approaches on causal relationships recommended for application at an early stage of the policy packaging process.

A prerequisite for the above is a better general and empirical knowledge about interactions between isolated policy measures. As pointed out in the accompanying papers to the White Paper, there is not very much we know, empirically, about the interaction of policies in a package.

4. Risk, uncertainty and adaptive planning

Further research is needed on adaptive planning (institutional issues, etc). Adaptive planning has been explored in the context of "adaptation to climate change". It is important to explore this body of research to see how it can cater to institutional requirements for mitigation

policies – and how the requirements for adaptive planning can be formulated to meet demands for mitigation as well as adaptation.

Optic has emphasised the issue of risk and uncertainty in the policy formulation stages. While Optic has addressed underpinnings for risk and uncertainty, further research is required to integrate risk and uncertainty ex-ante (as well as ex-post).

Acknowledgements

The research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° TREN/FP7TR/233681/"OPTIC".

References

- Agrawala, S. and S. Fankhauser (eds.), 2008. *Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments*, OECD Publishing.
- Amekudzi, Adjo A.; Khisty, C. Jotin and Khayesi, Meleckidzedek, 2009. Using the sustainability footprint model to assess development impacts of transportation systems. *Transportation Research Part A* 43 (2009) 339–348
- Banister, D., Stead, D., Steen, P., Åkerman, J., Dreborg, K., Nijkamp, P. and Schleicher-Tappeser, R. (2000) *European Transport Policy and Sustainable Mobility*, London: Spon
- Basu, Ron; Little, Chris and Millard, Chris, 2009. Case study: A fresh approach of the Balanced Scorecard in the Heathrow Terminal 5 project", *Measuring Business Excellence*, Vol. 13 Iss: 4, pp.22 – 33
- Bemelmans-Videc, M. L., Rist, R. C. and Vedung, E., (Eds.) 1998. *Carrots, Sticks and Sermons: policy instruments and their evaluation*, New Brunswick, NJ: Transaction
- Bickel, Peter; Burgess, Arnaud; Hunt, Alistair; Laird, James; Lieb, Christoph; Lindberg, Gunnar and Odgaard, Thomas, 2005. State-of-the-art in project assessment. HEATCO Deliverable 2. HEATCO Developing Harmonised European Approaches for Transport Costing and Project Assessment. Contract No. FP6-2002-SSP-1/502481. 219 p.
- Bourdieu, P., 1991. *Language and Symbolic Power*. Cambridge: Polity Press.
- Calderon E., Pronello C. and Goger T., 2009. Integrated assessment of environmental impact of traffic and transport infrastructure. COST 350 final report, Univ. Politécnic Madrid, ISBN 978-84-7493-401-4, 405 p.
- CEDR, 2010. Road Data and Performance Measures. Final report on tasks M3 (Road Data) and M8 (Performance Indicators). Conference of European Directors of Roads (CEDR), April 2010
- Cochrane, J.L., Zeleny M., 1973. *Multiple Criteria Decision Making*. University of South Carolina Press.
- Cohen, M.D., March, J.G., Olsen, J.P., 1972. A Garbage Can Model of Organizational Choice. *Administrative Science Quarterly*, 17(1), pp. 1-25.
- Cowell, F.A., 1997. *Measuring inequality*, Oxford: Philip Allan
- De Ceuster, Griet; Logghe, Steven; Van Herbruggen, Bart, 2006. Indicator Assessment of the Objectives of the White Paper on Transport. Presented at: European Transport European Transport Conference, Strasbourg from 18 - 20 September 2006
- Delle Site, P.; Salucci, M.V.; Sitavancova, Z., 2010. Thematic Research Summary: Efficiency in Sustainable Mobility. Specific Support Action. Transport Research Knowledge Centre.
- Dobranskyte-Niskota, A., Perujo A., Pregl, M., 2007. Indicators to Assess Sustainability of Transport Activities - Part 1: Review of the Existing Transport Sustainability Indicator Initiatives and Development of an Indicator Set to Assess Transport Sustainability Performance. <http://publications.jrc.ec.europa.eu/repository/handle/111111111/10416>
- Dolowitz, D. and Marsh, D., 1996. "Who Learns What from Whom: a Review of the Policy Transfer Literature", *Political Studies*, 44, pp. 343-357.
- Dolowitz, D.P. and Marsh, D., 2000. "Learning from Abroad: The Role of Policy Transfer in Contemporary Policy-Making", *Governance*, 13(1), pp. 5-24
- Dolowitz, D.P., 2003. "A Policy-maker's Guide to Policy Transfer", *The Political Quarterly*, 74(1), p. 101-108.

- EEA, 1999. Environmental indicators: Typology and overview. European Environment Agency, Copenhagen.
- EEA, 2010. Towards a resource-efficient transport system. TERM 2009: indicators tracking transport and environment in the European Union. Copenhagen: EEA. URL: <http://www.eea.europa.eu/publications/towards-a-resource-efficient-transport-system>, (retrieved May 10, 2010).
- Elster, J., 1979. Ulysses and the Sirens. Studies in Rationality and Irrationality. Cambridge University Press.
- Etzioni, A. (1975). A comparative analysis of complex organizations: on power, involvement, and their correlates. (Rev. and enl. ed.) New York: Free P..
- European Commission, 2009. Commission Impact Assessment Guidelines (SEC(2009)92)).
- European Commission, 2011a. Commission Staff Working Paper. Impact Assessment. Accompanying document to the WHITE PAPER Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system SEC(2011) 359 final. Brussels, 28.3.2011 SEC(2011) 358 final.
- European Commission, 2011b. White paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, Brussels 28.3.2011 COM(2011) 144 final.
- European Commission, DG TREN, 2005. The SEA Manual. A Sourcebook on Strategic Environmental Assessment of Transport Infrastructure Plans and Programmes. BEACON. European Commission Directorate-General For Energy and Transport. Directorate B - Transeuropean Networks Energy & Transport, Bruxelles 79 p.
- Feitelson, E., 2009. Policy packaging: why and how. Invited presentation, Transport Studies Unit, University of Oxford, 23rd October; copy available from E. Feitelson, Hebrew University of Jerusalem, Jerusalem, Israel.
- Fellenz, M. R., 2000. "Flexibility in Management Theory: Towards Clarification of an Elusive Concept". Available at SSRN: <http://ssrn.com/abstract=1098111>.
- Flyvbjerg, Bent, Nils Bruzelius, and Werner Rothengatter, 2003. Megaprojects and Risk: An Anatomy of Ambition (Cambridge: Cambridge University Press).
- Gifford, J. L., 1994. Adaptability and Flexibility in Urban Transportation Policy and Planning. Technological Forecasting and Social Change, 45, pp. 111-117.
- Gifford, J. L., 2003. Flexible Urban Transportation. Oxford: Elsevier Science, Imprint
- Gitelman, Victoria; Doveh, Etti and Hakkert, Shalom, 2010. Designing a composite indicator for road safety. Safety Science 48, pp 1212–1224.
- Givoni, M., Macmillen, J. and Banister, D., 2010. From individual policies to policy packaging. Paper presented to the European Transport Conference 2010 in Glasgow. Glasgow, Scotland, 12.10.2010.
- Goodwin P., 2006. The gestation process for road pricing schemes II, Local Transport Today 1, June 2006, vol 444: 17.
- Greenwood, R, Oliver, C, Sahlin, K and Suddaby, R., 2008. The Sage Handbook of Organizational Institutionalism.
- Grunwald, A., 2002. Technikfolgenabschätzung – Eine Einführung. Berlin.
- Grunwald, A., 2007. Working towards sustainable development in the Face of Uncertainty and Incomplete Knowledge. In Journal of Environmental Policy and Planning, 9:3, 245-262.

- Grunwald, A., 2009. Technology Assessment: Concepts and Methods. Handbook of the Philosophy of Science. Volume 9: Philosophy of Technology and Engineering Sciences, 1103-1145.
- Gudmundsson, H. and Sørensen, C. H., 2011. The role of indicators in European Sustainable Transport policy. Deliverable number D12; POINT Policy use and influence of indicators. roject co-funded by the European Commission within the Seventh Framework Programme (2007-2013). April 4, 2011. URL; <http://bayswaterinst.squarespace.com/>.
- Gullberg, A., Isaksson, K., (eds.) 2009. Congestion taxes in city traffic: lessons learnt from the Stockholm trial. Lund: Nordic Academic Press.
- Ham, C. and Hill, M. 1993. The Policy Process in the Modern Capitalist State, Harvester Wheatsheaf, Hemel Hempstead.
- Hardin, G., 1968. "The Tragedy of the Commons". Science 162 (3859): 1243–1248. doi:10.1126/science.162.3859.1243. PMID 5699198.
- HEATCO, 2006. Developing Harmonised European Approaches for Transport Costing and Project Assessment, Deliverable, Final Technical Report: <http://heatco.ier.uni-stuttgart.de/>.
- Hickman, R., Ashiru Takedo, O., Banister, D., 2009. 20 Percent Transport: Visioning and Backcasting for Transport in London. VIBAT London. September 2009. http://www.vibat.org/vibat_ldn/pdf/VIBAT_London_exec%20summary_sept2009LR.pdf.
- Hill, M. and Hupe, P., 2002. Implementing Public Policy: Governance in Theory and in Practice. London, Thousands Oaks, New Delhi: SAGE Publications.
- Howlett, M., Ramesh, M., 2003. Studying Public Policy: Policy Cycle and Policy Subsystems, 2nd Edition, Oxford: Oxford University Press.
- Hupe, P.L. and Hill, M.J., 2006. "The Three Action Levels of Governance: Re-framing the Policy Process Beyond the Stages model", in Peters, B.G. and Pierre, J. (eds.): Handbook of Public Policy. London: SAGE Publications.
- IAIA, 2003. Social Impact Assessment: International principles. Special publication Series N°2.
- Ison, S.; Marsden, G., May, A.D., 2011. Transferability of urban transport policy. In Transport Policy, 18(3), pp. 489-491.
- Jakobsson, C., Fujii, S., Gärling, T., 2000. Determinants of private car users' acceptance of road pricing. Transport Policy 7 (2000) 153-158.
- Jacoby, H. D., and Ellerman, A.D., 2004. The safety valve and climate policy. Energy Policy 32: 481–91.
- Jones P., 1998. Urban road pricing: public acceptability and barriers to implementation. In Button, K.J., Verhoef, E., 1998. Road Pricing, Traffic Congestion and the Environment. Issues of Efficiency and Social Feasibility. Edward Elgar Publishing Ltd, Cheltenham.
- Joumard R. and Gudmundsson H. (eds), 2010. Indicators of environmental sustainability in transport: an interdisciplinary approach to methods. INRETS report, Recherches R282, Bron, France, 422 p. <http://hal.archives-ouvertes.fr/hal-00492823/fr/>.
- Justen, A.; Schippl, J.; Hörtl, A.; Fleischer, T., 2010. Expect the unexpected: qualitative and quantitative tools and methods to detect unintended effects of transport policies. Paper presented to the European Transport Conference 2010 in Glasgow. Glasgow, Scotland, 12.10.2010.
- Knack, S. and P. Keefer, 1995. "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures," Economics and Politics 7, 207-27.
- Knight, F. H. (1921). Risk, Uncertainty and Profit. Chicago, University of Chicago Press.

- Lempert, R.J. and D.G. Groves, 2010. Identifying and evaluating robust adaptive policy responses to climate change for water management agencies in the American West, *Technological Forecasting & Social Change* 77 (6) (2010) 960–974.
- Lindblom, C.E., 1959. The Science Of 'Muddling Through', in *Public Administration Review*, Vol. 19, pp. 79–88, 1959.
- Lowi, J.T., 1964. American Business, Public Policy, Case-Studies, and Political Theory, *World Politics*, 16 (4), July.
- Lowi, T.J., 1985. The State in Politics: The Relation Between Policy and Administration, in Noll, R.G. (ed.): *Regulatory Policy and the Social Sciences*, Berkeley, Los Angeles, London: University of California Press, pp. 67-110.
- Lukes, S., 1984. *Power – A Radical View*.
- Macmillen, J., Givoni, M., 2010. Ex-post package optimisation. Optic WP3 working document. TSU Oxford, October 2010.
- Maibach, M.; Schreyer, C.; Sutter, D. van Essen, H.P.; Boon, B.H.; Smokers, R.; Schroten, A.; Doll, C.; Pawlowska, B. and Bak, M., 2007. Handbook on estimation of external cost in the transport sector. Report, CE Delft, Delft, December 19th, 2007.
- Maibach, M., C. Schreyer, D. Sutter H.P. van Essen, B.H. Boon, R. Smokers., A. Schroten, C. Doll, B. Pawlowska, M. Bak, 2008. Handbook on estimation of external costs in the transport sector Produced within the study Internalisation Measures and Policies for All external Cost of Transport (IMPACT) www.ce.nl.
- Mander, S., Bows, A., Anderson, K., Shackley, S., Agnolucci, P., and Ekins, P., 2007. Uncertainty and the Tyndall decarbonisation scenarios. In: *Global Environmental Change* 17, Page 25-36.
- March, J.G., 1994. *A Primer on Decision Making. How Decisions Happen*. New York, Toronto, Ocford, Singapore, Sydney: The Free Press.
- Marchau, V.A.W.J., W.E. Walker and G.P. van Wee, 2010. "Dynamic adaptive transport policies for handling deep uncertainty", *Technological Forecasting & Social Change* 77 (2010) 940–950.
- Marsden, G.; Frick, K.T.; May, A.D., Deakin, E., 2011. How do cities approach policy innovation and policy learning? A study of 30 policies in Northern Europe and North America. In *Transport Policy*, 18(3), pp. 501-512.
- McFadden, D., 2006. Free Markets and Fettered Consumers, AEA Presidential Address. *The American Economic Review*, Vol. 96, No. 1.
- Milgrom, P., Roberts, J., 1990. The Economics of Modern Manufacturing: Technology, Strategy and Organization. *American Economic Review* 80 (3), pp. 511-28.
- Minken, H. et al., 1999. PROSPECTS. Developing Sustainable Land Use and Transport Strategies. A Methodological Guidebook Deliverable 14 of PROSPECTS. Funded by the European Commission 5th Framework – EESD. Institute of Transport Economics, Oslo.
- Nash, C; Matthews, B; Link, H.; Bonsall, P.; Lindberg, G.; van der Voorde, E.; Ricci, A.; Enei, E. and Proost, S., 2008. Policy Conclusions. Deliverable 10 of GRACE (Generalisation of Research on Accounts and Cost Estimation), Funded by Sixth Framework Programme. ITS, University of Leeds, Leeds. 2008.
- Nicholson, N. K., 1997. Bureaucracy and rural development policy implementation, In D. W. Brinkerhoj, ed., *Policy Studies and Developing Nation*. Vol. 5. Greenwich: JAI, pp. 113-137.

- North, D. C., 1995. "Institutions and Economic Theory," in J. Harriss, J. Hunter and C. M. Lewis (eds) *The New Institutional Economics and Third World Development*. New York: Routledge.
- OECD, 2007. *Instrument Mixes for Environmental Policy*, Paris: Organisation for Economic Cooperation and Development.
- Optic, 2010a. Deliverable 1. Inventory of measures, typology of non-intentional effects and a framework for policy packaging. Downloadable from <http://optic.toi.no>.
- Optic, 2010b. Optic Deliverable 2: Inventory of tools and methods for early detection of adverse effects. <http://optic.toi.no>.
- Optic, 2010c. Optic Deliverable 3. Ex-post identification and remedies of adverse effects. Downloadable from <http://optic.toi.no>.
- Optic, 2011a. Deliverable 4. Best Practice in Policy Package Design. Downloadable from <http://optic.toi.no>.
- Optic, 2011b. Deliverable 5. How to manage barriers to formation and implementation of policy packages in transport. Downloadable from <http://optic.toi.no>.
- Ostrom, E., 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press.
- Ostrom, E., 1999. Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework. In Sabatier, P.A. (ed.) *Theories of the Policy Process*. Boulder, Colorado: Westview Press, pp. 35-71.
- Pei, Yi Lin; Amekudzi, Adjo A. M Meyer, Michael D.; Barrella, Elise M. and Ross, Catherine L., 2010. Performance Measurement Frameworks and Development of Effective Sustainable Transport Strategies and Indicators. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2163, Transportation Research Board of the National Academies, Washington, D.C., 2010, pp. 73–80.
- Pinch, S., Sunley, P., Macmillen, J., 2010. Cognitive Mapping of Creative Practice: a case study of three English design agencies, *Geoforum*, 41 (3), pp. 377-387.
- Pindyck, R.S., 2009. Uncertain Outcomes and Climate Change Policy, MIT Sloan School Working Paper, pp. 4742-09.
- Pizer, W. A., 2002. Combining price and quantity controls to mitigate global climate change. *Journal of Public Economics* 85, pp. 409–34.
- Portney P.R., Weyant, J.P., 1999. Introduction. In *Discounting and intergenerational equity*, Portney P.R. and Weyant J.P. (eds.) Resources for the future, Washington, DC.
- Poulikakos, L.D.; Lees, A.R.; Heutschi, K. and Anderegg, P., 2009. Comparisons of the environmental footprint of heavy vehicles in the UK and Switzerland. *Transportation Research Part D*, 14, pp 507–513.
- Pridmore, A. and Miolla A., 2011. Public Acceptability of Sustainable Transport Measures - A Review of the Literature. Discussion Paper No. 2011-20 . European Commission – Joint Research Centre Institute for Environment and Sustainability. May 2011.
- Prud'homme, Rémy and Kopp, Pierre, 2005. *The Stockholm Toll: An Economic Evaluation*, paper (second draft 7 September 2005).
- Putnam, R. A., 1985. Creating facts and values, *Philosophy*, 60 (232), pp. 187-204.
- Rahman, Adnan and van Grol, Rik, 2005. SUMMA. - Final Publishable Report. Version 2.0. Deliverable 8.. RAND Europe. URL: <http://www.tmlleuven.be/project/summa/summa-d8.pdf> (retrieved May 2010).

- Rietveld, P., Verhoef, E., 1998. Social feasibility of policies to reduce externalities in transport. In: Button, K. J. and Verhoef, E. (eds., 1998) *Road Pricing, Traffic Congestion and the Environment*, Cheltenham: Elgar, Cheltenham, UK - Northampton, MA, USA. pp. 285 - 308.
- Robinson, D., 1996. Head injuries and bicycle helmet laws. *Accident Analysis & Prevention* 28 (4): 463-475.
- Rothstein, B., 2005. *Social Traps and the Problem of Trust*. Cambridge: Cambridge University Press. ISBN 0521612829.
- Rye, T.; Welsh, J.; Plevnik, A.; Tommasi, R. (2011): First steps towards cross-national transfer in integrating mobility management and land use planning in the EU and Switzerland. In *Transport Policy*, 18(3), pp. 533-543.
- Sager, T. and Ravlum, I.-A., 2005. From Projects to Strategies: A Transaction Cost Approach to Politicians' Problems with Strategic Transport Planning. *Planning Theory and Practice*, Vol. 6, No. 2, 213–232, June 2005.
- Schade, J., Schlag, B., (Eds.) 2003. *Acceptability of transport pricing strategies*. Pergamon, Amsterdam.
- Sen, A., 1982. *Choice, Welfare, and Measurement*, Oxford: Blackwell.
- Sessa, Carlo; Vendetti, Adele; Fioretto, Michela; de Kievit, Martijn; Tavasszy, Lóri; Schelling, Ab; Schneekloth, Nils and Bröcker, Johannes, 2007. Deliverable 1.2: Transport sustainability indicators: Existing sustainability indicators, knowledge gaps and roadmap towards better indicators and tools. REFIT. Refinement and test of sustainability and tools with regard to European Transport policies.
- Simon, H., 1947. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*, - 4th ed. in 1997. The Free Press.
- Simon, H.A., 1955. A Behavioral Model of Rational Choice', *The Quarterly Journal of Economics*, 69(1), pp. 99-118.
- Smart, J., 1999. Ruth Anna Putnam and the Fact-Value Distinction. *Philosophy*, 74 (3), pp. 431-437.
- Stadler, W, 1979. A survey of multicriteria optimization or the vector maximum problem, Part I: 1776-1960. *Journal of Optimization Theory and Applications*, 29(1):1–52.
- Stiglitz, J.E., 1994. Discount rates: The rate of discount for benefit-cost analysis and the theory of the second best', in Layard, R. and S. Glaister (eds.) *Cost-Benefit Analysis*.
- Sunstein, C.R., 2005. *Irreversible and Catastrophic*. The University of Chicago, The Law School. John M. Olin Law and Economic Working Paper No. 242, Public law and Legal Theory Working Paper No. 88.
- Swanson, D., S. Barg, S. Tyler, H. Venema, S. Tomar, S. Bhadwal, S. Nair, D. Roy, J. Drexhage, 2010. "Seven tools for creating adaptive policies", *Technological Forecasting & Social Change* 77, pp. 924–939.
- Timm, P., 2011. Urban transport policy transfer: "bottom-up" and "top-down" perspectives. In *Transport Policy*, 18(3), pp. 513-521.
- Transport for London, 2006. *Impacts monitoring Fourth Annual Report*, June 2006.
- Tsebelis, George, 2002. *Veto Players: How Political Institutions Work*. Princeton University Press.
- Van Asselt, M.B.A. and Rotmans, J., 2002. Uncertainty in integrated assessment modelling. In: *Climate Change* 54, pp. 75-105.

- van der Doelen, F., 1998. The "give and take" of packaging of policy instruments: Optimizing legitimacy and effectiveness. In M. Bemelmans-Videc, R. Rist, & E. Vedung (Eds.), *Carrots, sticks and sermons: Policy instruments and their evaluation*. New Brunswick: Transaction Publishers.
- Vedung, E., 1998. Policy instruments: Typologies and theories. In M.-L. Bemelmans-Videc, R. C. Rist, & E. Vedung (Eds.), *Carrots, sticks, and sermons: Policy instruments and their evaluation* (pp. 21-58). New Brunswick, NJ: Transaction.
- Volkery, A. and T. Ribeiro, 2009. "Scenario planning in public policy: Understanding use, impacts and the role of institutional context factors", *Technological Forecasting & Social Change* 76 (2009) 1198–1207.
- Walker, E.W., Rahman, S.A.; Cave, J., 2001. Adaptive policies, policy analyses, and policy making. In: *European Journal of Operational Research* 128, pp. 282-289.
- Walker, W.E. and V.A.W.J. Marchau, 2003. "Dealing with uncertainty in policy analysis and policymaking", *Integrated Assessment*, 4 (1), pp. 1–4.
- Walker, E. W., Marchau, V., Swanson, D., 2010. Addressing deep uncertainty using adaptive policies: Introduction to section 2. *Technological Forecasting and Social Change*, 77, pp. 917-923.
- Wardekker, J.A., A. de Jong, J.M. Knoop, J.P. van der Sluijs, 2010. Operationalising a resilience approach to adapting an urban delta to uncertain climate changes, *Technological Forecasting & Social Change* 77 (6), pp. 987–998.
- Whittles, M.J., 2003. *Urban road pricing: public and political acceptability*. Aldershot: Ashgate.
- Wilson, J.Q., 1980. *The Politics of Regulation*, in Wilson, J. Q. (ed.) *The Politics of Regulation*. New York: Basic Books, Inc., Publishers.
- WRR, 2010. *Exploring futures for policymaking*. Scientific council for Government Policy.

Appendix 1: Optic glossary

FROM POLICY MEASURES TO POLICY PACKAGES

OBJECTIVES

In broad terms an objective indicates what should be achieved by introducing policy measures. Examples of objectives on a European level are for instance making transport secure and safe or making transport more environmentally sustainable. Transport policy objectives are related to the improvement of the transport sector as a whole in terms of economy or efficiency, safety, environment and sustainability, accessibility and social inclusion. In Optic, policy objectives are categorised according to these four broader topics and different policy measures are assessed to meet a specific objective (Optic, 2010 a, p.19ff).

TARGET

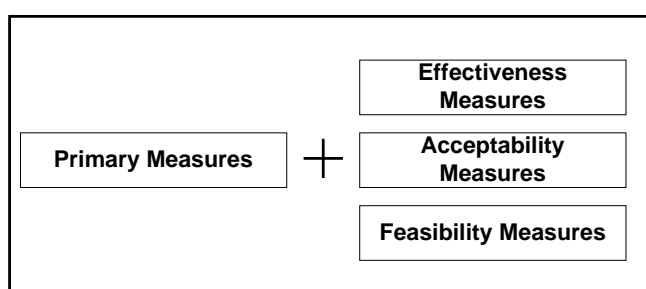
A target is considered as a concrete and measurable indicator of achievement of policy objectives. Regarding quantitative targets one may distinguish between direct targets which refer directly to the impact category in question and indirect targets that refer to an impact category which has more of an instrumental character with regard to the ultimate target. A number of direct targets are present in European transport policies; for example, that road transport deaths should be halved between 2000 and 2010. Indirect targets are more common. One example is the binding target for a minimum 10 % share for biofuels in transport by 2020 that has been passed (CEC, 2008 a) together with requirements on what kind of biofuels might be acceptable. These are set to reduce the use of fossil fuels in transport and, hence, corresponding emissions (Optic, 2010 a, p. 15).

MEASURE

Measures are analysed towards their ability to meet transport policy objectives. Many of the aspects of transport policy come under the national governments. Measures, like urban and land-use planning policy, urban transport policy and social and education policy take place at the local and national level. It is necessary to consider the types of policy measures and their effects in the context of the policy aims, and the mechanisms that allow the measures to become adapted to fulfil them. In Optic, five broad categories of measures were defined in order to establish an inventory of policy measures: legal, financial/economic, infrastructure, land-use and public awareness related measures (Optic, 2010 a, p. 21)

PRIMARY MEASURES

It was stated that the approach of *policy packaging* results in more efficient and effective policy decision making compared to introducing isolated measures. Defining a primary policy measure is the initial step of a policy packaging process. Such a measure has to address a given policy objective. The primary measure induces further secondary measures to be added to the package in order



for it to fulfil the criteria of a successful and significant policy package. The main objective is to enhance the policy process' effectiveness and efficiency by introducing such secondary measures.

POLICY PACKAGE

A policy package is considered in the Optic context as a combination of individual policy measures, created to address one or more policy goals. The main objective here is to increase the impact of each measure, to minimise possible counter intended effects and to facilitate the measure's implementation and accessibility (Optic, 2010 a, p.53).

POLICY PACKAGING PROCESS

The framework of policy packaging has been created in order to address concerns on the *effectiveness* and the *efficiency* of political interventions with respect to the objectives set, inter-measure actions, social and political acceptability, technical and economical feasibility. Further, the *ex-ante prevention* and *ex-post mitigation* of *non-intentional effects* were considered when developing the framework. The process of policy packaging consists of four steps: 1) Determination of objectives and targets, 2) Creating an inventory of measures 3A) Distributional effects of the primary measures are considered and evaluated, 3B) Prevention and mitigation of non-intentional effects, 4) Analysts make a statement on the necessity of modifying policy package (Optic, 2010 a, p.59)

ADDITIONAL (SECONDARY) MEASURES

Once the primary measure(s) have been identified and the likely impact has been evaluated, policy-makers may need to incorporate additional measures so as to enhance both the effectiveness and efficiency of the proposed intervention. Such additional measures can be usefully categorised according to the role they are expected to perform within a policy package. Three justifications for adding secondary measures appear particularly significant—relating respectively to the enhancement of packages effectiveness, acceptability and feasibility (Givoni, Macmillen and Banister (2010): From individual policies to policy packaging). The essential criteria by which a potential additional measure would warrant inclusion in the policy package relates to whether it is likely that the total marginal benefits (TMBs) resulting from its inclusion will outweigh the total marginal cost (TMCs) of its inclusion. Contradictory measures produce conflicting outcomes or incentives, which means they are “at odds” with the purpose of other measures (Optic, 2010 a, p.70).

PACKAGE EFFECTIVENESS

In the context of the Optic project, an ‘effective’ policy package would be one that exhibits a degree of influence on a policy target to such an extent that it is capable of manipulating it in an expedient manner. The effectiveness of a primary measure may be increased through the provision of additional measures. (Optic, 2010 a, p.56)

PACKAGE ACCEPTABILITY

Additional measures may help to make a primary measure(s) more socially and/or politically acceptable assuming they are implemented in full awareness of the political and institutional context into which the proposed package is to be deployed. (Optic, 2010 a, p. 58)

PACKAGE FEASIBILITY

Policy packages must have an inbuilt sensitivity to complexity and the ability to address policy targets with various spatial and temporally-differentiated measures. Considering these factors the political feasibility of policies will increase (Optic, 2010 a, p. 58)

POLICY EFFECTS

PRIMARY AND SECONDARY EFFECTS

The effects that relate to specific, explicit goals (intentions) are called primary effects in Optic. Effects may also refer to other objectives, unspecified in this instance, but which nevertheless retain a degree of importance to pertinent actors, which are called secondary effects (Optic, 2010 a, p.34)

CATEGORIES OF EFFECTS

Effects or situations are divided here with regard to the ‘known’/‘unknown’ distinction into four

		CONSEQUENCE DIMENSION		
		A. Expedient / Intentional	B. IN-EXPEDIENT	
			B1. COUNTER INTENTIONAL	B2. SECONDARY
KNOWLEDGE DIMENSION	W. KNOWN	INTENDED CONSEQUENCES	ANTICIPATED COUNTER-INTENTIONAL EFFECTS	ANTICIPATED NON-INTENTIONAL EFFECTS
	X. UNKNOWN	NOT ANTICIPATED POSITIVE EFFECTS	NOT ANTICIPATED COUNTER-INTENTIONAL EFFECTS	NOT ANTICIPATED NON-INTENTIONAL EFFECTS

broad categories centring on the role of conceptual causal models linking interventions to effects: Situations where recognised causal models linking intervention to effects exist and are applied to rather correctly predict effects (W); Situations where recognised conceptual models are applied, but the actual application of them do not predict the effects completely (Z); Situations where causal assumptions are made in policy, which however fail to take into account significant recognised conceptual models, or evidence (Y); Situations where there is no agreement over causal models, or where no models to predict cause and effect are available and might not be feasible (X) (Optic, 2010 a, p. 44)

UNINTENDED EFFECTS

A counter intentional effect is an effect which was not intended and has an opposite or modifying impact on the measure (Optic, 2010 a, p. 32). Non-intentional effects which occur during the implementation of measures influence the outcome of a policy making process in an altering way. Hereby the effect may be of expedient – accidentally obtaining a desirable outcome, catalysing the process – or inexpedient nature – rather counter intentional. Two types of effects are discussed separately: primary and secondary effects. Secondary effects arise in situations in which the outcome bears such consequences which are not desired considering a given objective beyond such consequences which were explicitly favoured to happen. Primary and secondary effects may be known or not known, anticipated or not anticipated. In worst cases they are neglected, misunderstood or suppressed. Essential for the detection of effects is the knowledge about them for informed actions.

TYOLOGY OF UNINTENDED EFFECTS

The purpose of such typology is 1) to develop clear definitions of ‘unintended effects’ of ‘policies’ and related terms 2) Provide a systematic and useful categorisation of types of unintended policy effects 3) Enable guidance on how transport policies, transport policy packages and transport policy processes can be designed to consider ex ante, and if necessary, mitigate ex-post, unintended effects (Optic, 2010 a, p. 29)

CAUSAL MAPPING

CAUSAL MAPPING APPROACH

Causal mapping may be understood as a form of qualitative modelling. It was chosen as part of the policy packaging framework because it collates structures and presents intuitive information which supports effective and transparent decision-making. Applying the causal mapping approach facilitates two stages of the policy package process: first, evaluating the chosen measure with respect to its likely effectiveness, costs and key uncertainties; and second, evaluating the measure with respect to the likely presence of unintended effects. (Optic, 2010 a, p.61, 98).

ACTOR ASSESSMENT

The interests and beliefs as well as the political position and available resources are collected during the actor assessment approach. The actor assessment supports decision-makers and analysts in developing tailored strategies for coping with the varying interests, beliefs, positions and power held by affected stakeholders.

CRITICAL PATHS IN CAUSAL MAPS

Critical paths are pre-conditional interrelations between individual measures in the causal map. Such paths may bare delays in implementing policies, high transaction costs and also financial costs if not assessed in early stages. Causal mapping needs to be supported by quantitative methods in order to identify critical paths and limit the uncertainties among the number of variables in a given dataset.

METHODS FOR POLICY ASSESSMENT

WEB OF NODES

The transport system with its components and inter relations can be defined as a web of nodes which links for instance social, economic and environmental components with each other. Such an approach for describing the complexity of transport systems was taken when assessing different methods to detect adverse effects (Optic, 2010 c, p.15)

TOOLS AND METHODS TO DETECT UNINTENDED EFFECTS

Key-criteria for the categorisation of tools and methods should be their ability in detecting different types of unintended effects. Foresight tools are never able to systematically reproduce the full picture, neither in scope nor in depth are they able (or even designed) to fully reproduce a web of nodes. They either cut out a certain area (transport models) or, at the other extreme they provide only punctual knowledge from different areas (brainstorming, open space). A general distinction between two groups of tools and methods along the following criteria is performed: 1) Does the structure of the method allow for a high degree in openness concerning the inclusion of parameters and linkages between parameters or 2) is the method rather characterised by a pre-defined set of nodes and linkages between these nodes?

STRUCTURALLY OPEN METHODS

Open methods have no fixed setting and are mainly explorative. In general they are used where there is no good understanding of cause-effect relations. They do not seek for quantification of results and are open for detection effects 'outside the box'. Qualitative approaches can help to filter and structure information or arguments. All relevant stakeholders should be considered here. Strongly one-way communication methods are expert interviews and surveys (e.g. Delphi). Approaches with higher stakeholder involvement are for instance workshops, focus groups and interview meetings, cooperative discourses and planning panels (Optic, 2010 b, p. 43) With the application of qualitative assessment in the step of building the policy package (detect and name unintended effects), it is intended to reduce the number of unknown ('X') effects taking into account that the consequence dimension of 'X' and related effects can never be entirely avoided (Optic, 2010 b, p. 66).

STRUCTURALLY CLOSED METHODS

On the other hand, methods rather characterised by a pre-defined set of 'nodes' and linkages between these nodes we call structurally closed methods. Closed methods do have a predefined setting. They are used when there is at least a rough understanding of cause-effect relation in a system or in a subsystem. An understanding of relevant parameters and inter linkages is needed to for interpretation of results. Closed methods are mainly quantitative and focus on effects inside a pre-defined system without having the ability to detect effects occurring 'outside the box'. Examples for rather simple quantitative approaches are Cost Benefit analyses, multi criteria analyses, cross-impact matrix and life cycle assessment. More complex quantitative tools are transport models such as TRANSTOOLS and REMOVE. In reality, there is rather a continuum than a clear border line between open and closed methods (Optic, 2010 b, p. 20). Quantitative models like TRANSTOOLS or REMOVE are developed to explicitly quantify intended and as far as they are measurable – unintended effects.

INTEGRATIVE APPROACH

Integrative in the context of foresight approaches means to combine several tools and methods in order to maximise the chance to detect adverse effects in the planning process. A possible approach would be to discuss quantitative results during expert workshops. Usually integrated approaches are used to assess a set of measures rather than one single measure. For instance, scenarios offer the functionality of assessing interrelations between different policy measures. Technological roadmaps make use of different sources of knowledge in order to integrate quantitative and qualitative data (Optic, 2010 b, p. 50)

SCENARIOS

Scenarios are becoming increasingly relevant for policy making. Models and the links between models and scenarios are seen as useful means to support policy decisions. In general several tools are combined in a scenario process (workshops, CBA, trend analyses, models such as TRANSTOOLS and REMOVE, Delphi, roadmaps and others). Most relevant in the Optic context is that scenarios are having a knowledge function. They help to systemise and deepen knowledge in a certain field. They can illustrate possible consequences of specific activities. Furthermore, they help identifying uncertainties, blind spots, contradictions or dilemmas.

POTENTIAL THREATS FOR POLICY PLANNING

RISK AND UNCERTAINTY

For the purpose of the Optic project risks and uncertainties are categorised as following: ‘unknown unknowns’ (Given the complexities of the transport system and its links with related policy domains, we should expect completely unforeseen unintended effects), ‘known unknowns’ (There is an understanding of the adverse effects; however, there is no possibility to reliably assess the probability of their occurrence or the extent of their impacts.) and ‘knowns’ (the adverse effect has not been addressed adequately and becomes visible as an unintended effect after implementation) (Optic, 2010 c, p. 24).

IRREVERSIBILITY (EX-ANTE PREVENTION)

One interpretation of irreversibility is when a return to the status quo is impossible or extremely difficult, at least on a relevant timescale. This is the interpretation the environmentalists relate to. The relevance of irreversibility is its association with the magnitude of the damage. An alternative interpretation sees irreversibility in terms of sunk cost, corresponding to the definition in economic literature on options theory. Those costs that cannot be recovered totally are sunk costs. With either of these interpretations, irreversibility only matters if there is uncertainty. Irreversibility can also arise due to government regulation or institutional arrangements (Optic, 2010 c, p.29).

PATH DEPENDENCY

Path-dependency means that the sequence of historical events influences future possibilities. With the acknowledgment of path dependency, the traditional understanding of long run equilibrium paths of development is contested (i.e., the traditional models used for transport demand analysis are inadequate for handling these issues) (Optic, 2010 c, p. 36)

LOCK-IN SITUATION

A situation, in which irreparable unintended effects occur during the policy packaging process are called lock-in situations. It is important to capture such potential situations together with path dependencies for instance with deterministic or stochastic models (Optic, 2010 c, p.33).

POLICY LIMITATIONS AND REMEDIAL ACTIONS

EPISTEMIC LIMITATIONS

In order to understand instances of package ‘failure’, analysts must seek to examine the space in-between their ex-ante assumptions and ex-post ‘reality’ in order to determine why a policy package has not performed as expected (Optic, 2010 c, p. 56). In the case of epistemic limitations the ex-ante knowledge-base upon which a policy intervention has been developed is somehow inadequate. More specifically, such inadequacy can be understood as resulting from weaknesses in observational focus and/or conceptual reasoning. Observational focus here pertains to the accuracy of the ‘picture’ upon which analysis takes place and relates strongly to the manner in which interventions are perceived and framed.

COMMUNICATIVE LIMITATIONS

In the case of communicative limitations the degree to which such knowledge is shared amongst relevant policy actors is somehow inadequate regardless of the quality of ex-ante knowledge. This may be characterised by the presence of overly-narrow discourses, lack of sufficient discussion between politicians, analysts, stakeholders and the public, misunderstandings amongst such actors with regard to their respective perceptions, priorities, capacities, or responsibilities, and incompatibilities amongst actors' tools.

POLICY INTENSITY

Policy intensity refers to the strength and depth to which interventions seek to impact upon their corresponding policy target(s). In certain situations, adjusting this intensity may prove to be an expedient means of improving an intervention's effectiveness and/or efficiency. Such intensity adjustments are not necessarily characterised by including additional measures in the policy package. Analysts' ex-post optimisation efforts are focussed upon 'calibrating' the existing intervention rather than altering its fundamental constituent elements.

EX-POST MONITORING

Ex-post monitoring represents the principle mechanism by which one can gain insight and understanding about the effects (both positive and negative) of a policy intervention on the dynamics of a particular socio-technical system (e.g. the impact of a congestion charge on congestion levels). Currently, various monitoring practices are evident in the European transport policy community (Optic, 2010c, p. 47).

EX-POST MONITORING CONTINUUM

Monitoring practices are conceptualised by presenting them on a monitoring continuum which distinguishes five situations: 1) situation in which monitoring is not in use 2) situations, where basic 'rhetorical monitoring' takes place, 3) situations where more quantitative monitoring takes place; 4) situations where quantitative data is subject to detailed analysis and 5) situations where analysis from 4) supports consideration of policy implications and remedial actions (Optic, 2010c, p. 47)

EX-POST ADJUSTMENT

Policy actors have taken different ex-post options on adjusting policies. These actors have sought to 'optimise' (or otherwise improve) the effectiveness and/or efficiency of certain policy interventions.

COMPLIANCE ADJUSTMENTS

Such measures seek to increase package effectiveness and/or efficiency whilst broadly retaining its original character. Such compliance adjustments function as a means of indirectly supporting a package's ability to bring about intended effects through ensuring relevant actors adhere to the demands of the intervention per se. In this context, such adjustments can perhaps be best understood as a form of remedial action, a 'tightening' of the original package following a recognition that the ex-ante assumptions underpinning the intervention are somehow inadequate. Rather than acting to regulate evasive actors, Ex-post efforts may also focus upon improving the clarity and direction of actors' duties and responsibilities in order to enhance package effectiveness rather than acting to regulate evasive actors.

CHARACTER AND NATURE

It is possible to identify ex-post adjustments that entail a qualitative shift in the character or nature of the package per se. Here, where monitoring activities indicate a degree of sub-optimality, adjustments typically involved the significant alteration or removal of original measures in the package and/or the incorporation of new measures.

SCOPE ADJUSTMENTS

Various forms of what might be termed 'scope adjustments' can be pointed out which policy-makers may seek to undertake as a means of ex-post package optimisation. 'Scope' can simply refer to the

geographic range of packages' intentional effects. Second, 'scope' can refer to what might be termed packages' target article—the actors and/or objects that the measures included in a package are designed to have an 'operative influence' upon. Third, 'scope' adjustments may pertain to changes made to packages' policy objectives and/or targets. Importantly, it is this focus on objectives that distinguishes such adjustments from 'character' adjustments, as the latter are primarily characterised by a change in measures. (Macmillen and Givoni, 2010).

Appendix 2: A note on Optic recommendations in view of the EC Impact Assessment Guidelines

As outlined in Section 4.1.3, the European Commission (2009) developed guidelines on how impact assessment is to be carried out in order to support the political decision making process (European Commission 2009). Six main steps were identified for an impact assessment:

1. Identification of problems;
2. Definition of objectives;
3. Development of main policy options;
4. Analysis of impacts of options;
5. Comparison of options;
6. Outline of policy monitoring and evaluation.

Some of these steps correspond more or less to the Optic framework, while others could be extended by the findings of Optic. Optic works on the assumption that the problem has already been identified so it starts with the definition of goals and objectives. Here the Guidelines and Optic agree on the importance of having clear and measurable objectives (SMART). The 'Development of main policy options' agrees to the inventory of measures, suggested in Optic. However, in Optic, each option is assessed as to its potential to achieve the policy objectives and its suitability to serve as primary measure. Assessment of the different policy options is carried out in the guidelines in step 4. Also here the Optic approach differs from the guidelines. Depending on barriers and unintended effect identified during the assessment, a policy package is created by adding additional measures. This package is then reassessed and adjusted/enhanced until a suitable solution has been found. Suitability has, of course, many dimensions as discussed before and refers both to achieving the objectives as well as to political acceptability. Monitoring and evaluation are, again, similar both in content as the importance given to it.

In the context of the Impact Assessment Guidelines, the contribution of Optic to the EU policy making process is especially for steps three, four and five. The process of policy creation process is enhanced by the express consideration of unintended effects and barriers during the design, decision and implementation process and, importantly, opening up the policy design procedure by adding additional policy options after the initial assessment for the creation of policy packages.

While the recent White paper (European Commission, 2011b) has listed a substantial number of measures, neither this white paper nor the Impact Assessment guidelines have sufficiently treated the question of interactions and packaging. The Optic project and this Deliverable contribute by shedding light on this complex area.