DISTILLATE

Improved Indicators for Sustainable Transport and Planning

Deliverable C1

Sustainable Transport Indicators: Selection and Use

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Executive Summary

The research brief for this deliverable was to:
- complement the scoping study review of indicators with a survey of local authorities' experience in measuring, predicting and using indicators;
- determine the extent to which current indicators correspond to stakeholders' understanding of sustainability and quality of life;
- specify the requirements for a core set of indicators at each stage in the decision-making process; and
- identify a core set of outcome indicators that best meets those requirements

The survey work identified a set of concerns surrounding the ways in which indicators are applied in practice. Eight aspects of indicators scored importance levels between fairly and very important and levels of satisfaction between not satisfied and fairly satisfied. These aspects of indicator selection would therefore appear to be of greatest concern to the practitioners. In order of importance, these were:
1. Their use in the development of well-founded targets
2. Cost effectiveness of monitoring
3. Ability to capture year-on-year improvements
4. Ease of measurement
5. Ease of understanding by politicians
6. Ease of understanding by the general public
7. Poor Consistency between transport and planning indicators
8. Poor Consistency between transport and sustainability indicators

Whilst the current set of indicators being used in local transport planning did not typically correspond well to the local authorities' perceptions of what sustainability is, some of what is measured is seen to count towards sustainability.

There are therefore several barriers to be overcome to the effective selection and measurement of indicators. One further area of concern that was investigated was the potential for indicator systems, through their role in driving performance changes, to lead to perverse incentives and outcomes. Smith (1995) identified eight unintended consequences of publishing public sector performance data which were; tunnel vision, sub-optimisation, measure fixation, myopia, complacency, misrepresentation, gaming[1] and ossification[2].

Where monitoring and strategy development are not well connected it appears that the performance management system will perform less well. If the indicators do not match well with the overall objectives then management action in pursuit of the indicators is likely to lead to distorted outcomes. Our review of the decision-making process determined that a common set of indicators, comprising a mixture of key outcome and intermediate outcomes, is desirable for application through the option generation and strategy formulation, testing and appraisal process as well as for use in monitoring the success of strategy delivery as shown in Figure A.

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[1] Gaming refers to the act of deliberately distorting the performance measure to gain some strategic advantage
[2] Ossification refers to an n unwillingness to change a set of performance measures once they have been set up
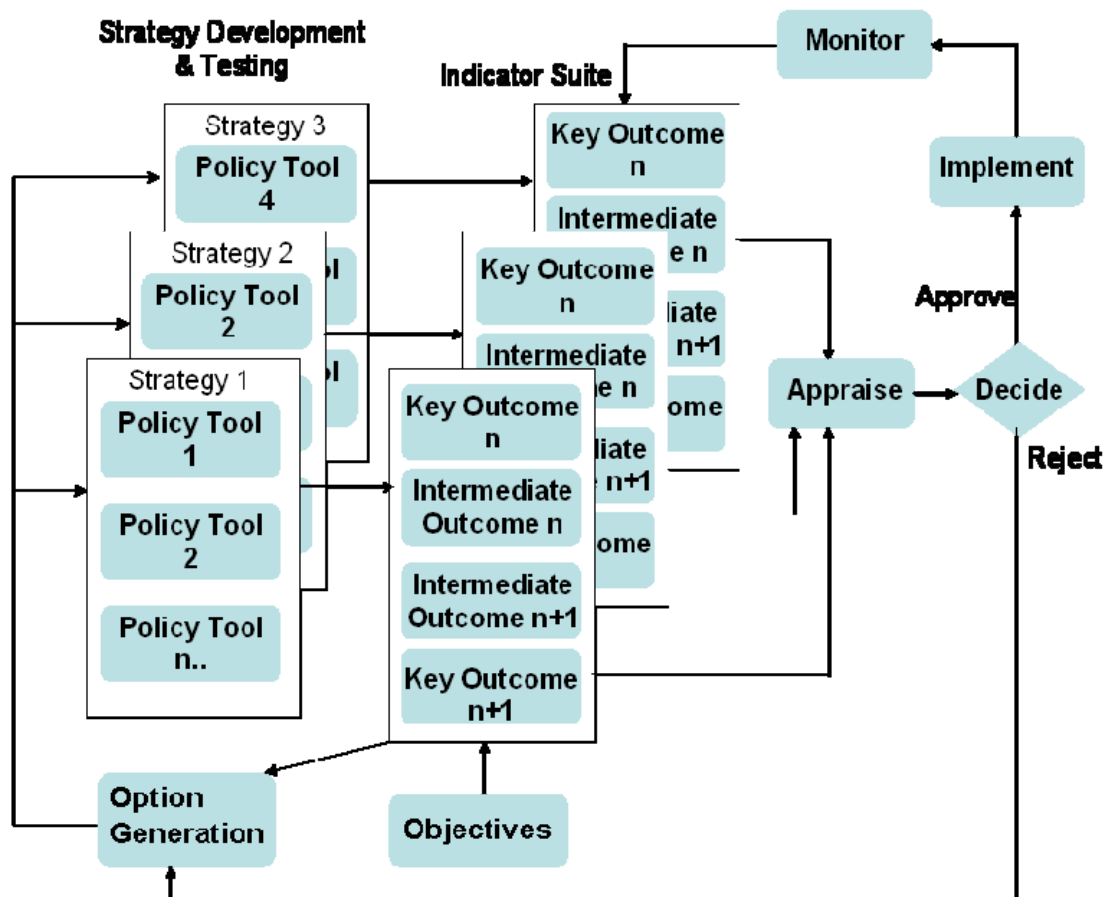
Figure A: Integrating the indicator set throughout the decision-making process

Monitoring of outputs and scheme specific monitoring are also important in determining the reasons for the successful or otherwise implementation of the strategy. Understanding what has been delivered and for how much is important for accountability purposes and for improving the efficiency of expenditure.

We have proposed a core set of outcome indicators (key and intermediate) for use across the strategic decision-making process. The suite of indicators is drawn from only those indicators already in use but provides a fuller coverage of sustainability issues than could be achieved by using just those mandatory indicators set out in the LTP2 guidance. We have also proposed a method for prioritising the selection of these indicators. Not all of them appropriate for each area nor would it be resource efficient or necessarily useful to monitor them all. The list of indicators can be found in Table A on pages 4 to 6.

It is not yet clear if or where, within any given local authority, some of the broader 'non-core' transport indicators are collected. The second round of LTP submissions may also bring forward a raft of locally specified indicators that may prove superior to those selected from the national lists considered in this report. Through case study investigations in 2006 we intend to investigate these issues further and update the outputs of this report accordingly.

Table A: Sustainability Outcome Indicators List - Key and Intermediate Outcomes

Environment				
ECMT area	Key outcome	Current Indicator	Intermediate Outcome	Current Indicator
Limits emissions within planet's ability to absorb them	CO2 emissions by end user/per capita	QoL N3	Change in area wide road traffic mileage	LTP2
	Local CO2 emissions	Audit commission Local quality of life indicators		
	Acidification		Annual average nitrogen dioxide concentration	QoL P2
			Annual sulphur dioxide emissions	QoL P1
Protects human health	Days when the pollution is moderate or high	QoL H10 LTP8	Emissions of particulate matter	QoL P2
	Number of days when air pollution is moderate or higher for PM10			
	For rural sites, number of days per year when air pollution is moderate or higher for ozone		Change in area wide road traffic mileage	LTP2
Uses of renewable resources	Energy Efficiency of transport industry/economy	QoL D15 QoL A2	Change in area wide road traffic mileage Mode share of journeys to school Congestion (vehicle delay) Public transport patronage	LTP2 LTP4 LTP7 BVPI102
Minimises noise generation	People rating the level of transport related noise as unacceptable	LTP APR Guidance	Noise levels	TAG UNIT 3.3.2 National QoL k8
			Change in area wide road traffic mileage	LTP2
Minimizing the impact on land/ water	Net loss to sites of importance (historical)	TAG UNIT 3.3.9	Buildings of grade 1 or grade II at risk of decay	QoL K5
			Loss or damage to historic landscapes and their settings	Sustainability Appraisal of regional spatial strategies
			Loss or damage to historic view lines and vistas	Sustainability Appraisal of regional spatial strategies
			Loss or damage to listed buildings and their settings	Sustainability Appraisal of regional spatial strategies
			Loss or damage to scheduled ancient monuments and their settings	Sustainability Appraisal of regional spatial strategies
	Net Loss to land	TAG UNIT 3.3.7	% of conservation area demolished or otherwise lost	Sustainability Appraisal of regional spatial strategies
			Construction and demolition waste going to landfill	Sustainability Appraisal of regional spatial strategies

	Net Loss to Habitat/ air pollution/ loss of land	TAG UNIT 3.3.10	Net change in natural/ semi natural habitats	Sustainability Appraisal of regional spatial strategies
			Changes in populations of selected characteristics species	
			Population of wild birds	National QoL H13
	Net loss to water	TAG UNIT 3.3.11	River lengths of good or fair chemical quality	National QoL H12
			Biodiversity in coastal/ marine areas* for coastal sites only	QoL R3

Economy				
ECMT area	Key outcome	Current Indicator	Intermediate Outcome	Current Indicator
Supports a competitive economy	• Total output of the economy (GDP and GDP per capita) • Regional GDP/GVA	QoLc H1	Congestion - average time lost per vehicle km	LTP7
Supports balanced regional growth			Work Fatalities and injury rates; working days lost through illness	QoLc C10
			Real changes in the cost of transport	QoLc T4
			Principal Road Condition	BVPI 196
Operates efficiently	Transport efficiency	Webtag Methods	Congestion - average time lost per vehicle km	LTP 7
			Bus Punctuality	LTP 5
			Pedestrian Delay (access of pedestrian crossing facilities)	BV 165

Social				
ECMT area	Key outcome	Current Indicator	Intermediate Outcome	Current Indicator
Meeting society's needs safely	Total killed and seriously injured casualties	BVPI99(x)	Principal Road Condition Non-principal Classified Road Condition Unclassified Road Condition Footway condition	BVPI 196 BVPI97a BVPI97b BVPI87
	Child killed and seriously injured casualties	BVPI99(y)		
	Total slight casualties	BVPI99(z)		
	Death rates from cancer, circulatory disease, accidents and suicides	QoLc F1	Cycling trips (annualised index)	LTP3
	Fear of crime	QoLc k9		
	% of residents surveyed who feel 'fairly safe' or 'very safe' after dark whilst outside in their local area	BVPI QB Q36		
	% of residents surveyed who feel 'fairly safe' or 'very safe' during the day whilst outside in their local area	Audit Commission voluntary quality of life indicators		

	People who think it is easy and safe to walk in their area	LTP APR		
Quality of life	% of residents who are satisfied with their neighbourhood as a place to live	QoL 18	Footway condition	BVP187
	Average satisfaction with the local community	European common Indicators		
End user satisfaction			% of highways that are either of a high or acceptable level of cleanliness	QoLc 34
			Bus Satisfaction	BVPI 104
			Rail passenger satisfaction	Methodology as bus
			% of users satisfied with local authority provided district transport services	BVPI Gen QB Q16
			Principal Road Condition Non-principal Classified Road Condition Unclassified Road Condition Footway condition	BVPI 196 BVPI97a BVPI97b BVPI87
Basic Access	Social participation/ sport/ learning	QoLc J4	% of rural households within 13 min walk of an hourly or better bus service	LTP APR
		Appraisal of regional spatial strategies	Working age people in workless households (access to employment)	QoLc C5
			% of residents defined as within a distance of 500m (15min walk) of key local services	QoLc 22/ BVPI QB Q6
Fairness	Accessibility	LTP requirement	% of a) households b) households without access to a car within 30 and 60 minutes of a hospital by public transport % of a) households b) households without access to a car within 15 and 30 minutes of a GP by public transport	LTP1 accessibility
			Changes in peak period traffic flows to urban centres	LTP6

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1 Introduction

Indicators: *"a means devised to reduce a large quantity of data down to its simplest form retaining essential meaning for the questions that are being asked of the data"* (Ott, 1978)

1.1 Aims of Deliverable

This report marks the first key deliverable of Project C (Improved Indicators for Sustainable Transport and Planning). The overall objective of this project is to "develop an effective set of core indicators that is able to reflect the objectives of the relevant stakeholder groups, to be transparent and measurable, to be capable of use in the setting of consistent targets, to be readily forecast, and to be used directly in appraisal" (DISTILLATE, 2004, p19)

Six objectives were established for the project, the first four of which related to consideration of how indicators are selected and used and how practice could change to provide better consideration of sustainability and quality of life and a more integrated decision-making process. The latter two relate to testing the ideas put forward in real-world case studies. This report concentrates on the first four objectives namely to:

- "complement the scoping study review of indicators with a survey of local authorities' experience in measuring, predicting and using indicators;
- determine the extent to which current indicators correspond to stakeholders' understanding of sustainability and quality of life;
- specify the requirements for a core set of indicators at each stage in the decision-making process;
- identify a core set of outcome indicators that best meets those requirements;" (*Ibid.*)

1.2 Description of Contents

This document provides a guide to the effective selection of indicators that can be used to assess progress towards the achievement of a sustainable land-use and transport system. The findings are based on two main sources. The first is a literature review of the impacts of indicators in decision-making and their application across the public and private sector. The second is an audit of current practice administered through a mail back questionnaire and augmented with semi-structured face to face interviews. The document is organised to achieve the objectives set out in Section 1.1 as follows.

Section 2 provides a description of the different types of indicators that exist and where in an idealised decision-making process they might best be used. The Section suggests how indicators should act as a common core linking the decision-making process from assisting in option generation through to strategy selection and appraisal.

Particular attention is given to how the appropriate use of indicators can lead to a more robust performance management process. The quality of the performance management process is one element of the Local Transport Plan (LTP) 2 assessment process so this advice should be both timely and relevant. Section 2 also describes the different types of indicators available to local and regional authorities and presents a framework to show how an outcome focussed set of indicators can be developed and applied throughout the decision-making process.

Section 3 looks at the practicalities of applying this framework in the local and regional transport settings that DISTILLATE is seeking to address. This section reviews the findings of the questionnaire and follow-up interviews and discusses:
(a)   The concerns and good practice of authorities in selecting and using indicators; and
(b)   Concerns and good practice in the application of individual indicators.

Section 4 builds on the findings from Section 3 and discusses the methodology applied to select a core set of outcome indicators for use within the decision-making process. The core outcome indicators are presented and discussed. Recognising that a one-size fits all approach is unlikely to be appropriate, we present both the methodology and our application of it. This will allow our local and regional partners to bring forward other local concerns and assess where best to fit them within the decision-making process themselves.

Section 5 discusses the implications of the findings to date and how the findings could be applied throughout the DISTILLATE project and, potentially, through other related SUE projects. In particular, the discussion reflects on one of the constraints placed on the project which was to work initially with only those indicators which already exist.

1.3 Glossary of terms

Table 1: Glossary of terms

CLASSIFICATION	INDICATOR DEFINITION	EXAMPLE (Public Transport)
QUALITATIVE INDICATOR	Uses words, symbols or colours to express attitudes and views	Green light if consumers are happy with the service
QUANTITATIVE INDICATOR	Uses numbers and expresses amounts or quantities	Number of journeys by public transport
INPUT INDICATOR	The resources (cost of Staff, materials and premises) employed to provide the service.	Cost of and resources used to subsidise the public transport
OUTPUT INDICATOR	The service provided to the public or the physical changes to the network	Number of journeys by public transport or Number of new bus stops
INTERMEDIATE OUTCOME	Proxy measures for progress towards key outcomes	Bus mode share as a proxy for reduced CO_2 emissions
KEY OUTCOME INDICATOR	The actual impact and value of the service delivery	% customer satisfaction with the public transport service
QUANTIFIED OBJECTIVE / TARGET	A desired end state for a specific objective to be achieved by a specified time	90% customer satisfaction rating by 2010

Adapted from Audit Commission (2000) PASTILLE (2002)

2 The role of indicators

"Even a perfect indicator system for sustainable mobility may be of little relevance if it has no bearing on actual decisions taken" (Gudmundsson, 2003)

Gudmundsson (2003) reviewed a number of sustainable transport indicator sets and concluded that for the most part, they failed to influence decision-makers as they were currently used as background information rather than being integrated into the decision-making process. In the light of this, and in line with the current approach to the formulation and assessment of Local Transport Plans, this section concentrates on the application of indicators to the overall enhancement of local transport decision-making. This is also central to the rationale of the DISTILLATE project.

2.1 Properties of indicators

Mitchell et al. (1995) state that indicators are needed to make sense of the 'complex systems' that we live in. In particular they identify four main reasons for using indicators to do this, which are:
- They allow the synthesis of masses of data
- They show the current position in relation to desirable states
- They demonstrate progress towards goals and objectives
- They communicate current status to stakeholders so that effective management decisions can be taken that lead towards the targets

Indicators are, therefore, a means of summarising the current position and the direction and rate of change of progress towards a particular goal or objective. As with any summary, the greater the degree of aggregation of the information the more the original picture can be lost. If indicators are to be useful to decision-makers they have to be capable of being simple enough to allow processing and trading off of performance between indicators that might be heading in different directions. At the same time, too many indicators may reduce the ability of an organisation to use the information effectively.

2.2 Uses of indicators

Indicators can be used for a variety of purposes from communicating with stakeholders (reporting), through benchmarking (reporting and comparing) to performance management (reporting, comparing and tacking action). The application to which the indicator is put has a strong influence on the properties that the indicator must have with, in general, those that are used to influence management actions and financial rewards requiring more rigorous data collection processes, standards and frequency of reporting.

A number of alternative approaches to indicator set development have been reviewed. The balanced scorecard method, developed by Kaplan and Norton to aid in the

process of providing companies with a method of creating a balanced set of indicators with which to report their performance, provides some interesting perspectives common to many of the approaches studied. Their approach uses the company's strategic goals and translates them into a framework that spans across the entire organisation for current and future issues. They suggested indicators need to be selected for the following four areas:

1. Financial perspective – how do we look to shareholders?
2. Customer perspective – how do our customers see us?
3. Internal business perspective – what must we excel at?
4. Innovation and learning perspective – can we continue to improve and create values

This reinforces the need for transport planners to examine not only the transport system performance (which can be viewed as analogous to financial perspective – is value for money being delivered to the Department for Transport in achieving key outcomes?) but also the customer perspective (how does the public perceive the quality of transport provision) as well as internal process based indicators (discussed further in Section 2.4).

2.3 Indicators and performance management

The reason that an organisation exists is 'to achieve a purpose, which is to meet the needs and expectations of its stakeholders' (Armstrong and Barrow, 1998). The way an organisation achieves this will affect how successful it is in meeting its objectives and goals. Performance management provides the structures to aid in the process of planning, monitoring and reviewing to enable these goals to be achieved. One definition of performance management is "a systematic approach to improving individual and team performance in order to achieve organisational goals" (Hendry et al, 1997)

So, where do indicators fit into this process? An example of a generic performance management framework is provided in Figure 1. This diagram shows a continuous cycle of determining the organisations objectives, setting organisational targets, measuring performance, monitoring performance against those targets and then evaluating the process and starting the cycle again.

To conduct performance management, indicators are required as the measure of performance. Lebas (1995) suggests five main reasons why organisations want to measure performance, which are that we want to know:

- How did we get to where we are?
- Where are we now?
- Where do we want to go?
- How are we going to get there?
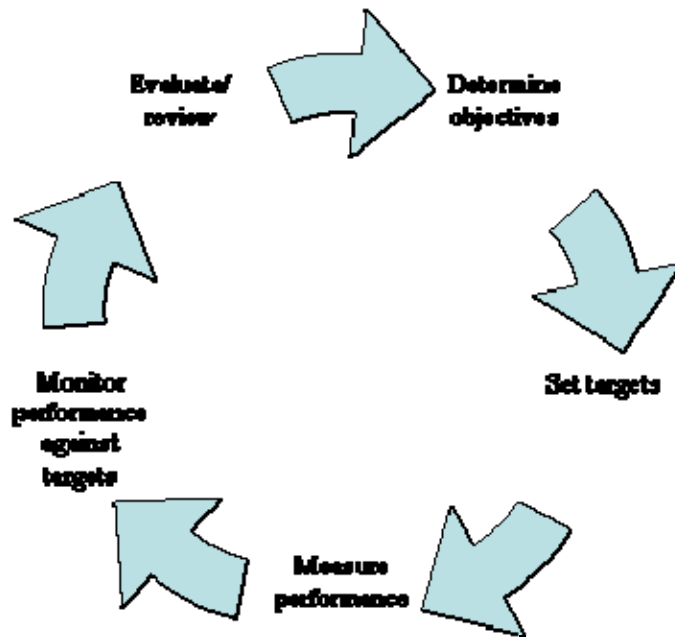- How will we know when we have got there?

Figure 1: Performance Management Cycle (Source: CIMA, 2000)

It is the ability of organisations to be able to measure performance in conjunction with pre-determined targets that allows them to be able to asses whether performance has improved and this is the role that indicators play in performance management. All of the above reinforces the importance of clear organisational goals. There is a need for indicators that reflect the full range of organisational goals to avoid the risk of 'tunnel vision' (Smith, 1995).

Once organisational goals are set, performance indicators are vital to quantifying the performance of an organisation against these goals. In order to form a complete part of the performance management cycle it is essential to know in what direction and how quickly the organisation would like the indicators to change (i.e. setting targets). It is this comparison of performance against goals that provides the stimulus for change.

The Audit-Commission (2000) states that a balanced set of indicators are required that reflect all areas of the service being measured. They argue that performance in local authorities consists of efficiency and effectiveness and links these two with a framework named the 'three Es', which is provided in Figure 2. It is this structure of grouping the indicators into input, output and outcomes that the DISTILLATE project will focus on.
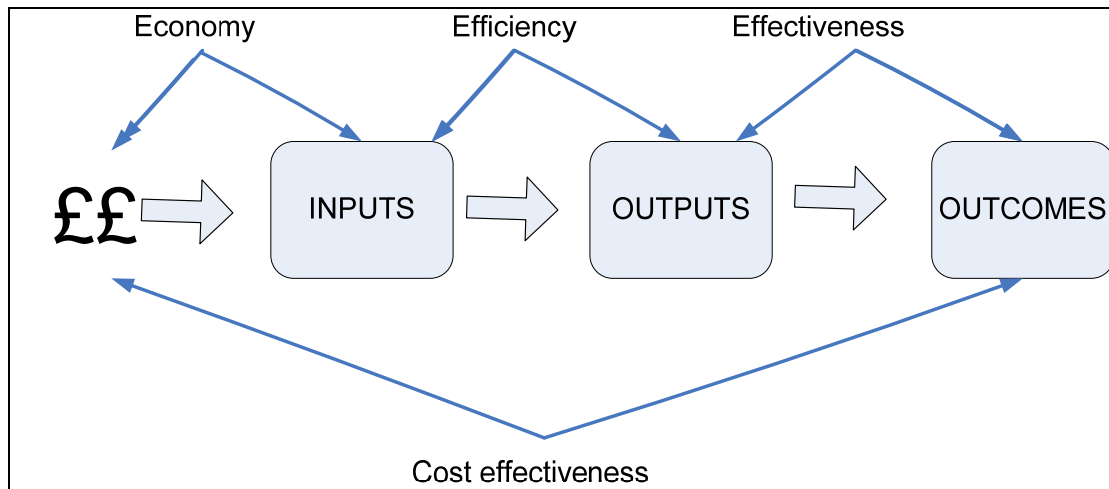
Figure 2 The aspects of performance that need measuring
Source: Audit Commission (2000)

2.4 Selecting outcome indicators

2.4.1 Consistency with DfT definitions

The Department for Transport sets out a hierarchy of indicators (and targets) that it wishes local authorities to use in developing their LTP2. These are:

1. "Targets for *key outcome indicators* including targets for the relevant mandatory indicators…and any other targets for indicators that, in the opinion of the LTP authorities, directly measure the achievement of shared priorities.
2. Targets for *intermediate outcomes*, which represent proxies or milestones towards key outcome targets and including targets for the relevant mandatory indicators (e.g. bus user satisfaction, bus punctuality, mode share, cycling levels, traffic levels on particular routes, number of users of park-and-ride services).
3. Targets for *contributory output* indicators - indicators measuring the delivery of schemes, policies or initiatives that, in the opinion of the LTP authorities will contribute towards the achievement of targets in the two categories above.
4. Targets for any *other* outcome or output indicators - including indicators that measure the achievement of local priorities only" (DfT (2004), p25, emphasis added).

We have adopted this terminology for consistency of approach. However, we do not assume that the LTP2 key outcome indicators are key sustainability outcomes (e.g. bus patronage) and reclassify these as intermediate outcomes where necessary.

2.4.2 Putting an outcome based approach into practice

The emphasis of current guidance to local authorities is on reporting outcomes not outputs. There are two main issues that make this approach challenging in the context of performance management:

1. Changes in transport outcomes occur over time, with longer-term responses typically greater than those seen in the short-term. Over what sort of time periods is it reasonable to assess progress and when should remedial action be taken if outcomes are not being achieved?
2. The interactions between different elements of transport (and other sector) policy that lead to the outcomes are complex. Key outcomes such as reductions in pollution and accidents are achieved through integrated strategies with several measures contributing towards the improvement of any one and probably multiple outcomes. The use of outcome indicators alone would therefore not be sufficient as a management tool. What if an outcome indicator does not respond in line with expectations? To what extent is this a result of:
   (a)   slow or failed implementation;
   (b)   implemented but ineffective policies; or
   (c)   other factors previously not considered?

Without a conceptual map of the key drivers for change of any given outcome indicator it is difficult to know where to go to look for evidence of why performance is not as expected. Such a map will lead to the identification of key outputs that need to be put in place to enable the outcomes to be delivered. An example conceptual map is shown in Figure 3. An appropriate mixture of outcome, intermediate outcome, output and input indicators therefore need to be selected and used for different purposes by a local authority.
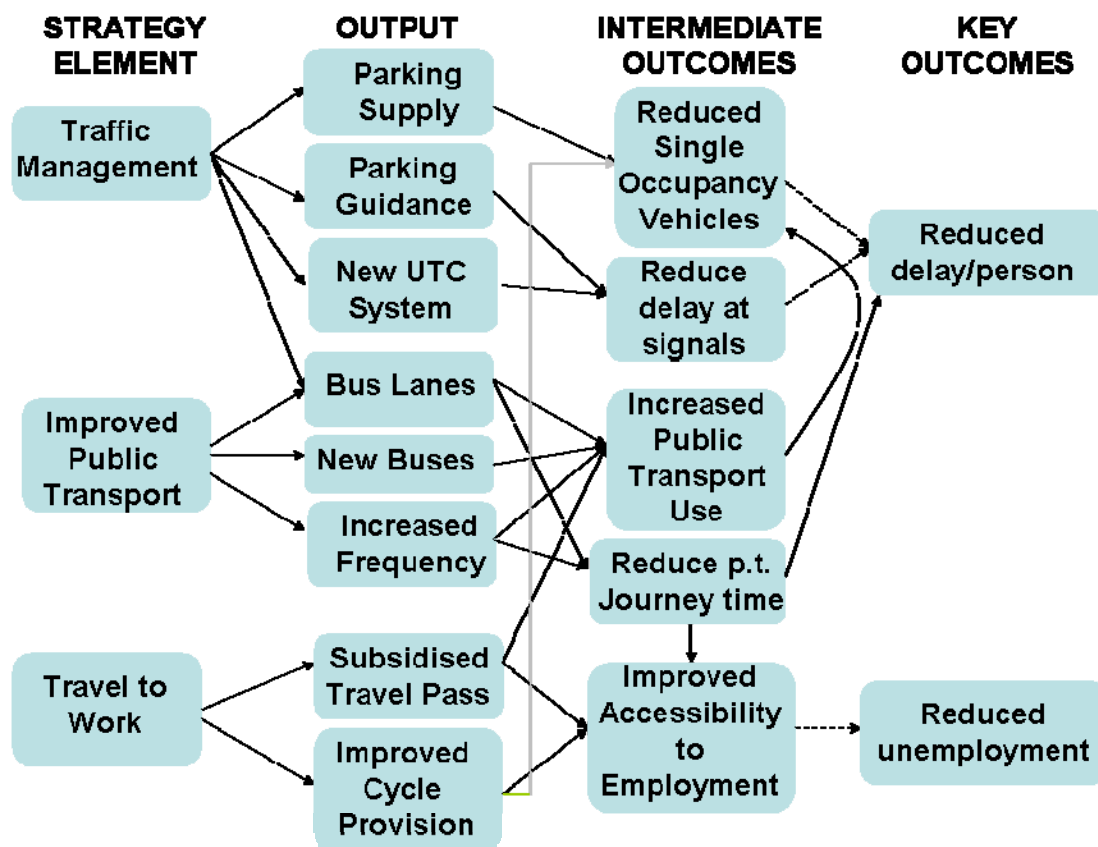

Figure 3: Key Outcomes, Intermediate Outcomes and Outputs

The recommended process for indicator selection for strategy monitoring would be as follows:
1. Take the list of key objectives for the strategy
2. Determine the key outcomes that reflect progress towards achieving the strategy objectives
3. Examine the key outcome indicators for current capabilities to measure and forecast changes in them
4. Identify a series of supporting intermediate outcome indicators that will monitor progress towards the key outcomes. This is particularly important when the key outcome itself cannot be directly measured or forecast.

A list of key and intermediate outcomes would then be generated which is linked to the objectives of the strategy. Due to the need for monitoring regimes to be cost-effective, it will be necessary to condense the list to ensure the key outcomes are all reflected but that maximum use is made, for example, of intermediate outcomes that contribute to multiple key outcomes. This process is shown in Figure 4 where the full list of indicators and intermediate outcomes is identified and shown on the left. On the right the two key outcomes that are not measurable are faded out. It is assumed that all of the intermediate outcomes are measurable but that a decision is taken not to use two of them as there is sufficient coverage of all of the key outcomes with the remaining four.
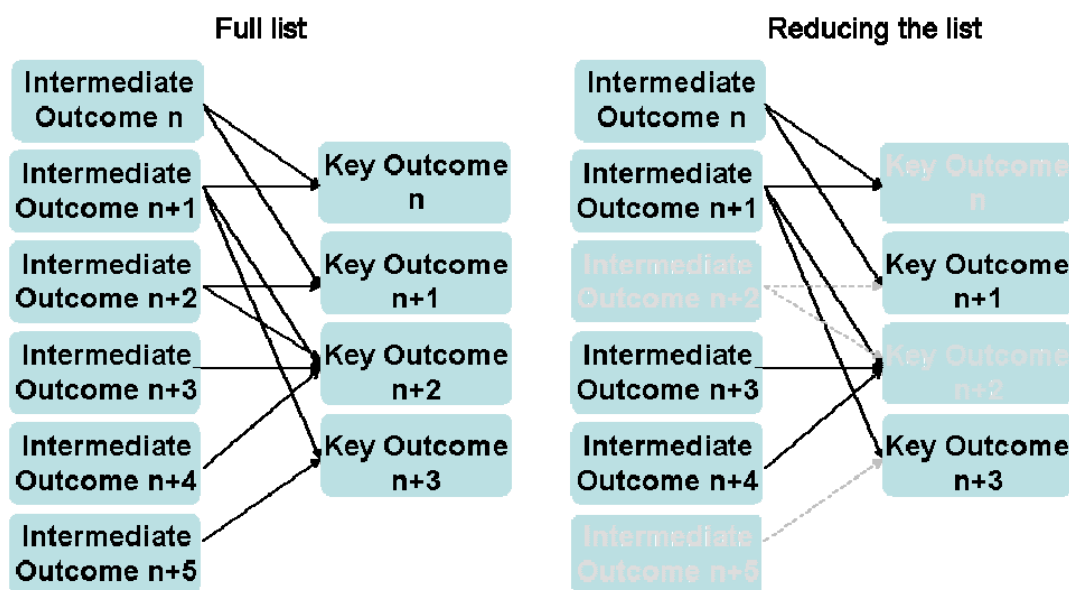
Figure 4: Selecting indicators from the possible list

2.4.3 Using the indicators throughout the decision-making process

At its simplest, the decision making process can be conceived as a cycle (Section 2.3). The identification of a problem and possible options to address it lead to the *formulation* of a policy, this policy is then *implemented* and the outcomes *evaluated*. The outcomes should then feed back into the problem identification and option

formulation stages[3]. The different types of indicator (input, output and outcome) are, or should be (Rydin *et al.*, 2003) used at different stages of this decision making process, generally fulfilling one or more of four roles: description, impact assessment, monitoring and or predication (Braissoulis, 2001; Higginson *et al.*, 2003). The following sections briefly outline the three types of indicator and their interactions with the decision making process.

Strategy generation
The list of indicators generated as a result of the exercise described in 2.4.2 is the list of outcomes against which the ultimate success of the strategy will be assessed. It should therefore also be used as the basis for assessing and selecting the preferred strategy in the strategy development and testing process.

At an option generation stage, it should be possible for the indicators to help steer the types of measures that are put together. Such capabilities already exist at a more aggregate level (e.g. looking solely at objectives such as improving the economy rather than more specifically looking at access to employment) through knowledge bases such as KonSULT[4] or the process could be conducted through the application of professional judgement in a range of different ways.[5]

Strategy appraisal
Once a series of strategy options have been developed they are typically tested (through a process of appraisal) and a preferred, or modified preferred, strategy developed which appears to perform best across the range of indicators and criteria considered.

Strategy monitoring (outputs and inputs)
Subsequent to the preferred strategy being selected it should be possible to determine the most appropriate output indicators to use to monitor the implementation of the strategy elements. Input indicators tend to describe how policies are implemented, focusing on the allocation and employment of resources. Since these measures show where and how resources are allocated (for example, the cost of putting more police on the street), they promote a degree of accountability and transparency.

Delivery and monitoring
The strategy then moves into a delivery and monitoring phase for which the indicators will also be used, feeding back in to the problem identification stage. It is stressed that new problems can emerge which the indicators do not capture. At all stages it is important that indicators help to inform the decision-making process by providing reliable and relevant information. They do not and should not dictate the decision-making process.

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[3] It must be noted that in reality the complex institutional context often means that these stages are blurred and indistinct, although this varies greatly between policy areas.
[4] http://www.elseviersocialsciences.com/transport/konsult/index.html
[5] Project B 'Option generation' is examining different ways to develop new strategies and scheme designs that encourage a broad range of perspectives and alternatives to be considered.

Figure 5 shows how the indicator suite should interact with the strategy development process. Table 2 shows what sorts of indicators get used where in this idealised decision-making process.
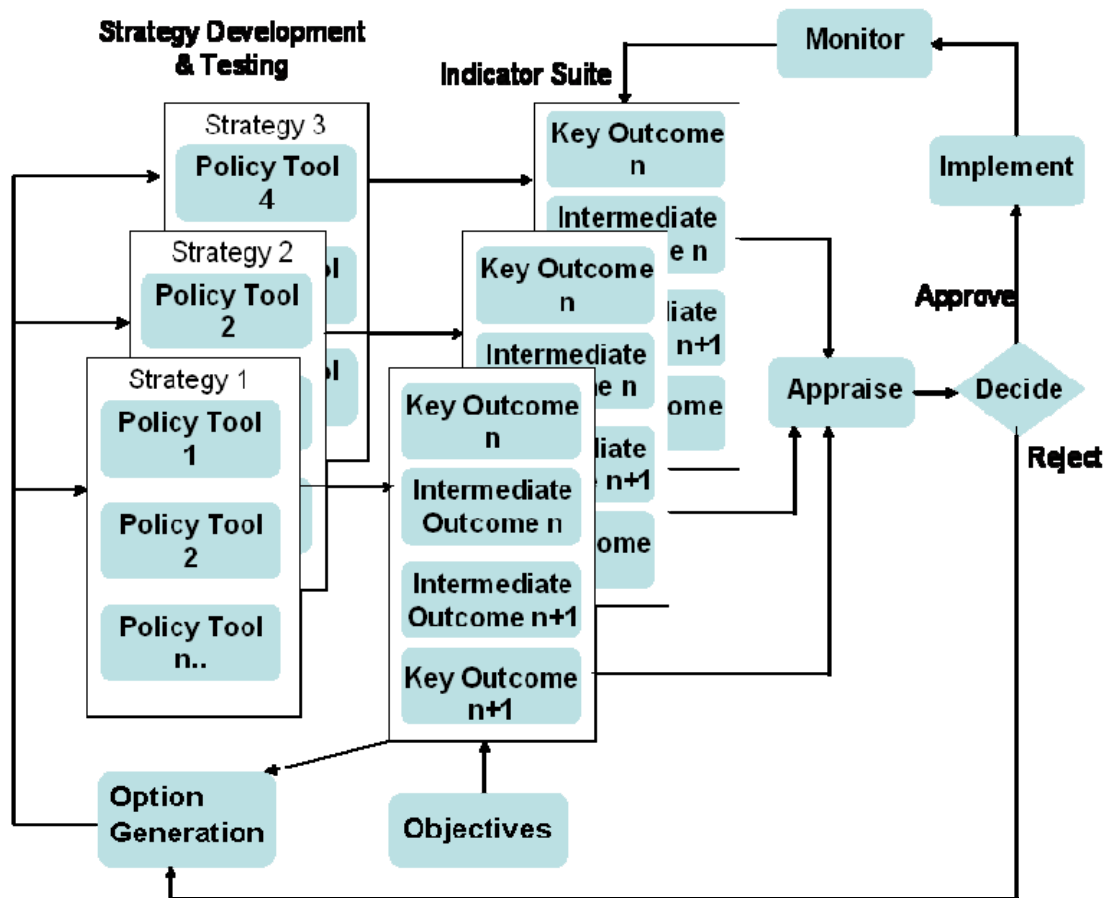
Figure 5: Integrating the indicator set throughout the decision-making process

Table 2: Applying indicators in the decision-making process

Stage in decision-making process	Key Outcome	Intermediate Outcome	Output	Comments
Objective setting				Objectives lead to outcome indicators
Problem identification	✓	✓		
Option generation	✓	✓		
Strategy appraisal	✓	✓		
Strategy monitoring	✓	✓	✓	Outputs (& inputs) for delivery monitoring purposes

As discussed in the introduction, the concept of the policy cycle is simplistic and assumes that policymaking occurs in discrete stages. However, due to the complex policy arena and the range of actors, institutions and processes and political issues at play the implied linear relationship between inputs, outputs and outcomes shouldn't be overplayed or considered formulaic (Owens and Cowell, 2001). The extent to which the decision-making process follows this idealised cycle and the reasons for any deviations are being explored further in Projects A and D of DISTILLATE.

3 What makes a good indicator?

The previous section has set out a rationale and process for selecting key outcome measures and for determining what sort of output measures it is necessary to track in order to be able to understand the behaviour of the outcome measures. However, deciding that improving employment prospects for the long-term unemployed, for example, is a key outcome measure and determining an effective indicator to represent are different but equally important elements in the process.

3.1 Aspects to focus on

The literature provides many lists that help to define the characteristics that a good or robust performance indicator should include (e.g. PASTILLE, 2002; Carlin, 2004; Audit-Commission, 2000; Markless and Streatfield, 2001). The four examples shown in Table 3 provide a good range of characteristics and indicate that the generic requirements are very similar across a range of disciplines.

Table 3: What makes a 'good' indicator?

Characteristics	Audit Commission (2000)	Local Authority Carlin (2004)	Education Fitz-Gibbon (1996)	Sustainability indicators PASTILLE (2002)
Relevant to the organisation/ strategy	√	√	√	
Clearly defined/ easy to understand/ transparent	√		√	√
Based on available data/ measurable				√
Controllable/ Attributable	√	√		
Cost Effective	√		√	
Limited in Number		√		√
Timely	√	√	√	√
Avoids perverse incentives/ non corrupting/ not corruptible	√		√	
Statistically/ Scientifically Valid	√		√	√
Comparable/ consistent over time	√	√		√
Responsive	√			
Allows innovation	√			
Capable of aggregation				√

Being cost effective was seen as being important for the Audit Commission (2000) and Fitz-Gibbon (1996) and all sources stated that the indicator should be timely and so provide the up-to-date information that is required. These characteristics can be used as a guideline for determining what indicators to include in the performance management process. This table provides a lot of characteristics that the indicators should comply with and it is noted that not all indicators will be able to meet all of these characteristics.

3.2 Aspects to avoid

"if an indicator of the system is poorly chosen, inaccurately measured,
delayed, noisy or biased, decisions based on it cannot be effective"
(Meadows, 1998).

If an indicator can be a 'good' measure in a management process then it also has the potential to be a 'bad' indicator. A section of the literature focuses on the dysfunctional effects of using indicators to measure performance. Meyer and Gupta (1994) suggest that several factors reduce the effectiveness of using performance indicators to measure performance, which include:

- *positive learning*, which results from indicators having the desired effect (performance improves), but the indicator is then not modified to reflect this so becomes incapable of detecting bad performance;
- *perverse learning*, which results when people know what is being measured so they concentrate on this area of performance at the expense of other areas. For example, Wiggins and Tymms (2002) found that English primary schools were more likely to concentrate on their targets at the expense of other important objectives; and
- *Suppression*, which results when differences in performance are simply ignored.

Smith (1995) identified eight unintended consequences of publishing public sector performance data which were; tunnel vision, sub-optimisation, measure fixation, myopia, complacency, misrepresentation, gaming[6] and ossification[7].

Many of these negative impacts can be addressed by setting indicators not because they have to be set but because they form an integral part of a performance management system as described in Section 3. In this way the suite of indicators and their connection to the key objectives and each other and therefore relative importance in the hierarchy is clearly articulated, avoiding the first three of Smith's problem list. The extent to which the remaining issues prevail depends substantially on external requirements – 'the rules of the game'. This is reviewed below.

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[6] Gaming refers to the act of deliberately distorting the performance measure to gain some strategic advantage
[7] Ossification refers to an n unwillingness to change a set of performance measures once they have been set up

3.3 Importance of different indicator sets

As part of the survey of local authorities[8], the respondents were asked to indicate the importance of various indicator sets that they currently use. These were the Audit Commission Quality of Life indicators (QoL), the Comprehensive Performance Assessment indicators (CPA), locally set indicators (local) which includes local transport plan indicators, Public Service Agreement indicators (PSA), Regional Transport Strategy indicators (RTS) and European derived indicator sets (Euro). The responses are shown in Figure 6.
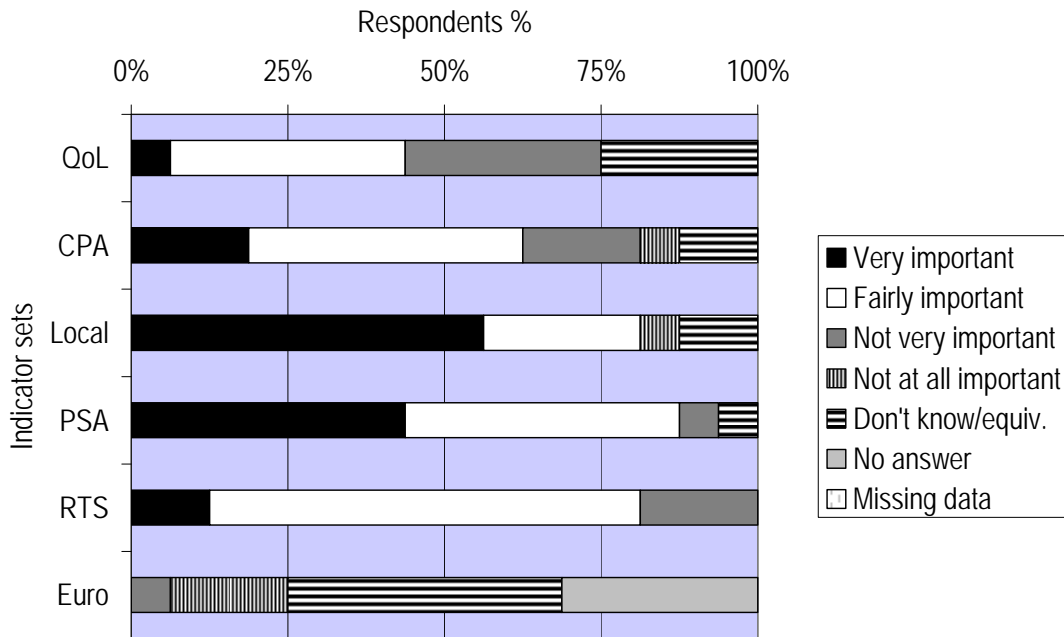
Figure 6: Survey responses on importance of indicator sets

With the exception of European indicators, that were not seen as important, four of the indicator sets were said to be either fairly or very important to more than 60% of respondents with the Audit Commission quality of life indicators very or fairly important to around 45% of the respondents. Locally derived indicators, including the Local Transport Plan indicators had the highest level of importance with over 50% rating these indicators as very important. These findings suggest that local and regional authorities use a range of indicator sets and that despite their varied rationales for development they are seen as important. There is some overlap between the different indicator sets which may be reflected in the responses.

3.4 Concerns of local authorities

The survey also asked a series of questions about the importance and satisfaction of local authorities with a series of aspects surrounding the use and selection of indicators. The results of the assessment are shown in Figure 7 which plots importance against satisfaction.

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[8] Respondents included 2 Passenger Transport Executives and one Regional Assembly.
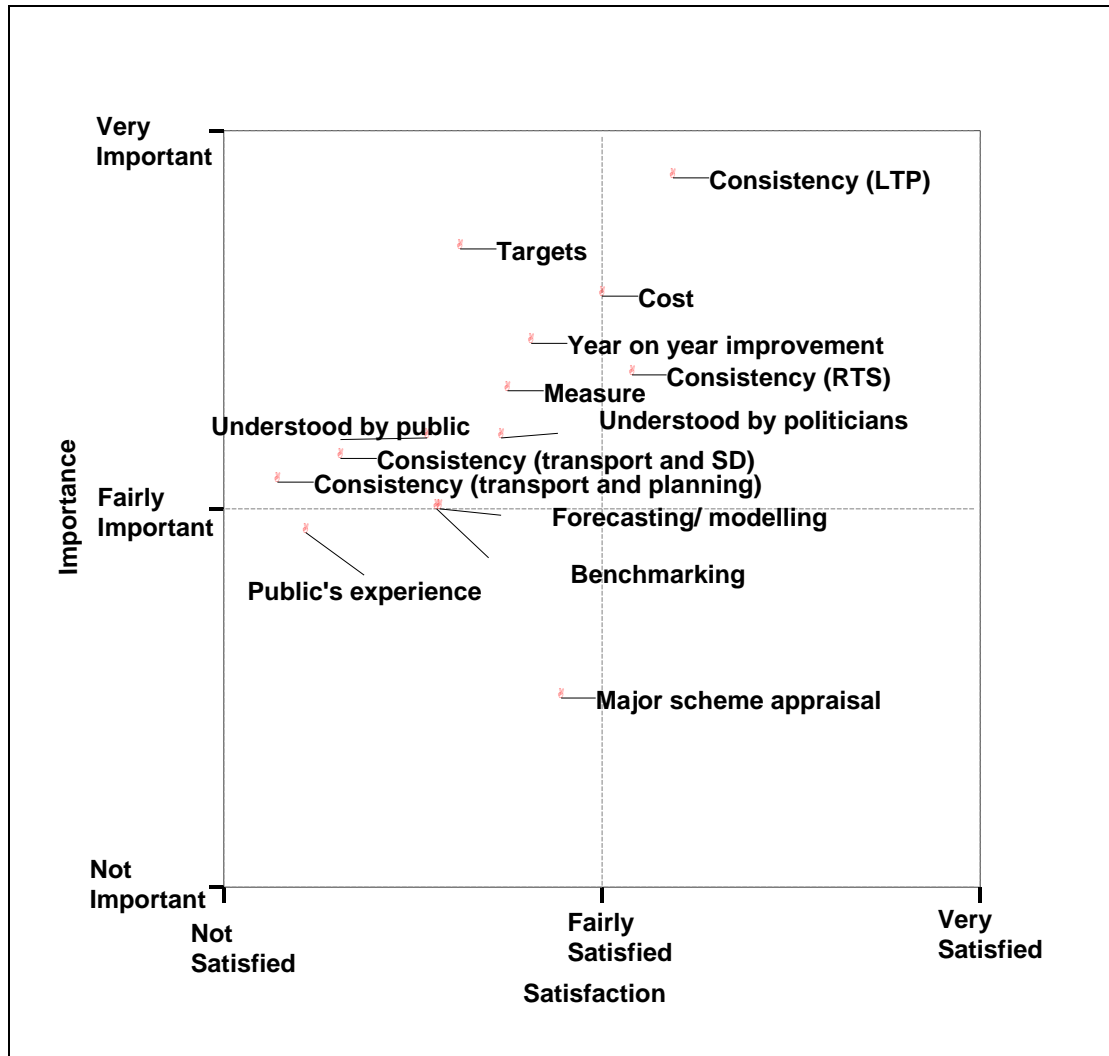
Figure 7: Importance and satisfaction ratings of indicator criteria

Eight aspects of indicators score importance levels between fairly and very important and levels of satisfaction between not satisfied and fairly satisfied. These aspects of indicator selection would therefore appear to be of greatest concern to the respondents. In order of importance, these were:

1. Allow development of well-founded targets
2. Cost effective to monitor
3. Capable of capturing year-on-year improvements
4. Easy to measure
5. Easily understood by politicians
6. Easily understood by the general public
7. Consistency between transport and planning indicators
8. Consistency between transport and sustainability indicators within your authority

Although scoring lower importance, the ability of the indicators to "Reflect the public's experience of travel" was also viewed as not satisfactory by the majority of respondents. This is particularly important as the balanced scorecard approach to

performance management suggests that the customer perspective is as important as the internal business perspective. It appears that the current indicator programmes do not reflect this.

It is clear that local authorities are satisfied with their ability to be consistent with local transport plan guidance. That is to say that the process of following guidance appears to be clear but the extent to which this means that a satisfactory indicator system exists far less so. The sub-sections below review the eight characteristics of greatest concern to local authorities.

3.4.1 Well-founded targets

Issues that were raised in the survey and subsequent interviews showed that many authorities struggle to set targets that they can realistically work towards. An absence of baseline data (which can be exacerbated by changing definitions of indicators) in areas such as accessibility and congestion and uncertainty over the extent to which the public will respond to newer policy interventions all make the establishment of targets difficult. As financial settlements will increasingly be linked to performance against targets, this appears to be an issue that requires further investigation. Respondents indicated that 'gaming' was a part of the indicator and target selection process to avoid apparent poor performance.

3.4.2 Cost-effective to monitor

Although ranked as important, the in-depth interviews highlighted a general lack of clarity over expenditure across all budget headings on monitoring. It seems that the cost-effectiveness of individual elements of the monitoring programme are often considered and indeed efforts were made to avoid duplication of effort. However, an overall view of the costs and benefits of monitoring was not common place.

3.4.3 Capable of capturing year-on-year improvements

Respondents indicated that, as performance would be judged on annual progress reports, there was a need to select indicators that showed responsiveness in the short-term. Given that changes to the transport system outcomes tend to happen in the longer-term (for example attitudinal measures), this naturally appears to push authorities into counting those things and selecting measurement methodologies that will demonstrate yearly variations.

Strong reservations were raised about the robustness of making assessments of performance based on annual data as poor performance in one year could be the result of contextual factors and would be statistically unreliable. If the nature of the change is such that the local authority cannot be certain that management action is required then the allocation of performance related funding on this basis was questioned.

3.4.4 Easy to measure

The responses to this question are more clearly understood by analysing the responses to the questions on individual indicators (Figure 8) and the in-depth interviews. Local Authorities were asked how important certain indicators were and how satisfied they were in how they could measure them.
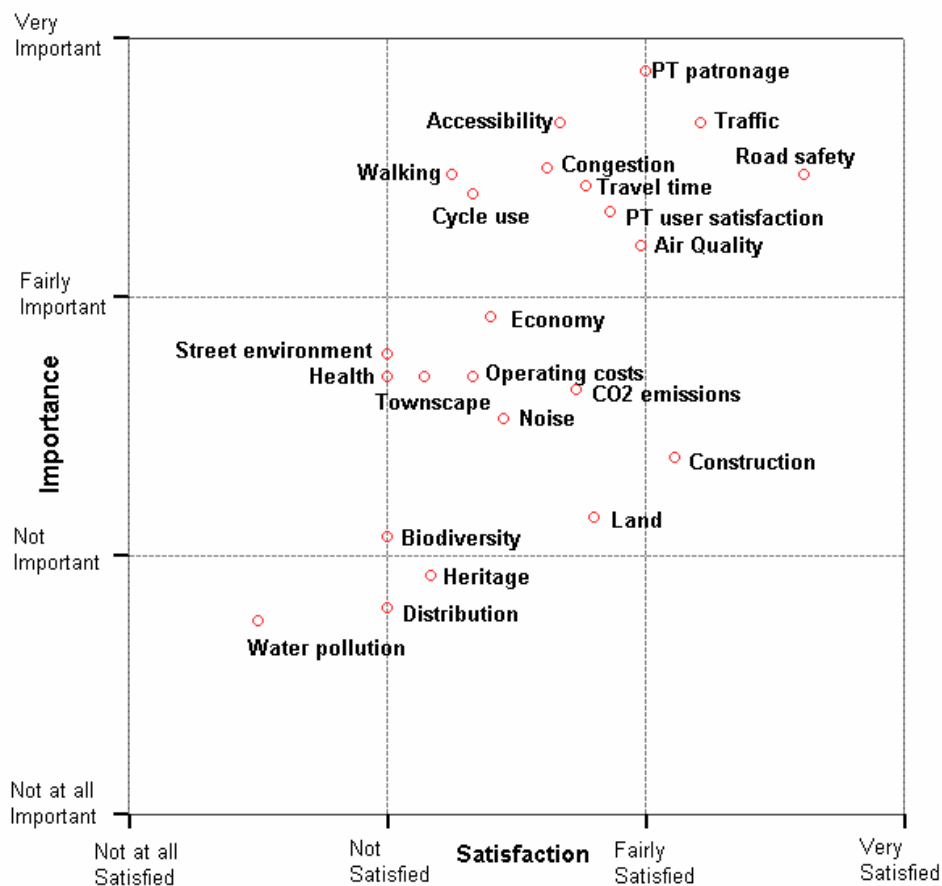
Figure 8: Importance and satisfaction ratings of indicator criteria

The overall picture is one of satisfaction with ease of measurement as many of the indicators have been measured over long time series (e.g. traffic levels, road safety, air quality):

- Outcomes with high levels of importance and satisfaction are road safety, air quality and public transport user satisfaction
- Outcomes with high levels of importance and intermediate levels of satisfaction include congestion and accessibility, probably due to the absence of adequate baseline data.
- Outcomes with both intermediate levels of importance and satisfaction are CO_2, economy, health, noise, street environment, and townscape. This appears to reflect both a lack of history and comparative policy prominence for all of these issues in terms of reporting requirements and the difficulties in capturing outcomes that are one stage removed from the transport planning process (e.g. reduced hospital appointments through improved fitness).

- The output measures of traffic levels, public transport patronage and travel time are between fairly and very important with the average respondent being fairly satisfied.
- By contrast, cycle use and walking are both ranked as fairly or very important but the level of satisfaction falls between not satisfied and fairly satisfied. In the interviews no-one was happy with the way in which these could be accurately measured.

For the most part, outputs continue to be seen as important and relatively easy to measure. The key policy outcomes are more difficult. In part this is due to uncertainty over what the best measures of performance against these outcomes might be, and in part due to difficulties in capturing these benefits through cost-effective measurement programmes.

3.4.5 Easily understood by politicians

The interviews suggest that politicians typically take a greater interest in the performance against targets than they do in the measures that are used or the way these are constructed. This was found to vary dependent on the extent to which the officials that were examining performance were also involved at the performance regime development stage.

3.4.6 Easily understood by the general public

There was a fair degree of dissatisfaction with the extent to which indicators are understood or used by the general public. The interviews suggest that the principal interactions on indicators are with specific lobby groups about issues such as 'why their indicator does not have a higher target'. This may be linked to the levels of dissatisfaction registered by respondents to the questionnaire in the extent to which the indicators were representative of the public's travel experiences. One example given in discussions was the new congestion indicator which did not map well to public understanding. Requirements for area-wide reporting were also felt to dilute the meaning of indicators to the public so the spatial scale at which information is provided is also important.

3.4.7 Consistency between transport and planning indicators

The principal overlapping indicator between transport and planning relates to the percentage of new commercial and housing development built in accessible urban areas. In some authorities the emphasis is on brownfield sites rather than on 'accessibility' per se. There is an opportunity for accessibility planning to draw the two disciplines closer together in the strategic planning process. One local authority surveyed is already using accessibility planning to help determine the contributions that developers promoting infill developments should make through Section 106 agreements.

3.4.8 Consistency between transport and sustainability indicators within your authority

This was considered to be a weakness identified in both the questionnaire and in-depth interviews. The current indicator sets were typically assembled as a result of requirements from various statutory documents rather than with a view to representing sustainable development. The current indicators captured some aspects of sustainable development but not all. The types of indicators that might be used internally to measure the implementation of action plans in this area (e.g. storm drainage) were also felt unlikely to correspond to the general public's view on sustainable development.

3.5 Summary of indicator selection issues

There is still a significant gap between the definition of outcomes we wish to achieve through improving our transport system and the definition of indicators that adequately capture this progress. This is particularly true of outcomes relating to accessibility, health, congestion and public satisfaction with the urban environment. The case studies within the DISTILLATE project and across the wider SUE programme should seek to fill these gaps with practical applications alongside on-going local authority initiatives.

A number of the criticisms of the perverse impacts of indicators and targets on decision-making can be avoided through careful development and application of the indicator system as described in Section 2. For example, where the indicators remain strongly linked to the key outcomes they are supporting this should mitigate some of the potential impact for the indicator itself to become the focus of policy.

Some other elements remain problematic. Annual reporting of indicators at a national scale would appear to strongly incentivise the selection of indicators that can demonstrate change in the short-term. These may not be consistent with the sorts of indicators that would be selected to demonstrate longer-term sustainability of the transport system.

The current set of mandatory indicators covers some, but by no means all, of the key aspects of a sustainable transport system. It is possible that such an approach will concentrate efforts on those things that can be and have to be measured at the expense of other elements of an 'integrated strategy'. An investigation of the extent to which this behaviour does occur is suggested.

The process of developing an outcome focussed performance management system for Local Transport Plans is still in its relative infancy. It would be unrealistic to expect all of the issues discussed above to be resolved by now. Indeed, one of the purposes of the DISTILLATE project is to identify such barriers and propose solutions. We have already proposed a framework for selecting indicators that can be applied across the decision-making process. A further task that this deliverable is to fulfil is to apply the best practice that exists in indicator identification and selection to identify a set of

indicators that best meet the requirements of the framework. This process is described in Section 4.

4 Sustainable Transport Indicators

4.1 Introduction

The primary consensus in indicator selection is that not everyone will agree on one common set of indicators. Different areas have different priorities and recommending the adoption of indicators that are not relevant to local circumstances would be a futile exercise. Some indicators can be identified through top-down processes relating to key national sustainability policy principles. Others are better developed through stakeholder participation as this can ensure that the most important aspects are measured and that the end users understand the outputs. This section describes a methodology for selecting sustainable transport indicators from a top-down perspective. It then applies this methodology using the definition of sustainable transport provided by the European Council of Ministers on Transport and the currently available indicator sets used by local authorities in the UK.

4.1.1 Definition of Sustainable Transport

As Section 3.3 highlighted, it is important to have a clear idea of the goals of an organisation to ensure that progress can be measured towards these goals. The overarching goal assumed here is that local authorities will seek to develop sustainable transport systems. The definition of sustainable transport provided by the European Council of Ministers is shown in Figure 9. It is organised according to the commonly used three pillars of sustainability. This provides a series of key outcomes under each heading and also a structure for organising the current indicator sets promoted by central and local government.
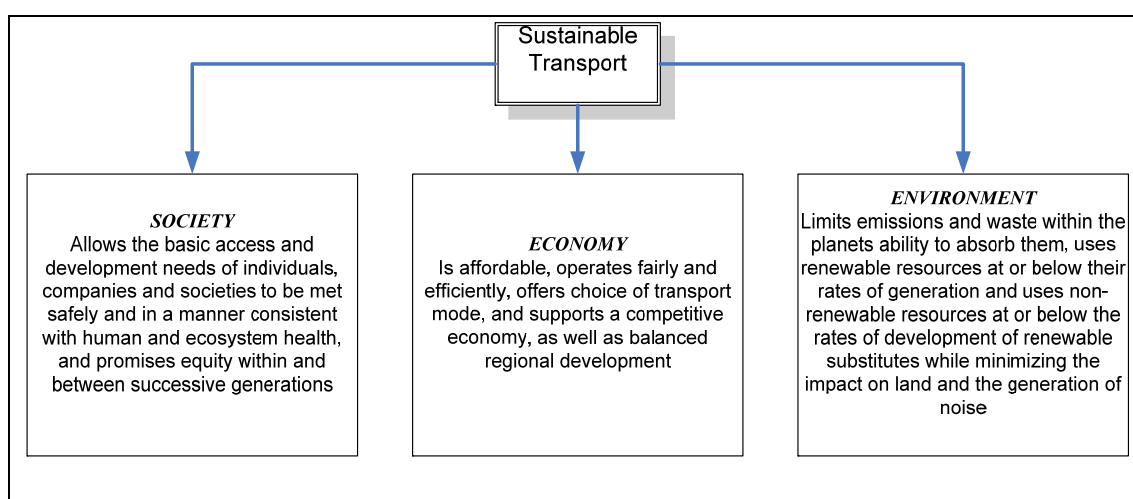
Figure 9: Sustainable Transport Definition (Source: Adapted from Council of the European Union 2001)

4.2 Methodology for indicator selection

One of the principal requirements from our local authority partners in this project is to avoid indicator proliferation. There are already too many indicators so how can those that are in existence be used better? The flow chart in Figure 10 sets out the principles for selecting the indicators. The process used in selecting indicators is then described.
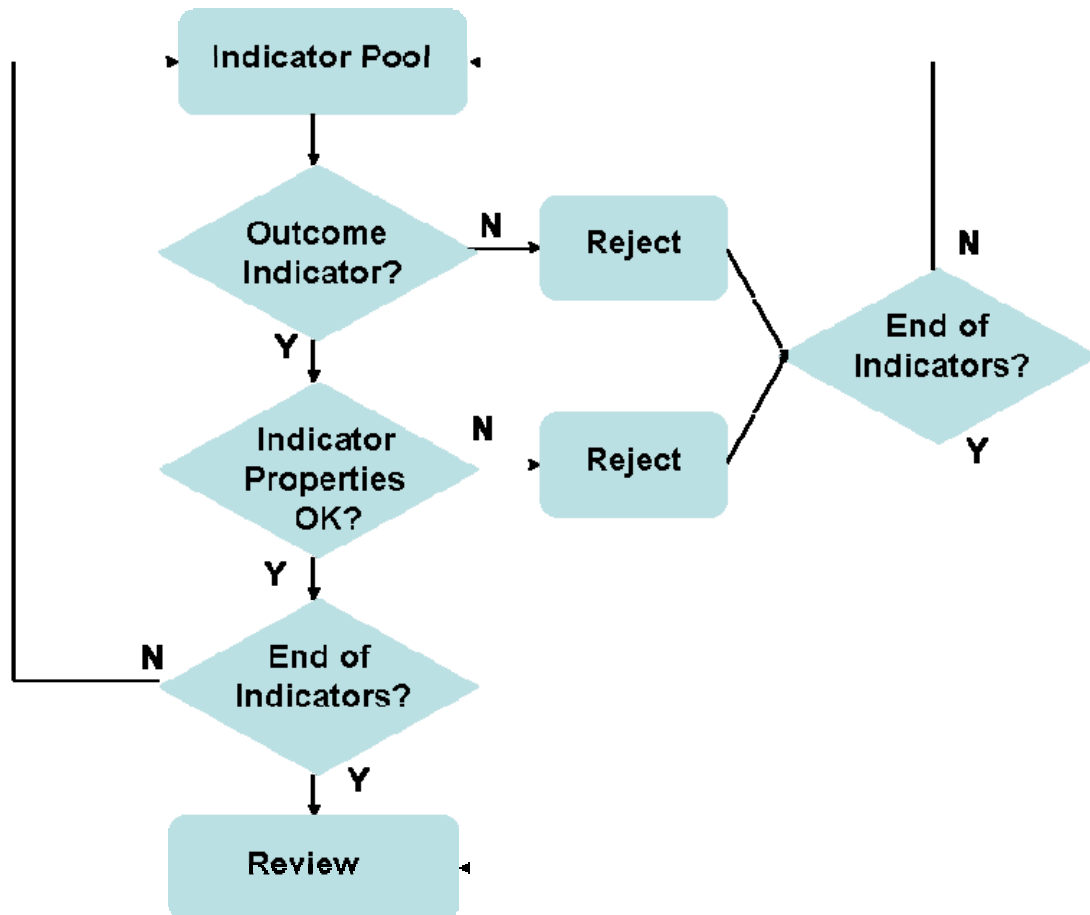
Figure 10: Indicator selection process

1. Only those indicators which have a relevance to transport interventions should be included in the initial indicator pool.
2. Those indicators that are relevant to transport should then be assessed as to whether they represent a sustainable outcome (which should be related to the agreed definition of sustainability, in this case set out in Section 4.1.1). It is necessary at this stage to refer back to whichever agreed definition of sustainable transport is being applied to understand which outcome it might reflect. If an indicator does capture an outcome then it is considered further, if it is an output or input then it is rejected and step one repeated with a new indicator.
3. An assessment is then made of the appropriateness of the outcome indicator against five criteria:
    a. Clearly defined - Where an indicator is not clearly defined it is rejected.

b. Controllable - Where the impacts of transport policy interventions are likely to be dwarfed by changes to an indicator than fall outside of factors which are controllable by the local/regional authority the indicator should be rejected. This is a grey area and the veracity of assumptions made here will only be borne out by practice in their implementation. Many outcome indicators will only be partially affected by transport interventions; this is the nature of integrated policy making.

c. Measurable – Where an indicator is not measurable, including by a suitable proxy measure it should be rejected.

d. Responsive – If an indicator is unlikely to respond in the short-term to policy changes then this should be noted although, by itself, this is not grounds to reject an indicator

e. Easy to understand – The indicator should be examined to ensure that it is presenting simple information. High degrees of aggregation of information can reduce the comprehensibility of an indicator and increase the risk of double counting of 'hidden' elements of that indicator.

Where an indicator scores positively across these aspects it should be accepted. Where sufficient doubt exists it should be rejected.

4. The indicator set that remains should be reviewed, looking for indicators that duplicate as measures for particular outcomes and looking for indicators that appear irrelevant in the circumstance considered and examining gaps in coverage.

5. Finally, the indicators should be examined for the scale at which it seems appropriate to measure and report on the indicators (local, regional, national or a subset of these) and for which 'pillar' of sustainability they belong most closely to. This forms part of a cleaning process to assess the apparent balance of the set of indicators selected.

Only at this stage will it become clear whether there are any outcomes which the organisation believes are important but for which no current indicators are available that could be applied. This would then enable a needs-led identification of any additional indicators to be undertaken. We have not conducted that exercise here but would wish to do so as part of the feedback process on this draft specification and through the case studies within DISTILLATE across all of the projects.

4.3 Indicator selection demonstration

This section applies the criteria above to a small sample of indicators to demonstrate how the assessment process has been applied.

4.3.1 Relevant to transport?

Note that this decision does not involve any judgement on the quality of the indicator, only its relevance. Table 4 shows two examples of indicators that have passed and failed the assessment of relevance to transport.

Table 4: Indicator relevance assessment example

Relevant		Not relevant	
Indicator	Indicator set	Indicator	Indicator Set
Travel to work (mode)	Local Quality of Life	Adult literacy/numeracy	Quality of Life
Carbon dioxide emissions	Regional Quality of Life	Planning applications in 8 weeks	CPA BVPI

4.3.2 Outcome indicator?

This decision involves an assessment as to whether the indicator constitutes a measure of a key sustainability outcome. Note that outputs (or what the Department for Transport sometimes refers to as intermediate outcomes) are rejected at this stage although may subsequently be adopted through the process outlined in Section 2 when no suitable outcome indicator can be identified.

Table 5: Indicator outcome assessment example

Indicator	Indicator set	Type of indicator			
		Outcome	Intermediate Outcome	Output	Input
Child killed and seriously injured casualties	Mandatory LTP and BVP199y	✓			
Mode share of journeys to school	Mandatory LTP		✓		
Bus kms per year	APR guidance			✓	
Average fuel consumption of new cars	Quality of Life				✓
Health Inequalities	Quality of Life	✓			
Amount of secondary/recycled aggregates used compared with virgin aggregates	Quality of Life				✓

4.3.3 Indicator quality acceptable?

This section shows the assessment of indicator quality. It is the most subjective element of the process. Whilst it can be seen that transport has a contribution to both community spirit and countryside quality for example, it is felt that both of these indicators have difficulties in both definition and ease of understanding. They should therefore be rejected and, if deemed important, a more transport focussed related indicator considered for development and application.

Whilst consumer expenditure has a substantial transport element the degree to which it is controllable as a result of local transport interventions is very small for most income groups. Other factors such as comparative prices of other goods, inflation, oil prices etc. make this an indicator with a lack of controllability.

Table 6: Indicator quality acceptable example

Indicator	Clearly Defined	Controllable	Measurable	Responsive	Easy to Understand	Selected
Community spirit	No	Partial	Yes	No	No	No
Congestion (vehicle delay)	Yes	Yes	Yes	Yes	Yes	Yes
Consumer expenditure	Yes	No	Yes	No	No	No
Countryside quality	No	Partial	Yes	Yes	No	No
Days when air pollution is moderate or higher	Yes	Partial	Yes	Yes	Yes	Yes

4.4 Final outcome indicator list

Section 4.1 established the process for selecting outcome indicators relevant to sustainable transport and Section 4.2 demonstrated how this process has been put in to practice. This section provides the draft list of sustainable transport outcome indicators developed by the DISTILLATE project team using the methodology set out above.

4.4.1 UK indicator sets reviewed

It is re-emphasised that the selection of indicators is based on an assessment of only those indicator sets that are currently in existence and in use in some way by the local, sub-regional and regional partners in the project. This should avoid 'indicator proliferation' across the organisations. The indicator lists used were:
- Mandatory LTP indicators (Department for Transport, 2004)
- LTP APR Guidance
- Headline/National/ (DETR, 1999) Regional (DEFRA, 2004) and Local Quality of Life Indicators (DETR, 2000)
- Regional Spatial Strategies (ODPM, 2004a)
- European Common Indicators (EU, 2003)
- Sustainable Communities (ODPM, 2004b)
- Comprehensive Performance Assessment (Audit Commission, 2004)

4.4.2 Sustainable Transport Outcome Indicator List

Table 7 below shows the complete list of key outcome indicators along with an indication of the relevant pillar of sustainability and the scales over which it would be most appropriate to report on this. Also included are the intermediate outcome indicators that support these key outcomes.

The list was derived from assessments made by three researchers independently. There was a large degree of agreement across the three independent sets, lending

confidence to the process described above. However, it must be acknowledged that absolute agreement across all of the different variables for each indicator is unlikely.

4.5 Discussion

4.5.1 What does the indicator set suggest?

The Table above suggests 26 'key outcomes' and 40 'intermediate outcomes'. There are 17 mandatory LTP indicators which would suggest an additional 49 currently deployed indicators are capable of being used as part of a comprehensive sustainability assessment. Other transport related intermediate outcomes, suggested in the run up to LTP2 but not made mandatory, could also be added. Whilst this may initially be seen to be a considerable extra burden it is worth noting that many of the environmental indicators will, in any case, have to be assessed as part of the requirements of the SEA Directive. We have also proposed a method for prioritising between the selection of indicators that perform broadly the same role so that it should be possible to select a list of between 20 and 40 indicators (which the Department for Transport's LTP2 guidance suggests is optimal for performance management purposes).

What the indicator set does suggest is that it is possible, within existing monitoring regimes and requirements to provide a comprehensive coverage of sustainability within the Local Transport Plan process. There are issues still outstanding such as which indicators might be best monitored at a regional level and which at a local level and how they should be collected. Other parts of this project are seeking to address some of these gaps.

4.5.2 Is it a definitive guide?

Table 7 represents our best attempt at linking intermediate and key outcomes. However, linkages exist of varying strengths between these levels and different authorities may place different levels of emphasis on these links which would lead to a slightly different list of intermediate measures. The nature of our understanding of sustainability is also evolving so we suggest that Table 7 be viewed as a common starting block for fine tuning at a local level rather than being seen as the definitive set of indicators.

Table 7: Outcome indicators list

Environment				
ECMT area	Key outcome	Current Indicator	Intermediate Outcome	Current Indicator
Limits emissions within planet's ability to absorb them	CO2 emissions by end user/per capita	QoL N3	Change in area wide road traffic mileage	LTP2
	Local CO2 emissions	Audit commission Local quality of life indicators		
	Acidification		Annual average nitrogen dioxide concentration	QoL P2
			Annual sulphur dioxide emissions	QoL P1
Protects human health	Days when the pollution is moderate or high	QoL H10 LTP8	Emissions of particulate matter	QoL P2
	Number of days when air pollution is moderate or higher for PM10			
	For rural sites, number of days per year when air pollution is moderate or higher for ozone		Change in area wide road traffic mileage	LTP2
Uses of renewable resources	Energy Efficiency of transport industry/economy	QoL D15 QoL A2	Change in area wide road traffic mileage Mode share of journeys to school Congestion (vehicle delay) Public transport patronage	LTP2 LTP4 LTP7 BVPI102
Minimises noise generation	People rating the level of transport related noise as unacceptable	LTP APR Guidance	Noise levels	TAG UNIT 3.3.2 National QoL k8
			Change in area wide road traffic mileage	LTP2
Minimizing the impact on land/ water	Net loss to sites of importance (historical)	TAG UNIT 3.3.9	Buildings of grade 1 or grade II at risk of decay	QoL K5
			Loss or damage to historic landscapes and their settings	Sustainability Appraisal of regional spatial strategies
			Loss or damage to historic view lines and vistas	Sustainability Appraisal of regional spatial strategies
			Loss or damage to listed buildings and their settings	Sustainability Appraisal of regional spatial strategies
			Loss or damage to scheduled ancient monuments and their settings	Sustainability Appraisal of regional spatial strategies
	Net Loss to land	TAG UNIT 3.3.7	% of conservation area demolished or otherwise lost	Sustainability Appraisal of regional spatial strategies
			Construction and demolition waste going to landfill	Sustainability Appraisal of regional spatial strategies

ECMT area	Key outcome	Current Indicator	Intermediate Outcome	Current Indicator
	Net Loss to Habitat/ air pollution/ loss of land	TAG UNIT 3.3.10	Net change in natural/ semi natural habitats	Sustainability Appraisal of regional spatial strategies
			Changes in populations of selected characteristics species	
			Population of wild birds	National QoL H13
	Net loss to water	TAG UNIT 3.3.11	River lengths of good or fair chemical quality	National QoL H12
			Biodiversity in coastal/ marine areas* for coastal sites only	QoL R3

Economy				
ECMT area	**Key outcome**	**Current Indicator**	**Intermediate Outcome**	**Current Indicator**
Supports a competitive economy	• Total output of the economy (GDP and GDP per capita) • Regional GDP/GVA	QoLc H1	Congestion - average time lost per vehicle km	LTP7
Supports balanced regional growth			Work Fatalities and injury rates; working days lost through illness	QoLc C10
			Real changes in the cost of transport	QoLc T4
			Principal Road Condition	BVPI 196
Operates efficiently	Transport efficiency	Webtag Methods	Congestion - average time lost per vehicle km	LTP 7
			Bus Punctuality	LTP 5
			Pedestrian Delay (access of pedestrian crossing facilities)	BV 165

Social				
ECMT area	**Key outcome**	**Current Indicator**	**Intermediate Outcome**	**Current Indicator**
Meeting society's needs safely	Total killed and seriously injured casualties	BVPI99(x)	Principal Road Condition Non-principal Classified Road Condition Unclassified Road Condition Footway condition	BVPI 196 BVPI97a BVPI97b BVPI87
	Child killed and seriously injured casualties	BVPI99(y)		
	Total slight casualties	BVPI99(z)		
	Death rates from cancer, circulatory disease, accidents and suicides	QoLc F1	Cycling trips (annualised index)	LTP3
	Fear of crime	QoLc k9		
	% of residents surveyed who feel 'fairly safe' or 'very safe' after dark whilst outside in their local area	BVPI QB Q36		
	% of residents surveyed who feel 'fairly safe' or 'very safe' during the day whilst outside in their local area	Audit Commission voluntary quality of life indicators		

Category	Description	Source	Indicator	Code
	People who think it is easy and safe to walk in their area	LTP APR		
Quality of life	% of residents who are satisfied with their neighbourhood as a place to live	QoL 18	Footway condition	BVP187
	Average satisfaction with the local community	European common Indicators		
End user satisfaction			% of highways that are either of a high or acceptable level of cleanliness	QoLc 34
			Bus Satisfaction	BVPI 104
			Rail passenger satisfaction	Methodology as bus
			% of users satisfied with local authority provided district transport services	BVPI Gen QB Q16
			Principal Road Condition Non-principal Classified Road Condition Unclassified Road Condition Footway condition	BVPI 196 BVPI97a BVPI97b BVPI87
Basic Access	Social participation/ sport/ learning	QoLc J4	% of rural households within 13 min walk of an hourly or better bus service	LTP APR
		Appraisal of regional spatial strategies	Working age people in workless households (access to employment)	QoLc C5
			% of residents defined as within a distance of 500m (15min walk) of key local services	QoLc 22/ BVPI QB Q6
Fairness	Accessibility	LTP requirement	% of a) households b) households without access to a car within 30 and 60 minutes of a hospital by public transport % of a) households b) households without access to a car within 15 and 30 minutes of a GP by public transport	LTP1 accessibility
			Changes in peak period traffic flows to urban centres	LTP6

4.5.3 Is it comprehensive?

The remit from our DISTILLATE case study partners was to confine ourselves to the existing sets of indicators and this we have done. There are clearly opportunities for other indicators to be deployed. To illustrate the degree to which the current indicators do not cover the full range of options a comparison has been made with a recent summary of practical indicators for sustainable transportation planning proposed by Litman (2005). Indicators that are not included that could form part of a sustainability assessment include:

- Use of fossil fuel energy for all transport
- Total motorized movement of freight
- Urban land use per capita
- Index of relative household transport costs
- Index of relative cost of urban transport
- Index of energy intensity of cars and trucks
- Percent of passenger-kms and tonne-kms fuelled by renewable energy
- Percent of labour force regularly telecommuting

Many of these are intermediate indicators and some would not require substantial extra data collection, rather reinterpretation of existing databases. It may be easier and more meaningful for some of these indicators to be calculated at a regional rather than a local level. Freight indicators are particularly difficult and generally ignored yet this is an area of growing importance.

A further recent study (Marsden et al., 2005) has also highlighted the difficulties with applying meaningful social indicators. For an indicator to have a target attached to it then it is usual for there to be a factual basis upon which to base the threshold. When it comes to issues of social progress, policy documents are vague about measures of and the level of transport disadvantage that is acceptable. The nearest to this approach at the moment is the disaggregation of accessibility by bus and car user. Such thresholds could be set as guidelines nationally but would require consideration and local focus put on them for them to be realistic and meaningful.

We therefore suggest that there is room to change the list of indicators that we use to assess sustainable outcomes. The degree to which this is desirable will depend on the costs of monitoring new indicators and the benefit this brings. Each indicator should be evaluated on its own merits. However, there is clearly scope to replace some of the existing indicators (or simply to combine them) to produce a better list for a similar outlay of effort and resource.

5 Application and Feedback

5.1 Answering the research brief

The research brief for this project was to:
- complement the scoping study review of indicators with a survey of local authorities' experience in measuring, predicting and using indicators;
- determine the extent to which current indicators correspond to stakeholders' understanding of sustainability and quality of life;
- specify the requirements for a core set of indicators at each stage in the decision-making process; and
- identify a core set of outcome indicators that best meets those requirements

The survey work identified a set of concerns surrounding the ways in which indicators are applied in practice. Eight aspects of indicators scored importance levels between fairly and very important and levels of satisfaction between not satisfied and fairly satisfied. These aspects of indicator selection would therefore appear to be of greatest concern to the practitioners. In order of importance, these were:
1. Their use in the development of well-founded targets
2. Cost effectiveness of monitoring
3. Ability to capture year-on-year improvements
4. Ease of measurement
5. Ease of understanding by politicians
6. Ease of understanding by the general public
7. Poor Consistency between transport and planning indicators
8. Poor Consistency between transport and sustainability indicators

Whilst the current set of indicators being used in local transport planning did not typically correspond well to the local authorities' perceptions of what sustainability is, some of what is measured is seen to count towards sustainability.

There are therefore several barriers to be overcome to the effective selection and measurement of indicators. One further area of concern that was investigated was the potential for indicator systems, through their role in driving performance changes, to lead to perverse incentives and outcomes. Smith (1995) identified eight unintended consequences of publishing public sector performance data which were; tunnel vision, sub-optimisation, measure fixation, myopia, complacency, misrepresentation, gaming[9] and ossification[10].

Where monitoring and strategy development are not well connected it appears that the performance management system will perform less well. If the indicators do not match well with the overall objectives then management action in pursuit of the indicators is likely to lead to distorted outcomes. Our review of the decision-making process determined that a common set of indicators, comprising a mixture of key outcome and intermediate outcomes, is desirable for application through the option

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[9] Gaming refers to the act of deliberately distorting the performance measure to gain some strategic advantage
[10] Ossification refers to an n unwillingness to change a set of performance measures once they have been set up

generation and strategy formulation, testing and appraisal process as well as for use in monitoring the success of strategy delivery.

We have proposed a core set of outcome indicators (key and intermediate) for use across the strategic decision-making process. The suite of indicators is drawn from only those indicators already in use but provides a fuller coverage of sustainability issues than could be achieved by using just those mandatory indicators set out in the LTP2 guidance. We have also proposed a method for prioritising the selection of these indicators. Not all of them are appropriate for each area nor would it be resource efficient or necessarily useful to monitor them all.

It is not yet clear if or where, within any given local authority, some of the broader 'non-core' transport indicators are collected. The second round of LTP submissions may also bring forward a raft of locally specified indicators that may prove superior to those selected from the national lists considered in this report. Through case study investigations in 2006 we intend to investigate these issues further and update the outputs of this report accordingly.

5.2 Putting the framework into practice

In suggesting that the suite of indicators be used across the decision-making process it is important to recognise that there are some barriers to doing so:
1. It is not clear how options can be generated for strategies that best improve the indicators proposed;
2. Traditional transport models do not produce estimates of some of the indicators; and
3. Some of the indicators are not familiar to local authorities
4. Many of the indicators fall outside of the LTP2 mandatory indicators so their adoption with insufficient baseline information as part of an LTP2 strategy may seem risky given the need to demonstrate performance against targets.

5.2.1 Option Generation

Project B is looking at ways to enhance the ways in which strategy and scheme options are formulated. One tool which could be applied is the existing KonSULT knowledge base (see below for screenshot).

Problem	Adelaide O-Bahn	Leeds Superbus
Congestion-related delay	XXXXX✔✔✔✔	XXXXX✔✔✔
Congestion-related unreliability	XXXXX✔✔✔✔	XXXXX✔✔✔
Community severance	XXXXX✔✔✔✔	XXXX✘✔✔✔✔
Visual intrusion	XXXXX✔✔✔	XXXX✘✔✔✔✔
Lack of amenity	XXXXX✔✔✔	XXXXX✔✔✔✔
Global warming	XXXXX✔✔✔	XXXXX✔✔✔
Local air pollution	XXXXX✔✔✔	XXXXX✔✔✔
Noise	XXXXX✔✔✔✔	XXXXX✔✔✔✔
Reduction of green space	XXXXX✔✔✔✔✔	XXXX✘✔✔✔✔
Damage to environmentally sensitive sites	XXXXX✔✔✔✔	XXXXX✔✔✔✔
Poor accessibility for those without a car and those with mobility impairments	XXXXX✔✔✔	XXXXX✔✔✔
Disproportionate disadvantaging of particular social or geographic groups	XXXXX✔✔✔✔	XXXXX✔✔✔✔
Number, severity and risk of accidents	XXXXX✔✔✔✔	XXXXX✔✔✔✔
Suppression of the potential for economic activity in the area	XXXXX✔✔✔	XXXXX✔✔✔

✔ = Weakest possible positive contribution, ✔✔✔✔ = strongest possible positive contribution

✘ = Weakest possible negative contribution ✘✘✘✘✘ = strongest possible negative contribution

XXXXX✔✔✔✔ = No contribution

Figure 3: KonSULT screenshot (Guided bus performance)

This currently links transport policy measures to both problems and objectives and provides detail of the performance of the policy measures. The knowledge base is now being extended to include around 10 of the mandatory LTP2 indicators to enable practitioners to identify tools that seem best able to maximise performance against particular indicators. One of the advantages of KonSULT is that it also provides extensive coverage of the likely impacts on other aspects of policy which could help to reduce the negative side effects of organisations focussing on just the indicator in question.

5.2.2 Modelling indicators

Whilst many of the indicators have traditionally been included as standard within many transport models (flows, emissions, bus patronage) others (including bus reliability, noise levels, accessibility and equity based indicators) are not or are available but as part of discrete modelling processes (e.g. accessibility models are typically separate to traffic assignment models). Table 1 summarises the indicators not currently covered by the main strategic models and suggests, where sources exist, how changes to these indicators might be forecast.[11]

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[11] Whilst the full list of indicators can be monitored, the ability to forecast these indicators for planning purposes is the focus of this section.

Table 1: Indicators not modelled using strategic models

Indicator	Source
Losses to biodiversity	Existing heritage/environment data sources
Principal road condition	Condition monitoring databases
Bus punctuality	Microsimulation
Pedestrian delay	-
User satisfaction	-
Personal safety/security	-
Accessibility (as defined by DfT)	Accessibility modelling tools

There is an opportunity to modify existing models within Project F to respond to the needs of local authorities and modifications to some of the existing indicators to align them more closely with LTP indicators could be undertaken as well as exploring the indicators that are less well represented.

5.2.3 Adopting new indicators

Although the list of key and intermediate outcome indicators has been selected from existing indicator lists, many will not be commonly employed by local authorities (As suggested by our survey findings). There is therefore an information barrier to be overcome to enable interested authorities to consider the appropriateness of the indicators and how they might measure or model them. One approach to overcome this would be to provide details on the indicators in a web repository such as Webtag. This would be structured by key and intermediate outcomes and would provide links between the two. The repository would contain details of what and how to monitor the indicators, sources of guidance on their use, available modelling tools and known issues with the application of the indicator. Two example pro formas of such an approach are provided in Annex A. The consultation on this document did not receive any significant support for this suggestion.

5.2.4 New indicators and LTP2

It is clear from our discussions with local authority partners that the existence of baseline information is essential to the ability of an authority to set meaningful targets and to have confidence in the ability of different policy tools to impact on the indicators. This would therefore appear to mitigate against the inclusion of new/unfamiliar indicators within LTP2 where performance will be assessed against the range of outcome indicators put forward. Whilst it would be possible to establish baselines over the LTP2 period for inclusion in LTP3 there appears little incentive to do so and the same barrier may exist five years hence. One of the purposes of DISTILLATE is to seek to overcome barriers to improving the sustainability of transport and land-use planning. There are several possible approaches that would allow the introduction of new indicators in a low-risk manner such as including periods where baseline data is established and measures are excluded from performance assessment processes or rewarding the inclusion of exploratory indicators developed through this, or other, researched programmes.

5.3 Improving monitoring of indicators

Project C will move forward through the conduct of four case studies with the DISTILLATE partners:

- What and how should we monitor at the Regional level? – Yorkshire and Humber Assembly
- The integration of land-use and transport indicators in housing decisions – Surrey County Council
- Assessing employment outcomes and accessibility indicators – Merseytravel
- How can transport indicators and other data collection within authorities work together better? – A review of several authorities

These case studies will each examine the application of the framework in a different context which will help to further refine and improve it.

Resource also exists to test new methods of collecting data for indicators. The key candidates for these trials are:

- Making better use of floating car data (ITIS congestion data)
- Improving walking and cycling monitoring

This work will be taken forward in 2006.

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ANNEX A – Indicator Pro forma

Outcome Pro Forma

Indicator: *National and Regional GDP / GDP per capita*

Mapping to S.D. statement:

A sustainable transport system is one that:
'Is affordable operates fairly and efficiently, offers a choice of transport mode, and supports a competitive economy, as well as balanced regional development' (ECMT, 2001)

Sustainable development is:
"Economic and social development that meets the needs of the current generation without undermining the ability of future generations to meet their own needs" (WCED, 1987)

Current Usage:
Used in the following indicator sets:
PSA Target 2 Regional Economic Performance
http://www.odpm.gov.uk/stellent/groups/odpm_about/documents/page/odpm_about_600099-02.hcsp

DEFRA (2005) UK Government Sustainable Development framework indicators
http://www.sustainable-development.gov.uk/performance/framework.htm

ODPM (2004) Sustainability Appraisal of Regional Spatial Strategies and local Development Frameworks. Consultation paper.
http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_030923.pdf

DETR (1999) Quality of Life counts
http://www.sustainable-development.gov.uk/sustainable/quality99/index.htm

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Scale Issues:
Indicator is currently collected used at the regional and national levels

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Likely Temporal Response:
Data is collected all year round .

Data Requirements:
National GDP (Gross Domestic Product) The Office for National Statistics publishes methodology and National GDP figures.
http://www.statistics.gov.uk/CCI/nugget.asp?ID=56&Pos=4&ColRank=1&Rank=294

Regional GVA (Gross Value added)- The Office for National Statistics publishes regional measurements of GVA per head.
http://www.statistics.gov.uk/CCI/article.asp?ID=573&Pos=1&ColRank=2&Rank=2 24

Modelling requirements:
In terms of transports impact on GDP this can be measured using the proxy of net benefits as measured by webtag (2005) methods
www.webtag.org.uk

Regional economic models are currently being developed to measure the direct impacts of transport on GDP.

Connecting intermediate outcomes:
Congestion
Work Fatalities and injury rates; working days lost through illness
Real changes in the cost of transport

Examples of existing use:

Current targets:
HM Treasury PSA 1 - Demonstrate progress by 2004 on the Government's long-term objective of raising the trend rate of growth over the economic cycle from the current estimate of 2.5% and make further progress towards increasing trend growth up to 2006.
http://www.hm-treasury.gov.uk./media/E8C84/psa02_ch17.pdf

Intermediate Outcome Proforma

Indicator: *Congestion - Change in average vehicle delay in the morning peak period (seconds lost per vehicle km).*

Linked to following key outcomes: *GDP / GDP per Capita, Transport efficiency, Energy Efficiency of transport industry/economy*

Current Usage:
Congestion is currently a Mandatory LTP2 indicator for certain localities.
http://www.dft.gov.uk/stellent/groups/dft_transstats/documents/pdf/dft_transstats_pdf_034290.pdf

It measures the average time lost by a vehicle travelling one kilometre and is derived from the difference between observed journey times and those that could be achieved in the absence of congestion (in free flow conditions). The journey times are flow weighted so as not to give undue importance to less busy roads. The network to be measured includes all roads with more than 10,000 daily flows or of strategic importance.

Scale Issues:
Only mandatory for LTP2 for metropolitan areas and urban areas with populations over 250,000

Likely Temporal Response:
Yearly

Data Requirements:
Measured annually on key routes using ITIS journey time and National Traffic census data to be supplied by DfT or other traffic data collected locally

Modelling Requirements:
The total delay encountered on the link/ route/ network (from the difference between actual speeds and a free flow reference speed)
divided by
the volume of traffic expressed as vehicle kilometres travelled.

Proxy indicators:

Examples of existing use:

Current Targets:
Congestion targets are being set in LTP2 for; West Midlands, South Yorkshire, West Yorkshire, Merseyside, Greater Manchester, Tyneside, Bristol, Leicester and Nottingham.

References: