

## Improving Decision-making for Sustainable Urban Transport: An Introduction to The DISTILLATE Research Programme

**Anthony May**

Institute for Transport Studies, University of Leeds, England<sup>1</sup>

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The policy measures needed to achieve more sustainable urban transport systems are now well understood. However, there remain serious barriers to the development and delivery of effective strategies. These include split responsibilities, lack of clarity in the policy process, inappropriate financing rules, lack of data and skills, limited public support and lack of political resolve. The series of papers in this special issue describe the research undertaken in an integrated research programme, DISTILLATE, which has developed a set of decision-support tools designed to help overcome these barriers. This paper outlines the context of the programme, which was conducted with sixteen local authority partners involved in the UK Local Transport Plan process. It describes the research approach, which focused on the barriers which were of the greatest importance to practitioners and the most researchable, and which used case studies, and action research, to understand problems and test solutions. It outlines the more detailed analysis of the barriers faced by local authorities. This demonstrated that the policy measures which were the most important were the most difficult to implement, and that the problems in doing so arose in all six technical areas of the research programme: monitoring, option generation, finance, prediction, appraisal and coordination. It also emphasised the need to distinguish between strategy development and scheme design. The paper describes the approach adopted to developing and testing the programme's 19 products for strategy development and scheme design, and the overarching decision-support tool developed to aid their dissemination. It concludes with an assessment of the growing challenges in urban transport policy and of the need to improve the take-up of decision-support tools.

*Keywords:* Urban transport policy; decision-support tools; strategy development; scheme design; dissemination

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<sup>1</sup> Leeds, LS2 9JT, T: +441133436610, F: +441133435334, E: [a.d.may@its.leeds.ac.uk](mailto:a.d.may@its.leeds.ac.uk)

## 1. Introduction

Many governments are now advocating the development of sustainable urban transport systems, and the European Commission has issued a Green Paper on the pursuit of such a policy for all European cities (EC, 2007). But the concept of sustainability is still being interpreted in widely differing ways, leading to different policy recommendations. Moreover, while there is agreement on what constitutes a potentially sustainable transport strategy, as in recent work by the then European Conference of Ministers of Transport (now the International Transport Forum ([www.internationaltransportforum.org](http://www.internationaltransportforum.org))) (ECMT, 2006), it is clear that there are significant barriers to implementing such strategies.

The concept of sustainability was introduced by the Brundtland Commission in 1987 as an approach which meets the needs of the current generation without reducing the ability of future generations to meet their needs (Brundtland, 1987). However, this concept has since broadened to one which encompasses environmental sustainability, social sustainability and economic sustainability (Lautso et al, 2004). Most policy statements define these terms in more detail by presenting a list of more specific strategic objectives, which between them address the three planks of sustainability. These include (ECMT, 2000; EC, 2007; Hull, 2009):

- environmental: reducing global warming, air pollution, noise, land consumption, waste and ecological damage
- social: improving access, health, safety and equity within and between generations
- economic: enhancing wealth, efficiency and affordability and reducing congestion.

Against these objectives, the European Green Paper demonstrates clearly that current urban transport is far from sustainable (EC, 2007). Indeed, the decision of the Commission to focus on urban transport is itself an indication of the severity of these problems. The Commission and its member states had long argued that urban transport is a matter for local and, at most, national governments, and that under the principle of subsidiarity the Commission should not intervene. However, as its Green Paper points out, with cities accounting for 60% of Europe's population and 85% of its economy, such problems are of direct concern to Europe as a whole.

The Commission is expected, in its anticipated Action Plan, to advocate the development of sustainable urban transport strategies in all European cities. Some countries, such as France with its *Plans de Déplacements Urbains* (Offner, 2006), and England, with its Local Transport Plans (DfT 2004), have already implemented such arrangements. As early as 1995, the European Conference of Ministers of Transport (ECMT, 1995) had focused attention on the importance of improvements in public transport, better management of road space and controls on the demand for car use as the key elements in a sustainable urban transport strategy. Subsequent research identified the key contributors as improvements to public transport services and fares, pricing of urban car use, low cost improvements in road capacity and more concentrated land use development (Lautso et al, 2004; May et al, 2005a). Hull (2009) lists a similar specification from the European Commission's Working Group on urban transport, and a more radical approach which would require more substantial behavioural change.

A subsequent review (ECMT, 2002), however, concluded that the implementation of such sustainable transport strategies was "more easily said than done". The review highlighted as the principal barriers poor policy integration and coordination, counterproductive institutional roles, unsupportive regulatory frameworks, weaknesses in pricing, poor data quality and quantity, limited public support and lack of political resolve. This led in turn to the publication of a set of Key Messages to national governments, who were seen as crucial in enabling and supporting local government initiatives (ECMT, 2002). A follow-up to that study confirmed its findings and

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identified a further barrier of weaknesses in the process of policy formulation (ECMT, 2006; May and Crass, 2007). It sent a further key message that “national governments should support local or regional authorities through technical, financial or other means as necessary and appropriate in the development, appraisal, monitoring and evaluation of integrated, sustainable, urban travel strategies”. Similar conclusions on the nature of the barriers facing urban transport planners, and on ways of overcoming them, have arisen in European research programmes, including MARETOPE ([www.tis.pt/projects/maretope](http://www.tis.pt/projects/maretope)), PROSPECTS ([www.ivv/tuwien.ac.at/projects/prospects](http://www.ivv/tuwien.ac.at/projects/prospects)), and TRANSPLUS ([www.transplus.net](http://www.transplus.net)).

There has been relatively little research into the detail of these barriers to sustainable transport strategies or, more importantly, into ways of overcoming them. This special issue reports, in a series of papers, on a UK research programme, DISTILLATE (Design and Implementation Support Tools for Integrated Local Land use, Transport and the Environment), which carried out research into six barriers deemed of particular importance to UK local authorities, and developed a series of products designed to support local authorities in their decision-making.

This paper provides an introduction to the research programme and the UK context in which it was conducted. It reviews the barriers identified in the initial stages of the research, their prioritisation, and the basis of the research conducted into the six selected priority barriers. It then outlines the 20 products of the research, their contribution to the policy cycle and the approach adopted to disseminating them. Finally it draws some conclusions for policy.

## 2. The approach adopted in the UK

The United Kingdom has a long history of providing support for local transport plans. In 1973 it introduced a requirement for all local transport authorities to produce annual Transport Policies and Programmes (May, 1994). In the early stages these were required to adopt a holistic approach, but changes in government policy and financial restrictions gradually led to their being limited to the funding of “(infrastructure) schemes of more than local importance” (May, 1994). The new Labour Government in 1998 decided that these needed to be replaced by a process which was more objective-led, encouraged integrated transport strategies, promoted a consultative approach to strategy development and gave greater flexibility and continuity of funding (DETR, 1998). The new system of Local Transport Plans was introduced in England outside London in 2000 (DETR, 2000) with similar arrangements in London and in the by then devolved governments of Scotland and Wales (Marsden and May, 2006).

The first round of English Local Transport Plans covered the period from 2001 to 2006, and followed a highly prescriptive process in which local authorities were required to specify their objectives, strategy, proposed schemes and implementation plans, and set themselves targets to be achieved over the five year period (DETR, 2000). They were subsequently assessed against those targets, which determined in part the funding which they received (DfT, 2006). In parallel, the government commissioned an evaluation of the LTP process which produced an interim report in 2005 (Atkins, 2005) and a final report in 2007 (Atkins, 2007). The interim report concluded that the LTP process had been welcomed by local authorities, that it had introduced a step change in the level of consultation and partnership working, that local authorities were using long term funding more effectively, and that there had been a focus on wider policy goals and on support for sustainable transport modes. However, it also highlighted a series of weaknesses, including conflicts between transport plans and those for other public policy sectors, managerial and political barriers to cross-boundary working, lack of integration between transport and land use planning, a weak evidence base and limited expertise in setting targets, reluctance to share good practice, limitations of staffing and skills, and inappropriate financial and political structures (Atkins, 2005). These match closely the barriers identified by the ECMT, and provided an important input to the identification of barriers within DISTILLATE.

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The final report reinforced the positive impacts of the LTP process, but identified weaknesses in option generation, and particularly in the use of demand management measures, in achieving national targets, in balancing capital and revenue funding, in the delivery of major schemes, in the fragmented decision-making structure in some local authorities, and in the lack of powers over public transport operators. It identified the pursuit of alternative funding sources, a focus on partnership working and effective performance management as the key enablers of success (Atkins, 2007).

A second round of LTPs was submitted in early 2006 (DfT, 2004). Nine criteria were used to assess them (DfT, 2006), including an assessment of the extent to which local authorities were tackling the four "shared priorities" (accessibility, congestion, air quality and road safety) specified by the Department for Transport. It appeared from the evaluation that the process for this second round of LTPs had overcome some of the limitations of the first, but that there were greater tensions between national and local priorities and continuing inconsistencies between transport and other sectors of public policy (Atkins, 2007).

### **3. The research approach**

The DISTILLATE research programme was funded under the UK Engineering and Physical Sciences Research Council's Sustainable Urban Environment initiative, which placed a particular emphasis on research which met the needs of practitioners. It also sought research proposals which were multi-disciplinary, reflecting the complex nature of the problems to be tackled, and multi-institutional, given a concern that no one institution might have the critical mass of research skills needed. The DISTILLATE programme responded to these challenges by involving local authorities and related actors directly in the research programme, as described more fully below, and by bringing together the research skills of two interdisciplinary transport research groups, a planning school, a policy-oriented research centre, and a national research establishment. In its original concept, the initiative was also designed to encourage interaction between the different sectors covered, including buildings, spatial planning, transport, water and waste. Unfortunately such collaboration was not subsequently encouraged, and there therefore remains a research challenge to investigate the potential for common, and integrated, approaches across sectors. The need for such collaboration is reflected in three of the papers in this special issue (Hull, 2009; Marsden and Snell, 2009; Forrester, 2009).

DISTILLATE was designed to help overcome those barriers to decision-making which were judged to be most serious, and most amenable to research-led solutions. It set itself a vision of helping to achieve a step change in the way in which sustainable urban transport and land use strategies are developed and delivered. It attracted participation from 16 local authorities, who between them reflected many of the different types of local government structure in the UK (Marsden and May, 2006). These included two unitary authorities; three unitary authorities which had adopted informal collaborations with adjacent local authorities; two shire counties; four metropolitan districts; three passenger transport authorities (PTAs); and two regional bodies. While unitary councils combine transport and planning powers, in shire counties planning is the responsibility of lower tier district councils. Metropolitan districts also combine transport and planning powers, but public transport is coordinated across the conurbation by the PTA. The two regional bodies differed in the powers available to them; the one in England had a purely advisory role, while that in Scotland was closer in its role to a PTA. A decision was taken not to include local authorities in London, whose decision-making processes had been greatly enhanced by the creation of the Greater London Authority (Marsden and May, 2006).

An initial scoping study was conducted in which the 16 local authority partners and the research team jointly developed a long list of some forty potentially researchable issues. These were assessed in terms of their likely contribution to the desired step change, the feasibility of

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researching them and the extent to which they might form a coherent research programme. The resulting shortlist was then grouped into nine priority research areas which were of most importance to local government and could be the focus of an integrated multi-disciplinary research programme, as listed below:

1. to document and review the barriers to the delivery of sustainable strategies (Hull, 2009);
2. to provide guidance on the development of an effective set of core indicators for use in strategy formulation, forecasting and appraisal (Marsden and Snell, 2009);
3. to develop new methods for generating appropriate strategy and scheme options (Jones et al, 2009);
4. to develop approaches for overcoming the financial barriers to effective implementation (Binsted and Paulley, 2009);
5. to enhance existing predictive models to reflect the impact of the wider range of policy instruments, and to facilitate interactive strategy development (Shepherd et al, 2009);
6. to improve the methods used for appraisal to reflect more effectively the requirements of sustainability (Page, May and Forrester, 2009);
7. to enhance the continued operability of implemented policies;
8. to improve the processes for involvement of stakeholders throughout the decision-making process; and
9. to support the more effective collaboration between the agencies responsible for transport strategy development, both within and between local authorities (Forrester, 2009).

Seven of these were selected for funding, but the Research Council elected not to fund areas 7 and 8. Each of the other seven forms the basis for a paper in this special issue, as illustrated by the references above. Six (2-6 and 9) were technical projects, while the first provided the contextual research for them.

The initial surveys conducted within the first research area (Hull, 2009) played a pivotal role in developing the detailed research approaches for the other six projects. They, the parallel work by consultants for the Department for Transport (Atkins, 2005), and a review of other studies, were used to generate a list of principal barriers to the development and delivery of sustainable transport strategies (Hull, 2009). These are shown in Table 1 grouped under the three headings of organisational, technical and external barriers. As Hull (2009) notes, the nature and intensity of these barriers changed somewhat over time, particularly as the experience of the second round of LTPs supplanted that of the more prescriptive first round. However, it was inevitably the first survey of barriers which determined the focus of the technical research programme.

On this basis, each of the six technical projects conducted a literature review, and produced a detailed research plan designed to enable it to develop tools and products which would help overcome those barriers (as shown in Table 1) which were particularly relevant to its objectives.

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**Table 1. The barriers identified by local authority partners (numbers indicate research areas which tackled each barrier (see Section 3); research in areas 7 and 8 was not funded)**

<b>Organisational</b>
Lack of inter-departmental working (9)
Pursuit of pet schemes (3)
Stakeholder numbers and diversity ((8))
Divided responsibilities (9)
Spatial boundaries (9)
Funding too focused on specific solutions (4)
Lack of revenue funding (4, (7))
Lack of option generation staff and skills (3)
Lack of modelling staff and skills (5)
Organisational change (9)
<b>Technical</b>
Number of indicators (2)
Inappropriate indicators (2)
Indicators which are difficult to measure (2)
Failure to use indicators in the policy process (2, 3, 5, 6)
Poor management of data (2, 5, 6)
Lack of understanding of certain impacts (2, 3, 5, 6)
Inability to model certain instruments (5)
Inability to appraise certain instruments (6)
Lack of trust and transparency in models (5)
Incomplete appraisal of certain objectives
Inconsistency between appraisal and targets (6)
Limited understanding of strategic environmental assessment (6)
Risk averse interpretation of national guidance (2, 3, 6)
<b>External</b>
Inconsistency in national, regional and local priorities (2, 9)
Lack of control of bus and rail operators (9)
Poor public acceptance of certain instruments (3, (8), 9)
Short termism in decision making (2, 3, 9)

The involvement of the 16 local authority partners in specifying the barriers to be researched was the first stage in a four year programme of partnered inquiry (Forrester, 2009). In the next stage they offered a series of practical case studies which helped illustrate these barriers. These case studies were selected to be relevant to one or more of the technical projects, and were used in three distinct ways. Some were used in an observational sense to understand the problems being faced. Others were laboratory case studies to help develop the decision-support tools. Others were comparator case studies which enabled the emerging tools to be tested. At the outset a total of 35 case studies were offered, on the clear understanding that some might not be available given changes in political priorities, and that others might emerge. The subsequent papers in this special issue provide some examples of the use of these case studies in an integrated programme of action research.

#### 4. The barriers and their implications for decision-making

It is informative to compare the identified barriers, and the research areas of which they form part, with previous studies of the barriers to sustainable transport. Table 2 lists the barriers identified in the earlier ECMT reports, and indicates those research areas within the DISTILLATE programme which contributed fully or partially to each.

**Table 2. ECMT barriers and the contributions of DISTILLATE research areas (numbers indicate DISTILLATE research areas (see Section 3); brief titles are provided in the table)**

ECMT barrier <sup>1</sup>	DISTILLATE Research Areas	
	Contributing significantly	Contributing partially
Institutional		9 (effective collaboration)
Process	2 (indicators) 3 (option generation) 5 (prediction) 6 (appraisal)	
Acceptability		3 (option generation) 9 (effective collaboration)
Information	2 (indicators)	3 (option generation) 4 (finance) 5 (prediction) 6 (appraisal) 9 (effective collaboration)
Financial	4 (finance)	
Legislative		

It is clear from the table that the DISTILLATE research programme has contributed more fully to some of the barriers identified by ECMT than others. Those which it has contributed most to are the process and information barriers. This is unsurprising, given that the discussions with local authorities focused very much on their decision-making processes and that information-related barriers were likely to be the most readily researchable. The other barrier directly addressed was that of lack of financial support. At the opposite end of the spectrum, none of the DISTILLATE research contributed directly to overcoming legislative and regulatory barriers, which require government intervention rather than research. Even so, three of the research areas helped to identify more specifically the limitations of the current regulatory structure, particularly as it affects public transport outside London (Hull, 2009; Binsted and Paulley, 2009; Forrester, 2009). None of the research contributed specifically to guidance on appropriate institutional changes, which is perhaps appropriate given the advice from research elsewhere that it is better to find ways of working more effectively within existing structures, through more effective collaboration, than to risk the disruption caused by institutional change (Marsden and May, 2006). However, the project on effective collaboration provided precisely the focus recommended in that research (Forrester, 2009). The Research Council's decision to reject the proposed research into stakeholder involvement limited the ability of the research to help overcome acceptability barriers. Even so, the development of option generation tools which take account of acceptability concerns, and of collaborative approaches which stimulate effective strategy formulation, will have helped.

The barriers, and the research areas to which they relate, can also be mapped onto the process of strategy formulation. Figure 1 shows one representation of that process, taken from the Decision-Makers' Guidebook on developing sustainable transport and land use strategies, which was financed by the European Commission (May et al, 2005b). It suggests that the starting point is the specification of objectives and indicators, and their use to identify current and future problems. These in turn are used to generate a set of possible policy instruments. The selection of policy instruments will be influenced by the barriers to their implementation (which the Guidebook lists as financial, technical, distributional and acceptability), as well as by their ability to overcome the problems identified. The policy instruments may be combined into a broader strategy, which in turn may help overcome some of the barriers to specific policy instruments (May, Kelly and Shepherd, 2006). Subsequent stages involve predicting the effects of the shortlisted instruments or strategies, potentially using related techniques to optimise the specification of those instruments and strategies, and appraising their performance as an input to decision-making. Once a chosen instrument or strategy has been implemented, regular performance monitoring

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and specific evaluation help assess the performance of the chosen policy, and hence assess whether the identified problems have been reduced.

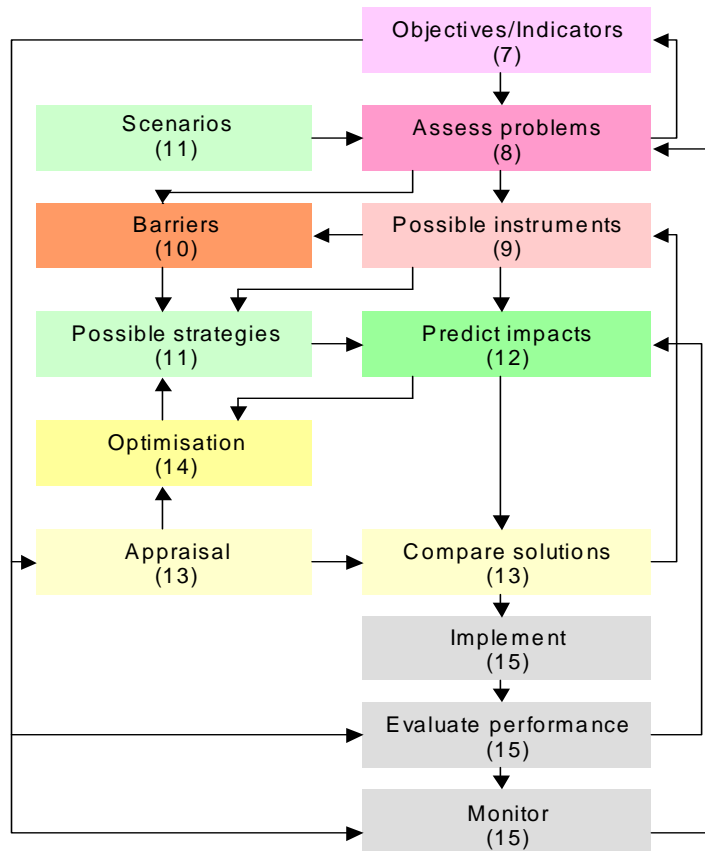


Figure 1. A representation of the policy process

Source: May et al (2005b)

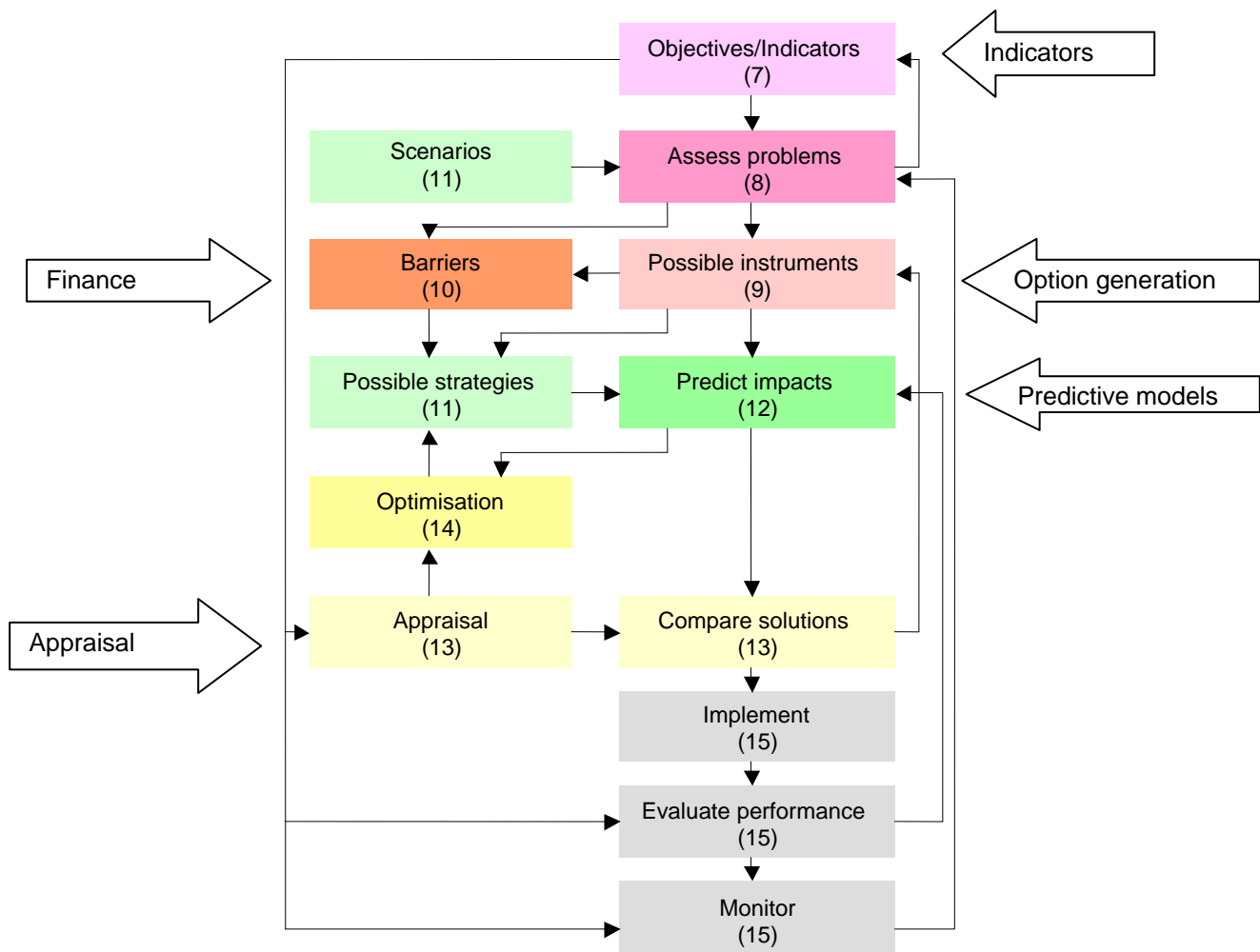
Figure 2 maps five of the six technical research areas in DISTILLATE onto this representation of the process. The project on indicators contributes directly to the specification of objectives and indicators. That on option generation supports the selection both of policy instruments and of strategies. That on finance contributes to reducing one of the principal barriers to policy selection. That on prediction contributes both to modelling and optimisation, while that on appraisal directly relates to the appraisal stage. The final project, on enhancing collaboration, contributes to the process as a whole rather than to any one stage in it.



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Key:  Indicators The contribution of the technical project on indicators

Figure 2. The role of the DISTILLATE research areas

The distinction drawn in Figure 1 between schemes and strategies became more specific in the course of the research. Guidance on the first round of Local Transport Plans (DETR, 2000) had already stressed the importance of developing an overall strategy, but had given little guidance on how to do so. It became increasingly clear that many local authorities were unclear as to the meaning of a strategy, and tended to think in terms of a set of separately specified and unconnected policies (Atkins, 2005). In parallel, guidance on strategy development was emerging from related research (Lautso et al, 2004; May et al, 2005a; May, Kelly and Shepherd, 2006). It became clear that local authorities could adopt a strategy-led approach, in which the strategy was defined broadly, and used to identify a set of more specific policy instruments, or a scheme related approach, in which individual policy instruments are selected and then packaged in ways which make them more effective. The principles of packaging, or integration, to achieve complementarity or to help overcome barriers, are discussed elsewhere (May, Kelly and Shepherd, 2006) and form a key input to one of the resulting option generation tools (Jones et al, 2009). To reflect this, the surveys in the project reviewing barriers (Hull, 2009) drew the distinction between strategy and scheme in the questions which it posed. Subsequently, the projects dealing with option generation, prediction, appraisal and, to a lesser extent, finance, all developed products designed to support both strategy development and scheme selection.

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Figure 3 (May, Page and Hull, 2009) summarises the early findings on the relative severity of these barriers. It indicates that funding was the most widely experienced problem, followed by problems with modelling and monitoring and evaluation. The other barriers were more frequently experienced when dealing with strategies rather than schemes. Strategy option generation and strategy appraisal were both problems for half the respondents, while only a minority experienced problems with scheme option generation, design and appraisal. These findings confirmed the case for the chosen technical research projects on monitoring, option generation, finance, modelling and appraisal. They also reinforced the need to treat tools for strategy development and scheme design separately.

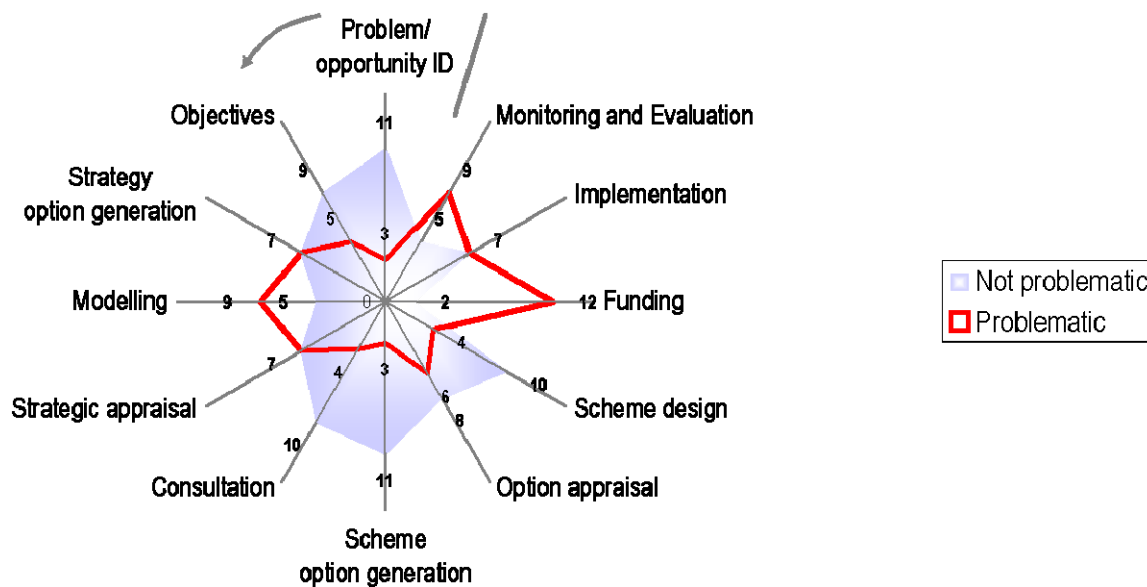


Figure 3. The principal barriers to sustainable transport strategies

Key: The numbers are numbers of respondents. E.g. for Funding, 12 experienced problems, 2 did not.

Source: DISTILLATE surveys (Hull and Tricker, 2005)

The initial survey also shed light on the extent to which these barriers impacted on the ability to implement different types of policy instrument. Figure 4 (May, Page and Hull, 2009), presents “seriousness scores” calculated as the product of scores of importance and difficulty of implementation, for each of a range of policy instruments. It can be seen that local authorities experience the greatest difficulty in implementing changes in bus services, fares, demand management and land use, which are precisely the policy instruments which research elsewhere has shown to be the most important contributors to a sustainable transport strategy. Respondents were not asked why these instruments were more difficult to implement, but the contributory causes can be inferred from their answers to other questions and from other sources of evidence. Table 3 sheds more light on this, by assessing the difficulties experienced with each policy instrument at each stage of the policy process. The first column summarises the seriousness scores from Figure 3. The assessments for monitoring, modelling and appraisal also use seriousness scores from the DISTILLATE survey. Those for option generation, finance and coordination are drawn from experience in DISTILLATE case studies and the study conducted for the Department for Transport (Atkins, 2007). It is clear that the four policy instruments which are the hardest to implement suffer at most stages in the policy process. The only exceptions are under the heading of finance, where many restraint measures can generate revenue, and land use measures, which typically impose few costs on local authorities. This reinforces the case for seeking enhancements to all stages of the policy process. Conversely, most of the policy

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instruments which are easier to implement typically impose fewer problems at all stages. However, there are a few exceptions. In particular, local authorities expressed concern over the ability to monitor slow modes, and to finance soft options, which require revenue funding. Thus improvements to these stages of the policy process should have wider ranging benefits.

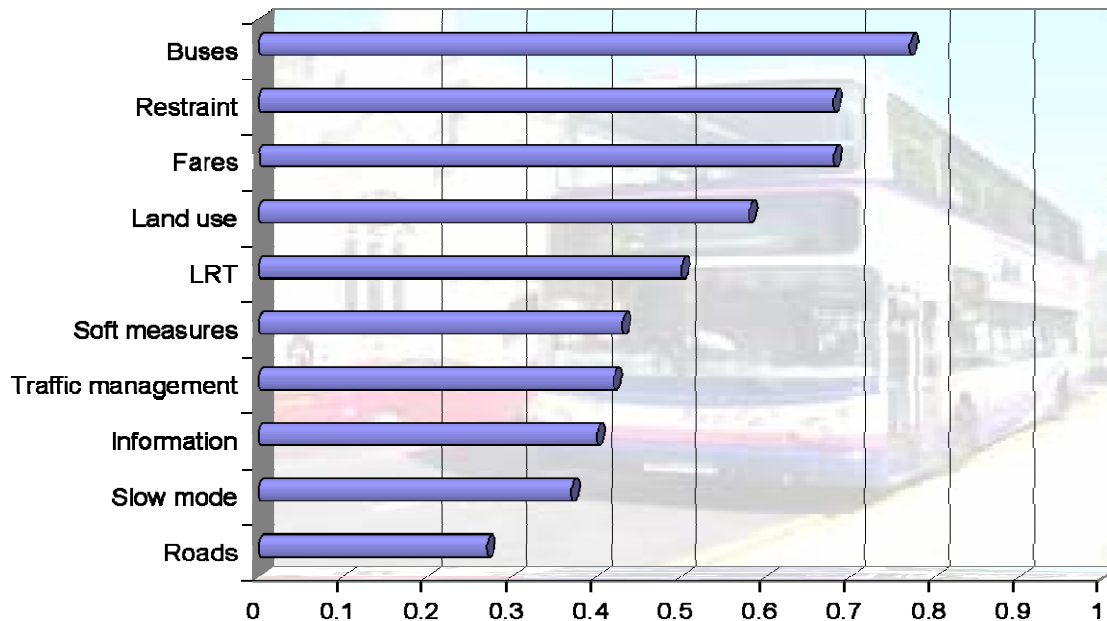


Figure 4. Seriousness of problems in implementing specific policy instruments

Key: the seriousness score is the product of importance of a policy instrument and difficulty in implementing it (1 high)

Source: DISTILLATE surveys (Hull and Tricker, 2005)

Table 3. Seriousness of barriers to the implementation of policy instruments at each stage of the policy process

	Overall Implementation <sup>1</sup>	Monitoring	Option generation	Finance	Modelling	Appraisal	Coordination
Buses	•••	••	••	•••	•••	••	•••
Restraint	•••	••	•••	•	•••	•••	••
Fares	•••	••	••	•••	•••	•••	•••
Land use	•••	••	•••	•	•••	••	•••
Light rail	••	-	•	•	••	••	•••
Soft options	••	-	••	•••	••	•	•
Traffic mgmt	••	•	•	•	••	•	•
Information	•	-	•	•	•	•	••
Slow modes	•	•••	•	••	•	•	•
Roads	•	•	•	•	••	••	•

Key: ••• Seriousness score > 0.5 (Hull, 2009)

•• Seriousness score 0.4 - 0.5 (Hull, 2009)

• Seriousness score < 0.4 (Hull, 2009)

••• Most severe problems identified in DISTILLATE case studies and Atkins (2006)

• Least severe problems identified in DISTILLATE case studies and Atkins (2006)

- Not addressed in the survey

Note: <sup>1</sup> Seriousness scores as shown in Figure 4

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## 5. The development of decision-support tools

In each of the six technical research projects, the initial survey of local authorities provided valuable guidance on the nature of the problems experienced, and the type of support which might be needed. This was reinforced by drawing on evidence from the Department for Transport's parallel research into the LTP process (Atkins, 2005) and from reviews of the literature. The first stage of the action research then related this understanding of the problems to the initial set of case studies, which offered specific examples of the problems.

Proposals for ways of overcoming these problems were developed from consideration of the needs for both strategy development and scheme design, and came from a number of sources. In some cases, the research team brought initial proposals to the research arena, which were then debated and further specified. Examples of this approach can be found in the work on option generation, modelling and appraisal (Jones et al, 2009; Shepherd et al, 2009; Page, May and Forrester, 2009). In some cases the literature provided evidence of solutions in other areas of public policy. This was particularly the case with the work on indicators and monitoring, option generation and effective collaboration (Marsden and Snell, 2009; Jones et al, 2009; Forrester, 2009). In other cases the case studies themselves offered examples of solutions (e.g. Marsden and Snell, 2009; Binsted and Paulley, 2009; Forrester, 2009).

Initial proposals were presented to the programme's Steering Group, which included representatives of the European Commission, ECMT, Department for Transport, Transport Scotland, Local Government Association and individual local authority partners. Each project also convened its own developmental workshop, to which a wider Reference Group, including other local authorities, consultants, operators and interest groups were invited. The views expressed led to the shortlisting of a set of 19 products, as listed in Table 4, which indicates those which were designed to aid strategy development and those for scheme design. Some of these were analytical tools, such as the option generation tools (Jones et al, 2009), the enhanced models (Shepherd et al, 2009) and the new appraisal techniques (Page, May and Forrester, 2009). Others were guidance documents, including those on monitoring and indicators (Marsden and Snell, 2009), finance (Binsted and Paulley, 2009), the policy guide on appraisal (May, Page and Forrester, 2008) and the guide on partnership working (Forrester, 2009). Figure 2 shows how these products related to different stages in the policy process.

The guidance on monitoring and indicators took as its starting point concerns that local authorities were required to monitor too many indicators, which were used inconsistently in the policy process and often failed to reflect public concerns. The initial guidance on developing a monitoring programme focused on outcome and intermediate outcome indicators to reflect policy objectives. Subsequent products provided guidance on the selection of suitable indicators and on their consistent use throughout the policy process (Marsden and Snell, 2009).

The tools for option generation were produced to strengthen what is widely regarded as the least well developed stage in the policy process (Atkins, 2005; Eddington, 2006). As the Atkins study found, many local authorities fail to recognise the need to generate alternative solutions to problems, and are over-reliant on government guidance. The project developed two tools for strategy development and two for option design. Following its literature review, one of each was an "inside the box" method drawing on what is currently known, while the others used "outside the box" methods to encourage innovation (Jones et al, 2009).

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**Table 4. The DISTILLATE products**

Project	Product for		
	Strategy development	Scheme design	Both
Indicators	<i>Integration of indicators across sectors</i>		<i>Selection and use of indicators Specification of new indicators</i>
Option generation	KonSULT option generator Accessibility strategy planner	Road space reallocation option generator Public realm improvement generator	
Finance	<i>Implications of funding mechanisms</i>		<i>Funding toolkit Advice to funding agencies</i>
Predictive models	MARS optimisation tool STM public transport and land use model	Demand management modelling Public transport modelling	
Appraisal	Distributional impacts of strategies <i>Good practice in appraisal</i>	Distributional impacts of schemes Small scheme appraisal tool	
Effective collaboration			<i>Good practice in partnership working</i>

Key: standard font: Tools; *Italic font: Guidance*

The guidance on funding reflected the evidence that finance was the most serious barrier to the development of effective strategies, that restrictions on revenue funding often led to less cost-effective solutions, and that many local authorities were unaware of the full range of funding sources available to them. The principal guidance was provided in the form of a Funding Toolkit reviewing the barriers to funding, identifying the range of sources and the extent to which they were applicable to different types of scheme, and providing case studies of good practice in their use. Companion products provided guidance to funding agencies and to government on good practice in funding (Binsted and Paulley, 2009).

The tools for better modelling and prediction were developed against a background in which many local authorities did not use predictive models, and many others did not trust them, or felt that they were not suitable for the wider range of policy options and performance indicators which they wished to consider. Rather than develop new models, the project enhanced four existing ones. Two provided improved methods for predicting the effects of alternative strategies, and for interactive strategy development. The other two were extended to allow them to analyse policy instruments which were seen to be inadequately represented in existing models (Shepherd et al, 2009).

The project on appraisal reflected widespread concerns that the specified appraisal process in the UK was seen as a barrier to strategy development, that it did not adequately reflect local authorities' wider objectives, and that appraisal methods were too cumbersome for use with smaller schemes. One tool was developed for the appraisal of smaller schemes and, potentially, for the prioritisation of solutions at earlier stages of strategy development. Two tools were developed for the appraisal of distributional effects, one for strategies and the other for schemes. A related guidance document provided a first principles analysis of the requirements for appraisal and of the selection of alternative methods (Page, May and Forrester, 2009).

The project on partnership working reviewed the barriers to collaboration within and between agencies. The former included differences in approach in different policy sectors such as planning, education and health; the latter identified problems between tiers of government,

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between adjacent authorities, and between the public and private sectors. The project developed guidance on good practice in partnership working, illustrated by case studies. It also tackled the barriers between the providers of decision-support tools, including those within the research team, and the potential users of those tools. This led directly to the development of the overarching decision-support tool, which is described more fully below (Forrester, 2009).

In all cases, these products were developed in association with local authority case studies, thus reinforcing the emphasis on action research. However, the process for doing so differed by product. In some cases, which included three of the option generation tools and the two distributional appraisal tools, the product was developed as part of a case study, and further work will be needed to create a standard product which can be applied more widely. Most of the other tools were developed by the research team as generic products, and then tested with specific case studies, or as part of the general policy development process. The guidance documents typically incorporated case studies as evidence of good (or in some cases bad) practice (Marsden and Snell, 2009; Binsted and Paulley, 2009; Forrester, 2009) and were then assessed critically by local authority partners. The guidance on developing a monitoring strategy was also tested by one of the partners as part of the preparation of its second LTP; this application was commented on favourably in the government's assessment of its LTP (Marsden and Snell, 2009).

While each product was designed to be self sufficient, many benefited from the development of products which were applicable earlier in the policy process (Figure 2). The most obvious example was the early development of guidance on indicator selection (Marsden and Snell, 2009), which was used to specify indicators to be incorporated into the tools for option generation, prediction and appraisal. Subsequently the strategic prediction model, MARS, was designed to test outputs from the strategic option generator, and the small scheme appraisal method was developed in part to assist in the prioritisation of such strategies (May, Page and Hull, 2009).

Each product was presented to the local authority partners, the Steering Group and, in most cases, to the Reference Group through the programme's workshops. Final presentations were also made in workshops in London and Brussels. However, the research team had already obtained evidence from the local authority partners that they were unaware of the tools currently available to them, and that more would need to be done if the DISTILLATE products were to be better used. To this end, an overarching decision-support tool was developed, which enables users to identify products of assistance to them at different stages in the policy process.

The tool distinguishes between strategy and scheme development, reflecting the concerns expressed earlier in the study. It is based on a flowchart of the policy process similar to that shown in Figure 1, and asks users at each stage to indicate whether they need assistance. Where they do, information on the relevant products from the programme is added to their "shopping basket". At the end of a cycle of questions on strategy development, users are asked whether they need help with more detailed scheme design. Users who have started by considering scheme design are asked, at the end of the process, whether they wish to consider the role of the scheme within a wider strategy. The information provided for each product is a short summary, in standard format, indicating its purpose, method and outputs, and providing further detail on how to access it. Forrester (2009) describes the iterative approach to designing this tool, involving interaction between practitioners and researchers from different disciplines. The tool has been incorporated into the Local Transport Practitioners' Network website ([www.ltpnetwork.gov.uk](http://www.ltpnetwork.gov.uk)), which was developed by the UK Department for Transport and its partners to provide support for local transport planners.

While the facility has thus been provided to enable practitioners to access the programme's products, much will depend on the encouragement given to them to do so. In this regard it is of some concern that the draft guidance for the third round of Local Transport Plans (DfT, 2008),

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while reducing the prescription of what is required, does not do more to offer guidance on the tools available.

## 6. Conclusions

There is now a much better understanding of the policies which are needed to achieve greater sustainability in urban transport. Cities need to focus first on the development of a strategy, rather than pursuing un-coordinated schemes. Effective strategies need to be based on packages of mutually supportive measures, which should include improvements to public transport service levels, quality and fares; controls on the level of car use; land use policies which support these measures; and greater use of low cost measures to reallocate road space and encourage a switch to public transport, walking and cycling. Once the strategy is in place, cities can focus on the design of suitable schemes which contribute effectively to that strategy.

The review for the UK Department for Transport has concluded that the Local Transport Plan process in the UK has improved the ability of local authorities to develop and deliver such strategies. Local authorities have added capacity and skills to improve strategy development, and have become more competent in their use of a wider range of policy measures. Those with strong and stable administrations, corporate support for the transport portfolio in the context of wider policies, effective consultation and partnership working and well designed performance management methods have typically been the most effective (Atkins, 2007).

Despite this, many of the barriers identified in the ECMT reports (ECMT, 2002; 2006) still apply. The UK LTP review refers to fragmented decision-making; lack of direct powers over public transport; the biases caused by limitations on revenue funding; lack of public support; shortages of staff skills; and weak or inconsistent political leadership (Atkins, 2007). It also makes clear that the initial guidance was too prescriptive, and encouraged undue emphasis on compliance with complex procedures rather than on clarity in the policy process. These barriers were also evident in the surveys undertaken in DISTILLATE, which suggested that financial restrictions, staff shortages and divided responsibilities remain the most serious problems (Hull, 2009). Of particular concern, these barriers appear to apply most severely to those policy measures which are the most central to an effective sustainable transport strategy.

As both the Eddington (Eddington, 2006) and Stern (Stern, 2006) Reports have indicated, it is becoming increasingly important to overcome these barriers. Decision-making is becoming more complex, with more actors and greater involvement of the private sector and interest groups. Transport increasingly needs to be seen as part of a wider strategy, in which transport supports other areas of public policy, such as development, health, education and social inclusion, while ensuring that those policy areas do not adversely affect the performance of the transport system. The target of an 80% reduction in CO<sub>2</sub> emissions by 2050 will require perhaps a 40% reduction in motorised travel in cities (Banister and Hickman, 2006; Bristow et al, 2007), which will intensify the challenges faced by local government (Hull, 2009). For all of these reasons, generating the "right policies" (Eddington, 2006) will become an increasingly demanding process.

Against this background, while there is a clear case for less prescriptive guidance on Local Transport Plans, there is a continuing need to encourage local authorities to develop a strategic approach and to use policies from the full range of measures available. In the UK context, local authorities need particular help with the integration of land use and transport policies, the removal of the distinction between capital and revenue funding, which places too much emphasis on supply-side solutions, and the introduction of demand management measures. The widespread failure, outside London, of the government's encouragement of congestion charging indicates the need for a greater willingness to share risks in the introduction of potentially effective but demonstrably controversial policies.

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The DISTILLATE research programme, reported in the papers in this special issue, is the first to have taken a holistic approach to these challenges, and to have developed a series of interlinked products designed to aim decision-making in sustainable urban transport policy. As Forrester (2009) notes, it has brought together the research principles of a wide range of disciplines, has adopted an action research approach, drawing substantially on case studies to provide evidence and to test outputs, and has involved extensive partnered inquiry with practitioners throughout the process. Forrester (2009) argues that in this way the programme illustrates double loop learning (Argyris and Schön, 1978); researchers from different disciplines have learnt from one another and from practitioners, there has been a resulting shift in understanding among the participants, and the research community has adopted a policy-focused approach to dissemination of its outputs.

The programme's findings and products will only be of value, however, if they result in a shift in understanding and in skills among the wider practitioner and research communities. This in turn depends on effective dissemination and guidance. The DISTILLATE products are being disseminated through the national Local Transport Practitioners' Network website ([www.ltpnetwork.gov.uk](http://www.ltpnetwork.gov.uk)). But there is evidence that local authorities are increasingly finding this website to be overloaded with information and difficult to navigate. Meanwhile, national guidance has become much less specific (DfT, 2008). As the earlier report on the LTP process concluded, guidance needed to become less prescriptive, but local authorities needed to "raise their own competence, ability and confidence to pursue innovative, inclusive and locally-relevant transport (policies)" (Atkins, 2007). It is unclear as yet whether the right balance has been struck between prescription and guidance.

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