Department for Transport

Evidence and Research Strategy

2006 edition

DRAFT – FOR COMMENT

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Research and Technology Strategy Division

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Invitation by the DfT Chief Scientific Adviser and Chief Analyst

This new strategy builds on a long tradition of using statistical and research evidence and analysis to inform our work, covering a whole range of economic, technological, social and environmental factors. It is worth noting that many of these factors are not primarily transport ones, for example changes to demography and lifestyles, advances in communications technology, and changes in industry structures. But they are critical to the successful achievement of our transport objectives and reflect also the challenges identified for the Comprehensive Spending Review announced for 2007.

This document will be supplemented by more detailed Unit (and agency) strategies, currently under development, which will be published in 2006. These strategies are intended to help:

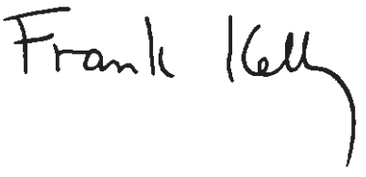
- communicate our evidence priorities and how we envisage meeting them;
- sustain and foster the research and analytical communities that provide us with so much of our evidence; and
- focus our requirements on evidence fit for the purpose of informing current and future policies.

It is only if we succeed in engaging with public- and private-sector partners that we will succeed in meeting our goals. For example, government cannot replicate the information technology capability of the private sector, but does have a role in harnessing this capacity and resolving issues that impede the delivery of innovative solutions.

An important part of our roles as Chief Analyst and Chief Scientific Adviser is ensuring that the evidence we use is of high quality. As well as using evidence from both the public and private sectors, we also generate evidence through activities such as scientific research, economic modelling and the compilation of transport statistics. In line with cross-government initiatives we are looking to better exploit our analytical resources and skills to meet the many challenges that face us.

This strategy illustrates the diversity of disciplines that inform the evidence base upon which we build our policies: from economics and consumer research to information technology and engineering. It is far from complete, but represents a significant step in a process to improve the quality and comprehensiveness of the evidence we use.

We invite feedback from all those with a stake in using, developing and delivering transport systems. More detail on evidence issues particular to individual policy areas will be published through the Unit-level strategies in 2006. But we welcome views and comments on this document and in particular on the cross-cutting and longer-term issues which set the strategic context for all our evidence.



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Executive summary

1 Introduction

The chapter summarises the government's commitment to evidence-based policy as articulated through a number of Cabinet Office, Treasury and Office of Science and Technology papers. Evidence to inform DfT policies is generated through a wide range of activities, and this document represents a further step towards developing a more strategic approach.

2 Aims and objectives

Recent DfT White Papers and our business plan set out how we intend to respond to the challenges of a growing economy and the increasing demand for travel. The high-level strategy will be developed through the Department's Strategy Group and strategic cycle introduced to assist 30-year planning and integration with medium-term and business planning.

Our evidence needs are met through monitoring and data collection, analysis (of internal and information available elsewhere), policy evaluation and commissioned research.

3 Evidence needs

We have assessed our more immediate evidence needs against broad policy themes – reducing congestion, improving accessibility and public transport, reducing environmental impact, improving safety and security and supporting the economy. Though these are often interdependent and overlapping, by assessing evidence against broad themes we are better able to review evidence gaps, priorities, dependencies and possible duplication. This chapter seeks to identify our priorities and gives some examples of how we are meeting the evidence requirements. Further detail will be contained within Unit-level strategies.

We have also sought to define the strategic context within which our policy themes must operate. The issues are not primarily transport-specific but ones which will affect our success in delivering transport objectives: technological, global competitiveness, security, energy and demographic. This helps identify where horizon-scanning of the longer term (10-30 years and beyond) is vital to inform decisions to be taken over the next two to five years (see Chapter 9 on 'Transport futures').

4 Communication

We need to communicate effectively to ensure that stakeholders, delivery partners other interested bodies and the wider public are informed not only of our strategic plans but also of the evidence and reasoning that underlie them.

The quality of our evidence base also depends on how it is generated and used; we therefore need to be open about the sources of evidence and analytical methods. Making research, statistics and policy evaluations accessible can maximise the benefits we obtain from them and also prevent unnecessary duplication.

At every step of policy development we should be open and transparent, meeting our obligations under the Freedom of Information Act. To meet these needs, initiatives include enhancement of the research management database and the citation of all sources of evidence in policy documents.

5 Collaboration

Collaboration on data collection, analysis and research can bring significant advantages to the Department, local authorities, industry and academic partners. These include not only economic advantages, but also the provision of effective means of knowledge transfer and the opportunity to tap into high-quality research and leading-edge science and technology.

We will develop plans for a new 'Virtual' Transport Research Centre (VTRC) to provide a focus for transport research in the UK. The VTRC will be jointly funded by DfT, the Engineering and Physical Sciences Research Council (EPSRC), Economic and Social Research Council (ESRC) and Natural Environment Research Council (NERC).

We will seek to identify additional scope for building joint evidence bases with OGDs – for example with ODPM on land use, agglomeration and regeneration; with Defra on climate change and air quality; with the Home Office on electronic vehicle identification; with DWP on ageing; with DH on health impacts. We will also participate in European and OECD initiatives to improve data access and comparability, allowing better international benchmarking.

Our knowledge of EU research will be exploited more widely to anticipate potential future European transport policies. We will coordinate analysis at regular intervals.

6 Professional skills

Making the best use of evidence also requires that analytical, research management and other specialist skills are recognised and developed. Among the major groups involved in analytical work are economists, social researchers, statisticians and engineers. Most staff have their own professional structures within DfT assisting in keeping skills up to date, promoting best practice and advising HR.

We are clarifying the role for heads of profession, further securing quality and value for money (vfm) from our analysis and research. However, this support varies considerably across the Department and we need to continue progress towards ensuring high standards for all professions. To address future skills shortages we need to expand our working relations with relevant professions, academic institutions and research councils, for example our participation in the Transport Planning Skills Initiative seeking to rectify the shortage of transport modellers.

7 Evidence and research management

The new strategies will facilitate planning and priority setting at a strategic level and help ensure that evidence and research are aligned with our longer-term goals as well as immediate policy objectives. It will be fully reviewed every two years in line with the spending review process and will be informed by more regular assessments of evidence needs by the DfT Board through its strategic planning cycle. The new approach is intended to improve planning and management of the evidence base underpinning the Department's spending bids, budget proposals and regulatory impact assessments.

The CSA plays a key role in scrutinising Units' evidence and research strategies as part of the improvements to our internal processes and arrangements for improving quality. We have developed an Evidence and Research Quality Framework (ERQF), which sets out the quality standards required for the planning and delivery of 'evidence', against which strategies will be scrutinised.

We commission research from a wide range of organisations and will look to develop our procurement arrangements to meet objectives of efficiency, quality and vfm (for example, through increased use of framework contracts).

8 Technology and innovation

As a department we need to improve our awareness of relevant technology and innovation. The Chief Scientific Adviser's Technology Forum will provide oversight and coordination of technology issues, helping to ensure that technology and innovation issues are integrated into wider strategy cycles and delivery planning. The Department recognises the role that procurement of goods and services by the public sector can play in acting as a lever for stimulating and enabling innovation and will continue to improve practices.

The Department will develop its use of technology readiness levels to better manage technology procurement. Along with technology road maps, this approach will help DfT manage risk and provide estimates of timelines to maturity of technology. We will also continue to work towards ensuring that our appraisal methods and risk management guidelines do not impede the adoption of innovative solutions that help meet our objectives. We will consider developing a simple 'technology awareness checklist' to be used alongside the New Approach to Transport Appraisal in appraising schemes and policies with long timescales.

9 Transport futures

Futures thinking is embedded in much of the work of the Department, underpinning strategy and policy development. The Department works with the Office of Science and Technology on the Foresight programme, in particular the Intelligent Infrastructure Systems (IIS) project. The scenarios generated will help us better understand the exogenous assumptions in our high-level modelling, i.e. GDP, values of time across social groups, vehicle efficiencies, carbon prices and oil prices. We will develop scenarios further and use them to build up a more systematic risk-based approach to appraisal (e.g. by using real options analysis), quantifying these factors. The focus of this horizon-scanning will include:

Technology

- Satellite navigation and wireless communications technology to make the best use of new and existing infrastructure;
- Continuing advances in information science, enhancing our ability to manage, access and analyse increasing amounts of data from different sources;
- Consideration of legal, social-science and public engagement issues alongside the science and technology developments.

Global competitiveness

- Contractual relationships appropriate for innovative financing, vfm from subsidy and cross-subsidy, and fuller understanding of the benefits and drawbacks of decentralising transport decision-making;
- Better integrated regional transport, spatial planning and economic strategies, including improved understanding of the interaction of transport with land use and housing and the effects of agglomeration economies;
- Developing sufficient understanding of the skills and capacity in the labour market related to future transport delivery and delivery chains particularly incorporating advanced technology.

Energy and climate change

- The impact of the rise in oil prices on the whole transport system and transport industry cannot be ignored and confirms the importance of achieving greater efficiency across all modes;
- Developing understanding of the science and economics of climate change, including attitudes of the public to climate change and possible measures;
- Developments in energy production and supply;
- Better understanding of air-quality health impacts.

International security

- Recurring terrorist attacks have brought security issues to the top of the agenda – security must be an integral part of our policy development.

Demographics and lifestyle

- Changes in demography (particularly the ageing population) and social habits;
- Better segmentation of transport users' requirements across different groups.
- We recognise that it is important not only that we seek to identify, manage and reduce uncertainty, but that we find better ways of communicating it. Uncertainties will be better represented through the use of Bank of England style 'fan charts' for, say, fuel prices, rather than simplistic central forecasts. This will help ensure that future uncertainties are taken into account in policy development. Similarly, we need to learn lessons from previous risks and analysis of outcomes through policy evaluation, feeding this back into risk identification and management strategies.

1 Introduction

1.1 Evidence and research in government

The government's commitment to evidence-based policy was announced in the *Modernising Government* White Paper and developed in the Cabinet Office paper *Professional Policy Making*. Improving how science, research and analysis inform policy making is part of this agenda.

The Cabinet Office's Performance and Innovation Unit report, *Adding it Up* (2000), concluded that commitment to evidence-based policy making required a fundamental change in culture to place good analysis at the heart of policy-making. Amongst its recommendations were for departments to:

- produce an annually-reviewed analytical strategy to encourage input, challenge and feedback from experts and stakeholders;
- undertake a review of their analytical capability;
- communicate and make better use of the large amounts of data government routinely collects.

Similar recommendations have been made concerning the use of science and research. Among the key proposals of the White Paper *Excellence and Opportunity: A Science and Innovation Strategy for the 21st Century* was for government departments to publish science and innovation strategies setting out the purpose of research activities in the context of overarching objectives and public sector agreements. Recommendations of *Investing in Innovation: A Strategy for Science, Engineering and Technology* included the need for departments to:

- improve their competence to act as an intelligent customer and manager;
- increase external scrutiny and benchmarking to facilitate the exchange of good practice and to encourage a dynamic for improvement;
- appoint a Chief Scientific Adviser, who can ensure that scientific activities are well directed and policy is soundly based on good science.

Measures taken by government to strengthen the use of evidence include publication of:

- Chief Scientific Adviser's guidelines[1] on scientific advice in policy making;
- government Social Research Unit's Magenta Book, providing guidance on good practice in social research and policy evaluation;

1 *Guidelines On Scientific Analysis In Policy Making*, October 2005. Office of Science and Technology, http://www.ost.gov.uk/policy/advice/index.htm

- National Statistics Code of Practice, which sets out the key principles and standards which official statisticians are expected to follow and uphold.

Dft's commitment to good-quality policy-making and to the EU and UK Better Regulation agenda requires good-quality evidence. This includes full understanding and assessment of the implications of policy interventions, and our evidence base will support better regulation, inform our impact assessments and later evaluations. Like other government departments, DfT invests considerably in research and analysis to develop the evidence base to inform policy and deliver public services. It is essential that we make the best use of this investment.

Freedom of Information legislation requires departments to make publicly available the analysis which underlies policy advice and decisions. This creates an added challenge, as our credibility as a department will depend on the extent to which analytical support for policy is available and stands up to public scrutiny.

1.2 Generating evidence

The Department's evidence base is actively generated through:

- data collection and monitoring of, among others, behaviour, attitudes, performance, accidents and emissions;
- analysis of available information and the development of policy tools and models (e.g. the range of policy evaluation tools, forecasting models and pricing estimates);
- evaluation of policy options, policy execution, and the quality and comprehensiveness of information (e.g. reviewing the quality of data about the causes of road accidents);
- research into new processes, methodologies and knowledge gaps e.g. into new transport technologies and their potential impacts, including through pilots and trials.

Such work may be carried out in house (possibly using external contractors), wholly commissioned from outside providers or accessed through published reports and surveys. While we will never be able to meet all our evidence needs in house, it is essential that we maintain adequate internal expertise to meet unexpected needs and to commission and integrate evidence from external sources.

1.3 Towards an evidence and research strategy

As a department, we need to have a clear idea of what our evidence and research priorities should be, both now and in the future. Looking forward, we must ensure that we remain well placed to exploit the opportunities that science and technology have to offer.

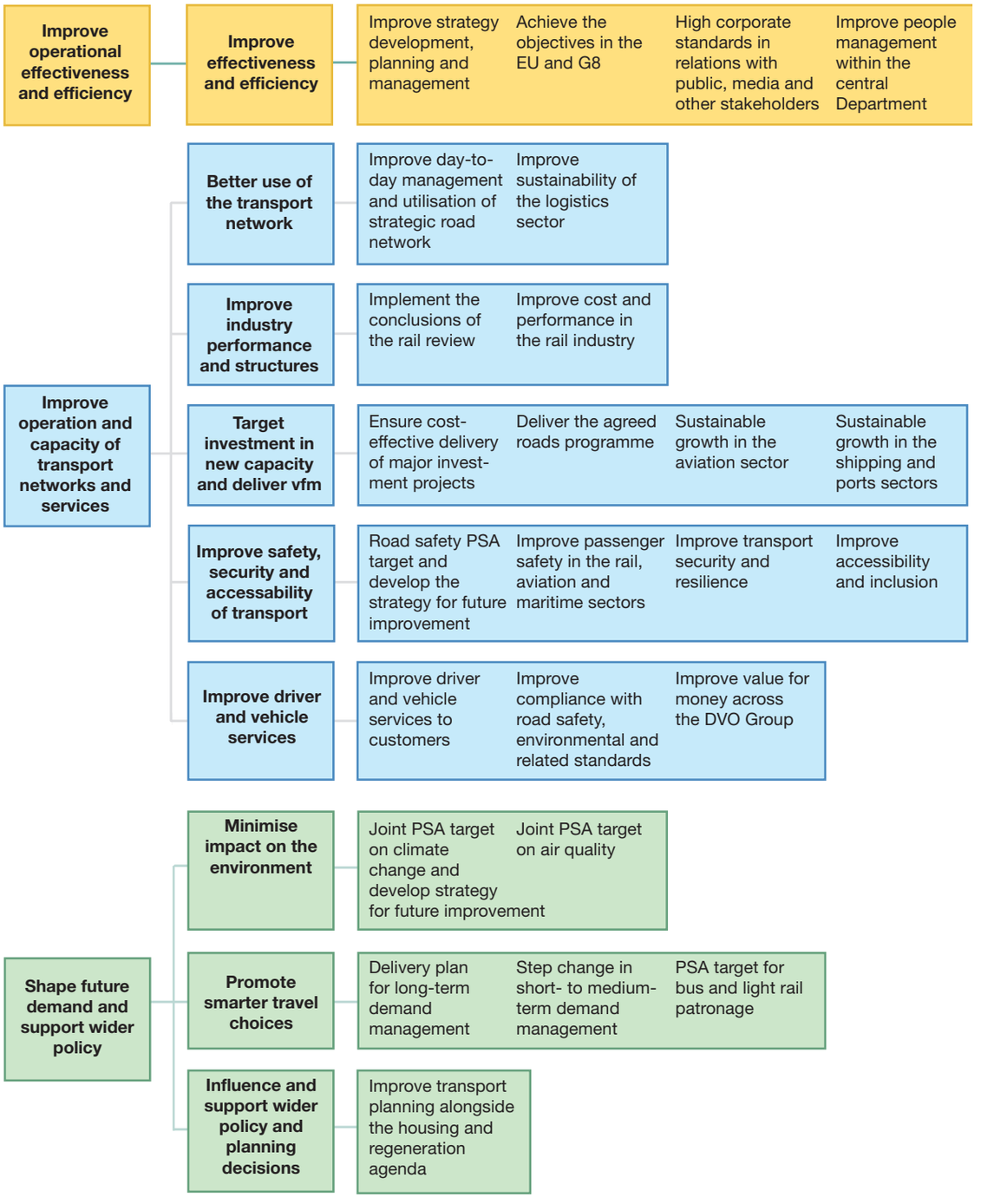
We published our first *Evidence and Research Strategy* in January 2004. Since then we have started to make a number of improvements to the strategic management of our evidence and research. Steps we have already taken include the appointment of a Chief Scientific Adviser, improved research management guidelines and a review of evidence gaps.

The publication of this document represents a further step towards meeting the remaining recommendations of government reports and developing a more strategic approach to identifying and meeting our evidence needs. Through this strategy, we are striving for a more integrated evidence base, acknowledging all sources of evidence and ensuring quality by adopting best practice. This strategy also sets out what we currently understand our evidence needs are for the next three years and beyond, as well as the areas and activities we plan to develop, so that DfT policies and future strategies are based on the best evidence available.

2 Aims and objectives

The Department's long-term strategy is published in the White Papers *Future of Transport*, *Future of Air Transport* and *Future of Rail*. They set out how we intend to respond to the challenges of a growing economy and the increasing demand for travel, while achieving our wider environmental and safety objectives. Our current priorities are set out in Figure 2a and are described in more detail in our business plan (2005/06-07/08). These targets underpin our decision-making and structure the allocation of resources and budgets.

Figure 2a DfT business targets as of 2005/06



We are also committed to meeting the objectives of cross-departmental strategies such as the government's Sustainable Development Strategy and government commitments to reduce greenhouse gas emissions (see tinted box).

Examples of our cross-government commitments

To meet shared objectives we work with:

- the Department for the Environment, Food and Rural Affairs (Defra) to meet shared PSA targets to improve air quality and reduce greenhouse gas emissions;
- the Office of the Deputy Prime Minister on the implementation of the Sustainable Communities Plan, development of the Neighbourhood Renewal Agenda, and the work of the Social Exclusion Unit on links between transport and social exclusion;
- the Department of Health to tackle issues of obesity, the welfare of air passengers and the health impacts of air quality;
- the Treasury, Defra and DTI on the government's Powering Future Vehicles strategy;
- the Department for Education and Skills and DoH to find ways of reversing the rise in the number of children travelling to school by car;
- the Home Office, police and local authorities to tackle road traffic offences and road policing, vehicle-related crime, anti-social behaviour and fear of crime on public transport;
- the Countryside Agency to ensure that the rural dimension is adequately considered in our policy-making and delivery.

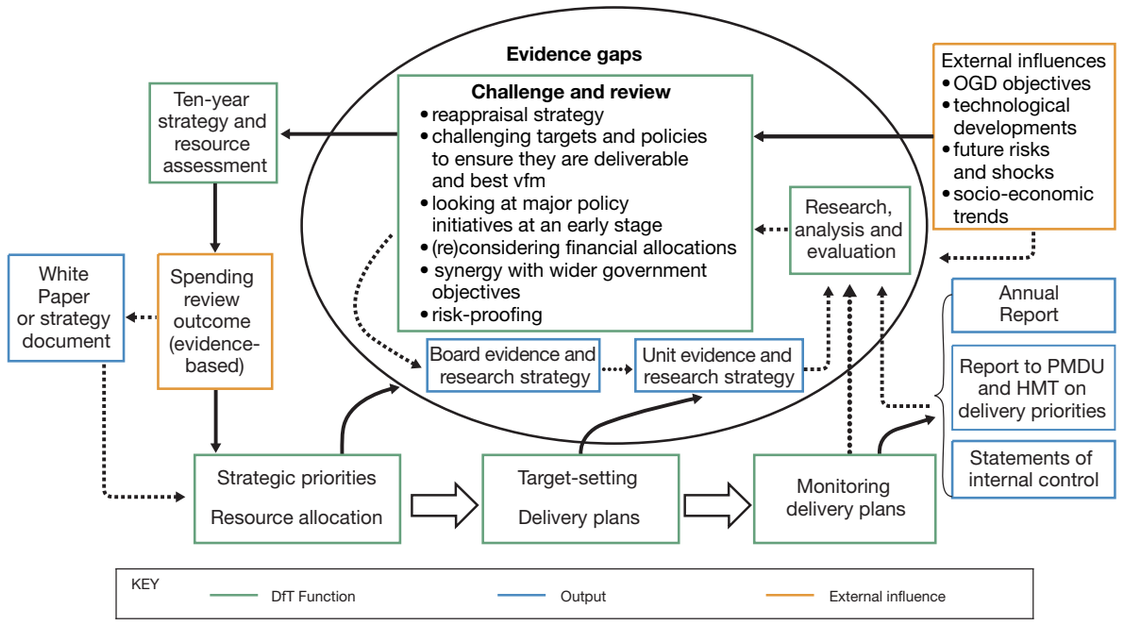
2.1 Coordinating evidence and strategic planning

Ensuring that our long-term strategy and short-term policies are founded on the best available evidence has implications for our organisation and use of resources. We have taken several steps towards ensuring that evidence is an essential element of our short-, medium- and long-term planning:

- introduction of a strategy group to consider a 30-year planning timeframe, identifying evidence needs and the implications of long-term trends;
- introduction of a strategy cycle (Figure 2b) to help integrate long-term thinking with medium-term objectives and our three-year business plan. The cycle of activity will focus on the Treasury's 'spending rounds' and disseminate findings across the Department, particularly agencies, as well as sustaining wider public debate;

- greater involvement by the DfT Board to ensure a better fit between departmental and analytical priorities, including explicit ownership of high-level strategic priorities.

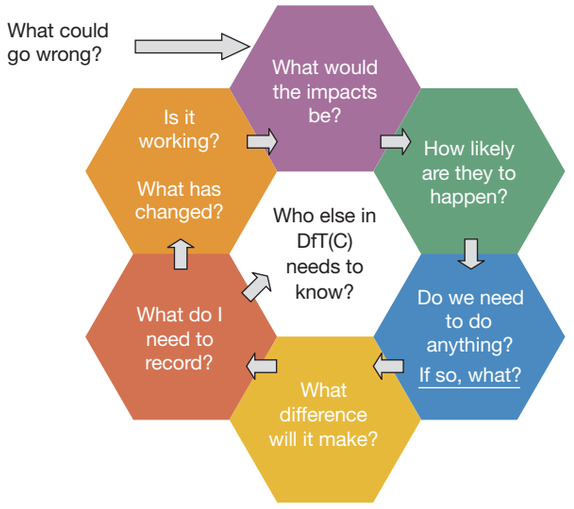
Figure 2b Key steps in the strategy cycle



2.2 Planning for the unexpected

Our evidence needs are shaped not only by our objectives, but also by what may prevent us from achieving them (Figure 2c).

Figure 2c Planning for the unexpected



2.2.1 Risk management

All policies involve risks that may prevent their realisation. Risk management is therefore integral to business planning and performance monitoring:

- As a key tool to ensure delivery of our objectives;
- To minimise surprises and reduce time spent 'fire-fighting';
- As part of our approach to contingency planning, especially on financial issues; and
- To demonstrate robust oversight of our use of resources.

2.2.2 Building resilience

We will never be able to prevent all disruptive events and must improve our ability to withstand such shocks. The transport system is generally very resilient, but strategic decisions such as a reduction in the number of modes or saturation of any system may affect this resilience.

Examples of major shocks (and opportunities) that would have a sustained impact on transport demand and provision are set out in Figure 2d.

Understanding the likelihood and impact of events such as those in Table 2a requires effective analysis and research, adding a further dimension to the evidence base needed to develop, implement and evaluate policies. Anticipating and, where justified, preparing for such events informs many elements of this strategy.

2.3 Meeting our evidence needs

2.3.1 Monitoring and data collection

The availability of appropriate and accurate data underpins all our analytical work, from the simplest cost/benefit estimates to the most sophisticated travel models.

The Department's statistical branch, social research branch and other analytical branches are responsible for the collection of a wide range of data used for monitoring and analysis purposes. Regular National Statistics Quality Reviews are carried out to ensure statistical outputs are of high quality and continue to meet users' needs, both inside and outside DfT. External data provided by other government departments (especially the Office of National Statistics) and a wide range of private and public sources (including collaboration with established data centres, such as NERC for environmental data) are also essential for achieving our aims and objectives. We are in an increasingly data-rich environment, which offers opportunities for new data sources and applications but also presents challenges in terms of data management and the security of personal data.

Figure 2d Examples of events that would have a sustained impact on transport demand and provision

Socio-economic shocks	**Safety and security shocks**
• Industrial failure – key operator or company fails • Energy crisis – e.g. oil price shock, fuel blockade • Major change in international transport economy, e.g. global tax on aviation fuel • Loss of public confidence in transport mode, e.g. following terrorist attack • Loss of public confidence in technology/data use • Major social protests – rail strikes, port blockades, etc.	• Cyber-attack on major IT networks • Direct-action tactics target transport network • Malicious attack on pipelines/energy infrastructure • Chemical, biological, radiological or nuclear (CBRN) attack on transport hub • Intensive terrorist bombing campaign launched • Infectious disease epidemic • Health effects found for existing technology, e.g. mobile communication technologies
Environmental shocks	**Technological shocks**
• Long-term climate change effect, e.g. Gulf Stream failure • Massive pollution event, e.g. oil tanker spill or nuclear incident • Increased frequency of extreme weather such as riverine and coastal flooding, and high winds • Natural disaster, e.g. earthquake, landslips, volcanic activity, hurricane	• Breakthrough energy technology • Breakthrough in new fuels technology • Technological failure – particularly IT or GPS technology • Critical systems failures - energy supply, power failure • Obsolescence of supporting technology

2.3.2 Analysis

We have a strong analytical tradition, and it is recognised that much of our analysis is of high quality; it also plays an important role in policymaking and delivery. The types of analysis undertaken include, in no particular order:

- transport modelling;
- economic appraisal and policy analysis;
- regulatory impact analysis;
- operational and social research.

Analytical work often straddles the divide between data collection and policy development. It is essential that it is integrated in the policy process, while also being able to shape and inform data collection and monitoring. Those responsible for data collection are often best placed to provide comment and analysis.

2.3.3 Evaluation

We are committed to improving policy making by learning from current and past policies. Evaluations provide evidence of what works and for whom. Evaluation relies on the independent gathering and analysis of evidence about the different stages and parts of the policy. The Department monitors centrally its ongoing programme of policy evaluations, to ensure that evaluation is appropriately focused on the initiatives key to the delivery of our major commitments.

2.3.4 Research

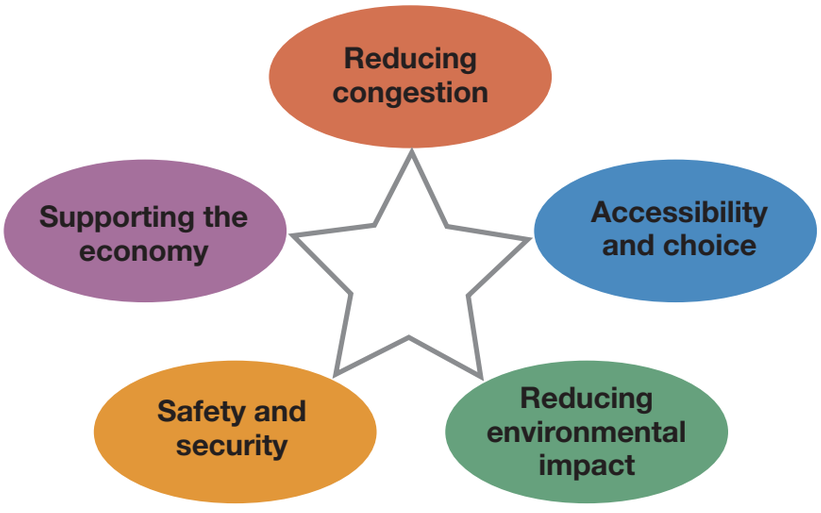
The Department funds comprehensive research programmes that cross a wide range of disciplines, from engineering and technology, through social and economic research, to the physical and natural sciences. Research programmes are the responsibility of individual policy directorates and agencies in order to maximise the linkages between policy and research. This includes activities to inform our own operational objectives for the services we deliver (e.g. the licensing and inspection responsibilities of the Driver and Vehicle Organisation). Central oversight and strategic management of research ensure that cross-directorate cooperation on research issues can be facilitated and that the balance of research is appropriate in the light of strategic objectives.

3 Evidence needs

To deliver the 30-year strategy described in *The Future of Transport* and related White Papers, we must work with delivery partners and other stakeholders to establish the evidence base on which to develop effective policies. We have mapped our evidence needs to five broad strategic policy themes (Figure 3a):

- improving reliability by **reducing congestion;**
- improving **accessibility and choice** – including improving public transport;
- **reducing environmental impact** and improving sustainability;
- improving safety and security; and
- **supporting the UK's economy** in a global competitive environment.

Figure 3a Broad strategic policy themes



Though these themes are often interdependent and overlapping, by assessing evidence against broad themes we are better able to review evidence gaps, priorities, dependencies and possible duplication. This chapter seeks to identify our priorities – recognising it is important to understand how to prioritise among these themes and deal with real and potential conflicts between them. The chapter includes examples of how we are meeting the evidence requirements; further detail on the priorities will be developed within Unit-level strategies.

In drawing up this strategy we have identified the strategic context within which our policy themes must operate. This is not a context dominated by transport issues but one which will, nevertheless, determine success or failure in delivering our transport objectives. It helps to identify where horizon-scanning of the longer term (10-30 years and beyond) is vital to inform decisions to be taken over the next two to five years. This work will largely

be taken forward through the activities summarised in Chapter 8 (Technology and innovation) and Chapter 9 (Transport futures). It will, of course, also underpin many of the evidence priorities recognised within the strategic themes in this chapter. This strategic context includes trying to anticipate trends in technology, innovative financing and delivery structures, energy, climate change, security and demographics.

3.1 Reducing congestion (strategic theme 1)

Increased trade and mobility bring substantial economic and social advantages. But they can also result in increasing congestion on our transport systems.[2] Road traffic has grown by 79% since 1980 (Figure 3b), and the number of journeys made by national rail has gone up by 33%. Some of our airports have reached, or are fast approaching, capacity.

To reduce congestion and enhance reliability, there are cost-beneficial and effective measures that can be taken. Improving our understanding of how we can deliver these measures and how users might respond is a key part of our evidence agenda. We need therefore both to improve the performance of current networks and optimise investment in new infrastructure. It is estimated that 25% of congestion on the strategic road network is caused by incidents, and the Highways Agency is examining the complete life cycle of incidents to improve management and minimise the resulting congestion. We have capacity in our road and rail systems for much of the time, but our work/lifestyle patterns generate uneven travel demand, which produces significant peak-time congestion.

Through earlier work looking at the potential of road pricing, we know much about the technological, institutional, administrative, economic and behavioural issues. But further evidence of the nature of the problem to be solved and potential solutions are needed to examine the case for implementation. The technology is already being developed, and freeing the private sector to do this is fundamental to its potential success. We need to know more about what the government's role is in making sure the systems work.

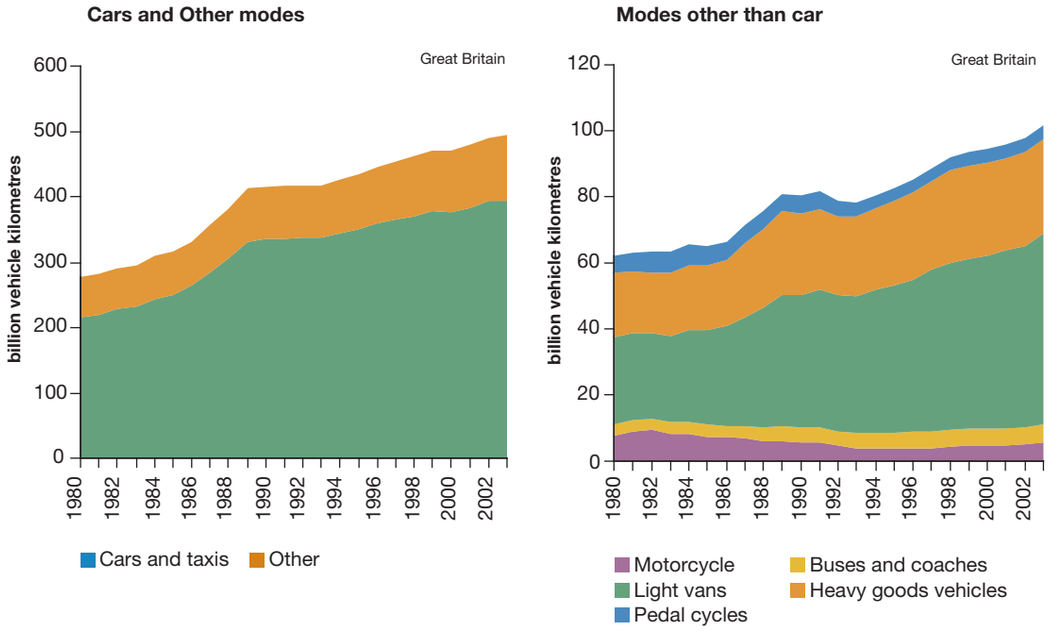
Tackling congestion is a key government objective for which we have two PSA targets (see Annex E). It has implications also for the delivery of other objectives, for example relating to safety and the environment. The research on those objectives also contributes to the evidence base on congestion.

3.1.1 Monitoring trends

The setting of congestion targets, monitoring the effectiveness of policies and predicting future demand require developing suitable measures of traffic and congestion across transport modes. We are working to enhance congestion monitoring on the road network by developing existing and new data sources. We need also to monitor social, economic and environmental trends liable to influence demand.

2 *The Future of Transport*, White Paper (July 2004).

Figure 3b Road traffic by mode, 1980-2003 (Department for Transport, *Transport Trends*)



3.1.2 Evidence priorities

We need better evidence to inform the development of transport infrastructure across all modes, as well as encouraging the development and application of new technology (see tinted box).

Cross-modal evidence priorities

- Improve understanding of how changes in land use, demographics and social habits will affect future demand for transport.
- Develop analyses to ensure investment in infrastructure and technology delivers best value for money.
- Identify how to lock in infrastructure benefits so as not to induce additional demand.
- Assess the potential of new transport modes to reduce congestion.
- Encourage technology transfer from outside the transport sector.
- Improve exploitation of transport-related data and the development of new applications.

Tackling congestion on roads

We will continue to improve our information and network management techniques to tackle congestion on the existing road network, including through the research, trialling and adoption of proven technologies and intelligent transport systems. Opportunities include the use of geographic information to reduce disruption of road works, intelligent speed adaptation, collision avoidance technologies, and the long-term potential of cooperative vehicle highway systems. We will also continue to evaluate HOT and HOV solutions and explore how travel choices can be influenced by information on traffic conditions.

We are committed to assessing the options for road pricing. This needs to be informed by improved understanding of a wide range of issues, from public acceptability of the impact on privacy, of the types of schemes available and their differing impacts, through to the capabilities of different technologies and how they might develop over time. We need also to recognise the implications of the European interoperability directive.[3]

Tackling congestion on the rail network

To continue to improve the reliability and capacity of the network while reducing costs, we will specify and procure major infrastructure to deliver new capacity where this is needed. And we will support better use of the rail network through the development of route utilisation strategies and timetabling improvements. We need also to improve our abilities to forecast demand and our overall modelling of cost, performance, safety and impact on freight. We must also ensure we understand how to make the best use of new capacity delivered by major infrastructure projects.

Tackling congestion in the aviation and maritime sectors

We need to improve reliability and maximise the capacity of current infrastructure. This includes examining the impact of more sophisticated economic instruments to manage peak time slots and other demand management measures within capacity limitations. We will also need to continue to assess the impact of measures from Brussels and from Eurocontrol on the Single European Sky, and determine how best to increase capacity and deliver the White Paper recommendation for two new runways in the South-east.

Changes in international trade have increased congestion at our ports and across connecting transport networks. The rapid economic development of China and India is forecast to have a major effect on the quantity and pattern of international trade in the future. We need to improve our understanding of how these trends will impact on the demand for freight transportation and ensure that this informs any expansion of port capacity and related infrastructure.

3 Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive). *Official Journal L* 108, 24/04/2002, pp 0033-0050.

3.2 Improving accessibility and choice (strategic theme 2)

We are committed to inclusive and accessible transport systems and services. This involves working effectively with delivery partners at a local and regional level, particularly in meeting our PSA targets to improve the accessibility, reliability and use of local public transport. Central to this will be giving regional and local bodies more influence to ensure that transport services can be tailored to local needs and preferences.

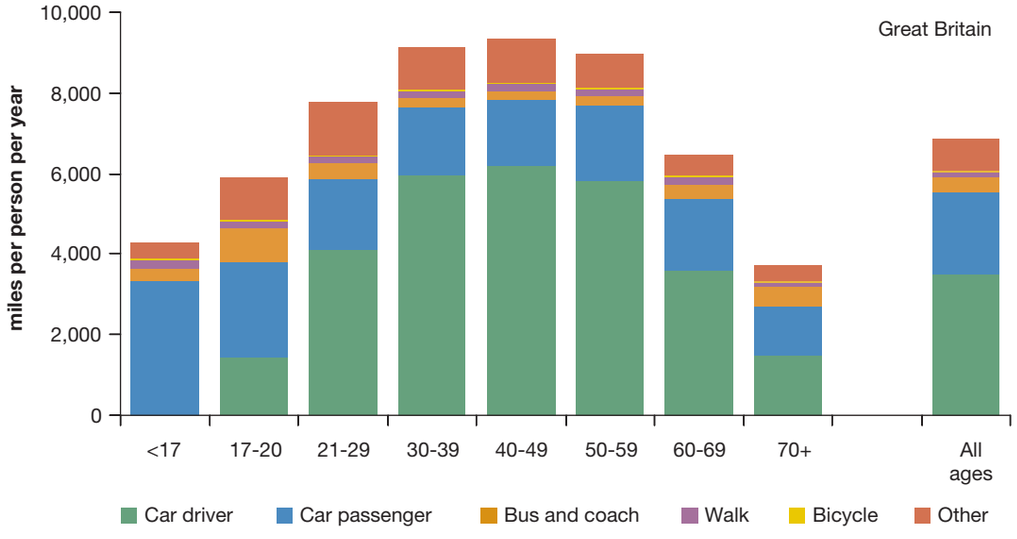
3.2.1 Monitoring trends

Travel patterns reflect not only people's need and desire to travel but also limits imposed by the quality of their access to transport. To predict future demand for transport, and deliver on our commitment to improve public transport, we need to understand people's changing travel behaviour, their transport needs and choices. Among our priorities we need to improve our understanding of:

- satisfaction levels among transport users and non-users, in a way that allows better comparison across transport modes and provides a means of measuring changing expectations;

- perceptions, needs and attitudes that affect choice and access to transport (Figure 3c), in a way that helps us compare different economic, social or geographic groups. Identifying key drivers that influence travel choice will improve transport modelling and help deliver better policy.

Figure 3c Average distance travelled by main mode and age, 2002/03 (Department for Transport, *Transport Trends*)



3.2.2 Evidence priorities

Improving planning and access to transport, jobs and services

To improve access, we need to continue to track how transport demand is determined by where people live and work, not only in relation to the services and facilities that they need to access, but also the factors influencing modal choice. We need to help local transport authorities to identify geographic and economic barriers to accessing transport in their own areas. Working with the Social Exclusion Unit and Neighbourhood Renewal, we need also to improve our understanding of the transport requirements and travel behaviour of different social groups.

So as to best meet demand, we must continue to improve identification and assessment of existing accessibility problems and our methods of appraising local and public transport options, whether bus, light rail or congestion charging schemes. Our appraisals need to be based on adequate valuations of the economic and social benefits of transport services (for example, better access to jobs, hospitals and commerce) in order to inform transport planning alongside housing and regeneration agendas. And, as expenditure increases through the Transport Innovation Fund (TIF), we will need evidence to inform decisions on early schemes.

With major projects such as widening of the M25, the Olympics, the Thames Gateway regeneration project and plans for Crossrail, we need also to assess the potential implications of construction pressures around London over the next ten years.

Improving rail services

Our aim of continued improvement on the railways requires a sound evidence base by which to judge performance. This includes ensuring an appropriate statistical resource to support the Department's new rail responsibilities and the rail industry, as well as working with the Office of the Rail Regulator (ORR), which collects much of the rail data. The High Level Output Specification for the railways will set government's requirements of the industry, requiring the gathering of detailed evidence about the industry's performance predictions and future planning. We need also to improve our understanding of costs within the industry and the benefits of improving cost attribution, as well as the incremental costs and benefits of improving above a specified performance level. New franchising will be informed by improved monitoring of customer satisfaction.

Looking further ahead, we will encourage rail bodies and the wider rail industry to identify and address long-term challenges facing the railways.

Towards integrated information and services

We need to understand the type of travel information people require, as well as how and when they wish to access such information (see tinted box). Providing users with convenient, flexible and fast payment methods will help develop fully integrated information, booking and ticketing systems that allow seamless travel across transport modes**.** This will require extending 24/7, 'one-stop' and e-enabled services to private and business customers. To do this, we must understand the full potential and limitations of different technologies such as smart cards and payment by mobile phone.

Travel information evidence priorities

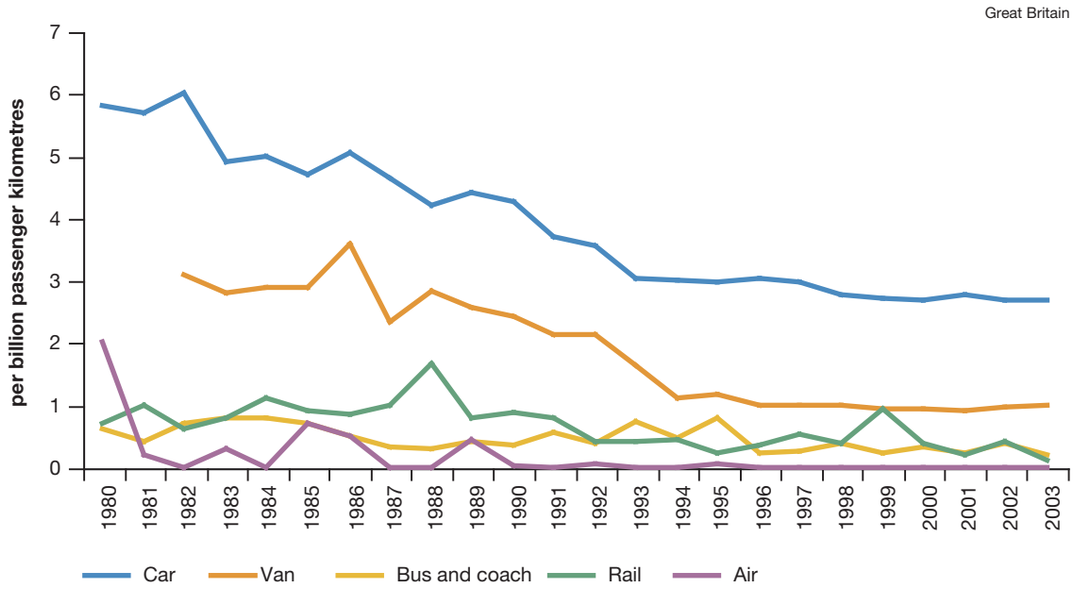
These priorities include:

- understanding the performance and perception of Transport Direct to inform further development including use of real time data;
- ensuring that the adoption of new technology does not become a barrier to accessing information for any social group;
- improvements to data and information exchange, identifying data accuracy, timeliness, security and confidentiality issues;
- provision and presentation of information to users of the strategic road network.

3.3 Improving safety and security (strategic theme 3)

Safety and security are key concerns of the Department and its agencies across all modes of transport. In terms of fatalities per passenger kilometre (Figure 3d), air continues to be the safest mode of transport. On the roads, the passenger fatality rate for cars, the mode of transport used most, has halved since 1980, though the reduction is now levelling off. Across all modes, appropriate safety regimes must be further developed to manage risk at an appropriate level without placing unreasonable costs and constraints on operators, the travelling public or industry.

Figure 3d Passenger fatality rates: air, rail, motor vehicles, 1980-2003 (Department for Transport, *Transport Trends*)



In ensuring the security of the transport system, recent terrorist attacks illustrate the challenges we face. No single security measure is capable of mitigating every threat, so a range of security measures based on the best possible evidence is needed, as well as planning to prepare for the consequences and improving resilience.

3.3.1 Monitoring trends

It is essential that we monitor the safety and security of transport and set targets on the basis of data that accurately reflects real-world risks and cost-effective counter-measures. This requires monitoring both the frequency and severity of accidents as well as other safety incidents. It also requires data on usage for comparison of rates of risk. In terms of road safety, we also monitor driver behaviour and vehicle design or maintenance defects, for example, through work such as the on-the-spot accident investigation study and the cohort study of novice drivers.

3.3.2 Evidence priorities

Identification and assessment

To continue reducing the number of people killed and injured in road traffic accidents (and those on other modes of transport) requires improved understanding of causation and the behavioural, environmental and technical factors that contribute to accident occurrence and severity (see tinted box). We must also assess how socio-economic trends (e.g. an ageing population) will affect safety in the future, and improve our understanding of what factors influence the public perception of risk. Understanding of the vulnerabilities of transport and associated technologies, such as information and communication technology and power systems, will inform the assessment of security and safety risks.

Prevention and enforcement

To reduce further the number and severity of road accidents, we need to understand how best to deploy combinations of measures, including education/publicity, engineering and enforcement of traffic law. More generally, we need to understand how best to communicate safety information to influence public behaviour and the factors influencing the public acceptance of ‘intrusive’ safety systems or automatic enforcement.

As well as the formulation of a strategy for maritime e-navigation, the main focus of our maritime safety strategy is prevention through design improvements (to vessels, equipment, methods and systems) and use of accident data for better targeting of resource.

Road safety evidence priorities

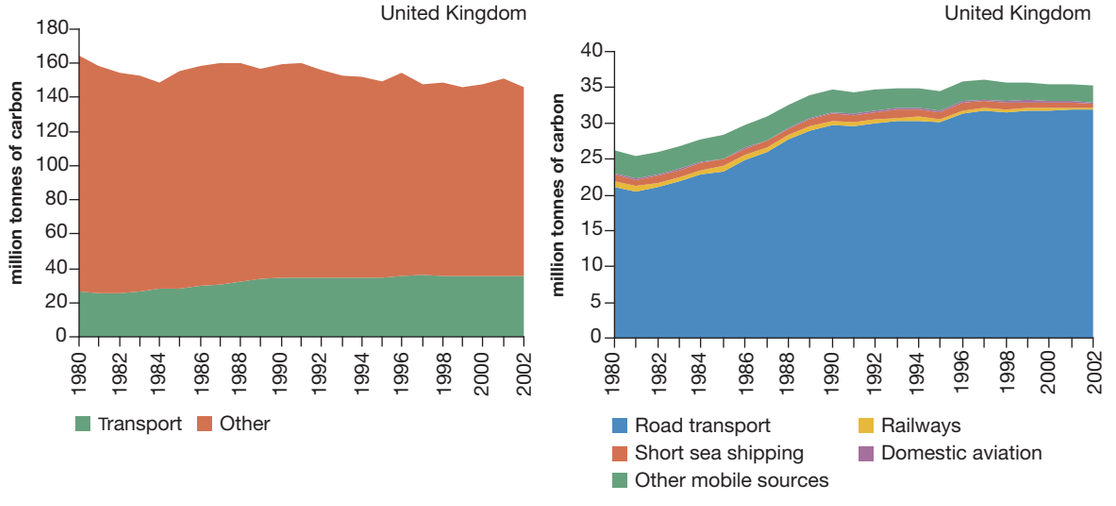
These priorities include:

- identify indirect vulnerabilities created by new vehicle technologies affecting behaviour, e.g. how in-vehicle technology affects driver attentiveness and safety;
- assess computer simulations of vehicle crash behaviour as an alternative to conventional impact testing;
- increase understanding of road accident causation to improve safety measures, including driver training, road environment and vehicle design;
- improve speed management to reduce accident risk and severity by use of road engineering and enforcement technologies such as cameras;
- investigate further whether the level of under-reporting of road accident casualties has changed.

3.4 Reducing environmental impact (strategic theme 4)

Meeting an increased demand for travel must be balanced against safeguarding the environment and improving the quality of life for everyone. The detrimental impacts of travel include emissions of greenhouse gases (Figure 3e) and air pollutants, for which we have PSA targets (shared with Defra and DTI), noise, and damage to both the natural and built environments. We need to ensure that our policies contribute to the government's sustainable development strategy and commitment to a low-carbon economy. As well as reducing emissions, we wish to encourage improved fuel efficiency and investment in alternative fuels for the future.

Figure 3e Carbon dioxide emissions by source, 1980-2002 (National Environmental Technology Centre, *Transport Trends*)



Over recent years our understanding of the state of the environment has improved, and we have made progress on defining the environmental standards we must meet. We need to monitor policies in the light of the evidence – recognising its uncertainties. This requires a multidisciplinary approach that combines evidence from the natural, social and economic sciences with technology and engineering (see tinted box).

Climate change

Like many other environmental impacts, the effects of greenhouse gas emissions are transnational. Developing an international framework of targets, based on robust evidence, is essential, even where action must be undertaken at a national level. Areas where we need to improve our understanding include:

- appraisal of technology options, including full-life cycle evaluation of carbon release;
- effects of the European Union voluntary CO_2 vehicle emissions targets for 2008;
- impacts of aviation and how effectively these may be redressed by emissions trading;
- public perception, attitudes and behaviour in relation to climate change and the sustainability agenda;
- costs of reaching the 60% target – all sectors or varying targets by sector;
- risk-based assessments of the impact of climate change and extreme weather on transport infrastructure.

3.4.1 Monitoring trends

A high level of technical expertise is often required in order to monitor environmental impacts effectively. It often requires the establishment and maintenance of a sampling infrastructure. Applying monitoring results to the policy environment, whether in the setting of targets or the calculation of costs that can be used to inform policy, can also be problematic. Effective monitoring requires consulting stakeholders on best practice and engaging with cross-government and external expertise.

3.4.2 Evidence priorities

Reducing environmental impacts

Measuring and predicting the environmental impacts of transport requires us to use the best available evidence and most suitable analytical tools, whether this be the metrics most suited to reflecting noise disturbance or better assessment of the impacts of aviation emissions on a local and global scale. Our priority evidence needs include:

- how we could further encourage the uptake of clean, low-carbon vehicles and fuels;
- how we promote the development and early uptake of hydrogen-powered vehicles;
- the scientific basis for the tightening of vehicle emissions standards and emissions resulting from the possible development of Heathrow Airport.

Evidence on noise mitigation and the impact of transport infrastructure on biodiversity will continue to inform our choice of appropriate designs and technologies.

Improving social and environmental sustainability

Our appraisal of policy options, standards, economic instruments and other methods to mitigate environmental impacts must be well informed. To this end, we must ensure that policy appraisals reflect the value of environmental resources and assess environmental standards and guidance on the basis of the most recent evidence. It is also essential that our policies are based on the best possible evidence concerning, for example, fuel resources, sustainability and future technologies.

We are assessing the contribution of alternative fuels and new technologies, such as telematics, to sustainable growth of the logistics, aviation, shipping and ports sectors. We will continue to investigate the potential of alternative energy technologies to power infrastructure such as lights and signs across the strategic road network.

By improving linkages with other government policies, we can access a broader evidence base to help us integrate transport policy with planning, regeneration and land use policies in order to minimise impacts on the environment and improve understanding of the inequalities of those impacts.

We need also to improve our understanding of public attitudes and opinions on environmental issues to determine the effectiveness of initiatives such as environmental labelling schemes.

3.5 Supporting the economy (strategic theme 5)

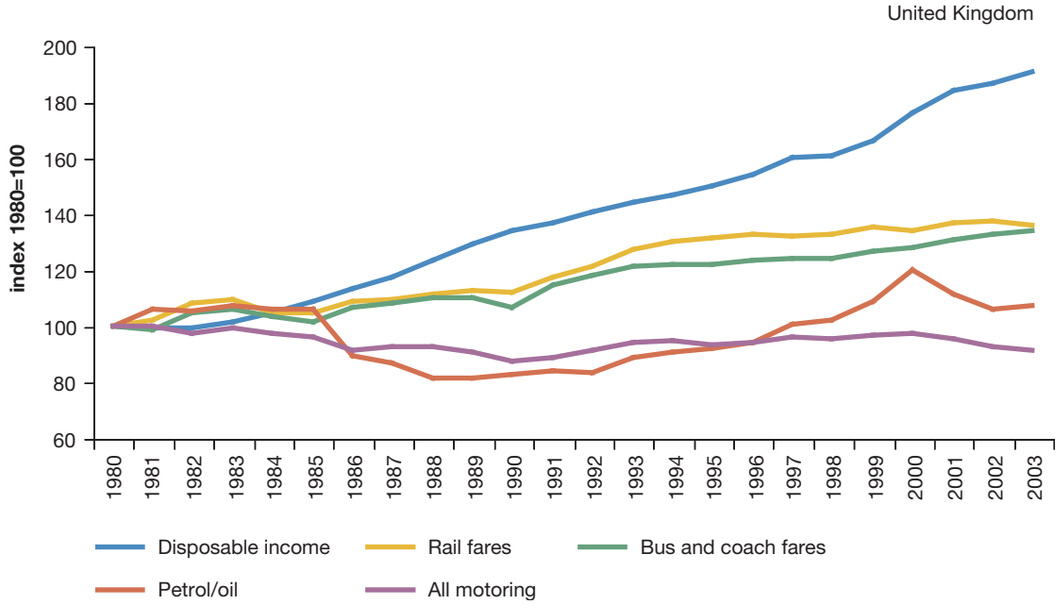
The transport system helps underpin the international competitiveness of the economy. By facilitating the national and international free movement of people and goods, we contribute to regional and national prosperity. In turn, economic growth increases demand for goods and therefore for their transportation (we work closely with other departments to deliver regional economic growth targets). Through our commitment to sharing decision-making with regional and local stakeholders, we seek to ensure that regional and local planning is based on a shared view of priorities, deliverability and affordability. In the longer term, we need to improve our ability to estimate the broader economic effects of transport.

3.5.1 Monitoring trends

We need to improve or build new analytical tools and models that allow us to monitor and predict the effect of transport on the broader economy The development of appropriate methodologies is dependent upon an evidence base derived from data supplied by public and private transport operators (Figure 3f). Among the factors needing consideration are:

- monitoring effects on the local, regional and national economies;
- monitoring the distribution of economic effects across social groups, whether in terms of employment, income or productivity.

Figure 3f Changes in the real cost of transport and income, 1980-2003 (Department for Transport, *Transport Trends*)



3.5.2 Evidence priorities

Economic effects of transport

We will continue to improve our understanding of how transport and other aspects of national and regional economies relate to one another, including the location of households and businesses. For example, regional economic models need to use higher-quality sub-regional and regional data in their evaluation of the impacts of transport schemes. This will help us identify drivers to reduce travel demand while encouraging economic growth. Such an understanding could also help us to, for example, maximise the macro and micro economic benefits of aviation and related developments at regional airports.

In developing our economic analysis, we need to improve our understanding of the sensitivities of models to underlying assumptions and, whenever possible, test forecasts

against a variety of future scenarios. This will help us assess the implications of placing greater weight on economic, social or environmental benefits. We must also identify how best to ensure that our appraisal methods are not unduly risk averse to the adoption of new technologies.

Understanding our transport industry

We wish to improve the cost, performance and long-term economic sustainability of the transport industry by creating an appropriate economic framework based on sound evidence This requires us to have a better understanding of the nature and use of subsidies and of the ways to promote more rational pricing across transport modes.

We need to further develop appraisal criteria to assess the value for money of specific rail schemes and prioritise expenditure on the railway on a consistent basis across organisations. This includes, for example:

- valuation of performance;
- crowding;
- station benefits;
- environmental benefits;
- freight benefits;
- road decongestion benefits;
- option value;
- optimism bias;
- value of time; and
- better understanding of the cost of safety and comparisons across modes.

There also needs to be continued analysis of the financial viability of new airport capacity and understanding of how best to encourage sustainable development of the ports industry.

Asset management

We need to ensure that local authorities and the Highways Agency have the right tools to manage their highway assets effectively and efficiently. Service delivery levels need to be defined in terms of public need, rather than by engineering standards. This includes, for example, whole-life costing, valuation, risk management and optimisation of assets.

Transport appraisal

We need more comprehensive valuations of the impacts of transport measures, including the evaluation of whole-life costs. We need also a better understanding of how transport can support the economy when our current models are unable to assess how the economy works or how transport interacts with it. The indirect costs and benefits of transport schemes are particularly difficult to quantify (see tinted box). Public transport schemes often appear to offer less value for money than road schemes and, yet, used as complementary measures, they may help deliver the full benefits of congestion charging.

Real options analysis

This is a tool to help make decisions about investments.

The Council for Science and Technology suggests that, in the context of the Ten Year Investment Framework, which requires substantial growth in business R&D in the UK and where the government is increasing its own funding of the science base, it is essential that government draws on the best available information and techniques for taking decisions on which projects to support.

The applicability of real options theory will be explored further in the context of transport scheme appraisal, innovation and wider vfm. Modelling and assessment of the transport implications of future scenarios should provide a much broader assessment of uncertainty, leading to better decision-making. This will provide the basis for developing more systematic risk-based approaches to appraisal (such as real options analysis) in circumstances where the vfm of a project is particularly sensitive to the underlying drivers covered by scenarios.

4 Communicating research and evidence

The effective use of evidence and research requires good communication. Through our stakeholders and other groups, we can improve the use of evidence, identify uncertainties and encourage peer review. Internally, we can help to maximise the value of our evidence across policy areas.

For transport to be an effective enabler, it is important that we take the lead in establishing links with government departments and other key opinion formers and to be seen as authoritative, evidence-based, yet open to critique. We must seek to ensure that stakeholders, delivery partners, other interested bodies and the wider public are informed of our strategic plans and the evidence and reasoning that underlie them.

4.1 Guidance

The communication of evidence and research informing government policy is governed by a range of guidelines:

- *Guidelines on Scientific Analysis in Policy Making* sets out key principles applying to the development and presentation of scientific advice in policy making.

- The *Code of Practice for Scientific Advisory Committees* provides a framework for scientific advisory committees to operate within. Among the committees following the code are the Secretary of State for Transport's honorary medical panels and the Commission for Integrated Transport (see tinted box).

- Professional codes of practice and protocols such as the National Statistics protocols that underlie the publication of government statistics.

Such guidance helps maintain the quality of the information we use and publish, but should not inhibit us from communicating less detailed or robust evidence where this is the best available. In line with the Freedom of Information Act, there should be a presumption towards openness and transparency. To help meet these obligations and improve our communication, the Department has introduced its own guidance, including:

- research guidance on the dissemination of project proposals and results, with the aim of making available all our research findings, subject to few exemptions;

- guidance on statistical releases to provide a framework for effective working between statisticians and policy colleagues, and ensure that DfT complies with the Code of Practice for National Statistics and in particular its supporting Release Practice Protocol.

Other initiatives include enhancement of the research management database and the citation of all sources of evidence in policy documents. Our publication scheme specifies the information we intend to publish and is accessible from the Department for Transport's website. The Department also carries out research on the effectiveness of communications and the extent to which behaviour and attitudes change as a consequence of publicity.

The Commission for Integrated Transport (CfIT)

CfIT was established in 1998 as a non-departmental public body (NDPB), advising the government on integrated transport policy and supported by independent research. The Commission's remit is:

- future policy options: 'blue-sky thinking' on future strategic issues;
- policy issues spanning departmental boundaries (i.e. environment, social, etc.);
- best practice amongst local authorities/delivery agencies to improve performance and highlight barriers to best practice;
- comparison with European/international policy initiatives and dissemination of best practice;
- the impact of new technology on future policy options;
- specific issues as requested by the Department for Transport.

The Commission plays an important role in refreshing the transport debate, based on published reports. It aims to raise the overall level of 'the transport debate' and, where possible, build consensus among stakeholders.

4.2 What are we communicating?

We need to communicate much more than the final results of research and analysis.

4.2.1 Aims and intentions

We have to communicate our needs and priorities clearly if the wider research agenda is to reflect our requirements. Publication of this strategy is an essential step to achieving this. We will also give notice of individual research projects, and our Unit-level research and evidence strategies will give details of aims and objectives, encouraging peer review and critique of our evidence needs.

4.2.2 Data and statistics

The Department already publishes a wide range of statistical bulletins and reports, all of which are made available on the Department's website. By improving data access, we can also encourage the development of new applications and analyses. Subject to addressing technical issues, and the need to protect personal data, we hope to be able to offer wider on-line opportunities to analyse raw data held by the Department.

4.2.3 Analytical methods

We will continue to explain how we monitor progress towards our objectives, and the models and analyses that underpin our evidence (see tinted box). The publication of results from economic models can help raise the sophistication of debate and encourage constructive critique of our methodologies.

National Transport Model

The outline of a multi-modal National Transport Model was developed following a commitment to take forward our modelling for policy analysis. The outline was reviewed by the Institute for Transport Studies, University of Leeds, and consultants Mott MacDonald. They concluded that a model of this form would be suitable for representing the impact of a wide range of policies, and recommended a development programme. This programme was endorsed by most of the 70 or so experts invited to a seminar on the NTM review in February 2001.

The model was reviewed at an expert seminar in June 2003 and full details of the model have now been published on the web. The model is being continually developed and used to assess options for the 2004 spending review as well as, in conjunction with other models, to indicate the likely effects of the options for road pricing.

4.2.4 Results

We will publish the results of our research and analysis, and also project and programme reports, summaries and evaluations. Where possible results should be published in peer-reviewed journals or other specialised media that will be read by the expert communities whose feedback we need.

4.3 How are we communicating?

The choice of methods will depend on whom we communicate with and on the complexity of the information and the resources available. It will also depend on whether we are simply seeking to communicate information or foster a more active engagement from those we are communicating with.

4.3.1 Disseminate information

This is a one-way process of disseminating information, e.g. the publication of results through traditional media, distribution lists and websites. Rapid growth of the internet as a communication medium has been reflected by development of the DfT website – used for the publication of a wide range of information, including research reports, statistical bulletins and progress towards targets.

4.3.2 Assess opinions

This involves the capture of opinion and views on a particular subject, e.g. peer review, opinion surveys, on-line surveys and questionnaires.

4.3.3 Consultation

This exemplifies a two-way relationship of asking and receiving information on our use of evidence (see tinted box). It allows for greater interaction than the simple capture of immediate opinion, e.g. seminars, workshops, open and public meetings, focus groups, written consultation exercises and internet-based forums.

Transport Statistics User Group

The Group was set up in 1985 as a result of initiatives by both the Department and the Statistics Users Council, with the assistance of the Institute of Logistics and Transport. The Group holds regular seminars, and a newsletter is circulated to all members. Aims of the group are to:

- identify problems in the collection, provision, use and understanding of transport statistics, and discuss solutions with those responsible;
- provide a forum for the exchange of views and information between users and providers;
- encourage the proper use of statistics through publicity and education.

4.3.4 Participation and engagement

This aims to foster active engagement and participation in the collection and use of evidence. The Council for Science and Technology's report on public dialogue[4] provides criteria for selecting priorities for public dialogue, whether these are long-standing areas of controversy or new, emerging issues. The purpose of dialogue is not to determine but to inform policy by challenging the thinking of policy-makers, scientists and others who can contribute to policy development.

However, we need to continue to improve the ways that we draw on the global pool of knowledge by accessing external data, independent research and analytical work.

We are improving our internal management of information in part to meet the need for systems to track casework under the FoI Act. Other improvements to help us share information include:

4 'Policy through dialogue: informing policies based on science and technology' by the Council for Science and Technology can be found at http://www2.cst.gov.uk/cst/reports/#8.

- direct desktop access to a range of information sources via the e-library gateway;
- InfoPoint – internal enquiry service;
- citation of all evidence sources;
- an enhanced research management database.

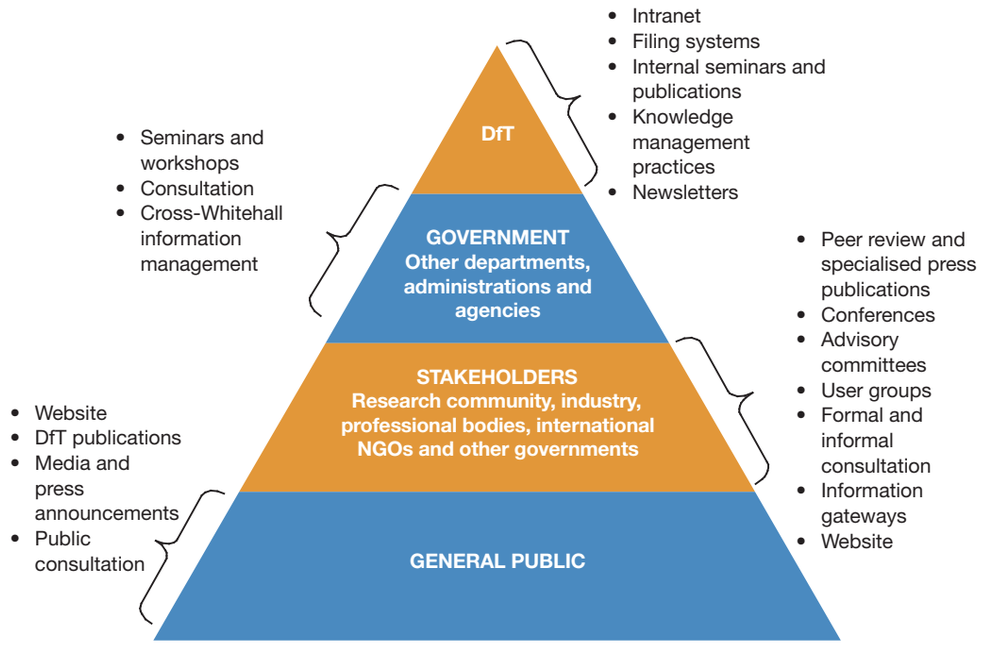
We recognise that solutions to the sharing and use of information are often best managed within smaller groups, by adopting those tools that best meet their requirements, but effective solutions also require a degree of central guidance and coordination.

4.4 Who are we communicating with?

The best way to communicate depends very much on who we wish to communicate with. We need to coordinate and manage the dissemination of information, not just within our own department but across and beyond government (Figure 4a).

Good communication within the Department helps us not only maximise the benefits we obtain from research and surveys, but also prevents the unnecessary duplication of effort. For example, we will reap the full benefits from policy evaluations only if the results are well disseminated and the results of past evaluations easily accessible. This requires effective communications within the central Department and across our agencies. To improve communication across government, we participate in a number of initiatives, such as the government's Chief Scientific Advisers' Committee and the Social Exclusion Unit's interdepartmental research liaison group.

Figure 4a Ways in which the DfT communicates



5 Collaboration

5.1 Introduction

Collaboration on data collection, analysis and research can bring significant advantages to all concerned. As well as economic advantages, such partnerships can provide effective means of knowledge transfer, tapping into high-quality research and leading-edge science and technology. Co-funded research very often leads to economies of scale. A sometimes modest investment by the Department can buy into significant research projects, which we may not be in a position to fund directly. We can also benefit from the knowledge and expertise of other disciplines in finding solutions to transport problems. Collaboration also brings benefits to external organisations by providing insights and understanding of the Department's needs, constraints, philosophy, culture and ways of working.

The range of people and organisations with whom we collaborate on the evidence base is extensive and diverse. Organisations involved in transport provision and research include universities, research councils, local authorities, passenger transport executives, industry, regulatory authorities, international research institutions, public and private sector research establishments and non-governmental organisations, both within the UK and abroad. We also collaborate with other governments.

However, the degree and quality of our collaborations vary enormously. We need to make sure that we have effective means of making best use of the evidence and research base, and sharing understanding, whether by collaboration or other means.

Ways in which collaboration can be achieved include:

- sharing knowledge and results, more of which is discussed in Chapter 4 on communication;
- working with local authorities, for example on road safety and traffic management issues;
- participation in consortia part-funded by the research councils or the European Union under the Framework programmes;
- jointly funded research projects and programmes;
- jointly sponsored dissemination events;
- participation in advisory and steering groups.

5.2 Collaboration across government

The Department collaborates with other UK government departments, including the Scottish Executive, National Assembly for Wales, and Northern Ireland Office, not least to ensure that lessons learnt are shared across boundaries. Perhaps most significantly, we

maintain close contacts with DTI and its research agenda, and we find effective means of working with industry, for example in assisting technology transfer and encouraging demonstration projects. We also collaborate with DTI by means of sponsorship of the Foresight programmes as a way of informing future research needs. Further examples are:

- collaboration with DWP to bring together proposals from both departments for a longitudinal study of disabled people;

- work with the Home Office to ensure more effective use of data from Automatic Number Plate Recognition (ANPR) cameras to tackle uninsured drivers; and

- collaboration with Defra on developing vehicle emission factors for inclusion in air quality models and marine pollution prevention/response, through coordinating research and sharing results.

A new emphasis on cross-departmental evidence and analytical needs is the setting-up of the Coordination of Research and Analysis Group (CRAG), to promote more responsive analysis and better dialogue between policy experts and the full range of analytical disciplines across government. DfT will participate fully where relevant cross-cutting issues are taken forward through the Group.

Our collaborations do not limit themselves to the joint funding of research but include collaboration on data collection, management and access issues. We cooperate with many organisations to improve access to our own data and coordinate data collection and management. For example, the collation of personal injury road accident data is overseen by a standing committee and involves close collaboration with police and local authorities.

To encourage data exploitation and the development of new applications, we collaborate on the development of common data structures and protocols, such as the Transport Data Framework (see tinted box). With other government departments, Ordnance Survey and the Office of National Statistics, we are seeking to make more effective use of spatially referenced data in the development and monitoring of policy.

Transport Data Framework

The Department is currently developing a data framework with local authorities. This is intended to provide standard data definitions, referencing systems, methods and protocols to enable easier cross-referencing of data held by the Department, Highways Agency and local highways authorities. The Framework will integrate existing and new data sources on roads – covering the road network, journey times, traffic, planned and unplanned events, incidents and works – and provide presentational and analytical tools to enhance the management of the road network in England. It will also facilitate dissemination of information to the road user via the Traffic England and Transport Direct portals.

DfT will continue to work with other government departments where mutual benefits can be identified – for example, with ODPM on land use, agglomeration and regeneration, with the Department of Health on health impacts of transport, and the Home Office on electronic vehicle identification. We are also coordinating work on how government can take advantage of innovations in the management and utilisation of real-time data as one of three 'Grand Challenges'. These challenges have been identified as cross-government issues where research and analysis could play a major role in establishing the way forward during the period of the 2007 spending review.

More generally, the collection and dissemination of comprehensive and accurate statistical information is key to good policy development. The Department works with other government departments, local authorities, regional government offices, the police, passenger transport authorities and others through groups such as the Standing Committee on Road Accident Statistics and the Central and Local Government Information Partnership, to encourage the proper handling and use of transport statistics.

5.3 Collaboration with research councils and universities

We have concordat agreements with EPSRC and ESRC, both of whom have significant transport research interests. These concordats provide a framework in which the Department and research councils can interact, coordinate and collaborate on issues of common interest. We maintain relationships with other research councils where we share common interests, particularly NERC and the Tyndall centre.

DfT is also a member of the SUE Futures programme steering group: a transport research consortium within EPSRC's Toward a Sustainable Urban Environment programme. The Department is also closely involved in the development of a programme of academic research on sustainable development. We will continue to strengthen our links with research councils, so that research supported by the councils better reflects our needs, and ensure the Department gains maximum benefit from research carried out by these institutions. We will consider, with the relevant research councils, the creation of a 'virtual' transport research centre to facilitate the joint working of engineering, technological, natural, environmental, social and economic scientists to tackle fundamental issues such as productivity, social inclusion, climate change, and security. The objective will be to provide a stimulating environment to deliver rigorous, multi-disciplinary research that will allow transport policy for the UK to be formed in a scientific manner, while engaging with stakeholders and the wider public.

The Department's links with many individual universities are being strengthened through support for postgraduate studentships, both at doctorate and master's level, in areas of particular interest to DfT, such as transport economics and climate change. We will develop further studentship schemes.

5.4 European and other international collaborations

In addition to taking an active role in shaping the relevant parts of the EU 7th Framework Programme (FP7) to reflect DfT objectives, the Department will join European consortia for projects relevant to our evidence needs, where it is beneficial so to do.

European Platform for Transport Research (EPTR)

The Department is a member of EPTR – an ad hoc grouping of national representatives to the FP6 Sustainable Surface Transport Programme Committee. The aim is a more coordinated approach to transport policy-relevant research in the Framework Programme as well as fostering cooperation between national research programmes. Eleven member countries (including the UK) are partners in the ERA-NET TRANSPORT project – which was proposed by EPTR. ERA-NET TRANSPORT provides the necessary resources to realise active collaboration among national transport research programmes.

Technology platforms

Related to Framework programmes are a number of technology platforms (advisory groups) set up by the European Commission to develop and promote strategic research agendas to inform the next Framework Programme – FP7. DfT is a member of the European Road Transport Research Advisory Committee (ERTRAC) and the European Rail Research Advisory Committee (ERRAC). DfT also takes an interest in the Advisory Council for Aeronautics Research in Europe (ACARE) and is an associate member of the ERA-NET aeronautics consortium aimed at improving cooperation between national research programmes in aviation. DfT also tracks developments in the newly-formed waterborne technology platform.

As well as the EU Framework programme (see tinted box), DfT collaborates with researchers in other countries through:

- participation in the management of the COST (European Cooperation in Science and Technology research) transport programme, and membership of consortia;
- participation in the steering committee of the Joint Transport Research Centre – supported by the Organisation for Economic Cooperation and Development (OECD) and the European Conference of Ministers of Transport (ECMT); and active participation in working groups and round tables on particular topics;
- direct collaboration with organisations abroad.

We will continue to actively participate in EU and other international research programmes and projects to ensure we gain maximum benefit from collaboration with research carried out overseas, through access to policy-relevant results and their dissemination within DfT. We will also be contributing to discussions on the revised EU Transport White Paper, to ensure evidence gaps and needs are identified, and that these are reflected in FP7.

The Department collaborates on individual research projects where there is a DfT business need. As an example, there is significant collaboration on research relevant to vehicle standards with other European organisations, largely due to the need to assemble an acceptable evidence base for internationally agreed standards (e.g. Development of

Harmonised Side Impact Test Procedures European Enhanced Vehicle Safety Committee (EEVC) and more recently by members of the International Harmonisation of Research Activities (IHRA)).

We will develop plans for collaboration with the OECD/ECMT Joint Transport Research Centre to improve the data we have on international benchmarking of transport indicators, e.g. comparison of journey-time reliabilities, public transport patronage.

5.5 Other collaborations

5.5.1 Rail transport

For rail transport, we will develop clear responsibilities for evidence and analysis with our partners following restructuring. The Department took an active part in the setting-up of Rail Research UK and continues research and collaboration with the Rail Safety and Standards Board (RSSB), as part of wider work looking at strategy and spending options for rail.

5.5.2 Aviation

In aviation, we collaborate closely with the extensive evidence and research work undertaken by CAA, NATS, EUROCONTROL and the industry (see tinted box). This includes identifying and meeting the evidence needs of the Future of Aviation 30-year strategic framework for the development of airport capacity in the UK.

CAA, NATS and EUROCONTROL

The Civil Aviation Authority (CAA) is a public corporation established by Parliament in 1972 as an independent specialist aviation regulator and provider of air traffic services. Following the separation of National

Air Traffic Services (NATS) from the CAA in 2001, the CAA is now the UK's independent aviation regulator, with all civil aviation regulatory functions (economic regulation, airspace policy, safety regulation and consumer protection) integrated within a single specialist body. CAA's costs are met entirely from its charges on those whom it regulates.

The European Organisation for the Safety of Air Navigation (EUROCONTROL) is a civil and military organisation which currently numbers 34 member states. Its primary objective is the development of a seamless, pan-European air traffic management (ATM) system. EUROCONTROL's other core activities span the entire range of gate-to-gate air navigation service operations – from strategic and tactical flow management to controller training; from regional control of airspace to development of leading-edge, safety-proofed technologies and procedures, and the collection of air navigation charges.

5.5.3 Freight

The Freight Logistics Research Group consists of independent members with industry knowledge as well as representatives from large retailers and from logistics providers. The Group evaluates the impact and relevance of outputs from individual projects in our research programme, as well as providing feedback and challenge.

DfT is seeking to reduce the environmental impact of vehicles, not least through cutting carbon dioxide emissions. DfT is a member of the Low Carbon Vehicle Partnership. This is a forum for industry, government and other partners to liaise on upcoming policy developments and regulatory issues. An important element of this is helping government to coordinate its research, development and demonstration activities. In a similar manner, DfT is working with the construction industry to reduce the impact of transport infrastructure through appropriate materials, design and technologies.

6 Professional skills

To deliver sound evidence-based policies, we need to ensure we possess the necessary levels of skills in the right quantity. Making the best use of evidence requires not only suitable work practices and resources, but also an environment in which analytical, research management, and other specialist skills are recognised, nurtured and developed. This can be achieved both by the training of existing staff and by ensuring such expertise is being produced elsewhere and attracted to DfT (see Table 6a). While we have made progress in recent years, we still have some way to go in developing such an environment.

The successful delivery of transport policy requires a wide range of professional and technical skills, from general civil service skills – policy-making, economic, parliamentary procedures, project and programme management, ICT, social research – to those with a transport focus, such as engineering, transport planning, traffic management and modelling.

Table 6a Responsibility for meeting our analytical skills needs

	Whitehall-wide	DfT central	DfT Units
Identifying skills	Develop PSG framework.	Coordinate and assess skills needs in light of objectives.	Identify current shortages and predict future needs.
Deployment of skills	Inter-departmental deployment.	Management of flexible deployment.	Engage with flexible deployment scheme.
Development of skills	Harmonise central funding of training costs. Clarify role of professions in PSG.	Improve skills guidance. Clarify training funding policy. Needs of specialist professions. Continued professional development.	Identify training and development needs. Encourage and monitor staff development. Succession planning.
Recruitment	Ensure that general recruitment schemes recognise the need for analytical skills. Engage with skills providers (research councils, universities, professional bodies etc).	Recruitment schemes for skills specific to DfT (e.g. traffic management). Liaise with skills providers on DfT skills needs. Ensure people with professional skills are recruited within the fast stream.	Ensure job specifications reflect required skills.

6.1 Professional Skills for Government

Professional Skills for Government is a programme of action agreed by the Civil Service Management Board to ensure that we have the right skills and expertise *in all areas and at every level* of the Service to be able to deliver our priorities. Within this vision, each department determines how they recruit and select people to meet the skills requirements for their organisation. To meet this challenge we need to:

- identify skills and deploy staff to best meet our changing priorities and objectives;
- maintain and further develop our skills base;
- ensure that we are recruiting staff with the skills to meet our future needs.

6.2 Identifying and deploying skills

Among the major groups involved in analytical work within DfT are economists, social researchers, statisticians and engineers. These professionals work in both central units and are 'bedded-out' in devolved policy directorates, generally grouped within specialist divisions. The devolved research programmes are managed by research programme managers and others located in the relevant policy areas and agencies.

In order to deliver government's commitment to restructuring the rail industry and improving performance, the Department has identified the commercial and technical skills necessary to the task. The transfer to DfT of the Strategic Rail Authority's functions and responsibilities is matched by a similar transfer of knowledge and experience.

To improve efficiency and respond better to changing priorities, we are introducing *flexible deployment* to ensure we get the right people in the right place at the right time.

6.3 Developing skills

We need to maintain and enhance in-house skills and ensure that people with the right skills are available in order to meet our changing requirements and priorities. This is best achieved by providing a range of opportunities, suited to the needs of the individual, for maintaining and developing expertise:

- exposure to cutting-edge knowledge by attending external conferences and seminars, and/or organising our own in-house seminars;
- guidance on competency requirement and training opportunities;
- mentoring and coaching;
- formal training schemes;
- encouraging the attainment of professional qualifications;

- encouraging membership of and participation in learned societies and institutes;
- secondments.

6.3.1 Professional skills development

Most of our specialist staff have their own professional structures within DfT to assist in keeping staff skills up to date, promote best practice and provide advice to HR and line managers on the recruitment and deployment of relevant staff. But it is fair to say that the level and intensity vary considerably across the different professions. We need to continue progress towards ensuring high standards for all professions.

Professional Skills for Government highlights the need to recognise and develop skills for all staff. Policy officials should be required to keep up to date with the requirements of evidence-based policy making, and their role in delivering it, through appropriate training. To this end we will continue to:

- develop our 'centre of excellence' focal point for programme and project management and our guidance on risk strategy and management;
- ensure that all staff have some familiarity with basic analytical skills and the contribution analysis can make;
- maintain specialist skills of all staff whose work needs to be of a high analytical standard. This includes the development of research management skills.

For certain professions, such as economists and statisticians, a pooling arrangement with ODPM and Defra allows managed moves between the three departments, providing wider career development opportunities than any single department could offer.

6.3.2 Heads of profession

Heads of profession (HoPs) have an important role in developing and promoting the Professional Skills in Government agenda throughout the Department, and acting as ambassadors for the Department with their professions. The Science Cross-cutting Review within SR2002 concluded that heads of profession should play an essential role in the continuing development of professional skills, including:

- review and categorisation of posts in terms of the requirement for expertise, and maintaining records of qualifications and experience;
- ensuring a competency framework for each professional group;
- continuing professional development of staff engaged in research management, including their exposure to the latest science in their area of work;
- recognition of professional skills in career progression.

To meet this challenge we must ensure that the HoPs receive adequate support and resources. The Chief Scientific Adviser coordinates HoPs to ensure continued progress in skills development. HoPs will be consulted by Human Resources Directorate on strategic issues around recruitment and retention, pay, career planning, training and development, talent pool assessment, and succession planning.

Members of professional groups are encouraged to join relevant professional bodies and participate in Continued Professional Development programmes.

The Government's Chief Scientific Adviser has been appointed the Head of Profession for Scientists and Engineers. We will work with the new HoSEP as he develops mechanisms for enhancing the role of science and engineering across Whitehall.

6.4 Recruiting expertise

The skills set available to the Department will need to be enhanced not only through developing existing staff, but also recruitment and/or secondments. Our drive to increase professionalism has seen recruitment to senior posts, including Chief Scientific Adviser, HR Director, Corporate Finance Adviser and Group Chief Accountant as well as to professional posts in the Highways Agency, DVO and the central Department.

We are seeking to rectify the general shortage of transport modellers in the UK by the Transport Planning Skills Initiative, aimed at attracting young people to take appropriate qualifications. We need to support and develop such schemes, as well as expand our working relations with the relevant professions, academic institutions and research councils to address future skills shortages.

Other steps which we are taking include:

- targeted recruitment (more flexible, smaller-scale recruitment exercises to bring in scarce skills and competencies);

- publishing an interchange strategy to encourage secondments with other organisations to bring in scarce skills, broaden current staff skills, and strengthen links between the central department, its agencies and the wider public sector. Shorter targeted and part-time secondments will be used more often, based on DfT business needs and the needs of the individual;

- scarce-skills programme to improve communication, risk, management, research programme and project management skills;

- DfT will sponsor studentships, not only for the results of the research, but to help create a pool of trained people with skills relevant to DfT from which it would be possible to recruit suitable staff.

7 Evidence and research management

Much of the evidence base which informs the Department is of wide relevance and utility, where other parties will take a lead on its development for many purposes. But some of the evidence is only of interest to DfT or to a very limited number of partners. Our challenge is to identify the state of current and future knowledge across our range of evidence needs, and commission research and analysis where it is needed.

Where evidence is not available, or not available within our timescales, the Department commissions research from a wide range of organisations. These include universities and research establishments in the public sector, and industry and consultancies in the private sector. Through this research, our evidence base looks to anticipate and evaluate events and interventions, and inform policy development, implementation and operational work. Over the period of this strategy, our approach to deriving robust evidence and research will be informed by issues common to many areas including, for example, the need to establish trade-offs between more extensive use of existing data and the new sources of data that are becoming available (from improved technology and its deployment).

We commission research largely from the applied end of the research spectrum. Transport is a sector where most of the 'blue sky' and basic research is taken forward by industry or through international initiatives. Our task is to encourage the research and development that can help achieve our detailed objectives.

Management of research funded by the Department is devolved to the policy units and agencies responsible for delivery of our objectives. There is a small team at the centre, supporting the Chief Scientific Adviser and Chief Analyst, responsible for, among other things, this Department-wide strategy and the underpinning framework. When the strategy has been fully implemented, the Department's ability to deliver consistently high-quality, policy-relevant evidence and research will be achieved through:

- implementing Board- and Unit-level evidence and research strategies that put in place a more systematic and strategic approach to identifying research needs and priorities in individual programmes;
- improving scrutiny and challenge, led by the Chief Analyst and Chief Scientific Adviser;
- introducing an evidence and research quality framework to ensure the quality of evidence and research management and assessment across all directorates and agencies.

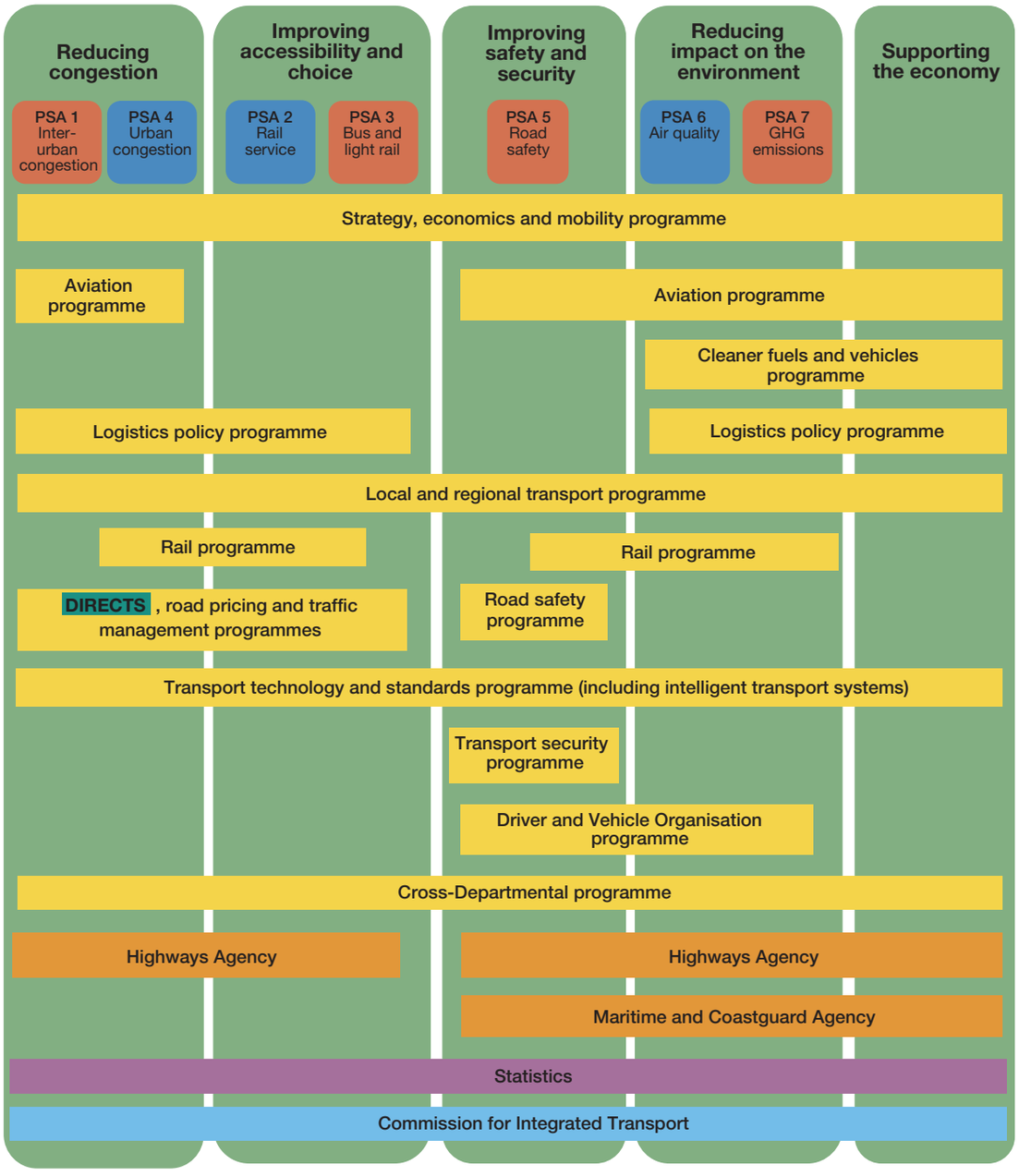
7.1 Board and Unit evidence and research strategies

This strategy replaces the existing *Evidence and Research Strategy* (January 2004) with a two-tier approach. This document, the 'Board-level' evidence and research strategy (B-ERS) will facilitate planning and priority-setting at a strategic level. The B-ERS will help ensure that evidence and research is aligned with our longer-term goals as well as

immediate policy objectives. It will also provide background for the production of Unit evidence and research strategies setting out in more detail the evidence requirements of our programme and delivery plans.

Our key themes, and how they broadly relate to Unit-level research programmes and to PSA targets, are shown in Figure 7a.

Figure 7a Key themes of DfT research programmes



7.2 Chief Scientific Adviser and Chief Analyst: scrutiny and challenge

The Board-level strategy will be fully reviewed every two years in line with the spending review process and will be informed by more regular assessments of evidence needs by the DfT Board through its strategic planning cycle . Assessment of evidence needed to inform Unit-level strategies will be part of an annual process to develop, scrutinise and approve research programmes.

Cross-cutting review of science and research (March 2002)

The review identified a number of areas for further action, including:

- Research budgets can be vulnerable to cuts in the face of more urgent spending pressures. Costed science and innovation strategies should be an input to spending review discussions and research spending identified early on in the spending review.
- Research needs often cut across departmental boundaries and there is a need for better exploration of the scope for stronger co-ordination in cross-cutting areas.
- Departments must be able to commission and manage outsourced research programmes. As well as appointing Chief Scientific Advisers to a suitably senior role, departments should ensure better management, development and deployment of scientific staff.
- Departments have a responsibility to ensure that the research that they commission is adequately exploited by adopting more strategic knowledge transfer objectives.

The Chief Scientific Adviser (CSA) is responsible for ensuring high-quality scientific evidence within the Department, for challenging DfT thinking and for evidence and research agendas (see tinted box). The CSA plays a key role in scrutinising Units' evidence and research strategies as part of the improvements to our internal processes and arrangements for improving quality (see Section 7.3 on the Evidence and Research Quality Framework). Heads of profession (HoPs) – in particular the Chief Economist, Chief Statistician, Chief Scientific Adviser and Head of Social Research – will also play important roles in quality assurance of research, ensuring that we are framing the right questions so that scientists and analysts can answer them.

7.3 Evidence and Research Quality Framework

We have introduced an Evidence and Research Quality Framework (ERQF) to set standards for the quality of evidence and research in all policy directorates and agencies and to assist internal scrutiny by the Chief Scientific Adviser and Chief Analyst. The Framework sets out an agreed view on what we mean by 'evidence and research quality'. It makes clear the proxies for how evidence and research activities can be assessed – see excerpt in Figure 7b – enabling Units and agencies to assess their arrangements and performance in advance of scrutiny by the CSA. It will be developed further in 2006-07 to reflect experience and best practice and to address the issues emerging from broader Whitehall skills and analysis initiatives.

Figure 7b Excerpt from the Evidence and Research Quality Framework – Communication Chapter

Questions to consider	Best case	Worst case
Is there an agreed approach for communication of information about the Unit's evidence and research? What is it? Is it clear who is responsible for its implementation?	Analysis of range of communication needs, identifying issues, sources, interest groups, audiences and feedback mechanisms, and full adherence to the departmental research publications policy, including complete and timely RMD entries. Evidence cited in ministerial submissions and relevant evidence generally presented alongside policy announcements. Clear responsibility for advice, monitoring and enforcement.	Publication of research findings by researchers when appropriate. Ad hoc maintenance of RMD.
How are potential sensitivities and levels of uncertainty assessed? Is responsibility at all levels clear, before, during and after the project?	Arrangements for anticipating, identifying and handling sensitive issues (agreed with CD). Clear process to identify and consider, for example, the use of advisory panels and/or formal scientific committees with full role to communicate independent advice. Clear guidelines for all staff involved, to follow.	Unclear means of identifying and considering the impact, uncertainties and sensitivities.
What are the means of consultation and communication within DfT agencies and OGDs? Are they robust and effective?	Regular (e.g. annual) review to ensure all government interests, stakeholders and partners identified, and (as frequently as beneficial) a formal process for consultation with those interests. Feedback provided to all, and regular assessment undertaken of the utility of the process. Clear research findings highlighted.	Ad hoc responses when approached to enquiries about analytical and research needs, priorities and progress.
What are the means of consultation and communication with external stakeholders and partners? Are they robust and effective?	Regular (e.g. every two years) review to ensure potential stakeholders and partners identified, and (as frequently as beneficial) a formal and practical process for consultation with those interests. Feedback provided to all and regular assessment undertaken of the utility of the process.	Responsive when approached to enquiries about analytical and research needs, priorities and progress.
What are the means of consultation and communication with subject experts (including leading researchers and research councils? Does this include arrangements for specialist advice?	Regular (e.g. every three years) review to ensure leading research advisers identified and a formal process for consultation with those interests. Feedback provided to all and regular assessment undertaken of the value of the process.	Responsive to enquiries about analytical and research needs, priorities and progress.

For managing research within the Department (see tinted box), the ERQF reflects our role as intelligent/informed customers for research commissioned from a wide range of public and private-sector organisations. Two elements will be the particular focus of activity during the next period of strategy development: research procurement and research quality assurance.

Managing research

Strategic management of the Unit's evidence and research strategy

- assessment of the available evidence and evidence priorities;
- linkages to B-ERS;
- consultation with stakeholders and agents, with subject experts, within DfT and other government departments;
- active collaboration with other sources of evidence.

Management of the research programme

- financial management through SR bids and annual allocations;
- identifying annual priorities and preparing outline programme.

Appraisal of the project options

- decision-making on priorities and benefits;
- ensuring relevance to business planning and strategic needs.

Commissioning of research

- specification of the research question;
- market knowledge of contractor base (including SMEs) and capabilities;
- evaluation of proposals and selection of a research contractor.

Management of contract and contractor

- monitoring progress, quality assurance throughout and accepting deliverables;
- managing risks, unexpected findings and contract variations;
- quality assurance through peer review, publication, dissemination, etc.

Evaluation

- of project results and fitness for purpose;
- of project and follow-up work;
- periodic evaluation of programme and feedback to appraisal.

7.4 Commissioning research

We will continue to procure our research from a wide range of organisations, normally using competitive tender procedures. This requires knowledge of the contractor base and, in some cases, detailed procurement strategies to test a wider range of contractors, encourage new researchers into the market or to support limited facilities or expertise. Strategies vary according to the types of expertise and facilities required and the market supply. We will continue to broaden our supplier base by encouraging participation through open notices of research needs, addressing also the objectives of DTI's Small Business Research Initiative (SBRI).

For the future, we are seeking to improve relationships with our key suppliers, with the aim of maximising benefits to the Department and to those suppliers. We also intend to look at different ways of commissioning research, through framework contracts or S-CAT, for instance, to make the process more effective. The Highways Agency is expected to award its first national research framework contract by the end of 2005.

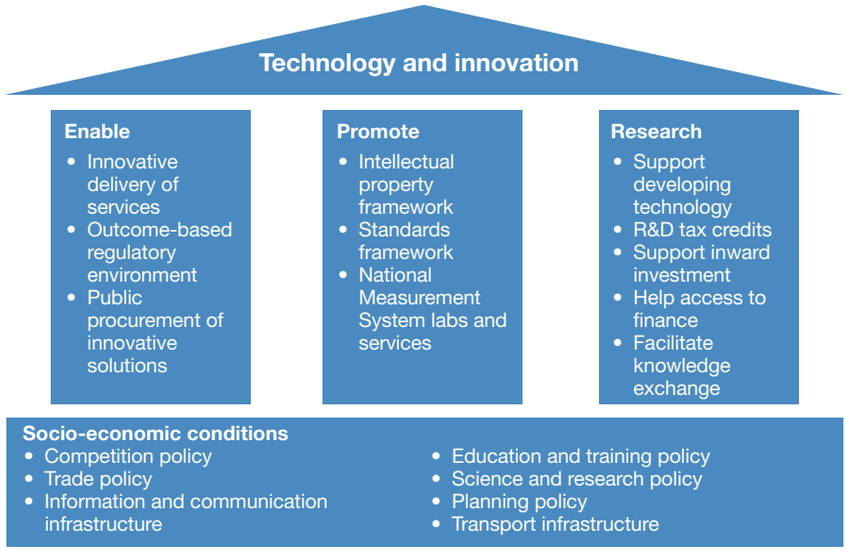
7.5 Quality assurance

All evidence based on research should be sufficiently robust to meet its intended purpose. However, we recognise that some research projects (for example, those limited to literature reviews, scoping or other simple studies) neither justify nor require the same level of quality assurance as findings derived from more complex or uncertain research. It is important that research managers, whilst adhering to common minimum standards (e.g. open publication), actively consider the scale and form of quality assurance appropriate to the research question.

8 Technology and innovation

Technology and innovation depend on the knowledge, skills and creativity of people at work. Government has an important role in creating the best possible conditions for innovation by developing a dynamic and innovative knowledge economy, including a strong science, engineering and technology base, incentives for knowledge transfer and high educational standards (Figure 8a).

Figure 8a How government policies influence technology and innovation



The DTI *Innovation Report*[5], published in December 2003, describes and sets targets for how government can drive innovation. A ministerial team, chaired by the Secretary of State for Trade and Industry, leads the innovation agenda across the whole of government and drives forward the implementation of the *Innovation Report* (see tinted box).

Innovation Report

The Report's action plan identifies areas where the government can drive forward innovation by:

- increasing the take-up of new ideas from UK's science, engineering and technology base;
- using government's purchasing power to support innovation;
- stimulating innovation through the regulatory framework;
- supporting innovation in the regions.

5 DTI Innovation Report, http://www.dti.gov.uk/innovationreport/

As a department, we need to improve our awareness of how we can influence technology and innovation. Relatively simple opportunities to promote desirable technologies can be missed if not considered early enough in the development of policy. Our technology strategy (see tinted box) aims to help us fulfil three key roles in supporting technology development:

- **enabler** – acting to drive innovation in transport technology, including use of DfT procurement;
- **promoter** – ensuring that technology aspects are considered in policy development and that the correct policies are in place to drive development of particular transport technologies; and
- **researcher** – developing and coordinating the use of research evidence across the Department, and working to develop a better consideration of uncertainty in policy development.

Our technology strategy

Key components of the strategy are:

1 Chief Scientific Adviser's Technology Forum

2 Technology platforms:
- information and communication technology;
- energy and environment;
- security.

3 Technology road maps and readiness levels

4 Fostering innovation through public procurement

5 Building links between government, industry and academia:
- steering and advisory groups;
- research council collaboration;
- workshops and working groups
- other academia and industry forums.

8.1 Chief Scientific Adviser's Technology Forum

The Forum will provide oversight and coordination of technology issues, helping to ensure that they are integrated into wider strategy cycles and delivery planning. It will not attempt to cover every aspect of technology, but seek to identify gaps or duplication in our approach to technology. Through the Forum, we will:

- facilitate information-sharing on technology initiatives across the Department (including evidence generated through pilots and trials);
- support strategic technology road-mapping, such as road pricing technologies and future energy sources for transport;
- facilitate 'state of the art' workshops with the Department for Trade and Industry (DTI) on relevant technologies to stimulate industry thinking and support related policy development;
- coordinate collaboration with DTI, research councils, the European Union framework programme and the Cambridge-MIT Institute. This will include input to DTI's Technology Strategy and Programme calls and support for research council initiatives such as studentship schemes;
- support the Department's proposed Investment Appraisal Framework by advising on technologies and related risks and risk strategies;
- enhance the role of the Chief Scientific Adviser to challenge the Department's policies and support DfT contributions on technology issues to the Cabinet Committee for Science and Innovation.

8.2 Technology platforms

Our current technology and innovation priorities are grouped into three main 'platforms':

- information and communication technology – including road-user charging technologies and satellite navigation;
- energy and environment – including cleaner alternative fuels;
- security – including biometrics, screening and detection technologies.

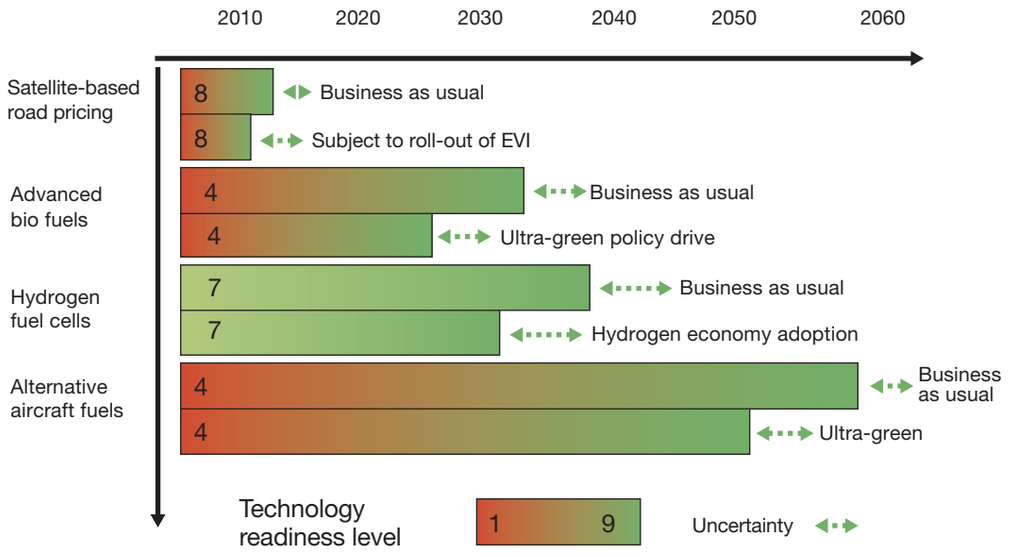
These provide a very clear tie-in with the DTI Technology Programme[6] themes of 'environmentally-friendly transport system', 'intelligent connected world', and 'a more secure environment'.

6 DTi Technology Programme, http://www.dti.gov.uk/technologyprogramme/

8.3 Technology road mapping and technology readiness levels

Road maps provide a graphical, time-based framework, allowing strategic plans to be mapped against technology options. They help effective decision-making by identifying technology synergies, dependencies and gaps. Road maps are used in conjunction with technology readiness levels (TRLs). Readiness levels provide a means of measuring and communicating the maturity of technologies, from development through to the point when they enter service. Assessing the risk of achieving each technology readiness level helps determine and manage technology risk. We will continue to road-map our technology interests, including defining TRLs and obtaining accurate estimates on timelines to maturity of technology – see Figure 8b.

Figure 8b Example of a technology timeline



8.4 Fostering innovation through public procurement

The Department recognises the role that procurement of goods and services by the public sector can play in acting as a lever for stimulating and enabling innovation. To this end we are continually improving our practices to:

- involve suppliers early in the procurement process, ideally during policy formulation, or programme inception where appropriate;
- encourage the involvement of SMEs;
- identify and specify outputs rather than the inputs to our requirements;
- improve contract management.

We will also continue to work towards ensuring that our appraisal methods and risk management guidelines do not impede the adoption of innovative solutions that help meet our objectives.

8.5 Building links between government, industry and academia

Well-established steering or advisory groups such as Freight Logistics Research Group and the Low Carbon Vehicle Partnership provide input to our own research programmes and policy considerations. We liaise with DTI's Technology Programme and ensure that we play a full part at the Cabinet Committee for Science and Innovation.

Close working relationships have been developed over a number of years with the research councils and other organisations, such as Intelligent Transport Systems UK. We jointly fund studentships with the Economic and Social Research Council and are currently completing a LINK programme with the Engineering and Physical Sciences Research Council on future integrated transport.

We will continue to support, appraise and apply the benefits of new technologies such as Galileo (see tinted box) by setting standards and/or harmonising protocols. We continue to support the application of IT and communication technology for monitoring vehicles, passengers and cargo. The Department also runs workshops focusing on transport modes (e.g. rail technology workshops) or technologies (e.g. Galileo, road-pricing technology). These bring together industry, local authorities and other interested organisations to focus on particular technology priorities.

Galileo

Galileo will be Europe's own global navigation satellite system, providing a highly accurate, guaranteed global positioning service under civilian control. It will offer accuracy down to one metre, which is unprecedented for a publicly available system. Applications will help provide safe and efficient transport by:

- giving the accuracy needed where safety is paramount, guiding ships, running trains, and landing aircraft, even in extreme conditions;
- supporting much-improved search and rescue services, to identify within metres the location of planes, ships, or people in distress; and
- extending and improving car navigation aids, car-theft protection, and fleet monitoring systems that depend on GPS technology.

The government, with the British National Space Centre, is investing €90 million in the Galileo project.

Other innovation forums include ACARE (see tinted box) and the Cambridge-MIT Institute (CMI) – Transport Special Interest Group. CMI helps bring together academics, from not just Cambridge but all UK universities, with experts from outside academia. Such a forum helps the interchange of ideas and encourages those from outside academia to participate actively in research by the provision of research funding or other resources.

Advisory Council for Aeronautics Research in Europe (ACARE)

The ACARE strategic research agenda goals are to make Europe the world leader in aeronautics through collaboration, strengthened and guided by a single shared vision. Common mechanisms will be created for research and technological development in the service of a leading-edge sector symbolising European industrial ingenuity and excellence.

A world-class European air transport system that meets society's needs is also a key aim of the 'Vision 2020', including noise reduction, emission reduction, reducing travel delays, and safer air transport.

9 Transport futures

One of the issues to emerge from the Modernising Government agenda has been a drive towards a more formalised approach to futures to help us to understand what the future might bring. Futures is not about predicting the future but about anticipating and preparing for new risks and opportunities (see tinted box).

The government (through the Foresight Programme and Cabinet Office studies) has recognised that the only way to reach the kind of future we want is to anticipate change and to plan actions based on this knowledge. Futures can comprise:

- identifying possible futures and visions (i.e. what we would like the future to look like) as a means of developing or adjusting strategy; and/or
- identifying long-term trends, forecasting and developing scenarios as an aid to understanding the future world.

What are futures?

Futures can be described as a methodical approach to envisaging different long-term ways in which the world might change. It is common to look at the world as being made up of separate, unconnected individuals and things. Future studies aim to take a more holistic view and consider the world as being made up of dynamically changing, interdependent parts.

9.1 Futures in strategy and policy development

Futures thinking is embedded in much of the work of the Department, underpinning strategy and policy development. This thinking is informed by evidence and analysis from a wide range of sources, such as research and other activities funded by DfT, by the work of our partners and collaborators, and by work undertaken by the wider analytical community. DfT's Board regularly considers policy and evidence issues over 10- and 30-year time frames, reviewing and informing current strategy (e.g. the *Future of Transport* White Paper) to ensure it reflects other departments' policies, the latest long-term trends, forecasts and stakeholders' views.

To challenge our own assumptions and to share best practice, we must ensure that we work on futures issues with colleagues and experts in other areas of government and beyond. The development of future scenarios is a valuable tool for challenging and developing strategies and specific policies. For example, scenarios can help unpack the assumptions and 'values' underpinning our economic modelling work. Use of the National Transport Model (NTM) requires detailed assumptions about policies but does not always reflect uncertainties of some key drivers of demand, an area in which work on future scenarios would be particularly useful.

By further developing such scenarios we can better understand how key strategic contexts, such as technologies, global competitiveness, international security, energy and demographic trends could evolve over the next 30 years or so (Table 9a). To deliver robust, sustainable and responsive transport systems we must be able to adapt policy to different futures and understand the implications of changing the relative priorities of themes and conflicts between them.

Table 9a Key strategic contexts in long-term transport scenarios

Technology • Satellite navigation and wireless communications technology to make the best use of new and existing infrastructure • Continuing advances in information science, enhancing our ability to manage, access and analyse increasing amounts of data from different sources • Consideration of legal, social science and public engagement issues alongside the science and technology developments *Energy and climate change* • The impact of a rise in oil prices on the whole transport system and transport industry; the importance of achieving greater efficiency across all modes • Developing understanding of the science and economics of climate change, including attitudes of the public to climate change and possible measures • Developments in energy production and supply will have a major impact on any strategy to abate climate change • Better understanding of air-quality health impacts	*International security* • Recurring terrorist attacks have brought security issues to the top of the agenda – security must be an integral part of our policy development *Global competitiveness* • Contractual relationships appropriate for innovative financing, vfm from subsidy and cross-subsidy, and fuller understanding of the benefits and drawbacks of decentralising transport decision-making • Better integrated regional transport, spatial planning and economic strategies, including improved understanding of the interaction of transport with land use and housing and the effects of agglomeration economies • Developing sufficient understanding of the skills and capacity in the labour market related to future transport delivery and delivery chains particularly incorporating advanced technology *Demographics and lifestyle* • Changes in demography (particularly the ageing population) and social habits • Better segmentation of transport users' requirements across different groups

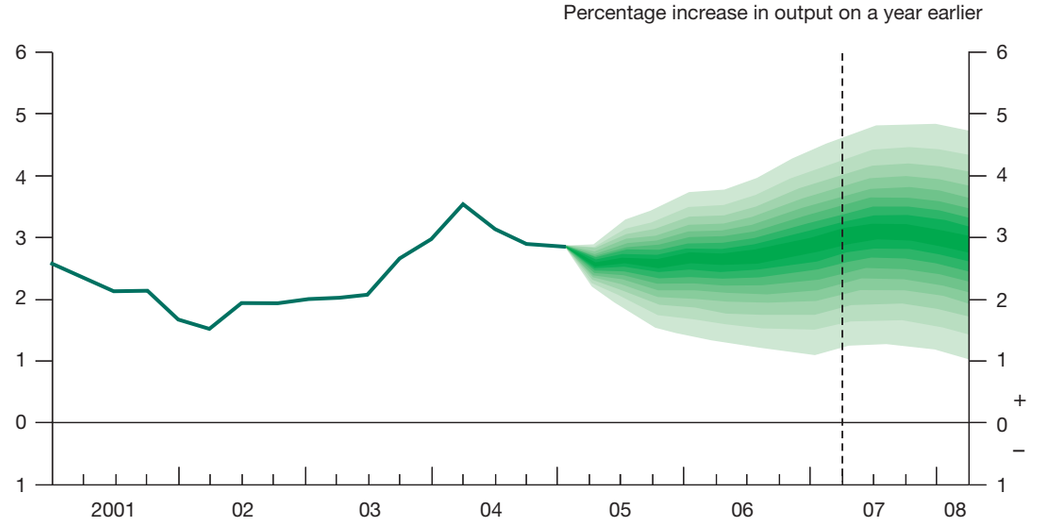
9.2 Presenting uncertainty

There will always be uncertainty about the future trends of many factors vital to our long-term strategic thinking, including economic, environmental and social trends. It is important that we seek to identify, manage and reduce this uncertainty, through improved risk management guidelines and futures studies. One such example would be the adoption of techniques such as those used by the Bank of England to present inflation or GDP predictions (see tinted box). Without projecting the implausible, we should always look at a range of scenarios and use them to develop a more systematic approach to appraising policy options.

Bank of England projections

The Bank published the first fan chart for GDP growth in its November 1997 Report. The objective was to improve presentation and focus attention on the whole forecast distribution, rather than on the central projection. Figure 9a makes clear the uncertainty in which decisions must be taken and contributes to wider debate about the risks to economic outlook and policy.

Figure 9a GDP fan chart (Monetary Policy Committee, 2005)



9.3 Futures programmes

Futures activity may be undertaken using a variety of methods, for example: scientific panels, structured communication methods such as the Delphi method, scenario development, surveys, targeted working groups, scientific seminars, and participation in research by other organisations such as The Tomorrow Project (see tinted box).

The Tomorrow Project

This project is an independent charity undertaking a programme of research, consultation and communication about people's lives in Britain in the next twenty years.

Its aims are to help individuals and organisations to think and learn about the future of people's lives in order to gain a better understanding of the present, as well as learn about the choices which will influence the future.

A series of workshops looked at a wide range of issues, from the automatic enforcement of parking and other penalties, to the use of technology and linked databases to detect infringements such as driving without insurance or MOT or driving a stolen car. The Tomorrow Project developed a set of possible future scenarios to stimulate thought among policy practitioners.

Within the Department, responsibility for futures work is largely devolved to Unit-level strategies. The Department also works with the Office of Science and Technology on the Foresight programme, and the Horizon Scanning Centre.

9.3.1 Foresight programme

We have interest in a number of Foresight projects but, in particular, the Intelligent Infrastructure Systems (IIS) project (see tinted box). The senior stakeholder group which oversees the strategic direction of this project is chaired by a DfT minister. This is a key project which will allow government to take a joined-up, long-term, strategic view of how we can apply science to respond to the challenges of future demand for transport.

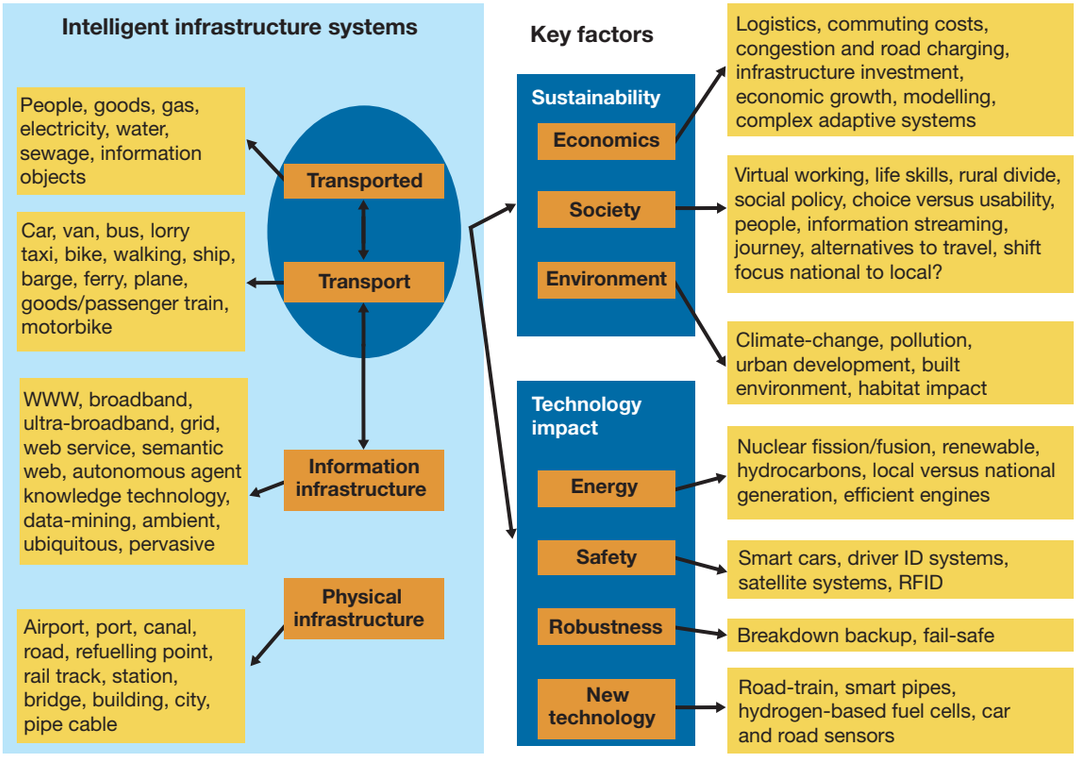
Intelligent Infrastructure Systems project

How could advances in science and technology be applied to create future transport infrastructure that is sustainable, robust and safe? This Foresight project is seeking to build a scientific evidence base to inform long-term strategic thinking on this question, covering such issues as:

- social impacts of future transport systems;
- how technology can minimise the environmental impacts of transport;
- balancing costs and competitiveness as we invest in transport infrastructure;
- implications of changing demand and transport capabilities on spatial planning.

(See figure 9b)

Figure 9b The application of science and technology to intelligent infrastructure systems



The IIS project explores how science and technology may be applied over the next 50 years to the design and implementation of intelligent infrastructure systems. One of the project's objectives is to produce four possible scenarios or visions of the future based on acceptance of/resistance to intelligent infrastructure and high/low impact on transport. The scenarios are based on various presumptions and challenges – social, economic, political, environmental and economic. Understanding these will ensure that we make the right strategic choices, so that science and technology can be applied to deliver and maintain robust, sustainable and safe intelligent infrastructure systems in the future. However, the scenarios will have a broader applicability in testing other policies options and methodologies (e.g. the NTM).

9.3.2 Responsive Horizons research

To inform better the challenges and opportunities that we might face over the next decade and beyond, the Department funds the Horizons research programme, which seeks ideas for research from external researchers. The objective of the research programme is to alert and inform the Department about long-term potential opportunities for, and risks to, achieving its policy and operational objectives. Innovative thinking is required about the future patterns of movement of goods and people. Proposals support our objective of reliable, safe and sustainable transport for everyone.

The programme is run responsively, with around two calls per year – each addressing different priorities and subject areas. Recent calls have addressed the implications for travel of the changing social networks, visioning and back-casting for UK transport policy, and advanced e-science methods of managing large amounts of transport data. Project selection is based on criteria, including relevance of research to DfT, originality of work, extent of forward thinking, scale of impact, potential benefit and uncertainty of these, and the scientific quality of proposed research.

Annex A DfT research partners

This annex lists some of the wide range of organisations that DfT works with on research, as well as those who have their own significant transport research programmes.

Central government	
Department for Education and Skills	www.dfes.gov.uk/research
Department for Environment, Food and Rural Affairs	www.defra.gov.uk/science/default.asp
Department for Work and Pensions	www.dwp.gov.uk/asd
Department of Health	www.doh.gov.uk/research/index.htm
Department of Trade and Industry	www.dti.gov.uk/industries_science_technology.html
Health and Safety Executive	www.hse.gov.uk/index.htm
HM Customs and Excise	www.hmrc.gov.uk
HM Treasury	www.hm-treasury.gov.uk
Home Office	www.homeoffice.gov.uk/rds/index.htm
Neighbourhood Renewal Unit	www.neighbourhood.gov.uk/
e-Government Unit	www.cabinetoffice.gov.uk/e-government/
Office of the Deputy Prime Minister	www.odpm.gov.uk
Social Exclusion Unit	www.socialexclusionunit.gov.uk
Office for National Statistics	www.statistics.gov.uk
DfT agencies and NDPBs	
Driver and Vehicle Licensing Agency	www.dvla.gov.uk
Driving Standards Agency	www.dsa.gov.uk
Highways Agency	www.highways.gov.uk
Maritime and Coastguard Agency	www.mcga.gov.uk
Vehicle Certification Agency	www.vca.gov.uk
Vehicle and Operator Services Agency	www.vosa.gov.uk/vosa
[Strategic Rail Authority]	[www.sra.gov.uk]

Devolved administrations	
Scottish Executive	www.scotland.gov.uk
Welsh Assembly	www.wales.gov.uk
Northern Ireland Office	www.nio.gov.uk
Transport operators	
Bus operators	Various
National Air Traffic Services	www.nats.co.uk
Statutory/regulatory bodies	
Civil Aviation Authority	www.caa.co.uk
Disabled Persons Transport Advisory Committee	www.dptac.gov.uk/access.htm
Rail Passengers Council	www.railpassengers.org.uk
Other government bodies	
British Transport Police	www.btp.police.uk
Health Development Agency	www.hda-online.org.uk
Local government	
County Surveyors Society	www.cssnet.org.uk
Local Government Association	www.lga.gov.uk
Local Authorities	Various
Passenger Transport Executives	www.centro.org.uk/ www.gmpte.gov.uk/ www.merseytravel.gov.uk/ www.nexus.org.uk/ www.sypte.co.uk/ www.wymetro.com/
Transport for London	www.tfl.gov.uk/tfl
London Underground	http://tube.tfl.gov.uk
Independent advisers	
Commission for Integrated Transport	www.cfit.gov.uk

Academia/research centres	
Centre for Ecology and Hydrology	www.ceh.ac.uk
EPSRC	www.epsrc.ac.uk
ESRC	www.esrc.ac.uk
Rail Research UK	www.railresearchuk.org.uk
NERC	www.nerc.ac.uk
Tyndall Centre	www.tyndall.ac.uk
Joseph Rowntree Foundation	www.jrf.org.uk
University departments and research centres	Various
Transport Research Laboratory	www.trl.co.uk
European/international forums	
Advisory Council for Aeronautics Research in Europe	www.acare4europe.com
COST Transport	www.cost.esf.org/index.php?id=238
European Framework Programmes	www.cordis.lu/en/home.html
European Organisation for the Safety of Air Navigation (EUROCONTROL)	www.eurocontrol.int
European Platform for Co-ordination and Co-operation in Transport Research	Sponsors of ERA-NET TRANSPORT, funded under the Sixth Framework Programme – see www.cordis.lu/era/
OECD	www.oecd.org/
International Civil Aviation Organisation	www.icao.int/
International Maritime Organisation	www.imo.org/index.htm
OECD/ECMT Joint Transport Research Centre	www.oecd.org/
United Nations Economic Commission for Europe	www.unece.org/trans/Welcome.html
UNECE/WHO Pan-European Programme on Transport, Health and the Environment	www.thepep.org/en/welcome.htm
European Rail Research Advisory Council	www.errac.org

Commercial organisations	
Technology companies	Various
Vehicle Manufacturers	Various
Network Rail	www.networkrail.co.uk
Rail Safety and Standards Board	www.rssb.co.uk
Interest groups and associations	
Association of Train Operating Companies	www.atoc.org/
The Health and Safety Commission's Railway Industry Advisory Committee	www.hse.gov.uk/aboutus/hsc/iacs/riac/
Bus Partnership Forum	See DfT website
Confederation for Passenger Transport	www.cpt-uk.org/
Energy Saving Trust	www.est.org.uk/
Freight Transport Association	www.fta.co.uk/
Institution of Civil Engineers	www.ice.org.uk
Institute of Logistics and Transport	www.iolt.org.uk/
Light Rail Transit Association	www.lrta.org/
Road Haulage Association	www.rha.net/index.shtml
Road Haulage Forum	Secretariat in Logistics Policy, DfT
Roads Liaison Group	Secretariat in Roads Policy Division, DfT
Royal Society for the Prevention of Accidents	www.rospa.com
SUSTRANS	www.sustrans.org.uk
The Carbon Trust	www.thecarbontrust.co.uk
Transport 2000	www.transport2000.org.uk/
Transport Planning Society	www.tps.org.uk

Annex B Key policy documents

Department for Transport

Annual Report 2005
http://www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_038338.pdf

The Future of Transport: a Network for 2030. The government's White Paper on the future of transport, 2004
http://transnet.dft.gsi.gov.uk/doc2.asp?docId=137353

The Future of Rail. July 2004
http://transnet.dft.gsi.gov.uk/doc2.asp?docId=137537&catId=68380#2

The Future of Air Transport. December 2003
http://transnet.dft.gsi.gov.uk/doc2.asp?doc=135397&cat=68376

Transport 2010: *The Transport Ten Year Plan 2000*,
www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_503944.hcsp

Transport Ten Year Plan 2000: Delivering better transport – progress report, 2002,
www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_023008.hcsp

Managing our Roads 2003
http://www.dft.gov.uk/stellent/groups/dft_transstrat/documents/downloadable/dft_transstrat_022779.pdf [

Tomorrow's roads: safer for everyone
http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/pdf/dft_rdsafety_pdf_504644.pdf

Tomorrow's roads – safer for everyone: The first three year review.
http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/pdf/dft_rdsafety_pdf_028165.pdf

Transport Trends: Current Edition
http://www.dft.gov.uk/stellent/groups/dft_control/documents/contentservertemplate/dft_index.hcst?n=9381&l=3

Highways Agency

Highways Agency, *Business Plan 2005/06*
http://www.highways.gov.uk/aboutus/corpdocs/bus_plan/2005_2006/

Corporate Plan, *Customers First 2005*
http://www.highways.gov.uk/aboutus/corpdocs/corp_plan/

Maritime and Coastguard Agency

Annual Plan and Accounts 2005
http://www.mcga.gov.uk/c4mca/mcga-the_mca/mcga-spt-ap_a_05.htm

DVO Group

Safe and secure drivers and vehicles: DVO Group Business Plan 2003/04
www.dft.gov.uk/stellent/groups/dft_about/documents/downloadable/dft_about_508302.pdf

DVO Group Corporate Plan 2005-07: Promoting safe and secure drivers and vehicles on our roads
http://www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_037824.pdf

ODPM

Annual Report 2005
http://www.odpm.gov.uk/index.asp?id=1123047

Urban White Paper, *Our Towns and Cities: the future,* 2000
http://www.odpm.gov.uk/index.asp?id=1127168

Sustainable Communities: building for the future, 2003,
http://www.odpm.gov.uk/index.asp?id=1139870

Making the Connections: transport and social exclusion, 2003
http://www.socialexclusionunit.gov.uk/downloaddoc.asp?id=70

Evidence and Innovation Strategy
http://www.odpm.gov.uk/index.asp?id=1142057

DEFRA

Evidence and Innovation Strategy (2005-08)
http://www.defra.gov.uk/science/how/strategy.htm

Rural White Paper, *Our Countryside: The Future – A Fair Deal for Rural England*, 2000
http://www.defra.gov.uk/rural/ruralwp/default.htm

The Air Quality Strategy Evaluation
http://www.defra.gov.uk/environment/airquality/strategy/evaluation/index.htm [

Department of Trade and Industry

Innovation Report. Competing in the Global Economy: the innovation challenge, December 2003
http://www.dti.gov.uk/innovationreport/innovation-report-full.pdf

Science and Innovation Strategy 2001
http://www.dti.gov.uk/scienceind/strategy.pdf

Cross-Departmental

Securing the Future – UK Government sustainable development strategy
http://www.sustainable-development.gov.uk/publications/uk-strategy/uk-strategy-2005.htm

Office of Science and Technology

Guidelines 2000: Scientific Advice and Policy Making
http://www.ost.gov.uk/policy/advice/guidelines_2000/index.htm

Excellence and Opportunity: a science and innovation policy for the 21st century
http://www.ost.gov.uk/enterprise/dtiwhite/pdf/whole.pdf

Investing in Innovation: A strategy for science, engineering and technology
http://www.ost.gov.uk/policy/science_strategy.pdf

Her Majesty's Treasury

Science and innovation investment framework 2004-2014
http://www.hm-treasury.gov.uk/media/95846/spend04_sciencedoc_1_090704.pdf

[Link does not appear to be correct]

The Patent Office

Intellectual Property in Government Research Contracts: guidelines for public sector purchasers of research and research providers,
http://www.patent.gov.uk/about/notices/2001/ipresearch.pdf

Annex C Statistical surveys

Surveys carried out in 2004/05

Commissioned by DfT

Statistical inquiry	Statutory or voluntary	Frequency	Individuals, business or local authority	Main purpose of the survey
National Travel Survey	V	Continuous	I	To monitor trends in travel behaviour
National Road Maintenance Condition Survey	V	Annual	LA	To monitor national trends in the visual condition of the whole LA road network and in the structural condition of the principal road network
Local Bus Fares Index, GB	S	Quarterly	B	Produces a fares index used in the compilation of the RPI, also a source for ONS Monthy Digest
Blue Badge Disabled Persons' Parking Scheme, England	V	Annual	LA	Sole source of data on Blue Badges issued to disabled drivers, for use by MIU
PSV Operators Return (including tram/light rail), GB	S	Annual	B	Main source of information on local bus and light rail patronage in a largely privatised industry. Patronage target PSA revised in spending review 2004.
Quarterly bus and light rail patronage	V	Quarterly	B	New index proposed from December 2005 for more timely tracking of PSA target
Taxis and PHV stock, licensed drivers, England and Wales	V	Two-year intervals (but ran in 2004 and 2005)	LA	To monitor taxi/PHV stock and licensed drivers, taxi quantity control, accessibility, input to policy
Concessionary fares	V	Biennial	LA	Tracking of concessionary fare arrangements offered by LAs
Bus reliability – scheduled mileage operated, England, except London	V	Quarterly	B	To regularly monitor performance against a target announced by DPM in 1999.
Bus crew assaults and vehicle vandalism,	GB	V	Occasional	B To regularly monitor levels of crime, to brief the bus policy STOP panel on crime prevention
Bus Passenger Satisfaction Survey	V	Quarterly	I	To monitor trends in passenger satisfaction relating to targets agreed with the bus industry
Road Accidents	V	Annual	LA	To produce national road accident statistics; to inform and support road safety policies and programmes, and to provide international cooperation with both EU and OECD

Statistical inquiry	Statutory or voluntary	Frequency	Individuals, business or local authority	Main purpose of the survey
Return of Port Traffic/Maritime Statistics Directive from 2000	S	Annual/ Quarterly	B	To inform United Kingdom and EC ports policy and provide statistics
Domestic Waterborne Freight	V	Annual	B	To inform policy on inland waterways and provide statistics to the EC
Sea Passenger Survey	S	Monthly/ Continuous	B	For ONS Balance of Payments and International Passenger Survey, to inform policy and to meet EU requirements. Based on the Maritime Statistics Directive system, but a separate output.
Ship Owners Capital Expenditure and International Trade Credit	V	Annual/ Quarterly	B	For the UK Balance of Payments and National Accounts produced by ONS
Continuing Survey of Road Goods Transport	S	Continuous	B	To provide information on the amount and type of work carried out by heavy goods vehicles within UK
International Road Haulage Survey	S	Continuous	B	To provide information on amount and type of work done internationally by UK hauliers
Roll-On/Roll-Off Goods Vehicles	V	Quarterly	B	Only source of information on the number of foreign-owned goods vehicles, by country of registration, visiting the UK
Survey of Company Registered Vans	V	Continuous	B	For the formulation and monitoring of policy, especially in support of sustainable development. To feed into the modelling and forecasting of van traffic. To contribute, in particular, to the spending review's forthcoming evaluation of transport policies and our understanding of the rapid growth in home deliveries. To complement the Department's ongoing surveys of HGV activity, enabling a complete picture of overall road freight activity to be established.
Customer Satisfaction – ADI Survey	V	Annual	B	To evaluate customer satisfaction with the service provided by the agency
Customer Satisfaction – LGV Survey	V	Annual	B	To evaluate customer satisfaction with the service provided by the agency
Customer Satisfaction – ATB Survey	V	Annual	B	To evaluate customer satisfaction with the service provided by the agency
Customer Satisfaction – ORDIT	V	Annual	B	To evaluate customer satisfaction with the service provided by the agency
Customer Satisfaction – PDI survey	V	Annual	B	New survey from 2004 to evaluate customer satisfaction with the service provided by the agency

Statistical inquiry	Statutory or voluntary	Frequency	Individuals, business or local authority	Main purpose of the survey
Operators Survey	V	Annual	B	To track customer satisfaction and test reactions to new service propositions
Drivers, Fitters and Presenters Survey	V	Annual	B	To track customer satisfaction and test reactions to new service propositions
MOT Garages	V	Annual	B	New survey from 2004 to track customer satisfaction
Municipal Ports Review	V	Ad hoc	LA	To find out how municipal ports are run
Transport of Dangerous Goods	V	Ad hoc	B	To better inform our RIA and to ensure the new enforcement regime is developed correctly
Motor Industry Services Survey	V	Ad hoc	B	To understand preferences and patterns of dealing with the DVLA for personalised registration marks and vehicle licensing in order to support the DVO Group with the development of a package of motor industry services
Local Office Service Survey	V	Ad hoc	B	To establish level of satisfaction with Local Office service and delivery methods
Port Employment and Accident Rates Survey	V	Ad hoc	B	For Ports Select Committee, which highlighted the lack of available information on ports employment and accident rates
Within reach baseline survey	V	Ad hoc	LA	To ensure the accessibility planning training and advice programme is tailored to the needs of LTA

Commissioned by other organisations, with DfT questions – sponsored questions included

Statistical inquiry	Statutory or voluntary	Frequency	Individuals, business or local authority	Main purpose of the survey
Labour Force Survey	V	Annual/ ad hoc	I	Information on travel to work (annual) and transport difficulties in reaching work (ad hoc)
ONS Omnibus Survey	V	Ad hoc	I	Modules four or five times a year on attitudes to transport issues
British Social Attitudes Survey	V	Annual	I	Module on attitudes to transport issues, to track long-term trends
British Crime Survey	V	Ad hoc	I	To collect information on transport-related crime and the fear of crime

Annex D: Financial charts

The tables show how the DfT planned expenditure is distributed across the current research programmes and statistics programme.

Other activities which may include evidence gathering and analysis (e.g. internal research, some policy evaluation and other programme expenditure, data collection and analysis work carried out by technical, statistical and economic divisions) are not included.

Future analyses of expenditure are planned to adopt the strategic policy thematic categories where relevant.

Table Da Research budget 2005-06

Programme	£ million
Chief Scientific Adviser	1.5
Civil Aviation	2.6
Freight Logistics	1.6
Local and Regional Transport	3.0
Rail	5.1
Road Safety	4.3
Strategy, Economics and Mobility	4.5
Cleaner Fuels and Vehicles	1.3
Transport Security and contingencies	2.1
Transport Technology and Standards	9.0
Driver Vehicle and Operator	0.5
Highways Agency	14.2
Maritime and Coastguard Industry	1.1
Commission for Integrated Transport	0.6
Total	**51.4**

Table Db Statistics budget 2005-06

Survey	£ million
Road Freight Surveys	0.04
Intelligent Transport Systems	0.03
Maritime Transport	0.2
National Travel Survey	2.2
Omnibus/BSA	0.1
Public Transport (Bus)	0.2
Auto Traffic Counts	1.7
Manual Traffic Counts	2.7
National Road Maintenance Condition	0.2
Congestion	1.7
Road Accident Survey	0.01
Total	**9.0**

Annex E PSA targets

Objective 1

Support the economy through the provision of efficient and reliable interregional transport systems by making better use of the existing road network, reforming rail services and industry structures to deliver significant performance improvements for users, and investing in additional capacity to meet growing demand.

1 *By 2007-08, make journeys more reliable on the strategic road network.*

2 *Improve punctuality and reliability of rail services to at least 85% by 2006, with further improvements by 2008.*

Objective 2

Deliver improvements to the accessibility, punctuality and reliability of local and regional transport systems through the approaches set out in Objective 1 and through increased use of public transport and other appropriate local solutions.

3 *By 2010, increase the use of public transport (bus and light rail) by more than 12% in England, compared with 2000 levels, with growth in every region.*

4 *By 2010-11, the ten largest urban areas will meet the congestion targets set in their Local Transport Plan relating to movement on main roads into city centres.*

Objective 3

Balance the need to travel with the need to improve quality of life by improving safety and respecting the environment.

5 *Reduce the number of people killed or seriously injured in Great Britain in road accidents by 40% and the number of children killed or seriously injured by 50%, by 2010 compared with the average for 1994-98, tackling the significantly higher incidence in disadvantaged communities.*

6 *Improve air quality by meeting the Air Quality Strategy targets for carbon monoxide, lead, nitrogen dioxide, particles, sulphur dioxide, benzene and 1,3 butadiene. (Joint with the Department for Environment, Food and Rural Affairs.)*

7 *To reduce greenhouse gas emissions to 12.5% below 1990 levels in line with our Kyoto commitment and move towards a 20% reduction in carbon dioxide emissions below 1990 levels by 2010, through measures including energy efficiency and renewables. (Joint with the Department for Environment, Food and Rural Affairs and the Department of Trade and Industry.)*

Objective 4

Improve cost-effectiveness through sound financial management, robust cost control and clear appraisal of transport investment choices across different modes and locations.

Annex F Glossary

ACARE	Advisory Committee on Aviation Research in Europe
ATM	Air Traffic Management
CAA	Civil Aviation Authority
CfIT	Commission for Integrated Transport
CMI	Cambridge-MIT Institute
CSA	Chief Scientific Adviser
CST	Council for Science and Technology
Defra	Department for Environment, Food and Rural Affairs
DTI	Department for Trade and Industry
DVO	Driver, Vehicle and Operator Group
DWP	Department for Work and Pensions
EEVC	European Enhanced Vehicle Safety Committee
EPSRC	Engineering and Physical Sciences Research Council
EPTR	European Platform for Transport Research
ERRAC	European Rail Research Advisory Committee
ERTRAC	European Road Transport Research Committee
ESRC	Economic and Social Sciences Research Council
FoI	Freedom of Information
FP7	European Union 7th Framework Programme
GDP	Gross Domestic Product
GPS	Global Positioning system
HA	Highways Agency
HoP	Head of Profession

HOT/HOV lane	High Occupancy Vehicle Lane
IHRA	International Harmonisation of Research Activities
IMO	International Maritime Organisation
MoD	Ministry of Defence
NATS	National Air Traffic Services
NERC	Natural Environment Research Council
NTM	National Transport Model
ODPM	Office of Deputy Prime Minister
OECD	Organisation for Economic Co-operation and Development
PSA	Public Service Agreement
RSSB	Rail Safety and Standards Board
SDC	Sustainable Development Commission
SME	Small and Medium-sized Enterprises
TIF	Transport Innovation Fund
vfm	Value for Money