

How Can Research into Cycling Help Implement the National Cycling Strategy?

**Review of Cycling Research
Findings and Needs**

**Report of Whitehall Summer Placement in the
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Executive Summary

1 Achieving the objectives of the National Cycling Strategy (NCS) is dependent on there being in place a high quality knowledge base to underpin decisions on cycling policy and implementation. This review of cycling research is intended to provide support for the work of the Department for Transport (DfT), the National Cycling Strategy Board and other stakeholders in cycling policy and advocacy, by analysing the state of cycling knowledge and identifying gaps that need to be filled. It covers cycling research projects that date back to the early to mid-1990s, focusing especially on research conducted as a response to developments since the publication of the Strategy in 1996. As well as this report, the review has enabled the production of an online Access database of all projects identified. This can be viewed and searched at <http://www.york.ac.uk/org/satsu/Projects/whitehall/>¹

Headline Facts and Figures

- 2 The headline facts and figures from the review's findings are:
- 2.1 Over 160 cycling research projects have been conducted in the UK since the early 1990s.
 - 2.2 Almost half of these were commissioned and funded by the DfT, whose total expenditure on them has been over £5 million during that period. The only other sizeable cycling research funders are the Engineering & Physical Sciences Research Council (EPSRC) and the Economic and Social Research Council (ESRC). Their total expenditure on cycling research is around £700,000. The average cost of cycling projects with cost information available is £125,500. This compares favourably with the average cost for all DfT projects of £181,000 and the average cost of all EPSRC transport projects, at £136,000.
 - 2.3 Total cycling research costs are likely to be somewhere between £8 and £15 million over ten years, a small fraction of total UK transport research costs.
 - 2.4 About one third of cycling research is conducted by consultants – mostly working on DfT projects – and a further third by academic researchers.
 - 2.5 Over a quarter of research projects have been conducted by academic researchers using either their own or university resources and time. This represents a considerable hidden subsidy of cycling research by the academic sector, in addition to the few projects funded by the Research Councils.

¹ Please note that this URL is case-sensitive.

- 2.6 The remaining research and research funding are accounted for by smaller endeavours among a variety of cycling and transport advocacy groups, other voluntary organisations, charitable trusts, local government and other national government departments and agencies.

Research Priorities and the Knowledge Base

3 The review has identified the key research priorities of the DfT, the NCS Board and wider cycling and transport stakeholders. It has evaluated the degree to which the knowledge base addresses these priorities, and it identifies gaps that need to be filled in order to help achieve the NCS objectives.

4 Key research priorities cover the following issues:

- planning and technical matters, including –
 - road space allocation
 - infrastructure design
 - cycle parking and cycle security
 - bicycle design
- the skills of transport engineers and of cyclists
- the promotion of cycling
- attitudes to cycling
- how to progress the National Cycling Strategy, including –
 - resources for cycling
 - the integrity of cycle usage data
- the relative significance of utility and recreational cycling
- modal shift from car use to bike use
- integrated transport and sustainability
- wider policy concerns such as –
 - social inclusion
 - health
 - young people
 - crime
 - public space

5 The research priorities identified in the National Cycling Strategy continue to be those which demand the most attention, but newer concerns with issues such as social inclusion, health and young people also need to be addressed. The framing of research priorities needs to balance the interests of a range of governmental and non-governmental stakeholders.

6 Research projects have addressed the full range of NCS research priorities, though more attention needs to be paid to certain issues.

- 7 The most prominent issues in the knowledge base are:
- technical matters such as infrastructure and facility design
 - safety issues
 - the cultural dimensions of cycling and transport, including attitudes
 - the position of cycling within overall modal split
- 8 Closer consideration of the data demonstrates further characteristics of cycling knowledge, notably:
- 8.1 There is a recognition that achieving modal shift will require cultural change
 - 8.2 There is less awareness of interconnections that must be further understood between cultural and behavioural issues and technical concerns
 - 8.3 This indicates a poor understanding among those designing many cycling research projects of the nature of innovation
 - 8.4 A great deal of health-related cycling research is focused on the safety dimensions rather than the health benefits of cycling
 - 8.5 There is only a limited understanding of the respective roles of – and relationships among – utility, leisure and sports cycling
 - 8.6 There is little knowledge about how to bring new people – children or adults – to cycling
 - 8.7 Several issues that are poorly represented in the knowledge base, such as the skills of professionals engaged with cycling, and analysis of best practice in infrastructure, are being actively pursued through means other than research. Research is not, then, the only route for increasing cycling knowledge.
- 9 Issues that do need further research effort include:
- 9.1 Understanding the balance between different kinds of cycling, notably between utility and leisure cycling
 - 9.2 Complexities within the cycling market, and the marketing of cycling to professionals and to the public.
 - 9.3 Research aimed at progressing the NCS, in particular monitoring its progress, identifying how to achieve its objectives, and examining ways of ensuring the integrity of data collected for the purpose of monitoring cycle use.
 - 9.4 Dissemination of cycling research findings has been poor, and needs attention in order to obtain the full benefits of research.
- 10 The repertoire of cycling research includes the following methods and approaches:
- Engineering studies
 - Attitudinal studies

- Analytical research in social and health studies
 - Policy analysis and the development of policy tools
 - Scientific studies
- 11 Other approaches that could offer some benefit for the cycling knowledge base include:
- comparative studies
 - agent-based transport modelling
 - scenario-building
- 12 It is recommended that these methods are explored in future research.
- 13 The review has found claims concerning bias in the knowledge base towards engineering research, towards quantitative and towards qualitative studies to all be unfounded. The current balance in both these pairings is felt to be appropriate, with increases needed across the whole research base rather than within any one segment of it.
- 14 Exploration is needed of the potential benefits to be had from conducting more interdisciplinary research, bringing the combined benefits of both engineering and social scientific work, and of both large-scale survey research and in-depth understandings of attitudes and behaviour.
- 15 The most pressing need is for cycling research to be underpinned by a comprehensive research strategy which ensures that projects are commissioned to fully support the objectives of the NCS. The resulting research programme should cover the full range of research priorities, it should include a balance between different methodologies and disciplines, and it should address short-, medium- and long-term goals. It should span both the users and the providers of bicycles and facilities, different types of journeys, facilities, routes and locations. Above all, the programme should be designed to capitalise on the interdependence of all these different elements.
- 16 Greater investment in cycling research is needed to achieve such a programme, both from the DfT but also from the university research councils, whose commitment to research on sustainable transport modes has not yet been translated into much research funding.
- 17 In conclusion, cycling research is comparatively inexpensive, and produces excellent value for money by generating crucial background knowledge to inform those making and implementing decisions about cycling policy and facilities. A stronger commitment to cycling research from the major research funders is needed in the form of both funding and research management if the Strategy is to receive research support to help it succeed.

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Many people have contributed to the understanding this project has given me of the field – I hope the results are sufficiently useful for the cycling world to justify their generosity. The various stakeholders in cycling, policy and other areas that I spoke to for the review are listed in Appendix 1, but particular thanks are due to Steven Norris and his colleagues on the National Cycling Strategy Board for England for their support and interest in the project.

It is hardly necessary to state that any errors in the report or the accompanying database reflect on my own failure to heed advice rather than on those who gave it. Most importantly, the Department for Transport and other stakeholders cannot be held responsible for any unintentional misrepresentations I may have made concerning their positions or views.

Shortly after I was awarded my Placement, I became involved in the AEA Technology plc bid to the DfT to set up and manage the English Regions Cycling Development Team. I have subsequently taken up a post within this Team alongside my university position. Many useful synergies have emerged between the review and my team responsibilities. Thanks to Larry Martindale, Marcus Jones and other AEAT colleagues for bearing with me whilst the final review write-up has been eating into my ERCDT time. I have endeavoured to ensure that references to the Team retain the independence of my university research post by focusing on its role within cycling policy and implementation, rather than on AEAT, my employer. Nevertheless, readers will be aware of a potential conflict of interest, and must judge my conclusions accordingly.

My final acknowledgement goes to my wife, Buffy, who spent much of the summer in London with me. Thanks are due to her for ensuring I did not spend all my waking hours on the review (at least not before I returned to York to write up the report), but also enjoyed the opportunity of an extended stay in London. She also helped make this one of the most significant as well as one of the busiest summers I have experienced.

Glossary

AA	Automobile Association
AHRB	Arts & Humanities Research Board
CLT	Charging and Local Transport
C-PAG	Cyclists' Public Affairs Group
CTC	Cyclists' Touring Club
DETR	Department of Environment, Transport and the Regions
DfT	Department for Transport
DoT	Department of Transport
DTLR	Department for Transport, Local Government and the Regions
EPSRC	Engineering & Physical Sciences Research Council
ERCDD	English Regions Cycling Development Team
ESRC	Economic & Social Research Council
HA	Highways Agency
MRC	Medical Research Council
NCF	National Cycling Forum
NCS	National Cycling Strategy
NTS	National Travel Survey
RAC	Royal Automobile Club
TRL	Transport Research Laboratory

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Chapter 1: Introduction

1.1 This document reports on a review of research into cycling dating back as far as the early to mid-1990s. The report is one of two key outputs of the review – the other being a database of cycling-related research projects to aid the work of the NCS Board, the DfT branches that support it and other cycling stakeholders.

1.2 The publication in 1996 of the *National Cycling Strategy* (DoT 1996) by the then Department of Transport led to a marked increase in, and widening of, cycling research. In particular, the focus of research expanded out from concerns with safety and facility design due to the need to monitor and evaluate progress towards achieving the Strategy's objectives and targets. The bulk of research covered in this review was either commissioned in relation to the *Strategy* or uses its objectives and targets as a starting point. The review does also cover work which is not directly related to the *Strategy*, either because of the relevance of its topic or because it predates that document. The original proposal for the review was in fact to examine research going back to the early 1990s. In practice, it has been found that there were fewer projects conducted prior to 1996 and – more significantly – the burgeoning of electronic databases has meant more recent work is easier to access. The main focus has therefore been on research conducted since the mid-1990s.

1.3 Much of the post-NCS cycling research has been commissioned by the Government in the various guises its transport department has had since 1996 – the Department of Transport (DoT) until 1997, then the Department of Environment, Transport and the Regions (DETR) until 2001, the Department for Transport, Local Government and the Regions (DTLR) until 2002, and finally the Department for Transport (DfT) since the early summer of 2002.¹ Other cycling research has originated from a range of sources:

- other central government departments and agencies
- local authorities
- cycling organisations
- the university sector
- charitable trusts concerned with transport and sustainability
- and various other bodies with a focus on transport, the environment, urban design, sport and leisure, the countryside and consumer interests.

1.4 The report examines the nature of the research that has been commissioned by these various organisations, as well as the make-up of the different bodies that have carried research out. The aim has been to produce a comprehensive analysis of the state of research-based knowledge about contemporary cycling, which covers the following areas:

¹ Unless there is a clear need to distinguish which of these is being referred to, the acronym DfT will be used to refer generally to the transport offices in Whitehall that deal with cycling.

- the role of cycling in different aspects of policy
- engineering requirements and best practice principles for designing cycle facilities and general road infrastructure
- the health and safety dimensions of cycling
- user attitudes and motivations for different types of cycle use
- the barriers to and facilitators of cycling
- and product design and marketing.

1.5 Inevitably, there have been constraints on what could be included in the review – due to either limited time or information not being easily accessible. For reasons of both time and applicability, very few studies from outside the UK have been included. The exceptions have been where the results are likely to have clear relevance to UK circumstances, or where a non-UK project has included UK case studies. Other projects may have been excluded due to a lack of clarity or detail about the research, although this has been kept to a bare minimum by including any project for which at least the most basic information was available, i.e. a topic heading and a research contact (though this basic minimum standard has had to be applied to very few projects).

1.6 Another question about what to include and what to exclude concerns the fact that much valuable work on cycling can only loosely be defined as 'research' – that is, trying to find answers to problems through means of empirical or conceptual investigation. Research funders often support projects and campaigns that include only a small amount of research, or none at all. In addition, the line between research and campaigns can be blurred – a campaign based on accepted but untested knowledge about an issue might serve to consolidate, transform or perhaps even undermine that knowledge. In conducting the review, a pragmatic approach has been taken to deciding whether a project has a sufficient enough upfront research dimension to warrant inclusion.

1.7 A parallel issue is that many studies have been identified during the project that have some relevance for cycling but no direct reference to it. It has not always been clear which of these studies, if any, ought to be included in the review. Again, a pragmatic approach has been taken, counting as relevant all research that directly addresses cycling but not that for which cycling is at best marginal.

1.8 Underlying all these issues of how to negotiate the process of conducting the review has been the need to balance the priorities of a range of different stakeholders – stakeholders that commission research, stakeholders that conduct research, policymakers and cycling advocates trying to carry forward the *National Cycling Strategy*, and the civil servants and local government officers charged with bringing it to fruition. It is to be hoped that this report, and the accompanying database, will satisfy at least some of the needs of each of these groups.

1.9 The review begins by outlining the policy structures that frame cycling issues, and identifying key cycling stakeholders. It then examines the various –

and sometimes contrasting – priorities for cycling research within government and the wider realm of cycling advocacy, before going on to outline which bodies commission and fund cycling research, and which organisations conduct it. This is followed by an analysis of the cycling knowledge base, focused on the methodologies used by researchers and the ways in which the various research priorities have been addressed. The report concludes by considering methodological gaps in the research base, presenting a possible programme of cycling research and making further recommendations.

Chapter 2: The Structure of Cycling Policy and Cycling Stakeholders

2.1 This chapter identifies the organisational actors involved in cycling policymaking, in order to provide a backdrop for the arena of cycling research. It is the various stakeholders in cycling – governmental and non-governmental – who determine which issues are researched, and it is also they who often commission research projects.

2.2 Since the mid-1990s, UK cycling policy has centred on the structures set in place within the DfT around the *National Cycling Strategy* (NCS), published in 1996 following a period of consultation and discussion with key stakeholders. The NCS was endorsed in the 1998 Transport White Paper (DETR 1998), whilst the Ten Year Transport Plan of 2000 reinforced this endorsement but added a headline cycling target to a tripling of the 2000 rates by 2010 (DETR 2000). The publication of the NCS was followed by the establishment of the National Cycling Forum (NCF) as a means of carrying through the *Strategy's* programme. Shortly before this, the £2 million Cycle Challenge Fund had helped establish various projects to promote and increase levels of cycling. More recently, a marketing contract was let out to set up and maintain the NCS website and to publish a series of leaflets on cycling aimed at various audiences – cyclists and potential cyclists, local authorities, employers, retailers and so on.

2.3 In 2001 it was decided to restructure this framework in line with the devolution of policymaking more generally. A more pro-active body, the National Cycling Strategy Board for England, was established to oversee implementation under the chairmanship of Steven Norris, with administrative support from within the DfT. The NCS Board has during its first year carried through a number of initiatives such as the £2+m Cycling Projects Fund and the establishment of the English Regions Cycling Development Team (ERCDDT) to work with local authorities and other stakeholders to achieve the NCS objectives. This report has been produced with the NCS Board for England in mind as a particular beneficiary, although its relevance should be equally applicable across the whole UK, and the review does not deliberately exclude any relevant UK-focused research.

2.4 The developments following the *National Cycling Strategy's* publication provide a useful backdrop for understanding where cycling fits within the overall structures of policy and advocacy. The main areas of central government responsibility for cycling cover the national laws that apply to cyclists on the road (as set out in the Highway Code); the development and publication of British Standards for bicycles, components and accessories; the setting of guidance for the design and implementation of infrastructure and facilities; and the setting and monitoring at a national level of objectives and targets for cycling as set out in the NCS. In the main, the agents for implementing these are local authorities, although initiatives such as the Cycling Projects Fund and the ERCDDT provide central support for that work.

2.5 For each of these areas of concern there is a wide range of stakeholders aiming to influence policies and actions, with often conflicting views as to which policies should be adopted and how they should be implemented. These stakeholders include government departments and agencies, local government, cycling organisations, the bicycle industry and various non-cycling interest groups. Paragraphs 2.6 to 2.12 sketch out the key stakeholders, both governmental and non-governmental.

2.6 At government level, policy pertaining to cycling has generally sat within the remit of the DfT, reflecting an implicit official view that cycling issues are primarily issues of transport rather than leisure, industry or any other policy area. The work of other government departments will occasionally touch on cycling, but not as a matter of course.

2.7 Cycling is covered specifically within the DfT by two branches of the Charging and Local Transport (CLT) Division, with lesser responsibilities for cycling occasionally arising in other divisions. The CLT3 branch remit includes cycling policy, cycle promotion and support for the National Cycling Strategy Board for England as well as projects the Board has initiated. The CLT4 branch remit includes the commissioning and dissemination of research on cycling, covering engineering, promotional and motivational dimensions, as well as producing technical advice to local authorities, mainly in the form of Local Transport Notes and Traffic Advisory Leaflets. These two branches include a dozen or so staff, with up to half of their total effort devoted to cycling – although this will vary over time according to departmental priorities. The most notable shift in priorities since the publication of the *National Cycling Strategy* has been the increased resource devoted to the National Walking Strategy and the promotion of Home Zones.

2.8 In addition to CLT3 and CLT4, the work of CLT2, concerned with Travel Awareness, includes cycling within its work on school travel and employer travel plans. Other branches engage with cycling issues occasionally in the course of their work – for example when dealing with general infrastructure design. Outside CLT, the Road Safety Division probably has the most significant cycling-related role.

2.8 As well as the DfT and the NCS-related structures, several other central government bodies have an interest in cycling. The most significant of these are:

- the Highways Agency, which is responsible for nationally-managed highways including trunk roads that can generally be used by cyclists; its work covers policy issues, operations, promotion and research;
- the Department for Health, whose concerns about public health and especially coronary heart disease are particularly relevant to cycling;
- the Department for Education and Skills, for which school travel and also the curricular dimensions of transport and the environment are relevant;
- the Department for Trade and Industry, which has responsibilities for product safety;

- the Office of the Deputy Prime Minister, responsible for planning matters; and within that, the Social Exclusion Unit, which has taken an interest in the social exclusion dimensions of transport;
- and the Department for Culture, Media and Sport, responsible for tourism and leisure.

2.9 There are also devolved government bodies with an interest in cycling. For example, the Scottish Executive has sponsored its own Cycle Challenge Initiatives that parallel the work of the DfT, whilst Transport for London has established a Cycling Centre for Excellence to manage its cycling responsibilities.

2.10 Several roles at local authority level also relate to cycling. The role of Highway Authority usually applies to county and unitary authorities – these are responsible for their local highways, including the provision of infrastructure and facilities for cycling. It is these authorities that are charged with applying transport policy at the local level, which includes meeting transport-related targets set by central government, such as the targets within the NCS. These authorities also have cycling-related roles as Education Authorities and as Tourism and Leisure Authorities. In addition, district councils and unitary authorities deal with cycling issues in their capacity as planning authorities, and are therefore required to deliver central government policy on the transport dimensions of land use planning. Most local authorities address these responsibilities in the same way as national government, by placing cycling within the remit of transport staff, often appointing cycling officers to deal specifically with relevant issues.

2.11 Outside the realms of national and local government there are many non-governmental stakeholders with an interest in cycling. Like government, these operate at both national and local levels, and sometimes span both. Cycling interest groups include the following:

- the Cyclists' Touring Club (CTC) has a membership base focused on leisure cycling but an advocacy and campaigning orientation at the level of head office. The latter is supplemented by a national network of local volunteer campaigners.
- Sustrans, the charity that has built the National Cycle Network, operates primarily at the national level, though it has a network of local offices which deal with their own routes and liaise with local partners. Sustrans has a high profile focus on the building of cycle routes, but also growing involvement in developing initiatives to increase sustainable transport more broadly, such as Safe Routes to Schools and TravelSmart.
- The Cycle Campaign Network is a loose co-ordination of the local cycle campaigns that exist across the UK, meeting periodically for workshops on various campaigning issues. The largest of the local campaigns is the London Cycling Campaign, with several thousand members and several full-time staff. The membership of other campaigns ranges from a dozen or so in some to several hundred in others.

- The Cyclists' Public Affairs' Group (C-PAG), involving a number of cycling organisations, was established to lobby policymakers on cycling issues at national level. This group therefore provides a direct link between cycling stakeholders and Parliament. It is also worth noting here the All-Party Parliamentary Cycling Group.
- Whilst not having a direct input into UK policy, the European Cyclists' Federation is an umbrella group to which several of the UK cycling bodies belong. It has a close relationship with the Vélo-City conference series that has since 1980 brought together cycling activists, planners and policymakers. It also develops and disseminates cycling resources, and is a key player behind the new EU-funded Vélo-Info project.
- There are in addition several more locally-based cycle promotion organisations funded by a combination of charities, local businesses and agencies, or even supported through the voluntary efforts of local campaigners. These include the Cycling Project for the North West based in Manchester, Cycle West based in Bristol, and the Cambridge Cycle-Friendly Employers' Scheme. The work of these organisations is matched by some of the better organised – and better funded – local cycling campaigns.

2.12 Other stakeholders with an interest in cycling include those concerned with green transport more broadly, notably Transport 2000; organisations such as the AA and the RAC whose broader interest in transport includes cycling, though it may not always overlap with the interests of cyclists; organisations concerned with still wider areas of interest in which cycling has some role to play, for example the Countryside Agency and Sport England; and the cycle industry – including manufacturers and importers of bicycles, bicycle parts and accessories, as well as bicycle retailers. The relationship of these firms to policy is mostly indirect, though important.

Chapter 3: Research Priorities

3.1 Whilst all the above stakeholders share a common goal of increased cycling, they do not necessarily agree on how this can be achieved, on what kinds of cycling have the greatest need of being increased, or on how to prioritise actions for achieving such goals. This chapter considers the different objectives and priorities of cycling stakeholders, and the ways in which their positions, and the debates that arise from disagreement, have informed the research agenda.

3.2 To begin with the government agenda, the NCS document contains clear priorities in the form of objectives, targets, indicators, mechanisms and outputs. Whilst it is not necessary to detail these here, the topic areas used to frame the key strategic outputs at the start of the document provide a useful guide to government priorities regarding how to increase cycling. These topic areas are:

- Planning – to make places accessible by cycle
- First steps – improving safety
- Getting there – road space and priority
- At the destination – cycle parking
- Security – tackling cycle theft
- Culture shift – changing attitudes
- Resources – the drive-chain of change
- The road ahead – directing and monitoring action.

3.3 Looking specifically at research needs, the document also includes, in its 'at-a-glance' summary of the Strategy, a section on 'Research and Development', whose objectives and targets are reproduced in Table 3.1.

3.4 The *National Cycling Strategy* makes clear the Government's research agenda for cycling, and the role for research within the overall strategy. Research needs are distributed across a variety of institutions, levels of decisionmaking and topic areas, in the following ways: the range of cycling interests involved covers not just policymakers and transport professionals but also bicycle users; both national and local government areas of concern are included, as well as those of institutions that train transport professionals; whilst the range of topics goes from the technical dimensions of cycling infrastructure and facilities to safety analyses and attitudinal research.

3.5 Since 1996, government priorities have shifted somewhat, reflecting in part a shift in wider social priorities. There are now several new areas of government concern that underpin current policymaking, many of them having a transport – and therefore cycling – dimension. There are increased policy concerns with health, with reducing social exclusion, with crime, with the use of public space, and with the needs of young people. National transport policy has also shifted decisively towards an integrated approach, which has direct implications for cycling. Of some relevance here is the recent consultation on the integrated transport research strategy of the Department for Transport

(DETR 2001a). This strategy includes 'promoting cycling, walking and greener travel' as one of 13 key research issues, with 'attitudinal research on how best to promote more cycling to meet the 10 Year Plan target' included as a high priority.

OBJECTIVE	TARGET
Increase cycle Use	1. Review data collection on cycle use
	2. Study "best practice" in medium sized European towns
Safety	3. Investigate the basis for cycling safety (exposure) targets
	4. Identify the scale and solution to Heavy Goods Vehicle threats
Expertise	5. Review professional training courses
Guidance	6. Review all technical guidance
Standards	7. Review highway authority standards
Cycle Parking	8. Study standards of cycle parking equipment and installation
Attitudes	9. Develop a research basis for attitudinal monitoring

Table 3.1. Objectives and Targets for Research and Development in the National Cycling Strategy. (adapted from DoT 1996: 30).

Target numbers not from original document.

3.6 Such policy concerns are replicated in the wider realm of cycling advocacy. The collaborative effort that went into producing the NCS means that its objectives are endorsed by cycling stakeholders as well as policymakers. Stakeholders are keen to see the NCS objectives and targets met, even though they sometimes prioritise the issues in different ways to government. The ways in which stakeholder and government priorities converge and diverge are examined in paragraphs 3.7 to 3.15.

3.7 One shared priority derives from the general recognition that in order to achieve cycling growth it is necessary to actively market cycling to both professionals and the general public. Another concerns the training of cyclists, both children and adults. This has come higher up the agenda with the realisation that as well as a need to improve children's cycle training, persuading adults to begin cycling – often for the first time in many years – requires new training initiatives too.

3.8 An area of high concern for non-governmental stakeholders relates to the sources and nature of the data used to produce cycling statistics. The baseline data from which the NCS figures and targets are drawn derives from the

National Travel Survey (NTS), which is compiled by means of face-to-face survey interviews plus one-week travel diaries involving a sample of over 5000 UK householders. The survey counts utility trips, i.e. journeys made for a purpose other than the journey itself, but not leisure trips made simply for their own sake.

3.9 From a cycling advocacy point-of-view, there are several problems with using the NTS as the basis for cycling statistics. Firstly, there are several cycling stakeholders whose advocacy role spans both leisure and utility cycling. Such organisations regard a focus solely on utility trips as inadequate for the purposes of the National Cycling Strategy. They argue that if the goal is simply to increase levels of cycling, it is not justifiable to exclude new leisure trips from the equation. Leisure cycling is seen to have intrinsic benefits in relation to health, the economy – especially of rural areas – and individual well-being. It is also believed by some to be a stepping stone to utility cycling, by providing a safe space for those who are new to cycling or coming back after a break to gain their confidence before venturing onto the road network. There should, from such a perspective, be a shift in the balance of how resources for promoting and researching cycling are allocated between leisure and utility trips; the latter are seen to have received a far greater share of resources than is warranted by the comparative numbers and mileage of utility trips. The utility focus of the DfT's own research programme is a particular object of such concerns, although the DfT has commissioned some leisure cycling research.

3.10 Arguments for giving more support and resources to leisure cycling are not accepted by all cycling stakeholders, especially those whose support for cycling is centred on the role it can play in reducing the congestion and pollution caused by everyday trips by car. Many stakeholders have doubts that there are links between leisure and utility cycling, and there are concerns that leisure cycling can generate increased car journeys to the countryside in order to then cycle for leisure. On the other hand, in circumstances where many potential utility cyclists face barriers they are unable or unwilling to overcome, the advocates of leisure cycling argue that it can at least capitalise on those benefits that it does offer. Most importantly for this review, the different perspectives on leisure and utility cycling highlight the need for research that can examine the relative benefits of the two and the degree to which leisure cyclists can be effectively encouraged to make utility trips.

3.11 Methodologically, too, there are concerns about the integrity of the NTS data since cycling accounts for only a few trips among the relatively small NTS sample. It is therefore difficult to ensure the accuracy of NTS figures when cycling rates are extrapolated to the wider population. Furthermore, analysis by Sustrans of cycle usage data on routes monitored by local authorities – including the National Cycle Network – suggests that the NTS does not capture accurately the trends in cycle usage. Sustrans' figures show that cycling rates increased in the year to 2001, contradicting government figures reporting a decrease in cycling. This may be accounted for by the discrepancy between leisure and utility journeys, but illustrates anyhow the low degree of trust that cycling advocates have in government cycling statistics. Establishing reliable sources of data is consequently a high research priority for such groups.

3.12 Cycling stakeholders are also concerned about the disciplinary balance of research. There is a strong perception that the research field is dominated by detailed engineering and design work which some feel has been refined sufficiently by now to require only minor adjustments. Others believe there is still much to learn about infrastructure design, notably from abroad. There is, then, no consensus on this point, but there is a general agreement that more resources should be devoted to research right across the field, including social scientific research that examines the motivations, behaviour, perceptions, experiences and needs of cyclists and other road users, and to analysis of case studies that can illustrate good practice.

3.13 Increasing the balance of social research and case study work is, in fact, supported not just by cycling advocates but also by the DfT, which wishes to ensure perspectives and methodologies are balanced across its full research remit. Strengthening the social science input into DfT research is a central component of its consultation research strategy from 2001 (DETR 2001a), whilst the Department shares with others an increasing concern 'that new policies and decisions ... are evidence-based' (ibid.: 11). That both the Department and its critics share similar views about what direction research should take needs to be emphasised, whatever their differences in how to pursue this.

3.14 Perhaps the most fundamental requirement of cycling research expressed by stakeholders is that projects should form part of a coherent research strategy rather than being ad hoc and unrelated. This again is an issue that is raised in the Department's own research strategy document. What should be noted is that for the Department, a coherent strategy needs to cover all its transport responsibilities, whereas cycling stakeholders are concerned only about the coherence of cycling research. Because of this, and because of the obligation of DfT to balance its resources and priorities, there is a point at which cycling stakeholders are inevitably going to be disappointed at the limited extent to which research focuses on cycling.

3.15 That said, stakeholder concerns about the DfT's approach to research are heightened by the slow progression of its new strategic approach into departmental practice. Whilst the consultation Research Strategy was produced in 2001, it has not yet been implemented – at least not in a thorough way. Several stakeholders have questioned the apparent lack of any strategic overview in the DfT's 2002 'Summary of Planned Research' (DfT 2002). They point out that whilst there is, to begin with, very little cycling-specific research in this document, a greater concern is that from the text in the document it appears that contractors may be permitted to produce research on topics that have some bearing on cycling without having included cycling dimensions in this work. For cycling stakeholders, what is required here is a demonstration that there is within the DfT a strategic understanding not just of the full range of issues for which cycling research could be valuable, but also of the impacts that transport decisions as a whole can have on cycling and cyclists. From discussions with the DfT's Transport Research Unit, this concern appears to be shared at least in some quarters within the Department, even if it has yet to filter

through in all directions. The criticism of DfT by cycling stakeholders may simply highlight, then, a need for better communication of the Department's perspective to stakeholders. For example, if consideration of cycling is indeed part of the contract specifications for research projects, the DfT could produce an advisory note for cycling stakeholders making this clear, and thus deflecting criticism.

3.16 Several of the issues discussed above will be returned to in Chapter Five, which examines in more depth the content of cycling research, and the approaches and methodologies used.

3.17 To summarise, the research priorities that arise from the National Cycling Strategy, the concerns of cycling stakeholders and emerging policy priorities can be listed as follows:

- planning and technical matters, including –
 - road space allocation
 - infrastructure design
 - cycle parking and cycle security
 - bicycle design
- the skills of transport engineers and of cyclists
- the promotion of cycling
- attitudes to cycling
- how to progress the National Cycling Strategy, including –
 - resources for cycling
 - the integrity of cycle usage data
- the relative significance of utility and recreational cycling
- modal shift from car use to bike use
- integrated transport and sustainability
- wider policy concerns such as –
 - social inclusion
 - health
 - young people
 - crime
 - public space

This list forms the basis of discussion in subsequent chapters.

Chapter Four: A Map of Cycling Research

4.1 Having identified the key priorities for research, this chapter outlines the topography of cycling research – who commissions and sponsors the research, who carries it out, and what the key routes are for dissemination.

The Commissioning and Funding Process

4.2 The DfT is the main sponsor of cycling-related research, responsible for almost half of all projects – in line with a 42% share of all UK transport research funding. Trying to determine exact expenditure figures is not possible since costs are not available for all projects, but DfT research on cycling or closely related themes during the last decade has added up to at least £5 million. To set this within a broader context, the research budget for the whole Transport Strategy, Integrated and Local Transport programme (which includes almost all cycling research) is currently almost £10 million per year. The total DfT research budget is something over £30 million per year, with a further £10-12 million annual research budget at the Highways Agency, which has also funded a small number of cycling-related projects.

4.3 The research supported by the DfT and the Highways Agency is largely 'directed'. In the case of DfT, branch heads within the department define research specifications in light of Ministerial priorities and problems experienced by local authorities during the previous year. More formal arrangements for seeking input into research have been established through the DfT's Traffic Management Board. These initial specifications are submitted to divisional research heads to be reviewed by the committee that compiles the annual research programme. This must then be approved by Ministers, who may demand revisions. Research projects are then put out to competitive tendering. In addition, the DfT has over the years supported a small number of 'responsive' research programmes managed either internally or by bodies such as the EPSRC (see below), where researchers submit proposals that address broad themes identified in the specifications for particular programmes; a proportion of proposals are then selected by a commissioning panel. Three cycling projects have been funded by such programmes in the last few years – one in the Inland Surface Transport programme and two in the Future Integrated Transport programme – though DfT has only funded one of these itself.

4.4 In contrast to the directive approach, the research councils that support much university research operate largely in responsive mode, allowing both submissions to programmes as outlined above, and also open submissions not tied to any programme that simply fit the overall remit of the relevant research council. Discussions with charitable trusts and researchers funded by them suggest that they too have both a responsive mode of funding good research ideas suggested to them, and a directive mode where they identify projects they would like to see carried out.

4.5 The research councils have together accounted for only eleven cycling projects over the last decade. The bulk of these have been funded by EPSRC, the Engineering and Physical Sciences Research Council, which funds most academic transport research in the UK (18% of the total spend). EPSRC's total spend on cycling research has been just over £1 million, spanning eight projects (including one of the Future Integrated Transport programme projects), although three of these – using half the total funding – have investigated the use of cycling to help paraplegics and are therefore not really relevant to general policy development. Those that do have general policy relevance have therefore cost only half a million pounds. EPSRC has a total annual research budget of over £300 million, of which £20 million is devoted to its Infrastructure and Environment programme, including transport. Whilst transport itself has less than a 1% share of EPSRC's overall budget, this needs to be understood within the context of the very high research costs – especially for equipment – involved in many of the council's other topic areas.

4.6 The other research council that has funded cycling research is ESRC, the Economic and Social Research Council. ESRC's annual budget is around £50 million, covering research training and research funding across the social sciences. This includes the social, economic and cultural dimensions of transport, although transport is a small part of the Council's overall remit. Three projects (one of them under the LINK Inland Surface Transport programme managed by EPSRC and supported also by the DfT and DTI) have been funded in the period 1995 to 2001, at a total of just under £160,000. Of the other five research councils, the MRC (Medical Research Council) has a health-related remit that is relevant to cycling, though it has not so far funded any cycling research. Its budget is approximately £400 million. In addition, the AHRB (Arts & Humanities Research Board), which is likely to come shortly under the Research Council structure, could fund research on the cultural and historical dimensions of cycling, but has been excluded from this review because of the review's focus on policy matters.

4.7 In addition to central government and the research councils (which are anyway funded by central government and required to follow a research agenda set by government), there are three other main sources of cycling research funding. Whilst detailed information on research budgets for these is not available, they are generally small funders in both the number and size of projects. Firstly, a variety of local and devolved authorities, government agencies and central government departments for which cycling is mainly a peripheral issue have occasionally funded research which has wider relevance than just their own needs. These include projects sponsored by the Scottish Executive, Transport for London, a few specific local authorities, and also the DTI. Secondly, charitable trusts that support transport and environmental work – notably the Ashden Trust and the Rees Jeffreys Road Fund – have funded several significant projects. Finally, cycling organisations themselves often commission research of considerable value (in cycling rather than economic terms) – these include national organisations such as the CTC and Sustrans, but also local cycling campaign groups working to very low or even non-existent budgets.

Cycling and transport research strategies

4.8 The variety of organisations that commission and fund cycling research shows that cycling is on the national research agenda, even though its share of national research budgets is very small. Increasing this share is dependent on being able to ensure that cycling maintains prominence as a worthwhile modal choice in the minds of the key funding bodies, and that the societal problems that cycling can help solve are prominent in their research strategies. The discussion of the DfT's research strategy above highlights the problem that funders face in balancing demands for research across the various modes. As already highlighted, support for cycling must usually be situated within a multi-modal research strategy, a problem not faced by organisations whose focus is solely on cycling.

4.9 That said, there are strong arguments for increasing the balance of research funding in favour of cycling. To begin with, of the 49 cycling projects reviewed for which there are cost figures available (that is, the majority of DfT projects, some of the HA projects and all those funded by EPSRC and ESRC), the average project cost was £125,415. This average would doubtless come down considerably were figures available for the other projects reviewed, because so many have been conducted by poorly-resourced organisations or in researchers' own time. This is, of course, a very crude way of assessing research value, and does not in any way evaluate results. Nevertheless, it provides a useful first-glance comparison between different kinds of research focus. Table 4.1 shows that the average cost of these cycling projects compares favourably with average project costs for DfT and EPSRC projects as a whole, and also for EPSRC's transport projects.¹ Moreover, the total cost for cycling research is a very small percentage of total transport research costs, especially when one considers that the cycling projects under discussion span well over five years compared to the two to four year maximum span of the EPSRC and DfT projects listed. Cycling research – just like cycling infrastructure – is, then, cheap compared to other topics and other modes.

4.10 Also like cycling infrastructure, cycling research has the potential to bring rewards that far exceed the modest investment needed. The many benefits of cycling are well rehearsed. Any increase in cycling will: help reduce pollution and congestion; reduce the need for increased investment in road infrastructure; help reduce journey times for all road users; and increase the health of those taking part. Together, these provide clear economic benefits for government, for local authorities, for the health service, for employers and – in the savings afforded through reduced car-dependence – for individual cyclists. It is beyond the scope of this review to try to quantify the economic benefits of cycling research, and given the long timespan of cycling targets this could be a risky occupation. Nevertheless, it is hard to imagine that the small investment in cycling research over the last ten years could have provided anything but good value for money. It should be noted that for the most part that value

¹ These comparisons have been selected both for their relevance and their availability.

resides not in cycling figures themselves but in the influence research has had on helping decisionmakers and implementers to choose paths for action.

4.11 The budgets of charities and voluntary organisations have much less scope for diverting funds towards cycling research, and in many cases this would simply mean diverting funds from cycling promotion projects to cycling research – this would not benefit cycling as a whole.

4.12 Therefore, aside from the DfT the main bodies which need to be persuaded of the value of cycling research are the research councils that fund university projects. To what extent can the benefits of cycling, and the problems it can help solve, be found in the research strategies of the three research councils to whose remits cycling is relevant? An EPSRC briefing on its transport research (EPSRC 2002) expresses a commitment to addressing environmental concerns, and claims its research 'has the goal of promoting socially inclusive and accessible transport by promoting walking, cycling and greener travel in addition to automotive and public transport research'. The ESRC includes as one of its thematic priorities (ESRC 2000) 'environment and human behaviour'. This priority covers mobility and transport, and encourages research which seeks to answer questions concerning integrated transport and the environmental dimensions of new requirements for mobility and land use. Cycling research could be relevant also to several other thematic priorities, concerning health, social exclusion, work and lifestyles. The health dimensions of cycling also have relevance to the MRC's strategy (MRC 2001), in relation to its cardiovascular initiative and its focus on social factors in health and policy and on public health.

Funding Source	Total Cost	Total Number	Average Cost
Average DfT project cost ¹ (current or completed in 2001)	£45.2m	250	£180,914
Average EPSRC project cost – transport (current in 2001)	£68m	500	£136,000
Average EPSRC project cost – overall (current in 2001)	£1,000 m	5100	£196,078
Average cycle project cost (current in 2002 or completed since c1995)	£6.1m	49	£125,415

Table 4.1. Comparison of average project costs for cycling and other research topics.

4.13 It seems, then, that the research councils are open in principle to funding further cycling research. Given that three out of eight policy-relevant studies funded so far have been supported from within transport research programmes

¹ Based on current and completed projects under all programme areas as listed in the 2000 – 2001 DETR Roads and Local Transport research compendium (DETR 2001b).

shared between the research councils and DfT, this seems an especially important avenue for researchers to pursue. The experience of researchers who have been funded through this route suggests that good liaison with programme managers and even those on commissioning panels can help ensure that research proposals submitted to programmes are targeted well for a successful result. This is less easy to achieve with the responsive mode, since the commissioning panels are not as likely to include transport specialists. In order to increase the amount of cycling research supported through open 'responsive mode' submissions, it may be necessary for the DfT and influential cycling advocates to argue the case with researchers and research council strategists, or for DfT to be more involved in the research process within universities.

The cycling research community

4.14 Having identified who commissions and funds cycling research, this section identifies the kinds of organisation that conduct research – these are fairly few in number, and are located in both the public and private sectors. Within these organisations, there are usually at most only a few individuals who are concerned with cycling, whilst other staff concentrate on other research topics. Usually an organisation that conducts cycling research will specialise in transport-related research, advocacy, teaching and/or consultancy, but in some cases cycling may be covered as part of a different set of interests, such as engineering, environmental or planning work. The kinds of organisation that conduct cycling research are:

- ***Transport, planning and environmental consultancies***

4.14.1 Consultancies derive a lot of their work from central and local government commissions. Much of this work is research-based, or includes a research component – for example researching the background conditions in developing an employer or school travel plan. Consultancies have been responsible for almost a third of DfT cycling research projects over the last decade, whilst this work has taken up three fifths of the cycling research work conducted by them. The rest of their work has almost all been commissioned by other government departments and agencies, or by local authorities.

- ***Academic researchers***

4.14.2 Researchers based in the universities account for a similar number of cycling research projects as consultancies, but their work is funded by a much more diverse range of sources. The biggest source, surprisingly, is universities themselves, with individuals making use of the research time allowed to most academic teaching staff, or funding their work privately in the case of PhD students. Projects that are uncosted in these two ways account for over a quarter of university cycling research. In terms of their more formally funded work, the government research councils account for a similar number of projects to internally-funded work, whilst the DfT has also funded several university projects. In addition, various

charities, cycling bodies and other transport organisations have funded a few projects each.

- **Government agencies**

4.14.3 A small amount of research is commissioned by the DfT to be carried out by other government bodies such as the Office of National Statistics. In addition, some government agencies – for example the Countryside Agency, Sport England and certain tourism agencies – carry out research in-house that has relevance for cycling.

- **Advocacy organisations**

4.14.4 The remaining cycling research is carried out by a variety of cycling and transport advocacy groups. These include staffed organisations such as the CTC, London Cycling Campaign, Sustrans and the AA, but also many local cycling campaigns which conduct local projects that they see as important but do not see any need to seek funding for. Some of the larger organisations may contract out data collection and carry out analysis themselves. For the smaller groups, though, research design, data collection, analysis and dissemination all depend on the labour of people who are for the most part volunteers.

4.15 Dissemination routes vary widely according to the sector in which the research is carried out, the needs and inclinations of researchers themselves and those of their funders or clients. Research results can be more or less easily accessible to potential beneficiaries or users, and this in part depends on the location of users themselves. Much cycling research is published as research reports for the original client and then distributed among cycling stakeholders in a fairly unstructured way – perhaps because the researcher wished to make the results known to a particular person, or because somebody has requested a copy. Research papers based on projects in academic settings are often published as departmental papers available in print or on the internet, or in academic books and journals. Certain consultancies also publish their reports, most notably the Transport Research Laboratory (TRL), formerly a government research facility but now privatised. TRL is a major player in DfT-sponsored cycling research, and its reports are highly respected but apparently not as widely read as they might be. A major factor in this is their high purchase cost, though the DfT is now working with TRL to place free downloadable files of their reports on the internet. From discussions with cycling stakeholders, this will be a welcome move, since poor dissemination of research results is a major criticism. This cannot be helped by the diffuse nature of the knowledge base, which restricts access to the results of much valuable research.

4.16 DfT itself publishes research results mainly in the form of Traffic Advisory Leaflets (TALs), which are distributed to local authority officers and other interested bodies. They are also available on the DfT website. There are currently about 30 TALs on the DfT website directly concerned with cycling.¹

¹ See <http://www.roads.dft.gov.uk/roadnetwork/ditm/tal/cycle/index.htm>

4.17 Probably the most wide-ranging dissemination route for cycling research is the Velo-City conference series, held every two years in a different (mostly European) city. The CD Roms of the proceedings from recent conferences form an invaluable library of cycling materials, though their usefulness is hindered in part by limited indexing and the sheer variety of different topics. The fact that the discs – and the bulk of the work producing the conferences – are the result mostly of volunteer labour mitigates these criticisms, and the conferences themselves deserve credit for providing a finely-targeted forum for cycling research papers. Of particular note, the conferences provide an outlet for many research papers – especially those of consultants – that are based on work produced for a specific client, and for which producing a conference paper is a more acceptable use of time than the greater effort needed to write a journal article.

4.18 Figure 4.1 shows the various research-related roles played by different kinds of organisation. There is a sizeable group of cycling stakeholders that engage in both research funding and research, whilst none is involved in neither. There are some funders that do not conduct research, and some researchers who do not provide research funding. Nevertheless, a considerable number of cycling stakeholders have multiple roles in the world of cycling research.

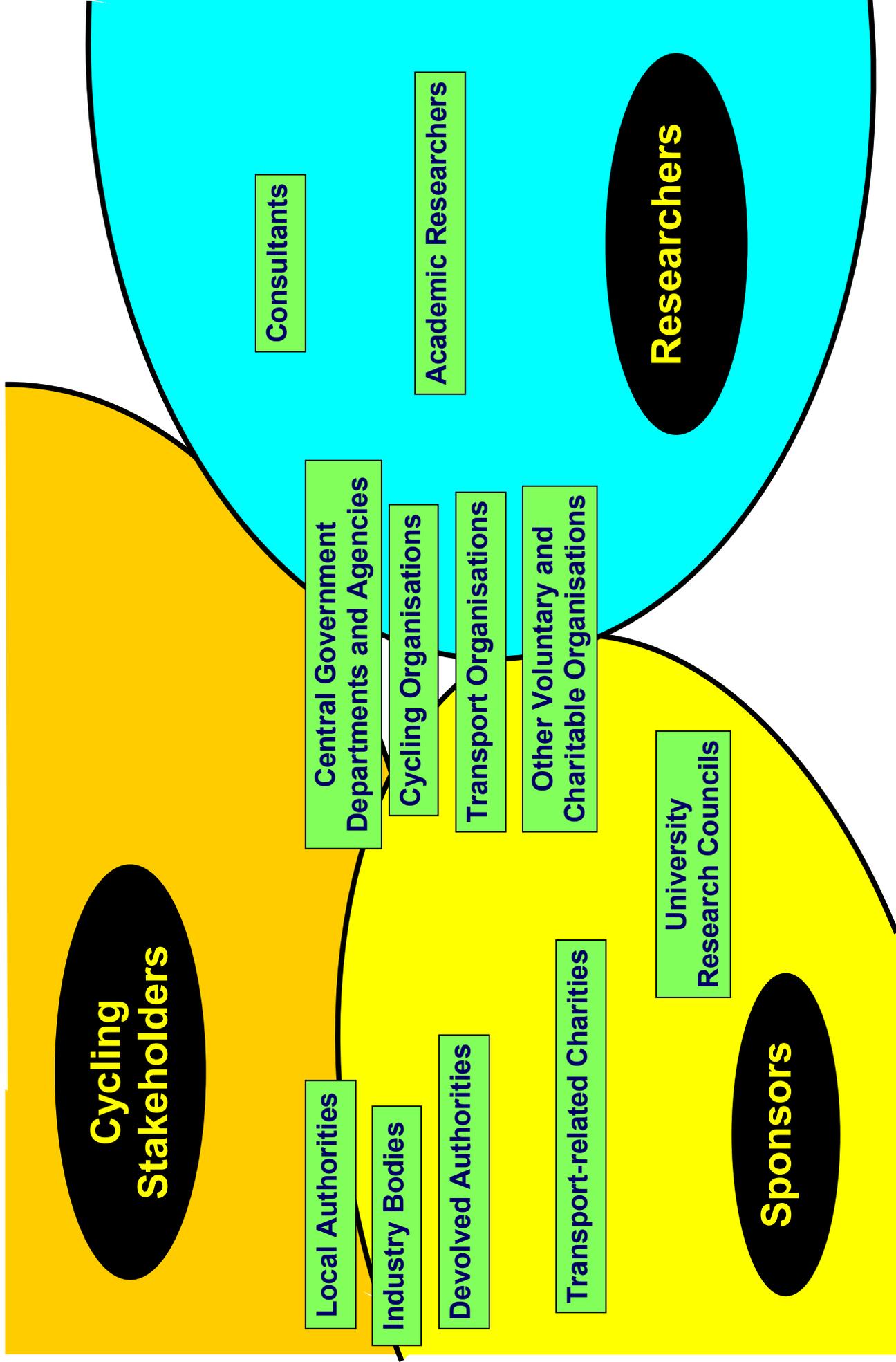


Figure 4.1. Cycling stakeholders, researchers and sponsors

Chapter Five: The Cycling Knowledge Base

5.1 The preceding chapters have been concerned with the mechanisms of cycling research. This chapter examines research content, and the methodologies used by different researchers. It does not go into much depth on research data, but rather sketches out which issues have been addressed and which gaps remain. It also explores alternative approaches that might enhance the quality of the cycling knowledge base.

Research Methods, Disciplinary Bases and Data Sources

5.2 Cycling research tends to draw on a fairly well-established repertoire of methods and approaches. These can be crudely broken down into the following general categories, though many studies will include elements from more than one of these:

- **Engineering studies** that evaluate the design detail of specific cycle facilities, that evaluate aspects of the general street infrastructure from the cyclist's point-of-view, or that devise and test new infrastructure possibilities for cyclists. This category also includes engineering- or design-based product research.
- **Attitudinal studies** that examines how different social groups (e.g. cyclists, non-cyclists, or motorists; groups based on demographic characteristics such as age, gender and social class; or people who live or work in certain locations) feel about cycling and cyclists, or about particular products. This category also includes market-based product research carried out by or for the cycle industry.
- **Analytical research** within social and health studies that looks in more depth at the attitudes, motivations and concerns associated with cycling, the travel patterns and activities of cyclists, and the ways in which these factors might be better configured in order to encourage more cycling.
- **Policy analyses** that assess the impact on cycling of different policies and policy instruments. Such work might examine policy areas that at first glance do not appear to be directly to do with cycling, such as travel planning, health, land use planning and the economy.
- **Research to develop tools** that can help implement policy, for example tools and models to help evaluate the benefits of different schemes, or to aid or guide the process of implementation.
- **Scientific studies** of the interaction of cycling with various factors such as health, accident and road casualty data, cycle helmets, and so on.

5.3 Within this broader framework, studies might be conducted under any of several different disciplines from within engineering, the sciences and the social sciences, and could examine a wide range of different data sources.

5.4 As mentioned in Chapter Three, a concern raised by a number of stakeholders about cycling research is a perceived bias towards engineering-based studies, particularly in research commissioned by the DfT – this is in fact a general criticism of the DfT's research programme and something being addressed by its Transport Research Unit. In order to assess the validity of such criticisms for cycling research, it is important to analyse the disciplinary breakdown of the research, and to make appropriate recommendations. It should be noted here that there was little comment from stakeholders concerning the role of the Highways Agency in cycling research, and hence no criticism of any engineering bias on the part of the HA. This seems to indicate a lack of awareness on the part of cycling stakeholders that cycling research comes under the HA's remit.

5.5 Much cycling research is carried out under a general disciplinary heading of 'transport studies'. Consultancy firms and academic departments working under this banner may include transport and urban planners, transport and civil engineers, people skilled in mathematical modelling applied to transport, economists, psychologists and sociologists, among others. This range of disciplines indeed accounts for the bulk of cycling research, whether under the banner of 'transport studies' or something more specific.

5.6 Looking closely at the research database, it is difficult to attach disciplinary labels to projects with much accuracy precisely because of the tendency of transport studies to take a multi-disciplinary approach. The range of types of data used in projects is thus a much more appropriate way of assessing the proportions of research effort devoted to engineering, to policy research and to social scientific work; within the latter this can also allow the separation of qualitative interview-based research from quantitative survey-based work. A summary of the contribution of these different data sources to the research base can be seen in Table 5.1.

Data Type	All Projects	%	Dft Projects	%	DfT/HA Projects	%
Technical/ engineering data	71	43	33	45	42	51
Policy data	19	11	13	18	13	16
Qualitative data	48	29	19	26	19	23
Quantitative data	56	34	19	26	20	24
Any social science	88	56	38	52	39	47

Table 5.1 Proportions of projects using engineering and social science data.

5.7 Analysing types of data source leads to interesting results which confirm some criticisms of research strategies yet disprove others. Looking at cycling research as a whole, 43% of projects draw on some form of technical or engineering data, whilst 56% draw on some form of social scientific data, and

11% on policy data (these figures, and those that follow, should not be read as referring to mutually exclusive groups of projects, since many studies draw on more than one data type; for this reason, too, percentages will add up to more than 100%). This appears to contradict the common perception that research is too engineering-focused – there is more social scientific data contributing to cycling research than engineering data.

5.8 Looking just at projects funded by the DfT, the pattern is very similar, with again a majority of social scientific projects, though the proportion is slightly smaller. Perhaps unsurprisingly, the balance is reversed when Highways Agency (HA) projects are brought into the picture. The combined research of the DfT and the HA draws on more engineering than social scientific data – though the difference of 4% between their total figures is barely significant. These findings reinforce draft figures supplied by the DfT which show that while engineering accounts for 29% of new DfT projects, social research accounts for 18% and mixed social and engineering work account for a further 21%. The remaining 32% of projects are divided equally between evaluations and economic modelling – both categories within which some projects would have been counted as social research in this review.

5.9 Another dimension of this issue is the question of how important it is for cycling research to be inter-disciplinary. It is a truism of cycling policy (and indeed policy more generally) that planners and engineers do not speak the same language, and that this causes many of the problems that arise in the implementation of facilities. In cycling research, too, whilst the high incidence of projects that use both engineering and social scientific data sources indicates that much inter-disciplinary work is taking place, such work actually accounts for only a minority of projects. Of all the projects that include some engineering data, 57% do not include any social scientific data. The figure for social science projects that exclude any engineering data is 64%. What this means is that 24% of all the cycling research projects covered in this review are exclusively engineering-based, and 34% exclusively social science based. Again, interestingly, the figure for social science projects is higher than that for engineering research. Whilst these figures are not overly high, it is important that those designing and commissioning research are aware of the problems that can arise when engineers ignore the social and cultural dimensions of how infrastructure is used, or when social scientists fail to take sufficient notice of the technical constraints on what is possible.

5.10 Just as significant as the difference between social science and engineering research is the difference within social science between quantitative and qualitative research. Quantitative research – drawing on survey and statistical data – is often regarded as more technically-orientated, whilst qualitative research – drawing on sources such as non-survey interviews, focus groups and discussions with strategic decision-makers – is often regarded as a more 'soft' approach (it should be noted, though, that social scientists in recent years have begun to challenge this apparent division by combining the two in many studies). These two approaches are, in fact, closely matched in the cycling research base, with 34% of projects drawing on quantitative data sources and 29% on qualitative ones. This negates claims that have been

made on both sides of the divide that cycling research is dominated by the other.

5.11 The above findings from the projects database offers an interesting commentary on the trends that influence the direction of cycling research, a great deal of which is – as described in Chapter Four – closely prescribed in terms of questions to ask, methods to use and approaches to take. This is especially true of research carried out for the DfT, but also for most work commissioned from consultants. On the other hand, there is also considerable work being conducted that is directed by the researcher – whether submitted to a responsive funding source or conducted in their own research time. Table 5.1 shows a broad consistency in the balance between social science and engineering data used in both the overall research base and those projects funded by the DfT. There is not, then, as might have been expected, a stark contrast between what DfT research officers feel is needed and what independent researchers choose to do of their own accord. This suggests that some kind of unconscious equilibrium has been reached within the cycling research field, balancing different kinds of data, and also balancing the two main approaches within social science. When shortfalls are identified in the knowledge base, then, what is needed is not a shift in the balance of research but an overall increase in the research base that will result in both more engineering research and more social science research, and within the latter, both more qualitative and more quantitative research.

Research Projects and Topics

5.12 Alongside discussions with stakeholders, the main component of the review has been the gathering of data on cycling research, and the construction of an Access database which currently contains details of 167 research projects. In light of the research priorities identified in Chapter Three, it is possible to check off against each project the priorities it addresses, from a range of 25 issues. These different issues, listed in Table 5.2, can be organised thematically in order to highlight the different contributions they make towards achieving the NCS objectives:

- planning and technical matters must usually be dealt with by local authorities, although product design – a matter for manufacturers – is also included in this group
- issues to do with skill, promotion and wider cultural change must be dealt with at a national level by a wide variety of stakeholders
- issues concerned directly with keeping the NCS on track, such as monitoring and resourcing, cut across the national and local dimensions
- different kinds of cycling and the place of cycling within the wider transport context are also matters for all stakeholders
- certain broader concerns within transport policy link cycling stakeholders into the wider framework
- whilst broader concerns from other policy areas do this even more.

5.13 As well as listing the priorities used in analysing the database, Table 5.2 presents a basic summary of how many research projects deal with each of the priorities – it should be noted that most projects deal with more than one issue and therefore the total numbers far exceed the actual number of projects.

5.14 It is clearly evident from this table that the existing research coverage of different priorities varies widely. Some issues have barely any coverage, whilst others are covered extensively. The solution to this is not necessarily simply for new research to equalise coverage across the range of issues. There may be reasons why a particular issue does not need further research. There may likewise be reasons to increase further the research coverage of an issue that is already prominent in the database. It is crucial, therefore, to consider not just the numbers of projects that deal with a specific priority but also how different projects deal with that priority.

Research Priority	Number Of Projects	Research Priority	Number Of Projects
Planning and accessibility	27	Resources	4
Improving safety	53	Directing and monitoring action	23
Road space and priority	15	Data integrity	9
Cycle parking	8	Utility cycling	23
Cycle security	5	Leisure cycling	10
Infrastructure design	50	Modal split	60
Product design	16	Integrated transport	14
Changing attitudes	52	Sustainability	5
Marketing	16	Social inclusion	4
Professional skills	5	Young people	15
Cycling skills	4	Health	21
		Crime	1
Other issues	9	Public space	4

Table 5.2. Coverage of research priorities in the database.

5.15 Several points stand out from just a quick survey of the coverage of research priorities. To focus first on those priorities that have enjoyed the most research interest, the following points emerge:

- There is an extensive and growing body of knowledge concerned with technical matters such as infrastructure and facility design
- Safety is another prominent research issue

- Concern over the cultural dimensions of cycling and transport – including attitudinal aspects – features to some extent in much of the research
- The position of cycling within overall modal split, and a concern to improve this, is likewise highly evident.

5.16 Looking a bit more closely at just these most prominent priorities raises some interesting questions about the kinds of research being conducted into them. A large number of projects (37 in total) cover both 'changing attitudes' and 'modal split', showing that those designing these projects see the two issues as closely linked. It is understood that if the modal share of the bicycle is to increase, a cultural shift is required.

5.17 This synergy is not, however, evident in the other combinations of these four topics. 'Infrastructure design' is a shared focus alongside 'modal split' in only 14 projects, and in only five alongside 'changing attitudes'; whilst there are only 8 'modal split' projects and 9 for 'changing attitudes' that are also concerned also with 'improving safety'. This indicates a lack of awareness among research designers of the interconnectedness and mutual dependence of the different dimensions of cycling – and ultimately a lack of understanding of the nature of innovation. Studies in the history and sociology of innovation show that it is the result not solely of technical change, entrepreneurship, or market or other social forces – rather innovation comes about as a result of the interactions among all of these (Rosen 2002). It is important, therefore, to think about these interactions when designing research (or, indeed, campaigns or promotional projects) aimed at facilitating a growth in cycling – an innovative solution to transport problems. Focusing on the design of cycle facilities without thinking about their users, trying to improve safety without thinking about people's fears of danger, or assessing attitudes to cycling in a way that ignores questions of safety or infrastructure, would all run the risk of producing ineffective research results. These are perhaps caricatures that overstate any shortcomings in the actual research base, and it would be unwise to recommend that every research project should cover such a wide range of issues that none can be addressed in any depth. Rather, it is necessary to return to the earlier call for a strategic approach to cycling research, where at least the overall research programme – if not individual projects – ensures that these links are acknowledged, and explored in more depth where necessary.

5.18 Moving onto coverage of the less prominent priorities in the research database reinforces the benefits of looking at the way projects link different priorities. For example, the amount of research on the health dimensions of cycling is higher than for many other issues, but it is dominated by a focus on safety (and hence danger); this accounts for over half of all health projects. What this means is that the health benefits of cycling are not receiving much research funding at all, even though the opportunity for exercise and increased fitness is probably the major factor in most people's decision to cycle. Health-related research is thus led – no doubt unintentionally – by an agenda set by those who see cycling as dangerous rather than by one of cycle promotion.

5.19 The database throws light also on the place within cycling research of the intertwined priorities of leisure and utility cycling. There are far more projects

concerned with the latter than the former, although usefully there are a few that directly address the relationship between the two. Sports cycling fares even worse than leisure cycling. In conducting this entire review, the only piece of cycling research found to address cycle sport has been an analysis of cycling injuries, although reviews by Sport England of a wide variety of sports in relation to social exclusion have included small amounts of cycling data. The lack of consensus – or certain knowledge – about the respective roles of utility, leisure and sport cycling indicate that the imbalance of research on these topics needs to be remedied urgently.

5.20 It is notable that apart from health, barely any research addresses the group of issues that originate from the wider government agenda – social exclusion, crime, the use of public space and, to a lesser extent, addressing the needs of young people. Only 21 projects altogether address these four priorities, and of these, only eight deal with topics other than young people. If the government wishes to improve the level of 'joined up thinking' between its different areas of responsibility, exploring the links between these issues and cycling needs to be given more priority. From the perspective of cycling stakeholders, too, there are important links to be explored. Many stakeholders see young people as the key to better cycling rates in the future. Finding ways of enticing children and young adults to cycle is crucial, and cycle training is one dimension of this that again has little research support. Access to public space for cyclists, and the role cycling can play in improving public space, are likewise important issues. In terms of social inclusion, most stakeholders are keen to highlight the benefits of cycling for increasing the mobility of those without access to other forms of transport. The research need here is how to promote these benefits to those for whom cycling connotes poverty.

5.21 One area of low research activity that perhaps does not need further attention is in the training of transport professionals. Work being conducted by a number of bodies under the auspices of the NCS Board – these include the Working Party on Professional Training for Planning for Walking and Cycling, the Institute of Logistics and Transport and the English Regions Cycling Development Team (ERCDT) – ensures that this issue is being dealt with by practitioners rather than researchers. This harks back to the point made in Chapter 1 that there are many overlaps between research and practice. Much infrastructure work would count here too, such as innovative schemes that are installed experimentally by local authorities and then reviewed in situ. It is not the intention in this report to conclude – as is common in research reports – simply that 'more research is needed.' As has been argued already, the focus and nature of research is as important as the quantity.

5.22 The quantity of research effort can, indeed, mask problems with the nature of projects. The implementation of initiatives such as the NCS marketing contract, the Cycling Projects Fund and the ERCDT shows that the NCS Board recognises the need for continually monitoring and maintaining such a long-term programme as the National Cycling Strategy. Perhaps the biggest failing of cycling research is the lack of support that research provides for this task of monitoring and maintenance. This again points to a shortage of strategic analysis underlying research design. Several 'programme maintenance'-related

priorities were identified in the NCS document such as directing and monitoring action, the integrity of cycling data, resources to support the NCS objectives and the marketing of cycling.

5.23 The 42 projects devoted to such priorities is perhaps a reasonable proportion of the overall research base. However, the main problem with this group of projects is that they include very little ongoing research effort. There are only four current projects and six proposed for the future. Three of the latter, but none of the former, are DfT projects. It is notable that the remaining work almost all originates from major cycling organisations – the CTC, Sustrans and the London Cycling Campaign. Added to this, it is striking that where marketing features in a project it is rarely the major focus.

5.24 It could be argued that this state of affairs is not as serious as it sounds, since – as with professional training – the task of seeing through the Strategy is being pursued through other means than research, especially since the appointment of the ERCDT. Nevertheless, it is difficult not to feel concerned that the DfT is sponsoring less research than stakeholder organisations on a matter directly related to its own targets. It is also not the case that bodies other than the DfT have these matters clearly in hand, as they do with professional training. The integrity of cycling data especially is something that is much contested, and it would benefit from analysis that was independent both of the DfT and the different stakeholder interests.

5.25 The resources available to support the NCS is an issue that exercises several stakeholders, some of whom are concerned that the DfT itself does not resource cycling sufficiently. As stated previously, from the DfT's perspective this problem results from their need to balance their resources according to Ministerial priorities.

5.26 There is also a clear need for research to support the marketing of cycling – both the formally structured marketing carried out through the NCS Board and its marketing initiatives, and informally to help shape the work of local authorities and cycling stakeholders. This set of priorities point again, therefore, to the need for cycling research to be underpinned by a strategic perspective that ensures the overall research portfolio contains a balance across all research priorities.

Chapter 6: Areas For Further Research Effort

6.1 This chapter identifies areas in which future cycling research effort might be concentrated. The first section explores methodological areas that are poorly represented in the existing knowledge base, and approaches that are becoming prominent in other areas of transport research. It considers the potential benefits for future research of drawing on such approaches. The second section sets out a possible programme for cycling research that takes into account the various issues discussed during the report.

Methodological Gaps in the Knowledge Base

6.2 Chapter 5 showed that cycling research draws for the most part on a fairly well-established set of methodologies – those set out in paragraph 5.2. There are, however, numerous other approaches that could be appropriate for researching this topic. This section will explore some of these and evaluate their potential usefulness.

6.3 One mainstream perspective that is in short supply within cycling research is comparative work that examines cycling trends, developments and provisions in different geographical or historical settings. Using a cross-European perspective, De la Bruhèze & Veraart (1999) argue convincingly that developments over time in local economic, demographic, industrial and political circumstances combine to shape the dynamics of cycling policy and attitudes. In their UK case study of Manchester, they argue that the city's lack of a cycling culture since the Second World War can be attributed to the interplay of these changes alongside an unfavourable climate and topography, and a general decline in the culture of cycling within the UK as a whole.

6.4 A key benefit of such comparative work is that it shows that perceived 'barriers' to cycling are neither universal nor impossible to overcome – although overcoming them can be extremely difficult. What comparative research does is enable taken-for-granted assumptions about the state of affairs to be questioned by means of counter-examples from elsewhere. A good example of this is the CTC's 'Benchmarking' project, funded until 2003 by the Ashden Trust, which involves a project officer located within the CTC facilitating meetings of local authority cycling officers, who together review examples of good and bad practice in each of their localities.

6.5 Another approach that is more-or-less completely absent from the cycling research base is transport modelling. Since this is a very common technique within transport studies more broadly it was felt worthwhile to investigate whether it has anything to offer understandings of cycling. It is important to note that what is under discussion is the use of mathematical modelling to simulate traffic movement and to predict changes in patterns and flows arising from specific interventions such as the introduction of new infrastructure. Whilst many research project descriptions use the term 'model' to refer to the

conceptual frameworks being developed, these are not generally the mathematical models under discussion here.

6.6 Transport modelling has undergone considerable changes over the last few decades; in particular it has become far less global and all-encompassing in its approach, adopting – along with mathematical modelling techniques across a wide range of applications – a more localised focus that has left it better equipped to provide detailed analysis of direct relevance to decisionmakers (see Kwa 1994 for an overview of these changes). Compared to the city-wide models of the past, transport models now deal typically with specific road junctions or groups of roads within the same locality, or with specific transport corridors.

6.7 Despite their more localised relevance, there remain problems with transport models, notably the difficulty of building into them the complexity of people's daily travel behaviour. For the most part, what is modelled are the ideal-typical movements of car traffic involving individual people's journeys by a single mode and with a single destination. In reality, people's travel patterns are more complex than this – they include shared journeys, 'trip chaining' (i.e. a single journey that consists of multiple consecutive destinations) and the mixing of modes where the parking location is not the final destination. Some modellers have begun to build this complexity into their work, but they remain a minority (see Wachs 1996 for a variety of these approaches).

6.8 These shortcomings of transport modelling make it difficult – though not impossible – to adapt it to include cycling. A review of future multi-modal modelling requirements conducted for the then-DETR (see David Simmonds Consultancy *et al* 2001) concluded that the inclusion of cycling and walking within models is problematic for a number of reasons. These include the strong influence of design detail – which is not taken into account in existing models – on people's willingness to use particular facilities, the relatively undisciplined nature of these modes, and the influence of the physical and vehicular environment on users' sense of comfort and on their perceptions of risk and safety. The review found that when cycle trips are included in multi-modal models, they usually miss much of this complexity, focusing instead just on the physical characteristics of cycle trips.

6.9 Further problems with trying to include cycling within transport models arise from the small amount of data available from which to extrapolate, and the fact that cycle trips tend to be less focused on the roads that are usually modelled – instead they make more use of roads and paths that models generally ignore. Again, the complexity of actual travel behaviour reduces the applicability of modelling techniques to cycling. Social scientific critics of mathematical modelling (in various applications) go further than this, concurring with the minority modellers discussed above that there are fundamental flaws with models that raise questions about their general validity. Certainly, with regard to cycling, if modal share figures for different options are treated as fixed within a model, it will be incapable of responding to the dynamics of behavioural change that are crucial to the success of current transport policy.

6.10 The review of multi-modal modelling suggests that agent-based modelling may be a useful technique for helping this methodology account for cycling. Agent-based models use computer simulation to build up a virtual population of 'individuals' that can display learned transport behaviour, rather than the aggregated uniform behaviour across a whole population that is assumed by conventional models. However, whilst some newer models have appeared since the review was conducted that do claim to include cycling, the report from the review is ultimately sceptical that newer approaches in modelling can resolve the problems faced.

6.11 A final methodological approach I wish to consider in this section is foresight and futures research. These approaches have become prominent since the mid-1990s as a way of identifying trends in innovation, policy and a wide range of other areas.

6.12 The UK Foresight programme is managed by the Office of Science and Technology, and has been operating since the mid-1990s. Its role is to promote collaboration between industry, academia and government by stimulating innovation. Its first round, during the second half of the 1990s included a transport panel, whose initial report set into motion research programmes on travel information, the 'foresight vehicle' and 'clear zones' – the latter being concerned with reducing congestion and pollution in city centres. The transport panel was later absorbed into a broader engineering-based panel which has since been dissolved.

6.13 From a cycling perspective, the Foresight programme has little to offer because of the focus on solving problems through technical solutions that will benefit UK industry. Technology here seems to be conceived in terms of high profile and highly innovative technologies such as information technology and new materials. Whilst such technologies are not unknown in the world of cycling, they tend to be far removed from the aspects of cycle usage that are most relevant to policy. In addition, low margins in the bicycle industry mean that on the whole it is not able to engage in the kinds of technical innovation that are characteristic of Foresight. Foresight itself seems unable to conceive of innovations that are low technology – for example, the Clear Zones website fails to include bicycle deliveries among its options for goods deliveries, even though this is an ideal option in the kinds of location in which clear zones are intended to operate.

6.14 Whilst the outputs from the Foresight programme have been of little relevance to this review, other approaches are perhaps more so. A report posted on the DfT's research website on 'Foresight Futures Scenarios' (Science Policy Research Unit 2001) takes a less narrow focus on foresight. Whilst still having the goal of helping identify new markets for industry, and helping firms create partnerships with academia and government, its approach is centred on generating different scenarios of future social, economic and governmental trends in order to better understand the possible routes towards these objectives. The report identifies four different future scenarios – world markets, global responsibility, national enterprise and local stewardship – which each have very different implications for a range of sectors including transport.

Whilst it is not necessary to explore the details here, these scenarios will also each have different implications for cycling, with knock-on effects for both cycling policy and the bicycle industry.

6.15 The authors of this report recommend that public and private sector organisations engage periodically in scenario-building exercises in order to better understand their markets and deal better with change. Such exercises could be valuable in a number of ways as a form of cycling research, though it would be important to avoid creating scenarios only of the idealistic visions of the future that often accompany cycling advocacy – in other words, to imagine the place of cycling in both ideal and less ideal circumstances. Using such a methodology, periodic surveys of the views of cycling stakeholders on possible future trends could help anticipate the degree of progress towards cycling targets, and adjust action accordingly. Scenario exercises could be held with a range of cycle users and non-users as a means of tracking changing perceptions of cycling, of the barriers to cycling and of its role as transport and/or leisure.

6.16 Scenarios could also be used in a low-tech way by the bicycle industry, helping them to track the changing fortunes of different forms of bicycle technology. This has contemporary relevance as, for example, mountain bikes become less popular than they once were, and the industry needs to reposition its products in the market. The policy interest here lies in the question of whether a shift to different types of bicycle indicates any shift in the kinds of cycling being undertaken – i.e. towards increased utility cycling – or in the kinds of cycle facility bicycle consumers need.

A Proposed Programme of Cycling Research

6.16 A prominent theme throughout this report has been the need for a strategic approach to cycling research. The successful achievement of the National Cycling Strategy's objectives is dependent on there being in place a high quality knowledge base to underpin decisions in cycling policy and implementation. This knowledge base needs to balance the different priorities identified in the NCS and by the various cycling stakeholders, and it needs to provide support for short-, medium- and long-term goals within the NCS. Figure 6.1 sets out the range of elements that need to be included in a cycling research strategy. Projects need to span users and providers of bicycles and facilities, different types of journeys, facilities, routes and locations, and be conducted from a variety of disciplinary and methodological perspectives. Key to this strategy is the interdependence of all these different elements. Each of the groupings in Figure 6.1 has links with each of the others – in designing a research programme it is important to bear this in mind in order to ensure these links are explored in relevant projects.

6.17 Table 6.1 sets out a possible programme of cycling research, comprising 24 potential research projects (short project summaries are provided in Appendix 2). This programme draws on the findings of the review, including

both the analysis of gaps within the knowledge base and the views of stakeholders. That said, this list does not by any means exhaust the list of research suggestions proffered by stakeholders. Rather, the programme has been designed to cover a wide range of the research priorities set out in Table 3.1 and the programme elements in Figure 6.1. Projects are grouped as in Table 3.1, and flagged for high, medium and low priority. High priority projects are generally those on whose results further action is dependent. All projects designed to help progress the NCS have high priority in order to ensure that the basis for the programme in the longer term is put in place as early as possible. It should also be noted that projects marked low priority are regarded as important, but not urgent – the low designation is not intended to mean they are not needed.

6.18 This research programme has not been constructed in the belief that it will materialise as described here. It is accepted that for any of these proposed projects to be taken forward they will need to go through internal reviewing and commissioning processes within the relevant funding bodies. What the programme is designed to do is, rather, to demonstrate that it is possible to put together an extensive programme of cycling research that has the coherence and spread of coverage that cycling stakeholders believe is needed to support the objectives of the National Cycling Strategy. Nevertheless, it is useful to note that were the average cost of these projects to match those of existing cycling research, the total would only just exceed a fairly modest £3 million, spread over three to four years. A coherent and well-balanced cycling research programme is thus not only possible but also affordable.

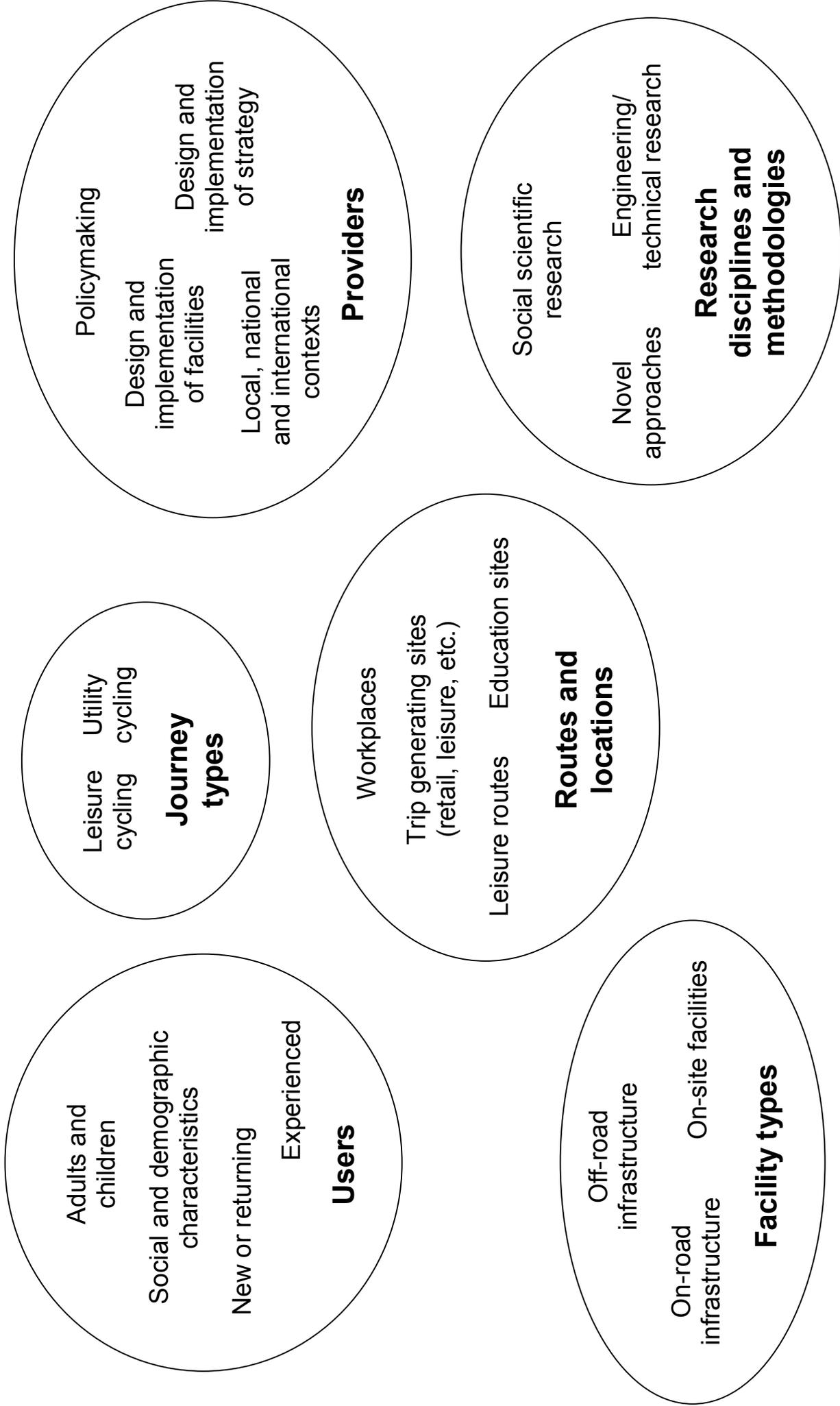


Figure 6.1. Essential Elements of a Coherent Cycling Research Strategy

Project Title	Other research areas	Priority
<i>PLANNING AND TECHNICAL MATTERS</i>		
The impact of congestion charging in London on modal shift to the bicycle	MODAL SHIFT	HIGH
Measuring the impact of cycling facilities	MODAL SHIFT	HIGH
The place of cycling within travel plans	MODAL SHIFT	MEDIUM
Infrastructure and cyclists' safety	ATTITUDES	MEDIUM
Bicycle designs and purposes	MARKETING	LOW
Opportunities for innovation in the bicycle market	MARKETING	LOW
<i>SKILL, PROMOTION AND CULTURAL DIMENSIONS</i>		
Demographics and segmentation of the cycling market	PROGRESSING THE NCS	HIGH
Understanding the complexity of barriers and facilitators	TECHNICAL ISSUES	HIGH
The attitudes to cycling of young adults	YOUNG PEOPLE	MEDIUM
Economic dimensions of cycling		MEDIUM
The impact of skill on cyclists' safety and vulnerability	TECHNICAL ISSUES	MEDIUM
Adult take-up of cycling		LOW
<i>PROGRESSING THE NCS</i>		
Refining the NCS targets for variations by region, journey and destination types	MARKETING	HIGH
Review of change management strategies	CULTURE	HIGH
Review of baseline data for the NCS targets		HIGH
Review of the NCS objectives and targets		HIGH
Public perceptions of cycling among the general public and stakeholders	CULTURE	MEDIUM
<i>TYPES OF CYCLING, AND TRANSPORT POLICY ISSUES</i>		
Analysis of leisure and utility cycling	MARKETING	HIGH
Understanding the leisure and sports cycling markets	MARKETING	HIGH
Attention to cycling issues in other transport research		HIGH
Cycling in rural areas	SOCIAL INCLUSION	MEDIUM
Integration of cycling with public transport		MEDIUM
<i>BROADER POLICY ISSUES</i>		
Cycling and health		HIGH
Cycling and social cohesion		MEDIUM
Ethnic dimensions of cycling		LOW

Table 6.1 A Proposed Cycling Research Strategy

Chapter 7: Recommended Actions

7.1 The research projects suggested in Table 6.1 and Appendix 2 in effect form the recommendations of this report – that is, research that needs to be conducted in order to address the failings identified in the review. To accompany such research, there is a need for strategic work that can help transform the cycling research field in order to address key problems. Especially important is the need for further research to be set within a strategic research programme that ensures a balance between research priorities, between disciplines and methodologies, and between short-, medium- and long-term objectives. Several additional recommendations flow from this requirement, which have been summarised briefly in the following paragraphs.

7.2 **Strategy** It is recommended first of all that the DfT (CLT3 and CLT4) and the NCS Board consider the possibility of developing a cycling research strategy that should then act as a framework for future cycling projects. Involving the Transport Research Unit in this work would ensure the constraints of wider research needs are kept in mind. Whilst there is a risk that the process of getting individual projects approved could still reduce their strategic coherence, this would at least provide a good starting point.

7.3 **Projects** The DfT has recently begun compiling its planned research programme for 2003. The following year's process will not begin until well into 2003. This leaves considerable time for the NCS Board, CLT 3 and CLT4 staff, and other cycling stakeholders to review the research projects proposed in Appendix 2 and use them as the starting point for submitting to the DfT a coherent programme of cycling research projects. It is recommended that this process is begun shortly, focusing especially on high priority research projects that are needed to inform the immediate progress of the Strategy.

7.4 **Outreach** The limited funding for cycling research within the DfT but even more so among other funding bodies highlights the need for cycling research to be 'sold' to these bodies at a senior policy level. It is recommended therefore that members of the NCS Board find ways of pressing home to research directors in the DfT, the EPSRC, the ESRC and the MRC the high value for money that cycling research can provide and the societal problems it can help to address.

7.5 **Dissemination** Making cycling research findings more widely available would help improve the currently poor state of research dissemination and would greatly enhance wider awareness of cycling research. It is recommended that the NCS Board explore the possibility of developing a resource such as a 'cycling research findings' information sheet or website, using this review and the accompanying Access database as a starting point.

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Appendix 1: List of stakeholders consulted

The following stakeholders and researchers either provided information on existing cycling research or shared their views with me on cycling issues and research priorities (many did both). Communication was conducted by email (marked *e* after their affiliation), telephone (marked *t*) or in person (marked *p*). Other resources consulted are referred to in the text or the list of references.

Rose Ades, Cycling Centre of Excellence, Transport for London *p*

Lynn Basford, Transport Research Laboratory *p*

Roger Bird, Transport Operations Research Group, University of Newcastle, and Universities Transport Study Group *t*

Paul Blaker, Department of Culture, Media & Sport *t*

Tom Bogdanowicz, CTC *p*

Natasha Brown, London Borough of Camden *p*

Nick Burkitt, Social Exclusion Unit *p*

Claire Burton, EPSRC *e*

Sally Cairns, ESRC Transport Studies Unit, University College London *p*

Johanna Cleary, Cleary Hughes Associates *p*

Andy Cope, Sustrans *e*

Phillip Darnton, Raleigh Cycle *p*

Katie Dickson, London Borough of Camden *p*

Dave du Feu, Spokes (Lothian Cycle Campaign) *e*

Robert Evans, Centre for Knowledge, Expertise & Science, University of Cardiff *e*

Chris Fox, DfT *p*

Geoff Gardner, North Yorkshire County Council *e*

Sian Griffiths, Faculty of Public Health Medicine, University of Oxford *p*

John Grimshaw, Sustrans *p*

Derek Halden, DHC Ltd *e*

Olly Hatch, C-PAG *p*

Trevor Hayward, British Tourist Authority *e*

Mark Hubbard, London Cycling Campaign *p*

Ian Jenkins, Department of Culture, Media & Sport *e*

Tim Jones, School of Planning, Oxford Brookes University *e*

Steve Lawson, AA *e, p*

Peter Lewis, London Cycling Campaign *p*
Kevin Mayne, CTC *p*
Hugh McClintock, University of Nottingham *p*
Kate McMahon, DfT *e*
Dave Morris, University of Nottingham *p*
Susie Morrow, Wandsworth Cycling Campaign *e*
Matthew Page, Institute for Transport Studies, University of Leeds *e*
John Parkin, Bolton Institute & Institute for Transport Studies, University of Leeds *e*
Stuart Reid, Transport Research Laboratory *p*
Tony Russell, CTC *p*
Harry Rutter, Faculty of Public Health Medicine, University of Oxford *p*
James Ryle, Sustrans *p*
Tim Ryley, Transport Studies Institute, Napier University *e*
Julia Samson, Transport 2000 *e*
Jane Shepherd, Sainsbury Family Charitable Trusts *e*
Malcolm Shepherd, Sustrans *p*
David Simmonds, David Simmonds Consultancy *e*
Gillian Smith and colleagues, Transport Research Unit, DfT *p*
Paula Smith, London Cycling Campaign *p*
Richard Thomas, CTC *p*
Jeff Turner, Transport Studies Group, University of Westminster *e*
Martin Whittles, Transport Studies Group, University of Westminster *e*

Appendix 2: Project specifications for Proposed Cycling Research Programme

Project Title and Research Summary	Other research areas	Priority
PLANNING AND TECHNICAL MATTERS		
<p>The impact of congestion charging in London on modal shift to the bicycle</p> <p>The introduction of congestion charging in London in February 2003 offers an ideal real-time opportunity to learn how such enforced changes affect travel behaviour. Whilst Transport for London will be monitoring the effects on traffic congestion, public transport use and economic impacts, cycling is not likely to be addressed in the same depth. Yet events which force travellers to change their behaviour, such as tube strikes in London or the fuel tax crisis of September 2000, have been found to have unanticipated consequences that can include increased cycle use. The research will track the motivations, planning and experiences of a cohort of commuters who have decided to switch to cycle commuting because of congestion charging. This will make it possible to identify barriers encountered at different stages in the process, and learn how they are dealt with by users. The project will provide lessons for the implementation of congestion charging in other locations, as well as broader understandings about motivations and behaviour more generally. By enhancing with actual behaviour data existing knowledge about non-cyclists' claims about the barriers and facilitators to modal shift, this project will provide important knowledge to help carry forward the work of implementing the National Cycling Strategy. Start date: January 2003 (in order to recruit respondents prior to implementation). Completion: Summer 2004.</p> <p>Outputs: Research report(s). National Cycling Strategy leaflet and web page. Dissemination via ERCDT.</p>	MODAL SHIFT	HIGH

<p>Measuring the impact of cycling facilities</p> <p>How direct is the link between the provision of cycle facilities and increased cycling? Which kinds of facilities, schemes, routes and networks, and what scale of scheme, are most effective? This project will develop a methodology for assessing cycling growth against investment in and provision of cycle facilities. It will use the data collected by the ERCDT from Local Transport Plans (LTPs) and Annual Progress Reviews (APRs).</p>	MODAL SHIFT	HIGH
<p>The place of cycling within travel plans</p> <p>How prominent a part does cycling have in travel plans, and in the travel plan promotion work which has received substantial government support in recent years? This project will review guidance literature and the Site Specific Advice process, and will study a range of organisations – employers, schools, trip generating sites – with different local circumstances and at different stages in the travel planning process.</p>	MODAL SHIFT	MEDIUM
<p>Infrastructure and cyclists' safety</p> <p>Roundabouts and other junctions are prominent barriers to cycling, and are perceived as dangerous by stakeholders and transport professionals as well as by cyclists themselves. This two-stage research project will firstly use crash data to identify the threat posed to cyclists by different kinds of junction and other infrastructure; and secondly examine ways of overcoming the dangers. An associated project would use scenario-based techniques with focus groups to identify how perceptions of danger can be overcome, comparing cycle training, marketing of cycling and facilities, and actual engineering improvements.</p>	ATTITUDES	MEDIUM
<p>Bicycle designs and purposes</p> <p>Much rhetoric surrounds the design and appropriate uses of different bicycle types, notably concerning the suitability of mountain bikes for urban and semi-urban (but non-mountainous) cycling. Exploring how users perceive their bikes – whether as adequate tools for the job or as a hindrance caused by inappropriate design – and how design issues have influenced people's bicycle use will be valuable in helping to influence</p>	USERS, MARKETING	LOW

<p>the bicycle industry's design considerations, as well as advice to consumers and retailers. This project would be ideally suited for the matched research/industry funded LINK scheme of the EPSRC.</p>		
<p>Opportunities for innovation in the bicycle market</p> <p>Cycling for leisure received a significant boost from the rise of the mountain bike in the 1980s and early 1990s. Industry information suggests that the mountain bike sales curve is now reducing. Qualitative research to investigate what direction the consumer market is now heading in, combined with scenario-based analysis of innovation trends in the industry in Britain and beyond, will help the British cycle industry situate itself within the home and global markets. This will also provide a means for policymakers to anticipate and try to influence market trends in line with policy commitments. This project may be suitable for the LINK scheme.</p>	<p>USERS, MARKETING</p>	<p>LOW</p>
<p>SKILL, PROMOTION AND CULTURAL DIMENSIONS</p>		
<p>Demographics and segmentation of the cycling market</p> <p>In the first stage of this project, secondary analysis of existing data on the demographics of who currently cycles will provide the basis for developing a strategy for a research and promotion programme targeted at those social groups where cycling is traditionally very low – notably lower income groups, classes C, D & E in marketing stratifications, ethnic minorities, women and girls, and those living in areas of social deprivation.</p> <p>The second stage will address a widespread assumption that all cyclists belong to a single group with shared concerns, needs and interests. Research has questioned this assumption in the course of other work but it has not been investigated thoroughly. The project will examine the different constituencies that make up 'cyclists' in order to help policymakers and transport professionals better cater for different cycling needs. It will identify which groups of cyclists do share common interests. It will also investigate ways of involving those less likely to identify themselves as 'cyclists' in cycling policy and in the design and implementation of cycling facilities.</p>	<p>PROGRESSING THE NCS</p>	<p>HIGH</p>

<p>Understanding the complexity of barriers and facilitators</p> <p>There is a common roll call of 'barriers to cycling' that includes issues such as safety, journey distance, speed, convenience, climate and topography. Likewise, the regular list of cyclists' needs includes stands, lockers, showers and so on. This research will look critically at these lists, with the aim of identifying the scope for overcoming barriers and providing appropriate facilities in different circumstances. The project will identify variations in how robust a barrier or a need is for different kinds of cyclist, for different demographic and social groups, including the socially excluded, in different regions and locations. This will support the implementation of the NCS by providing mechanisms for change that are tailored for different circumstances.</p>	<p>TECHNICAL DIMENSIONS</p>	<p>HIGH</p>
<p>The attitudes to cycling of young adults</p> <p>This research will provide a useful focus on an issue that has not been addressed in studies so far, the experience and attitudes towards cycling of those just entering post-school education and the workforce. Focus groups comparing the post-school experiences of people with different amounts of prior cycling experience, and having had different levels of support for cycling to school, will allow an understanding of where cycling fits within the travel habits, perceptions and attitudes of this age group towards transport at a time when the commitment to particular modes is often in the process of becoming embedded.</p>	<p>YOUNG PEOPLE</p>	<p>MEDIUM</p>
<p>Economic dimensions of cycling</p> <p>The role of cycling in the economy is often underplayed in arguing the case for cycling. Analysis of the contribution of cycling to the economy will include the cycle industry (design, manufacture, distribution and retail), cycle tourism as a product, and the contribution of leisure and sports cycling to local economies. It will balance the economic benefits to society of cycling – reduced congestion, less idle time spent in traffic, a more healthy and alert workforce – against costs such as those to the health service through accidents, and the reduced revenue for car-based industry and the state that will come about through modal shift. It will also examine how the tax regime affects cycling.</p>		<p>MEDIUM</p>

<p>The impact of skill on cyclists' safety and vulnerability</p> <p>Researchers have argued that concerns about safety are lower among more experienced cyclists than among novices or non-cyclists. This project will assess the degree to which skill affects perceptions of safety, and will evaluate the effects of skill and experience on cyclists' vulnerability on the road.</p>	TECHNICAL ISSUES	MEDIUM
<p>Adult take-up of cycling</p> <p>A study to examine the circumstances that stimulate and facilitate adults either taking up cycling for the first time or returning to it after a break. What bearing does somebody's previous cycling biography have on this? Are there particular events in life that stimulate change, and how can these be capitalised on? For those who have contemplated change and then decided against it – or who have given up cycling – what circumstances have led to such decisions, and how could they have been reversed?</p>	CULTURE	LOW
PROGRESSING THE NCS		
<p>Refining the NCS targets for variations by region, journey and destination types</p> <p>A review of cycling levels and targets across the UK as set out in LTPs and APRs, with the aim of identifying the regional variations and the differences between different types of journey and destination that can be expected to come into play in bringing about the NCS headline targets. Where can the headline targets not be expected to be met, and where can results be expected to exceed the average? What growth can be expected for specific kinds of journey and destination? The review will present case studies of typical local authorities, cycle routes and destinations that demonstrate what can be achieved with increases in cycling levels at a range of levels, covering interim as well as final results for the NCS targets. The review will look realistically at the likely achievement by 2012, and what must be done to realise the targets. This review will be based on data being collected by the ERCDT, and could be considered as a role for one of the Team to take on.</p>	MARKETING	HIGH

	CULTURE	HIGH
<p>Review of change management strategies</p> <p>Successful implementation of the NCS will only be achieved as a consequence of substantial changes in institutional culture and policy, as well as at a wider societal level. This requires buy-in from a wide range of stakeholders, and effective change management by those charged with carrying it forward. There is a great deal of value in learning from other experiences of change management – whether in industry, in the public sector or in campaigning organisations. This project will commission experts in change management to identify useful lessons from other sectors for those implementing the NCS.</p> <p>Output: National Cycling Strategy Guidance brochure.</p>		
<p>Review of baseline data for the NCS targets</p> <p>This project will review the data sources available against which to base the progress of the NCS targets, and draw on ERCDT evaluations of LTPs and APRs in order to map how local authorities have been charting their cycling figures. It will develop a common national method for maintaining cycling statistics for the NCS and LTP purposes. This will need to balance the information needs of the DfT, NCS secretariat and local authority LTP staff against accessibility, simplicity and user-friendliness.</p>		HIGH
<p>Review of the NCS objectives and targets</p> <p>The NCS contains 18 objectives and 24 key strategic outputs. This project will review the progress of the 1996 document and identify objectives and targets up to 2012. The review will highlight other relevant policy areas and identify appropriate objectives. This project could be allocated to the ERCDT.</p>		HIGH
<p>Perceptions of cyclists and cycling among the general public and stakeholders</p> <p>In order to monitor the wider impacts and progress of the NCS, a regular brief MORI-style survey should be conducted with randomly sampled members of the public concerning attitudes to cycling, awareness of new developments and of key cycling 'brands'. This should be conducted at quarterly or at most six-</p>	ATTITUDES, CULTURE	MEDIUM

<p>monthly intervals in order to build up a reliable profile of public knowledge and attitudes over time for the remaining life of the NCS. Extensions of this research could be conducted as one-off studies to focus on specific topics, such as the public image of cycling, perceptions of cyclists' road behaviour and so on. An accompanying project conducted less frequently would use scenario work with cycling stakeholders to measure changing perceptions of how the wider policy, social and economic contexts are likely to affect cycling and thus the progress towards the NCS.</p>		
<p>TYPES OF CYCLING, AND TRANSPORT POLICY ISSUES</p>		
<p>Analysis of leisure and utility cycling</p>	<p>MARKETING</p>	<p>HIGH</p>
<p>This study will look closely at the differences between leisure and utility cycling, and the scope for crossover between them, building on previous research conducted for the DfT and elsewhere. Several studies identify various barriers to and facilitators of cycling, but none has yet looked systematically at how they vary between leisure and utility cycling. What are the differences, and what must be learned in order to maximise both? What is the true scope for leisure cyclists to take up utility cycling? This project will involve both qualitative interview research and a practical component tracing individuals' experiences over time.</p>		
<p>Understanding the leisure and sports cycling markets</p> <p>This project will develop market intelligence and statistical data on leisure cycling, including both long-distance and short leisure trips as well as cycle sport. It will identify regional variations and the potential for growth, and will develop guidelines for tourism and leisure authorities.</p>	<p>MARKETING</p>	<p>HIGH</p>
<p>Attention to cycling issues in other transport research</p> <p>Facilities implemented as a result of transport research routinely impact on cyclists, but when the research concerned has been overseen by departments or organisations without a direct responsibility for cycling it often fails to include full consideration of how this might happen. This project will examine all DfT and</p>		<p>HIGH</p>

<p>HA research commissioned within the previous 12 months in order to determine how impacts on cycling are dealt with in the commissioning process. It will make recommendations with regard to current and proposed research.</p>		
<p>Cycling in rural areas Recent findings published by the Countryside Agency show utility cycling in rural areas to be minimal. At the same time, rural communities benefit enormously from cycle tourism – anecdotally, many rural businesses were saved from bankruptcy by the custom from cycle tourists during the foot and mouth crisis of 2001. This project will examine the state of cycling in rural areas and the balance between (local) utility cycling and (visitor) leisure cycling. It will examine the potential for achieving a better balance between the two by identifying travellers and journeys that have good potential for modal shift to the bicycle.</p>	<p>SOCIAL INCLUSION</p>	<p>MEDIUM</p>
<p>Integration of cycling with public transport Building on existing DfT and EPSRC research on integrated transport, this project will review current barriers and examples of good practice nationally and internationally on how to integrate bikes with buses and trains.</p>		<p>MEDIUM</p>
<p>BROADER POLICY ISSUES</p>		
<p>Cycling and health The benefits of cycling for health are well-known among cycling advocates, and previous research for the DfT and others has begun to prove this empirically. However, more work is required in, for example, clarifying links between cycling and rates of morbidity and mortality, and picking out the knock-on health benefits of cycling through increased physical activity. Most importantly, awareness of the health benefits of cycling is extremely low among health professionals. This project will review the current state of knowledge and future research needs, and will develop a programme of dissemination of cycling knowledge to health professionals.</p>		<p>HIGH</p>

<p>Cycling and social cohesion</p> <p>This project will build on past work on cycling and social exclusion by examining the contribution of cycling to current concerns with social cohesion and inclusion. What role does cycling play in making local communities more cohesive through countering community severance? Can the siting of cycle routes and networks enhance local communities? What are the knock-on impacts of this for health, social inclusion and other concerns? This project could be submitted to the Ashden Trust or Joseph Rowntree Foundation for support.</p>		MEDIUM
<p>Ethnic dimensions of cycle usage</p> <p>It is well known within cycling and environmental organisations that members of ethnic minorities tend not to engage in these activities. Data on the usage of the National Cycle Network and studies of sports activities among ethnic minorities confirms this knowledge. This project will build on this work and on positive inroads made by the London Cycling Campaign and others, examining these issues in more depth and producing recommendations for further action. Collaboration between the DfT and the Social Exclusion Unit or one of the charities that support social exclusion work may be valuable.</p>	CULTURE	MEDIUM