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Policing Road Risk:

Enforcement, Technologies and Road Safety

PARLIAMENTARY ADVISORY COUNCIL FOR TRANSPORT SAFETY
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Policing Road Risk:

Enforcement, Technologies and Road Safety

PARLIAMENTARY ADVISORY COUNCIL FOR TRANSPORT SAFETY

dedicated to improving transport safety for the public benefit

SEPTEMBER 2005

Foreword

The charitable objective of PACTS is to protect human life through the promotion of transport safety for the public benefit. It brings together academics, practitioners and parliamentarians to share experience and discuss best practice, and to analyse emerging developments in the transport safety field.

In recent years, new technologies, legislative measures and operational developments have led to a rapid pace of change within road traffic enforcement. This study offers both an overview of new and emerging technologies and a contribution to debates about the future direction of roads policing.

The report calls on politicians, criminologists, civil servants, police and transport safety professionals to reassess the value and role of roads policing. Along with education and engineering, road traffic enforcement can play a major part in reducing unnecessary death and injury on our roads. Roads policing also contributes to reducing other types of crime and anti-social behaviour. In order to succeed, however, it needs to be given resources and support.

Recommendations in this report focus on more effective use of existing resources in order to reduce road casualties further. Among the findings is the central role of information in supporting enforcement technologies. If the intelligence and data are not right at the outset, the rest of the enforcement process will be flawed.

The findings of this report have already contributed to legislative improvements. Early stages of the research highlighted the need for new police powers to combat unlicensed driving, better police access to insurance information and powers for evidential roadside breath testing. Following interventions in the House of Commons by David Heath MP and in the House of Lords by Viscount Simon and Baroness Anelay of St Johns, all of these measures were included in the Serious Organised Crime and Police Act 2005.

I hope the recommendations and conclusions of this report will be considered with an equal receptiveness. In this way, efforts towards improving road traffic enforcement and reducing road risk can continue on the basis of evidence and research.

Barry Sheerman MP
Chair of Directors
Parliamentary Advisory Council for Transport Safety
September 2005

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I would like to thank members of the project Advisory Panel for their guidance and assistance: Prof. Richard Allsop (UCL), Keith Bailey (ACPO), Prof. Oliver Carsten (University of Leeds), Dr. Claire Corbett (Brunel University), John Plowman (PACTS Director, formerly DfT), Gerry Rose (University of Cambridge) and David Smith (PACTS Associate, formerly DVLA). In addition to the advisory panel I am also grateful to the others who attended the PACTS seminar to discuss the provisional recommendations of the research: Elliot Griffiths (Magistrates' Association); Sgt. Alan Jones (ACPO/North Wales Police); Alan Jones (Police Federation of England & Wales); Chief Supt. Gwyn Jones (ACPO/North Wales Police); Chris Lines (Transport for London); Kate McMahon (Road Safety Strategy Division, DfT); Michael Ruff (Home Office); Barry Webb (Jill Dando Institute of Crime Science); and David Williams (GEM Motoring Assist). I am also grateful to members of PACTS Road User Behaviour Working Party for their comments.

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Jonathan Gaventa
Policy and Campaigns Officer

Notes

The Parliamentary Advisory Council for Transport Safety (PACTS) is an associate Parliamentary group and registered charity advising and informing Members of Parliament on road, rail and air safety issues. It brings together technical expertise from the public, private, academic and professional sectors to promote research-based solutions to transport safety problems. Its charitable objective is to protect human life through the promotion of transport safety for the public benefit. Further information about PACTS, including details of becoming a member, can be found at www.pacts.org.uk.

The contents of this report are an expression of the views of PACTS alone and do not necessarily represent the views of the other organisations and individuals who have contributed to this study.

Executive Summary

Road traffic enforcement is an essential tool for preventing unnecessary road death and injury and deterring illegal and dangerous driving behaviour. In recent years, new methods and technologies have transformed the enforcement process. This research project aims to give an independent analysis of the changing role of the police service in the context of rapid and accelerating technological change and emerging operational developments. It provides a focus on roads policing, and seeks to identify where emphasis should be placed to maximise casualty reduction.

Roads policing is at a critical juncture. On one hand, there has been a long-term marginalisation of roads policing within the police as a whole. As policing changes to match changes within society and reconfigures its methods, priorities, discourses and strategies, roads policing has lost the prominence and position that it previously held. There are fewer dedicated roads policing officers; a smaller proportion of resources being dedicated towards roads policing; less priority at both national and local levels and a progressive shedding of roads policing tasks to other groups and agencies. On the other hand, there are also signs of a belated recognition of the essential role that roads policing plays in reducing road casualties, and of the ways in which road crime overlaps with other forms of criminality. Policing - and roads policing in particular - are adopting new approaches aimed at the more effective management of risk and better use of intelligence. Roads policing has also been transformed through the use of new tools and technologies that radically reconfigure the capabilities of individual police officers.

The collective implications of these changes have been far-reaching. This report posits that new enforcement technologies have assisted and accelerated movements in roads policing towards the policing and management of risk. This implies a move away from a focus on deviance and enforcing the law for its own sake. Instead, there is a move towards an 'intelligence-led' approach based upon developing knowledge and intelligence about risk, and applying interventions to minimise its impact. This intertwines with related trends including the increased importance of information management and communication in policing, the 'diffusion' of enforcement to include other agencies, the expansion of surveillance and the development of preventative and situational means of securing compliance with the law.

Within all of these developments technologies have played a key enabling role. They contribute to road safety and risk management through fulfilling a number of functions, including managing information, detecting illegal or dangerous driving behaviours, establishing impairment, and altering the in-car environment to increase compliance with road traffic law.

First, technologies help to manage information and transform information into intelligence. Computerised records of driver and vehicle licensing and insurance enable the creation of a system of entitlement to drive. Through recording information about drivers and vehicles, databases both allow other forms of automated enforcement to take place and enable police to target enforcement towards offenders that operate outside this system and present a particularly high level of risk. Research indicates that minor traffic offenders are both more likely to commit serious traffic offences and to be involved in other types of criminality. By focusing enforcement on these offenders, these technologies help to enable an intelligence-led approach to roads policing. Automatic Number-Plate Recognition (ANPR) is a particularly significant example of this strategy and is viewed by many to be among the most important new policing technologies. ANPR intercept teams have achieved significantly higher arrest rates than other types of police. They may also contribute to road safety by providing a visible police presence and enabling offences to be detected through observation as well as automated methods. Information management technologies are also used to collect and

analyse collision data in order to better understand patterns of road risk and to enable police resources to be better targeted.

Second, surveillance technologies enable a concentration on specific driving behaviours linked to risk, such as speeding and red-light running. This allows enforcement to be focused on these violations, but more importantly it enables the creation of an effective deterrent against these specific risky behaviours by making drivers aware that their behaviour is being monitored. Speed cameras are among the most prominent and significant of these new technologies and have been extraordinarily successful at reducing speed and casualties at camera sites. Red light cameras have also been successful in reducing red light violations. Some surveillance technologies including closed circuit television (CCTV) have enabled increased civil enforcement of traffic offences (e.g. box junction violations) by non-police bodies such as Local Authorities. Other surveillance technologies such as 'video cars' contribute to supporting mainstream roads policing. In future, camera technologies may also be able to detect and enforce a wider range of offences including seatbelt violations and close following.

Third, technologies contribute to evaluating aptitude to drive at a particular point in time – i.e. assessing impairment. They may focus on a particular cause of impairment, such as alcohol, drugs or fatigue, or they may assess impairment more generally through addressing aspects such as response times. These technologies make impairment laws more effective through quantifying and measuring levels of impairment. With alcohol this is well-established – alcohol levels are taken as a direct indicator of level of impairment, based upon research developed over a number of years. With drugs and fatigue, this relationship is less-well known, and so technologies may be less precise or less effective on their own – observational techniques and medical procedures are also currently used to determine impairment. Although breathalysers are well-established, there have been considerable improvements to the technology, and current barriers to effective use of alcohol testing may be legislative rather than technological. New techniques and technologies also assist in detecting impairment from drug use, although there remain difficulties in using these technologies in roads policing. In the longer term, technological developments may transform the way that drug, alcohol and impairment testing is approached. In each of these cases, impairment technologies work through a risk-management approach: they single out categories of drivers most likely to cause crashes – those who are impaired through alcohol, drugs or fatigue – and enable enforcement resources to be targeted accordingly.

Finally, technologies play a major role in changing the environment to limit risk and control opportunities for offending. Methods of ensuring compliance with road laws go far beyond police enforcement to include modification of the vehicle and road environment to prevent dangerous or illegal driving behaviour. Enforcement through this sort of technology does not depend on intervention by the criminal justice system and may therefore help make some roads policing tasks 'redundant'. Existing technologies for self-enforcement include 'self-enforcing roads', traffic calming, 'psychological traffic calming' and seatbelt reminders, among others. Future technologies may include Alcolocks, Intelligent Speed Adaptation (ISA), and in-car fatigue and impairment detection devices. These technologies have potential not only to significantly reduce casualties but also to alter the focus and scope of roads policing in the UK.

While new enforcement methods and technologies have contributed to major road safety gains, there remains considerable scope for making better use of new technologies and for improving the effectiveness of roads policing. This report has identified a number of areas where improvements could be achieved. It is essential to ensure that roads policing is

adequately resourced and supported at a national level, and a better understanding of the role of roads policing in road casualty reduction is needed. Driver and vehicle databases underpin road traffic enforcement, and steps towards improving access to and accuracy of existing sources of data need to be made. Surveillance technologies could become more effective through a reassessment of the guidelines that govern their use. Similarly, legislation prevents extensive use of impairment testing, and revision to breath testing rules as well as support for new and emerging impairment detection technologies would be welcome. Active support for the development of new in-vehicle compliance technologies is also needed. In all of these cases, these technologies will need to be supported with an enabling legislative framework including innovative funding mechanisms to assist their deployment. A strategic approach with a clear focus on road casualty reduction will be necessary.

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Acronyms

ABS: Anti-lock Braking Systems
ACPO: Association of Chief Police Officers
ANPR: Automatic Number-Plate Recognition
BCU: Basic Command Unit
CCTV: Closed-circuit television
CORTE: Confederation of Organisations in Road Transport Enforcement
CSO: Community Support Officer
DCA: Department for Constitutional Affairs
DfT: Department for Transport
DETR: Department of the Environment, Transport and the Regions
DSA: Driving Standards Agency
DVLA: Driver and Vehicle Licensing Agency
EC: European Commission
EDR: Event Data Recorder
ETSC: European Transport Safety Council
EVI: Electronic Vehicle Identification
EVSC: External Vehicle Speed Control
FIT: Field Impairment Test
GPS: Global Positioning System
GIS: Geographical Information System
HMIC: Her Majesty's Inspectorate of Constabulary
HOSDB: Home Office Scientific Development Branch (previously PSDB)
HSE: Health and Safety Executive
IMPACT: Information Management, Prioritisation, Analysis, Co-ordination and Tasking
ISA: Intelligent Speed Adaptation
JDI: Jill Dando Institute of Crime Science
KSI: Killed or Seriously Injured
MIB: Motor Insurance Bureau
NAO: National Audit Office
NCIS: National Criminal Intelligence Service
NHTSA: National Highway Traffic Safety Administration (USA)
NIM: National Intelligence Model
ODPM: Office of the Deputy Prime Minister
OECD: Organisation for Economic Co-operation and Development
PACTS: Parliamentary Advisory Council for Transport Safety
PITO: Police Information Technology Organisation
PNC: Police National Computer
PPAF: Police Performance Assessment Framework
PSDB: Police Scientific Development Branch (now HOSDB)
PSU: Police Standards Unit
RoSPA: Royal Society for the Prevention of Accidents
STATS19: Police collision recording form
TfL: Transport for London
TRL: Transport Research Laboratory
VED: Vehicle Excise Duty
VOSA: Vehicle and Operator Services Agency

Chapter 1

Introduction

Overview

The form, shape, methods, discourse and technologies of road traffic enforcement have undergone significant and rapid change in recent years. These shifts – ranging from increasingly automated enforcement to new police powers to the transfer of certain policing tasks to other bodies – have important implications for road safety and how road users engage with road laws. In formulating policy and legislation relating to policing and road safety, it will be essential to take these developments into account.

This research project aims to give an independent analysis of the changing role of the police service in the context of rapid and accelerating technological change and emerging operational developments. It provides a focus on road policing, and seeks to identify where emphasis should be placed to maximise casualty reduction.

The report gives an overview of some of the new and emerging technologies in use in road traffic enforcement. Given the rapid pace of technological development, the research focuses less on the technical specifications and details of the technology (which are continually subject to change) and more on its relationship to policing strategies to reduce road casualties. The significance of enforcement technologies goes far beyond individual pieces of kit: of equal importance are the strategic, practical, legislative and political contexts in which technologies operate. This report therefore provides both a snapshot of current usage of enforcement technology and a contribution to ongoing debates about the future direction of roads policing.

Research context

In 1999 PACTS published the report 'Road Traffic Law and Enforcement: a driving force for casualty reduction'. This report was a comprehensive review of the powers available at that time to traffic police and the use of such powers in road traffic law enforcement, following the Government's 'North Review' in 1988 (DoT/Home Office 1988). In the last six years, the powers and technologies available to police officers conducting road traffic policing have developed significantly. This study will build on the earlier PACTS report and identify the changes that have taken place in road traffic policing. It will examine the role of traffic police officers in the context of quickly developing technology.

There have been many changes in the last few years, of both technological and operational aspects. Operational changes include, among other measures, the publication of the National Intelligence Model (NIM) in 2000; the introduction of civil enforcement for a number of moving traffic offences in the Traffic Management Act 2004; Crime and Disorder Partnerships established in 1998 and other efforts to involve the community in policing; new designations of enforcement personnel including Community Support Officers (CSOs) and Highways Agency Traffic Officers; the establishment of safety camera partnerships and cost recovery for ANPR enforcement; the European Commission (EC) Recommendation on Enforcement in the Field of Road Safety in 2003; and the publication in 2005 of a joint roads policing strategy by the Association of Chief Police Officers (ACPO), Department for Transport (DfT) and the Home Office. These developments have occurred in the overall context of a long-term decline in numbers of traffic police.

Technological changes include, among others, improved connections between databases; the use of ANPR; more advanced speed and red-light cameras; and closed-circuit television (CCTV) used for traffic enforcement. Technology still at development stage includes roadside impairment testing devices and roadside drug screening; close-following detection; and seatbelt detection. Technologies within vehicles are also progressing rapidly, with seatbelt reminders, Event Data Recorders (EDRs), Alcolocks and - in future – Intelligent Speed Adaptation all contributing to encouraging compliance with road traffic law.

Methodology

This research is based on two main sources. First, a comprehensive literature review was conducted. This incorporated academic and criminological work on policing and the role of technologies; policy documents; road safety research; technical evaluations of technologies; and relevant statistical data.

Second, a series of semi-structured interviews with roads police and other key stakeholders was conducted. This included interviews with representatives of police at all levels, local authority enforcement teams, magistrates and justice clerks. Direct quotations from the interviews are included in text boxes throughout this report.

This was supplemented by guidance from a project Advisory Panel made up of transport safety academics and criminologists, former civil servants and police representatives. A seminar to discuss provisional recommendations from the report was convened, and included representatives of ACPO, the Home Office, the Police Federation, DfT, the Jill Dando Institute of Crime Science (JDI), the Magistrates' Association, Transport for London (TfL) and GEM Motoring Assist as well as members of the Advisory Panel.

More informal discussions with road user groups, campaigners, manufacturers and others also contributed to the research.

The research process was an iterative one: themes identified from the literature review were addressed in the interviews; and issues arising in the interviews led to further literature searches.

Project interviewees

- Chief Superintendent Derek Barnett, Roads Policing Business Area Manager, Police Superintendents' Association of England and Wales, and Head of HQ Uniform Operations, Cheshire Police
- PC Dave Carter, ANPR team, Dorset Police
- Elliot Griffiths, Chairman, Road Traffic Committee, The Magistrates' Association
- Superintendent Ian Hamill, Head, Road Policing Development Branch, Police Service of Northern Ireland
- Commander Alfred Hitchcock, Specialist Crime Directorate, Metropolitan Police
- Alan Jones, Joint Central Committee, Police Federation of England and Wales
- Jim Lewis, Engineering Manager, Traffic Enforcement Camera Operations, Traffic, Policing and Enforcement Directorate, Transport for London
- PC Annie Mitchener, Road Crime Intelligence Officer, Dorset Police and National Co-ordinator, Operation Mermaid and National Roads Policing Intelligence Forum
- Tony Seculer, Chairman, Road Traffic Committee, Justices' Clerks' Society
- PC Ian Smallwood, ANPR Intercept Team, Warwickshire Police
- Sgt. Andrew Smith, ANPR Intercept Team, Warwickshire Police
- Superintendent Nick Wilkinson, Command, Road Policing Department, Sussex Police

Structure

Chapter 2: Roads policing and road safety analyses the role that road traffic enforcement plays within road safety, discusses the position of roads policing within policing in general and provides a general overview of the contribution of new technologies to roads policing. Research reviews have found a considerable body of evidence indicating links between enforcement, compliance with road traffic law and road casualty reduction. This evidence needs to be supplemented with a better understanding of the diverse range of tasks in which traffic police engage. Despite the links between enforcement and road safety, in recent years roads policing has been under-resourced and under-prioritised at both local and national levels, with roads policing losing out to ever-increasing demand for resources in other policing sectors. An increasing recognition of the crossover between road traffic offending and other types of crime, however, may help to reverse this trend. Technologies may also assist the effectiveness of roads policing. However, technologies cannot be seen as a replacement for roads police, and they need to be supported by investment in equipment and training in order to be of most use. Recommendations in this chapter are aimed at achieving a better understanding of the role of roads policing in road safety and ensuring that it is adequately resourced and supported at a national level.

Chapter 3: Concepts in road traffic enforcement also looks at the context in which new technologies are introduced, but focuses on more qualitative and conceptual shifts in roads policing strategies. The central argument of this chapter is that new enforcement technologies have assisted and accelerated movements in roads policing towards the policing and management of risk. This implies a move towards an 'intelligence-led' approach based upon developing knowledge and intelligence about risk, and applying interventions to minimise its impact. New technologies play a key role here, not only in organising and managing this intelligence but also in creating mechanisms for it to be used most effectively. These trends also tie in to related movements based upon widening engagement to incorporate local communities and other agencies into the enforcement process.

Chapter 4: Information and technology addresses technologies related to the management and use of information. These include databases that underpin the driver and vehicle licensing system and enable other forms of automated enforcement to take place; technologies such as ANPR that use these databases to identify drivers and vehicles that do not comply with this system; and new methods of collecting and analysing collision data to enable police resources to be better targeted. ANPR – thought by many police to be among the most significant new enforcement technologies – is discussed in detail as a case study. Recommendations in this section focus on improving access to and accuracy of existing sources of data.

Chapter 5: Surveillance and technology notes that camera-based surveillance technologies are an increasingly dominant feature of policing, enforcement and the urban experience. In roads policing this takes various forms including speed and red light cameras, CCTV for enforcement of certain moving traffic offences and for traffic management, and possible future use of cameras to detect other offences such as close following or driving without a seatbelt. As they have been particularly visible and controversial, speed cameras are discussed in detail as a case study. All of these technologies operate through the mechanism of deterrence and by encouraging drivers to monitor their own behaviour. Recommendations in this chapter focus on improving the guidelines governing use of surveillance technologies to allow cameras to be used more effectively.

Chapter 6: New impairment technologies focuses on technologies that assess driver impairment due to drink, drugs or fatigue. While database technologies authenticate authorisation to drive and camera technologies detect and prosecute against particular driving actions that contravene traffic laws, new impairment technologies focus on a much more subtle aspect: assessing aptitude to drive at a particular point in time. The breathalyser is a well established impairment detection technology, and is discussed in detail as a case study due to technological advancements and the context of falling breath test numbers and rising death and injury rates from drink driving. The implications of future technologies such as a generalised impairment measurement device based on reaction times rather than substances in the bloodstream are also considered. Recommendations in this chapter suggest both more extensive use of existing technologies and methods - and use of new and emerging technologies.

Chapter 7: In-vehicle compliance technologies looks beyond enforcement technologies to preventative and situational means of securing compliance. Methods of enforcement include shaping the external environment and the in-car environment as well as the act of apprehending offenders. In the longer term, in-vehicle compliance technologies may remove the need for many roads policing tasks, and were viewed by several interviewees as the future of road traffic enforcement. Intelligent Speed Adaptation (ISA) in particular has considerable potential to change the nature of speed enforcement. Other technologies in this area include seatbelt reminders, Event Data Recorders and Alcolocks. Recommendations in this chapter focus on supporting the development of new in-vehicle technologies and creating the framework for them to work most effectively.

Chapter 8: Conclusions summarises some of the key themes running throughout the research. New technologies play a key role in making roads policing increasingly intelligence-led and oriented towards managing road risk. In order to be most effective, these technologies will need to be supported with an enabling legislative framework including innovative funding mechanisms to assist their deployment. Public and community support for these changes will also be essential. New technologies should not be seen as 'anti-motorist'. Rather than inconveniencing drivers, the technologies discussed here can make enforcement more efficient and effective and can help target enforcement towards those who cause the most risk.

Chapter 2

Roads Policing and Road Safety

Introduction

Roads policing is at a crossroads. On one hand, there has been a long-term marginalisation of roads policing within the police service as a whole. As policing changes to match changes within society and reconfigures its methods, priorities, discourses and strategies, roads policing has lost the prominence and position that it previously held. There are fewer dedicated roads policing officers; a smaller proportion of resources being dedicated towards roads policing; less priority at both national and local levels; and a progressive shedding of roads policing tasks to other groups and agencies. On the other hand, there are also signs of a belated recognition of the essential role that roads policing plays in reducing road casualties, and of the ways in which road crime overlaps with other forms of criminality. Policing - and roads policing in particular - are adopting new approaches aimed at more effective management of risk and better use of intelligence. Roads policing has also been transformed through the use of new tools and technologies that radically reconfigure the capabilities of individual police officers. This chapter will assess the role that enforcement plays within road safety, discuss the changing position that roads policing holds within policing in general, and detail the context of the contribution of new technologies to roads policing.

Roads Policing and Road Safety

Roads policing is an integral element of road safety

Roads policing is an integral element of efforts to reduce road casualties. In 2003, there were 3,508 fatalities and 37,215 serious injuries on UK roads (DfT/National Statistics 2004a). The vast majority of these casualties are preventable. Research indicates that up to 95% of road collisions are attributable to human error (Sabey and Taylor 1980). A considerable element of this human error involves illegal or irresponsible driving behaviour. For example, nearly a third of fatal collisions involve excessive or inappropriate speed as a contributory factor (DfT/National Statistics 2004a: 36); around 16% of fatal collisions involve a driver over the legal blood alcohol limit (ibid: 25); and over 8% of car occupant KSIs could be prevented through better seatbelt wearing rates by drivers (DETR 1997: 47).

Road traffic enforcement concentrates on combating and preventing illegal or irresponsible driving behaviour and therefore has a major potential to reduce these types of casualties. The European Commission has estimated that cutting back on speeding, drink driving and seatbelt violations could prevent 10,000 road deaths per year in Europe (European Commission 2003: 2-3); and the European Transport Safety Council (ETSC) estimates that more effective police enforcement could prevent up to 50% of injury collisions in Europe (ETSC 1999: 7).

The human and financial cost of these casualties is immense. The Department for Transport estimates that the total economic value of preventing road casualties in the UK would be £18 billion per year (DfT 2004b: 27). This indicates that taking action to reduce casualties can be extremely cost-effective. A recent report for the European Commission estimated that the cost-benefit ratio of increased enforcement measures (over 15 years) is 1:5.3 across the EU for speeding (1:4.1 for the UK); 1:6.9 in the EU for drink driving (including 1:9.4 in the UK); and 1:10.2 for seatbelt use (including 1:3.6 in the UK) (ICF 2003: 21-33).

Roads policing is one element within a broader approach to road casualty reduction, and is traditionally conceptualised as one of the 'three Es' in the road safety triumvirate of 'engineering, education and enforcement' (evaluation, engagement and encouragement are also occasionally incorporated into this categorisation). This schematic approach is useful in illustrating the key role that road traffic enforcement plays within road safety. However, as discussed further below, roads policing also reinforces other aspects of the 'three Es': enforcement both reinforces education messages and ensures compliance with engineering measures.

This combined approach recognising the importance of road traffic enforcement is incorporated within *Tomorrow's Roads: Safer for Everyone – The Government's Road Safety Strategy* (DETR 2000). The strategy sets out ambitious targets for 2010: a 40% reduction in the number of KSIs; a 50% reduction in child KSIs; and a 10% reduction in the slight injury rate. A further 'Public Service Agreement' target was added in 2002: to tackle the higher incidence of road casualties in disadvantaged communities. Enforcement is envisaged as playing a key part in this:

> Enforcing the law is an essential part of reducing road casualties, and the police have a central role in improving road safety. (DETR 2000: 75).

Increased and improved enforcement is expected to deliver a substantial part of the reduction in casualties needed to meet the targets. A Transport Research Laboratory (TRL) analysis estimated that measures for speed reduction would contribute a 5% reduction in KSIs; measures for controlling drink driving would contribute a 1.2% reduction in KSIs; and additional measures for improved driver behaviour would contribute a further 1% reduction in KSIs (Broughton et al. 2000: 21).

The role of roads policing in reducing road casualties is also recognised by the Home Office:

> Roads policing is an important and valuable part of day-to-day policing. It is vital to help reduce the level of deaths and injuries on the roads and ensure the free flow of traffic. It is also concerned with the enforcement of criminal law. One of the Home Office's principal aims is to reduce crime and the fear of crime – roads policing seeks to reduce crime that involves the dangerous and anti-social misuse of vehicles, and provides a reassuring police presence.
> (Home Office 2004c: 44)

However, this stated recognition has not been matched by a sufficient prioritisation of roads policing within the National Policing Plan or other Home Office documents. As will be discussed below, both political support for and resources invested in roads policing have been lacking.

Recommendation 1: Dft and the Home Office should fully recognise the contribution that road policing makes to road safety and ensure roads policing is oriented towards casualty reduction.

Enforcement is also a key element of European efforts to prevent road casualties. The EC has set a target of reducing road deaths by 50% (a reduction of 20,000) by 2010, and has estimated that more effective enforcement could contribute half of this reduction. To help achieve this, in 2003 the Commission published a 'recommendation on enforcement in the field of road safety', which proposed that member states establish a national enforcement plan to outline programmes of enforcement of speeding, drink driving and seatbelts; regularly report to the Commission with details of enforcement actions; and implement automated speed enforcement systems, random breath testing and regular intensive enforcement action on seatbelts[1] (EC 2003).

The UK is currently a European leader in road safety. There are 62 road fatalities per million population per year in the UK compared to a European average of 103; only Sweden and Malta perform better (EC 2005). It sets an example that other European countries may often attempt to follow. Given this position, UK promotion of the recommendation would therefore encourage action throughout the EU. As noted in the recommendation, following the recommendation would also be likely to have positive implications for casualty reduction in the UK (EC 2003: 7).

However, despite this position of leadership, UK compliance with the recommendation is as yet unclear. A recent Parliamentary Question on progress towards the recommendation was answered with reference to meetings with other European countries rather than action within the UK (Hansard 1 Dec 2004: Column 124W). Similarly, a joint ACPO/DfT/Home Office strategy on roads policing was published in January 2005 without reference to the recommendation.

Recommendation 2: Given its position as a European leader in road safety, the UK Government should promote the EC Recommendation on Enforcement in the Field of Road Safety and set a positive example for other European countries to follow. If take-up of the recommendation proves to be limited, the UK Government should press for an EC Directive on enforcement.

The importance of roads policing for road safety also appears to be acknowledged by the general public. According to the SARTRE3 study on social attitudes to road risk, around 75% of all drivers report being in favour of more enforcement, with over 35% being 'strongly in favour' (SARTRE3 2004: 157). This includes substantial support for new technologies: 78% support speed cameras, 68% support in-car speed limiters, 75% support black boxes for crash investigation and 70% support electronic vehicle identification (ibid: 61-7).

Interestingly, support for stronger enforcement is shared by drivers likely to be caught by that enforcement. A recent Home Office study on the prevalence of and attitudes towards drink driving

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1 The Commission Recommendation also states:

> Because of the potential serious consequences of the violations dealt with by the Recommendation, Member States should apply as a general policy that violations are followed-up with effective, proportionate and dissuasive sanctions and not, as is currently sometimes the case, for instance with respect to non-use of seat belts, with only a warning. (EC 2003: 10)

Police in the UK have expressed concern that this might remove the ability of police officers to exercise discretion, which is regarded as an essential element of British policing. As a way of resolving this issue, the UK Government should seek a partial derogation to this clause and instead establish non-binding guidance on sanctions.

found that 86% of drivers supported random breath testing as a means of making detection of drink drivers more likely – including 70% of drivers who admitted to driving over the limit. Similarly, 62% were in favour of a lower drink drive limit, including 45% of 'over the limit' drivers (Brasnett 2004: 4).

Road traffic enforcement contributes to casualty reduction

There is a considerable body of research linking enforcement and casualty rates. A recent study review of 66 studies on enforcement for the London Road Safety Unit concluded that 'the majority of studies in the literature have found that increased levels of traffic policing have reduced road accidents and traffic violations' (Elliott and Broughton 2004: 23).

Research on enforcement and casualty reduction establishes three points. First, violations of traffic laws are connected to greater incidence of collisions. A recent summary of European research concluded that 'traffic violation history is associated with increased likelihood of getting involved in serious accidents' (Mäkinen et al. 2003: 38). Stradling notes that deliberate violators are both more likely to have been crash-involved in the past and to be crash-involved again in the future, and characterises persistent violators as 'crash magnets' (Stradling 1997: 5). Similarly, specific violations such as speeding are associated with a higher risk of collision (Taylor et al. 2000: 14).

Second, enforcement increases compliance with traffic law. This is particularly apparent in relation to speed enforcement: for example, Holland and Conner (1996) found a 56% to 64% reduction in the proportion of drivers breaking the speed limit on a 40mph urban UK road during an enforcement campaign; in the Netherlands De Waard and Rooijers (1994) found that when every sixth speeding offender is stopped, mean speeds fell by between 2.7 and 5.2 km/h (cited in Elliott and Broughton 2004: 33, 36). As will be discussed in chapter 5, automated enforcement is also effective in promoting compliance with speed limits.

Third, enforcement activity leads to a reduction in casualties. For example, meta-analyses by Elvik et al. (1997) cited by Zaidel (2002: 4-5) found that stationary speed enforcement (involving a physical police presence) can cut fatal accidents by 14% and drink drive enforcement can reduce fatal accidents by 9%.

However, despite the well-established links between enforcement and safety, the exact relationship between specific policing inputs and casualty reduction outputs is less direct than one might expect. As Elliott and Broughton conclude, 'it is difficult in practice to establish the relationship between levels of policing and violation, accident or casualty rates' (2004: 23). This is due in part to the limited information on levels of policing given by much of the literature and to the diverse range of methods that police employ. It is not therefore possible to match a specific level of policing input with an expected output or to establish a direct link between roads policing numbers and level of offending or casualties. Indeed, the long term fall in road casualties coupled with the long-term fall in roads police numbers have led some police to question the efficacy of policing in reducing casualties.

> In the mid-60s, there were half the amount of vehicles on the road, 13 million vehicle compared to about 26 or 27 million now. But there were nine and a half thousand people being killed, whereas now there's three and a half thousand people killed. Then, police enforcement was far greater and traffic divisions made up fifteen to twenty percent of the police establishment, but seemed to have no effect on reducing casualties. Because so much else has come into play.

Roads policing may also play a more generalised role in casualty reduction and in compliance with traffic law that is not detected in these studies, as much of the research concentrates on relatively minor increases or decreases in enforcement levels that are limited in time and space. It does not tell us what would happen in the complete absence of enforcement. Mäkinen et al. (2003: 44), however, give two examples of traffic enforcement ceasing temporarily. In 1979, Finnish police went on strike and halted all traffic enforcement activity for two weeks; during that time, mean vehicle speeds in urban areas increased by 2-3 kilometres per hour. Similarly, in 1980, traffic police in Nashville (USA) intensified enforcement for two months but subsequently went on a short term 'slow-down' strike. However, in this period, there were no recorded changes in the number of collisions. Both of these examples are short-term, however, and may not reflect the influence of sustained enforcement on drivers' attitudes, values and dispositions.

Recent evidence from France, however, appears to indicate that – if given appropriate political priority – increased enforcement can make a major contribution to reducing road casualties on a national scale. A new enforcement strategy was adopted in France in December 2002 with a specific focus on road safety and a concentration on speed, alcohol and seat belts. Between 2002 and 2003, the number of prosecutions involving penalty points for traffic offences increased by 40%. In the same period, road deaths dropped by 20.9% and the total number of injury collisions fell by 14.5%. The percentage of drivers exceeding the speed limit by more than 10km/h fell from 34% in 2002 to 26% in 2003, and seat

belt use by front seat occupants rose from 91% to 95%. This progress may not have been achieved by enforcement alone as the enforcement effort was supported by changes in legislation and an increase in publicity. However, a recent study indicated that 45% of French drivers cite a change in driving behaviour due to 'fear of punishment' and 37% cite a 'better awareness of the risk' (ETSC 2004: 3-4).

Much of the research on the effects of enforcement on driver behaviour and casualties comes from abroad: UK-based evidence is limited. The Department for Transport is currently commissioning a database that will allow it to monitor roads policing inputs and connect those to collision and casualty data. This is a welcome development, and should for the first time provide information linking police inputs and outputs. However, on its own it will be unable to distinguish the contribution of different methods and approaches to roads policing. As will be discussed in the next chapter, there have been major changes in approaches to policing in recent years, including a greater emphasis on intelligence and a shift in orientation towards the management of risk. More research on the effectiveness of particular types and methods of roads policing in the UK context – as well as the effectiveness of enforcement in general - would be welcome.

Recommendation 3: The Department for Transport and the Home Office should conduct research into methods of roads policing and their relationship to casualty reduction, including optimum levels of policing.

Roads policing is 'an eclectic assemblage of activities'

Part of the challenge of assessing effectiveness of roads policing and judging its contribution towards casualty reduction comes from the diversity of police tasks. A simplified 'engineering, education, enforcement' schemata that envisages police solely as enforcers of traffic law would mask the more disparate roles that roads policing plays in reducing casualties and – more fundamentally – creating the conditions for the safe movement of traffic. Road traffic enforcement is considerably wider than detecting and prosecuting violations of traffic law. As Acroyd et al. argue, 'police work is an eclectic assemblage of activities' (1992: 103). The range and nature of these activities need to be understood in order to fully comprehend the role of roads policing within road safety and the functions that new technologies will address.

ACPO's 'Modern Road Policing: A Manifesto for the Future' identified four priority tasks of roads police: enforcing the law, promoting road safety, investigating incidents and patrolling the roads (ACPO 2003: 1). A review of 'Roads Policing and Road Safety' by the Royal Society for the Prevention of Accidents (RoSPA) identified that roads policing:

- Deters illegal, dangerous and careless behaviour on the road;
- Detects illegal, dangerous and careless behaviour on the road;
- Identifies offenders;
- Identifies the causes of crashes;
- Changes the attitudes of road users;
- Educates road users;
- Prevents other forms of crime; and
- Identifies and removes dangerous vehicles. (RoSPA 2004: 2-3)

Similarly, Southgate and Mirrlees-Black found that roads police saw their own priorities as accident prevention, enforcement of traffic law and driver education (1991: 13-4).

In addition to these key priorities roads police fulfil a range of other functions within road safety. Newburn theorises an expanded role of the police – from a 'police force' to a 'police service', in which policing goes beyond enforcement of the law to a wider community role (2003c: 100). Roads policing is an important part of this extension, and forms a key arena for contact between police and the public (Southgate and Mirrlees-Black 1991; DoT/Home Office 1988). The educative role, including communicating information about risk, is a crucial one, as for many people an encounter with roads police or receipt of a fixed penalty notice will be one of their few dealings with the criminal justice system. This communicative role and engagement with local communities will be discussed further in chapter 3.

> We need more policemen out there stopping people, explaining what they're doing wrong, not necessarily giving them a ticket. It isn't just enforcement; it needs to be education as well.

Roads police also play a central role in providing data and information about risk to other agencies and road safety stakeholders. Ericson and Haggerty (1997) label police as 'risk communicators' and argue

that a central police role is collecting raw data for use in statistics by a whole range of other actors, including insurance industry, researchers, local authorities, government and others. This can often be a reciprocal process: data are collected by police, analysed by local authorities or central government, and returned to police in a more detailed format. Some of the technologies related to this information-gathering role of police will be discussed in chapter 4.

The range of roles of roads policing is reflected by the range of activities that roads police undertake. A study of traffic police activity and organisation found that traffic police officers spend about 26% of their time on traffic incidents, 5% on traffic-related checks, 25% on preventative patrol, 7% on individual crime incidents, 4% on other incidents and 33% on other support activities (Ogilvie-Smith et al. 1994: 2).

Enforcement is one of many factors determining compliance

These different functions of roads police reflect the fact that there is a large range of factors influencing driver compliance with traffic laws.

The primary mechanism of instilling compliance through enforcement is deterrence: 'surveillance or perceived surveillance by the police prevents road users from committing violations and infringements by instilling a fear of being caught and otherwise punished' (Mäkinen et al. 2003: 28). Deterrence can be 'general', whereby the overall perception of the risk of detection is increased, or 'specific', whereby individuals who have been caught are deterred from re-offending.

However, deterrence operates in the context of a much broader range of factors. A Scottish research study found:

> The influences on drivers' compliance with traffic law are many and complex. The deterrent effect of enforcement depends on the type of driving offence and the public's attitude toward the severity of that offence' (System Three 1997: 4).

Specific factors influencing offending included:

- Awareness of the law relating to driving
- If caught, the likelihood of being penalised and the type of penalty
- The degree of social stigma attached to the offence
- The risk of personal injury attached to the offence
- The risk of injury to others
- Gains in time/convenience
- Enjoyment or any pleasure derived from offending behaviour
- The likelihood of damage to the driver's own, or another's, vehicle or property
- Other, non-judicial financial costs e.g. higher insurance premiums associated with offending or accidents resulting from the offence
- The likelihood of gaining peer approval either through offending or being caught. (ibid: 2)

Similarly, in an evaluation of a drink driving enforcement campaign Riley (1991) found that cultural awareness of the campaign and the increase in social stigma were more important than fear of being caught by police. It should also be remembered that 'usually the majority of road users want to comply with the rules, not in order to avoid fines, but simply to behave as prescribed by law' (Mäkinen et al. 2003: 27).

These different factors influencing compliance lead to different motivations and types of offending. Parker theorises three different forms of human error in relation to driving: lapses, errors and violations.

> Errors embrace the categories of potentially dangerous mistakes and slips, while lapses are usually harmless but irritating. Violations differ from mistakes, slips and lapses in that they are committed intentionally and in the knowledge that one is engaging in potentially dangerous and often illegal behaviour. (Parker 1998: 2)

While much traffic offending clearly falls within the violation category, some contravention of traffic law may be better categorised as errors or lapses. Road traffic enforcement has the potential to influence all three types of error, through detecting and deterring violations and educating drivers to become aware of and limit lapses and errors.

> Whatever we do we've got to be accurate, got to be up to date, got to be relevant. All of it focuses on and comes down to influencing driver behaviour. We know the studies which show there's still a small group of people where the only thing that will stop them is enforcement, as they won't take any notice of signage or any education or any training. So it's about identifying those people.

While roads policing is an integral element of road safety work and enforcement of traffic law is strongly linked to casualty reduction, the context in which roads policing operates is a complex one. Roads police fulfil a diverse range of tasks, and enforcement of traffic law forms only one of many determinants of driver behaviour. Assessments of the effectiveness of policing and of the role of technologies in assisting police will need to understand this point.

Roads policing within policing

Roads policing numbers have been in long-term decline

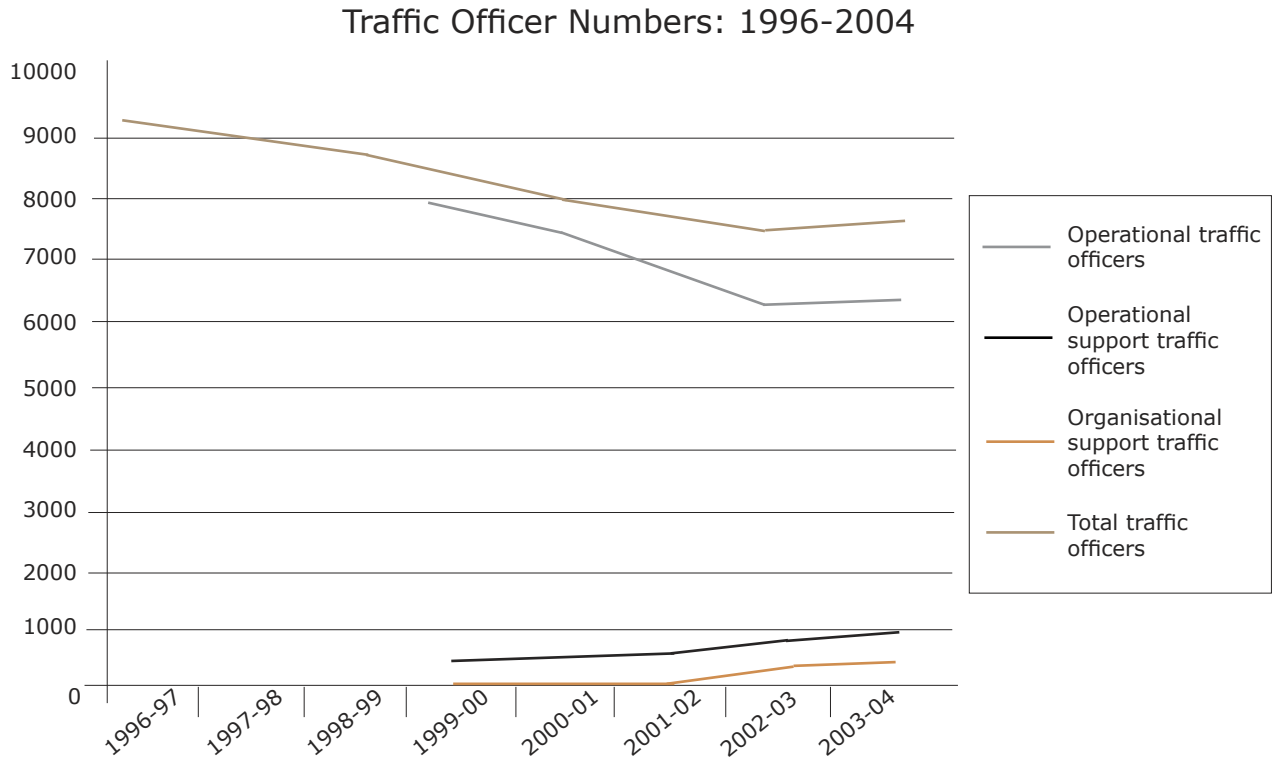
"Roads policing isn't considered as a high priority in any police force these days … but it's an expensive commodity because of vehicles and training".

"The demand on the police service is becoming ever greater. … So I think you'll find nationally there is in fact a general reduction – and a significant reduction, I might add – in respect of roads policing officers and police officers who are skilled in that particular role."

"Roads policing is such a small part of this force now. We're well under half of what we were when I first came onto traffic, and that's 17 years ago. But you can't tell me the cars have halved in the last 17 years."

While within roads policing units and the wider road safety community there is a strong recognition that road traffic enforcement can play a major role in preventing road casualties, this has not led to the prioritisation of roads policing as a police activity. A number of interviewees felt very strongly that roads policing has not been given appropriate resources or priority at a force or national level. In an article looking at the history of roads policing from its origins until the present day, Hitchcock (2003) goes as far as referring to 'the demise of roads policing' in recent years. This section considers the role that roads policing plays within policing more generally, and assesses the factors relating to its lack of priority.

Of particular concern has been the long-term decline in the overall number of roads police:



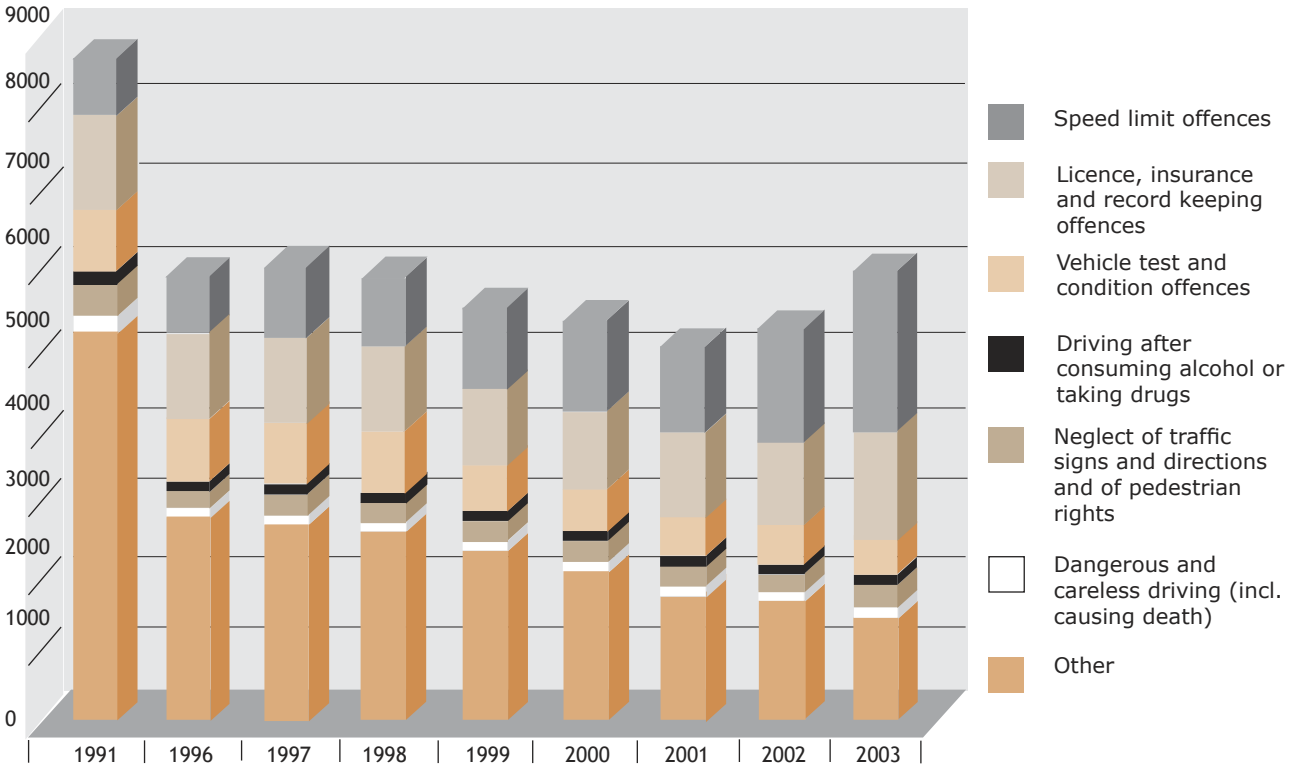
- Numbers of designated traffic officers fell from 15-20% of force strength in 1966 to 7% of force strength in 1998. (HMIC 1998: 10-12)
- Between 1996 and 2004, total traffic officer numbers fell by 17%
- Between 1999 and 2004, operational traffic officer numbers fell by 21%
- Support staff numbers for traffic policing have risen by 242% between 1999 and 2004. (Hansard 10 January 2005: Column 364W)

Similarly, a study of six forces by Southgate and Mirrlees-Black (1991: 116) found considerable reductions in both the total manpower of traffic departments and percentage of police strength between 1979 and 1989.

> The more we reduce roads policing skills, the more difficult it will be to bring them back.

Other indicators show a similar trend: the number of motoring offences dealt with by official police action – with the notable exception of speeding – declined considerably through the 1990s (see chart below). Between 1991 and 2001, the number of dangerous driving offences dealt with fell by 21%; careless driving offences fell by 29%; drink- and drug- drive offences fell by 19%; neglect of traffic signs and pedestrian rights offences fell by 31%; and licence, insurance and record keeping offences fell by 7%. The total number of motoring offences dealt with by official police action fell by 39% (Fiti et al. 2005: 22). This decline occurred despite a rise in motor traffic of 13% in the same period (DfT/National Statistics 2004b: 119).

Motoring offences dealt with by official police action



However, recently there have been some indications of a change in this trend. In the last year for which figures are available (2003/4), roads police numbers increased by nearly 200 to 7636 (Hansard 10 January 2005: Column 364W). Similarly, between 2001 and 2003 the number of motoring offences dealt with by police rose by 19%. This rise is not solely due to speed enforcement: dangerous driving offences dealt with rose by 19%; drink- and drug- drive offences rose by 10%; neglect of traffic signs and pedestrian rights offences rose by 24% and licence, insurance and record keeping offences rose by 19% (Fiti et al. 2005: 22).

While it is important not to attach too much importance to a single year's figure, combined with other signals such as the publication of a National Roads Policing Strategy this may indicate that continuing pressure on the Home Office and on individual police forces may have borne fruit.

Factors in this decline are many and complex

These figures provide a snapshot of a more complex situation involving a range of factors, from changing police structures to the changing role of the police itself. However, as will be argued below, the key factors that need to be addressed are the priority accorded to roads policing at local and national level and the targets and indicators used to assess roads policing.

> The numbers of traffic officers had already declined long before the speed cameras came in.

The reasons for the decline in numbers of roads police are many and complex. A focus on police numbers alone – and creating simple charts like the ones above - can be misleading, because it ignores the restructuring and renaming that has occurred within the police service. Increasingly, other designations of police also do traffic enforcement, even if they are not named as roads police. In UK policing,

> there is no specialist traffic or road policing force. All officers employed on traffic or road policing duties do so on a local basis as part of an overarching responsibility for policing any incident that they may encounter during the course of their duties. (Bailey 2004: 7)

Some police force areas operate centralised roads policing structures in which roads police are members of a separate traffic division. Others, however, operate decentralised structures in which roads police officers are attached to Basic Command Units (BCUs) and may be merged with other roles such as firearms units. A review of activity and organisation of traffic policing found no evidence of one method being more efficient than the other; however, in decentralised structures staff were more likely to be used for general policing activities (Ogilvie-Smith et al. 1994). Numbers related to dedicated roads police officers should therefore be treated with some caution.

Somewhat counter-intuitively, the success in reducing road casualties may also have contributed to reducing the number of roads police, as fewer collisions means that police spend less time investigating and clearing up incidents. Newburn (2003b: 2) argues that a rise in police comes in part as a result of a rise in crime; a fall in traffic police could also be interpreted as a reduction in accidents for investigation. Staffing issues such as tenure were also mentioned by interviewees as contributing towards the declining numbers.

A focus on police numbers alone may also miss crucial questions of effectiveness, efficiency and best use of resources. The last Her Majesty's Inspectorate of Constabulary (HMIC) thematic inspection of roads policing was conducted in 1998; a new inspection focusing on changes in roads policing and the demands of changing structures, methods and technologies would be welcome.

Recommendation 4: Her Majesty's Inspectorate of Constabulary should conduct a new thematic inspection of roads policing to provide better data on current levels and methods of roads policing. Areas of inquiry should include not only estimation of road policing numbers but also a 'skills audit' and assessment of compliance with the National Intelligence Model.

Other people are doing roads policing tasks

> Other people have a part to play. … I think the most important thing is being involved in partnership.

In parallel with changes within the police service that alter the way in which roads policing is organised, other changes in staffing and new legal developments have led to other types of police and other agencies becoming involved in the road traffic enforcement task. Elements of this 'diffusion of roads policing' involve increasing civilianisation, partnership working and decriminalisation of some traffic offences. These trends will be summarised briefly below and further discussed in the next chapter.

Civilianisation has been one of the key trends in policing in recent years. As a recent HMIC report noted:

> Over many years, police organisations in England and Wales have invested significantly in the process of civilianisation and modernisation. This has involved the replacement of police officers with police staff in specified roles and the introduction of new roles that are best suited to the skills and experience of non-sworn staff. (HMIC 2004b: 9)

This appears particularly clear in relation to roads policing: as noted above, support staff numbers in roads policing increased by 242% over five years.

> I'm not sure they've thought [civilianisation] through to its logical conclusion as to what will happen to the police officer.

The HMIC report also identified areas for possible further civilianisation within roads policing:

> Direct operational support for officers engaged in this area of policing is weak and a number of incidents and tasks are routinely dealt with by traffic officers that could be undertaken by

> appropriately trained and empowered assistants. … A road policing assistant could be deployed to deal with or assist at serious road traffic accidents. They could operate speed detection and similar devices, stop vehicles, identify and deal with minor traffic offences, and potentially administer roadside breath test procedures and detain and escort to a nearby police station or await the arrival of an officer. (HMIC 2004b: 167)

As noted in this quote, operation of new technologies (such as speed detection devices and breathalysers) is envisaged as a key function for civilian staff. The emergence of new technologies (including 'back of house' intelligence and information management systems as well as new enforcement technologies) can be seen as an enabling factor for civilianisation.

> The rule of thumb that's used is that if the officer is not using his or her powers as an officer, then it is possible to civilianise it. And that is generally translated in the police service as if you're not arresting people, if you're not using those powers of arrest, then why do you need to be a police officer?
>
> You've got a lot of unsworn policing staff doing policing roles: … the people doing the loading and unloading of cameras, the people using the enforcement technology – they are not police officers; they are police staff. That has grown exponentially, and enforcement technology has allowed that.

A second, visible manifestation of civilianisation has been the advent of Community Support Officers (CSOs). As of November 2004, there were over 4,000 CSOs employed by Police, and numbers are increasing rapidly: the Home Office has set itself a target of delivering 24,000 CSOs by 2008 (Home Office 2004a: 8). Until recently, CSOs had limited powers to deal with traffic - with the exception of the ability to fine cyclists on the pavement – unless they were also accredited as traffic wardens. However, the Serious Organised Crime and Police Act 2005 contained provisions to give CSOs the power to direct traffic. This is to be welcomed, as long as CSOs are adequately trained and equipped to do so: in the event of a crash or other incident, it is important to direct traffic safely away from the hazard in order to prevent secondary incidents occurring. This need must be balanced, however, with the need to preserve evidence after road crashes, to appropriately determine their cause. This is a specialist skill, and the situation will need to be carefully monitored to ensure that CSO traffic direction does not interfere with evidence collection.

> We get our intelligence from the community. If you've got people engaged in the community, they're gathering intelligence. [Community Support Officers] are engaged at a very local level, being highly visible, working in the community, gathering that intelligence and information in, which will come in and form part of the wider picture for us. It's the way we're going, and it's the right way round.

CSOs also contribute to the ever-increasing range of enforcement and traffic management personnel that may be encountered on the road. Among the traffic direction and enforcement personnel that road users may expect to find are police officers, police traffic wardens, Local Authority traffic wardens and parking wardens, Highways Agency Traffic Officers, Community Support Officers, Special Constables, neighbourhood wardens and School Crossing Patrols. It is not clear that the respective roles and powers of all of these types of officer are clearly understood by the public. Assessments of the role of CSOs and police staff have also raised questions about communication and intelligence-sharing between civilian staff and sworn officers (Crawford et al. 2005; HMIC 2004b). A review of this situation with a view to creating better clarity would be welcome.

All of these forms of civilianisation create a tension: police staff can assist officers in their work and free up the time of police to concentrate on the most important tasks. However, there is a worry (including concern expressed by roads police themselves) that this will add to pressure to divert police away from road traffic enforcement, with negative consequences for road safety.

Recommendation 5: The Home Office should assess the role of Community Support Officers, Highways Agency Traffic Officers and police staff in relation to their contribution towards road traffic enforcement. The Home Office should seek to clarify different types of officer related to traffic.

Partnership working is another prominent manifestation of the diffusion of road traffic enforcement. It occurs in two strands. First, police work in partnership with other agencies and bodies to carry out enforcement activity. Safety camera partnerships are good examples of this, as are joint activities between police and the Vehicle and Operator Services Agency (VOSA) or between police and the Driver and Vehicle Licensing Agency (DVLA), for example operations related to dangerous loads or Vehicle Excise Duty (VED) enforcement. Secondly, police also form partnerships with local bodies to reduce the need for enforcement by managing risk in other ways. One example of this is police co-operation with Local Authorities to develop 'route' strategies. This involves identifying routes of particular risk, and

combining enforcement with road environmental modifications such as engineering improvements or vehicle activated signs. Police are also involved in advising Local Authorities on sites most suitable for engineering measures. This is another good example of the partnership approach and takes the role of police beyond enforcement alone.

A third important element of the 'diffusion of roads policing' is decriminalisation. As resources are increasingly focused away from roads policing or towards what are seen to be the most serious offences, a number of minor traffic offences are un- or under- enforced. Over a period of time, several of these offences have been 'decriminalised', and responsibility for enforcing them has transferred to Local Authorities. The timeline of decriminalisation includes parking (1991); moving traffic in London (2001); and moving traffic throughout the UK with extended offences (Traffic Management Act 2004). The range of offences subject to civil enforcement now includes parking, banned turns, box junction infringements, and bus and cycle lane violations, among others.

This trend creates a dilemma: decriminalisation leads to more enforcement of the decriminalised offence, yet the only offences that are decriminalised relate to traffic management rather than road safety. In the interviews for this project, there has been a general agreement that it is desirable to retain safety-critical offences in the remit of the police, but there has been no agreement on how to ensure that these offences are adequately enforced and not overshadowed by enforcement of more minor offences. Several interviewees felt that decriminalisation had been occurring in a rather 'piecemeal' fashion without giving appropriate consideration to these concerns. A wide-ranging review of decriminalisation with a view to determining which offences are most appropriate for civil enforcement would be desirable.

New technology has been instrumental in bringing about this trend towards decriminalisation by allowing CCTV operatives and automated enforcement systems to fulfil roles that were previously done by police officers. This creates a need to share intelligence and data between police and decriminalised enforcement bodies. These issues will be discussed further in chapter 5.

Recommendation 6: DfT, Home Office and the Department for Constitutional Affairs (DCA) should conduct a wide-ranging review of all traffic offences to evaluate the impact of civil enforcement. This review should lead to a strategy aimed at bringing consistency into decisions on which offences should be subject to civil enforcement.

Appropriate targets and political prioritisation of roads policing are crucial

Despite these changes in the structure of roads policing, two of the most important factors that have contributed to the decline in roads policing have been targets and political priorities – both local and national.

Most of the stakeholders interviewed in the course of this project felt that national-level support for roads policing is lacking. National policing objectives were first introduced in the 1990s; to date they have not yet included a specific traffic objective (HMIC 1998: 12). Since 2003, the Home Office has published annual rolling three-year National Policing Plans. In the National Policing Plan 2003-2006 and 2004-2007, roads policing was listed under 'other policing responsibilities' or 'other areas of police work', alongside themes such as football-related disorder and animal rights extremists. Only two paragraphs of each plan were devoted to roads policing, but both advise:

> Forces and authorities should include in their local policing plans targeted and intelligence led strategies for reducing deaths and injuries on the roads and achieving a safe environment for all road users. (Home Office 2002: 18)

In the 2005-2008 plan, however, the framework changed significantly. The plan did not list any 'other areas of police work'; instead, roads policing was listed as an example of the key priority to 'reduce people's concerns about crime, and anti-social behaviour and disorder':

> One example of a visible police response to citizens' concerns is roads policing. Irresponsible, unlawful and anti-social use of our roads affects people's lives, safety and sense of security. Effective policing of our roads seeks to ensure that legitimate road users and pedestrians, especially children and older people, are not killed, injured or intimidated by unlawful and anti-social behaviour. We must also ensure that criminals are denied the use of our roads. (Home Office 2004d: 20).

This presents a mixed picture. While roads policing work can now be seen as contributing to the key priorities in the National Policing Plan, roads policing has also been relegated to an 'example' rather than a separate area of work, and instructions to police forces to include roads policing in their local policing plans have been removed. Combined with other indications – such as the omission of roads policing from

key Home Office strategic documents such as the Policing: Building Safer Communities Together green paper – this suggests that roads policing is not seen as of key importance at a national level. Structural divisions within the Government may exacerbate this: the road casualty reduction target is ascribed to DfT, but roads police are within the remit of the Home Office who may concentrate on their own PSA targets instead.

> Funding is an issue – the National Policing Plan has very little elements to do with road safety in it.

National Policing Plans set out national priorities and 'provide the framework for local police planning' (Home Office 2003a). Local police priorities and budget allocations, however, are determined by individual chief constables and police authorities. The role of roads policing varies within local plans, and some forces give it a considerably higher priority than others. Consultation by Crime and Disorder Reduction Partnerships is an important determinant of this. Evidence suggests that when consulted on policing, communities will rank often road safety as a high priority – but only when traffic enforcement is included in the consultation. In the Crime and Disorder Act community safety audits, of the authority areas that included collision/casualty data within their audits, 65% then went on to develop strategies targeted on improving road safety. However, where such casualty data were not included, only 15% of the authority areas developed local road safety strategies (Manning 1999: 1). There also appear to be similar links between areas where road safety was raised during consultation and areas where road safety was included in local policing strategies.

> I don't like to be target-driven in the sense that we put all these targets in place, in the sense that it creates all sorts of added difficulties and pressure on people to actually achieve the target when you're trying to balance so many balls in the air. What I do think is through proper management and proper resources and proper training and everything else … you can deal with that.

Targets and assessment are also crucial factors in determining police priorities. The main performance indicators for policing are determined by the 'Police Performance Assessment Framework' (PPAF), which replaced the previous 'Best Value Performance Indicators. PPAF is a set of 13 headline policing indicators comprised of 36 component measures and grouped into six domains: citizen focus, reducing crime, investigating crime, promoting public safety, providing assistance and resource use. Police contribution to road safety is assessed through Statutory Performance Indicator 9a:

> Road traffic collisions resulting in death or serious personal injury per 100 million vehicle kilometres travelled. (PSU 2005: 16)

Statutory Performance Indicator 1 (User Satisfaction) also includes the satisfaction of victims of road traffic collisions.

PPAF was developed by the Home Office and Police Standards Unit as part of the police reform agenda to provide improvements in police performance. Police activity is also assessed by HMIC under the baseline assessment framework, which incorporates the PPAF 'domains'. This provides more detailed grading criteria for assessing police activity and informs HMIC's annual 'baseline assessment' of policing forces. In roads policing, the grading criteria include:

- A proactive chief officer lead for roads policing who promotes and supports good working relationships within the force and with appropriate agencies and departments.
- A well formulated roads policing strategy, which incorporates the agreed national strategic statement.
- Evidence of a performance regime and culture that demonstrably links with the five key areas of the national strategy.
- Evidence of effective partnership working, especially to reduce road casualties.
- Evidence that the ACPO Road Death Investigation Manual has been adopted.
- Evidence that the ACPO Policy on Police Pursuits is being fully complied with, in particular that each pursuit is dynamically risk assessed.
- An intelligence-led approach to roads policing using NIM.
- Effective systems to recruit and retain staff with the best skills and potential for roads policing, with a commitment to relevant training and development and a robust and meaningful performance appraisal system.
- Evidence that appropriate technology, and technical support and expertise is being exploited fully to support roads policing. (HMIC 2005: 1-2)

ACPO and individual police forces are also committed to the Government's road casualty reduction target of reducing KSIs by 40% and child KSIs by 50% by 2010. However, these targets and frameworks for the assessment of roads policing activity do not seem sufficient to prevent the marginalisation of roads policing. There are a few barriers. First, there appear to be minor discontinuities between the Police Performance Assessment Framework and HMIC's baseline assessment framework in terms of how roads

policing is categorised. In PPAF roads policing measures are included in Domain 3: promoting public safety; in HMIC's baseline assessment framework, it is listed under Domain 4: Providing assistance. While this is not a major issue, it does suggest a lack of clear direction about how roads policing should be approached.

> Albeit it's a Government target to reduce fatalities, serious injuries and injury road traffic collisions by 2010 and in Europe by 2012, no one has told us how we're expected to do it, and it doesn't work like that.

Similarly, police are working to slightly different measurements than other actors involved in road safety. Police performance is measured by the KSI rate per 100 million vehicle kilometres; while the Government PSA target and individual Local Authority targets relate to total numbers of KSIs. Local Authorities may also sometimes use the indicator of KSIs per 100,000 population. It is also not clear who has responsibility for measuring traffic by police force area nor how robust these data are likely to be. In Local Authority traffic data, the sample of traffic measurements may be small, especially for minor roads, leading the DfT to warn:

> The sampling errors for individual authorities can be large. This limits the value of the estimates for comparing the levels of traffic across different authorities. (DfT 2005b: 1)

There have been no indications of how these barriers will be overcome to provide reliable measurement at force level.

> The police can only be part players for this. It's not totally our responsibility to drive down casualties or reduce casualties, but we've got a part to play, and it's about how we engage in doing those issues.

A more important difficulty, however, is that the road casualty reduction indicator is one out of many targets and measurements to which the police must have reference, and police lack ownership of the target. The actions of Local Authorities, vehicle manufacturers and road users themselves are as important to casualty reduction as the actions of the police. As road casualty reduction targets are (correctly) not seen as the sole domain of the police service, the targets may not be fully internalised. Especially in the context of limited national-level support for roads policing and competing demands from other areas, chief constables and police authorities may be reluctant to invest resources in roads policing when the casualty reduction target is being met by other means.

A further and more fundamental issue concerns the value and significance attached to roads policing and road crime. Hitchcock reports that within the police service roads policing is often seen as 'peripheral' (2003: 43). As Corbett (2003: 25) argues, this may in part be due to the fact that traffic offences - even those leading to serious risk - are not seen as 'real' crime. The concept of 'car crime' is limited to theft of and from vehicles and does not tend to include crime committed using vehicles. An example of this is the 'Crime and Policing' section of the Home Office website: in the list of 'crime types', vehicle crime (meaning theft) is mentioned along with other issues such football-related disorder and youth crime; road crime and road traffic offending are absent. These perceptions of road traffic offences as being separate from and of lesser importance than other types of crime may be deep-rooted and difficult to overcome. However, as discussed below, the connections between road traffic offending and other types of crime have recently begun to gain greater prominence, and may begin to change these perspectives.

Given these difficulties and barriers, it is necessary to consider not only what priority should be given to roads policing, but also whether other indicators that show roads policing inputs and effectiveness can be developed.

The key indicator of the number of killed or seriously injured road casualties remains the best measurement of the overall output of roads policing and other road safety measures; it lacks, however, indication of the overall contribution of roads policing towards this output or measures of specific police inputs and activities. The European Commission 'Recommendation on enforcement in the field of road safety' proposes that each member state produce a national enforcement plan including information on a range of roads policing activity, including level of speed enforcement, breath tests, seatbelt checks and other actions (EC 2003: 14). As well as showing important national-level information, these data could also be used to provide comparisons of roads policing inputs activity between police forces. However, as noted by the ACPO/DfT/Home Office Roads Policing Strategy, 'information on police activity… reflects resource input as opposed to success in challenging the problem' (2005: 6).

More detailed measures of the outcome of police activity are also necessary to show the effectiveness of police work. As suggested in the Roads Policing Strategy,

> Indicators of outcome … could for example include:
>
> - the proportion of breath tests following collisions which show positive, providing an indicator of the prevalence of drink driving, which can be monitored over time;

> - data from speeding monitoring devices such as those at safety camera sites, which provide an indicator of the prevalence of speeding;
> - data on levels of observed compliance with seat belt use;
> - and local opinion polling to monitor how safe and secure people feel on the roads. (ACPO/DfT/Home Office 2005: 6)

While this information may be too detailed to include as separate measurements within the Police Performance Assessment Framework, it would nevertheless be useful both to advise police forces on what roads policing indicators they should monitor and to collate the data centrally to provide a detailed national overview of roads policing activities and their contribution towards road safety.

Recommendation 7: The Home Office should reaffirm the importance of roads policing in future National Policing Plans and include the Roads Policing Strategy as an appendix.

Recommendation 8: As noted in the ACPO/DfT/Home Office Roads Policing Strategy, more detailed indicators both of roads policing activity and of outcomes need to be developed. These could be used at a local level to assess local priorities and to inform Police Authorities, police consultative committees and Crime and Disorder Partnerships. The Home Office should collate this information and publish an annual report of roads policing indicators.

A resurgence of roads policing?

Despite the long-term decline in the numbers of traffic officers and the failure to prioritise roads policing, there has recently been a renewed interest in roads policing due to an increasing recognition of the links between road traffic offences and other types of criminality. For example, the joint ACPO/DfT/Home Office Roads Policing Strategy, published in January 2005, recognises the importance of roads policing not only in reducing road casualties but also in combating crime and anti-social behaviour:

> Research shows significant links between involvement in other criminal activity such as theft and burglary and the commission of motoring offences. This is reflected in police experience that active road policing contributes to wider policing, including the detection and arrest of criminal suspects. … Criminals use roads to carry out a great deal of their activity - ranging from burglary and theft to drug dealing and terrorism. Proactive road policing can deny criminals the unchallenged use of the roads, and is an effective measure for containing and deterring crime.
> (ACPO/DfT/Home Office 2005: 4)

This theme of 'denying criminals the use of the road' is particularly prominent in relation to ANPR technology and will be discussed in further detail in chapter 4.

The links between road traffic offences and other criminality are increasingly well established. There are several key points raised in the research. First, drivers engaging in minor criminality are also more likely to have links with major criminality. The seminal study in this area is Chenery et al.'s Huddersfield-based research on illegal parking in disabled parking bays, which identified the phenomenon of 'offender self-selection', in which criminals breaking one set of laws or conventions will not feel bound by another. The study found:

- One in five of those illegally parked in a disabled space would occasion immediate police interest, contrasted with 2% of legally parked cars.
- One in three keepers of cars illegally parked in a disabled space have a criminal record, contrasted with 2% of legally parked cars.
- Half of those vehicles illegally parked in a disabled space had a history of traffic violations, contrasted with 11% of legally parked cars.
- One in five of those vehicles illegally parked in a disabled space were known or suspected to have been previously used in crime. None of the legally parked cars were.
- One in ten of those vehicles illegally parked in a disabled space were currently in an illegal condition, compared to 1% of the legally parked cars. (Chenery et al. 1999: 3)

Second, serious traffic offenders are more likely to have a criminal background. As Rose found in research on The Criminal Histories of Serious Traffic Offenders:

> Many offenders committing serious traffic offences may be involved in mainstream crime. Therefore offenders could be deterred and prevented from committing mainstream crime through

> the enforcement of serious traffic offences. (Rose 2000: 73)

Third, a significant proportion of traffic offences are committed by drivers who have also committed non-motoring offences. Research by TRL found that between 1995 and 1999, one quarter of all motoring offences were committed by drivers who also committed non-motoring offences during this period. Around one quarter of all drink drive offences, over half of all dangerous driving offences and three quarters of driving while disqualified offences were committed by motorists who also committed non-motoring offences (Broughton 2003: 21).

Fourth, there is a growing recognition that traffic offending can itself be a form of anti-social behaviour that contributes to a climate of lawlessness and fear. For example, recent Home Office research on community concern about anti-social behaviour found that speeding traffic was the most commonly mentioned problem (Wood 2004: 11). As recognised in the ACPO/DfT/Home Office Roads Policing Strategy:

> The roads are part of our public space. Unlawful and unruly behaviour on the roads and in vehicles needs to be challenged and lawful standards need to be asserted, as they are on the streets and in other public places. … Effective policing of the roads is therefore an important and visible element in the police's commitment to protect the public, maintain safe communities, maintain and strengthen civil society, and support law-abiding citizens' confidence that the law is being upheld. (2005: 5)

This recognises the street as an important public space and a key element of the public realm. Anti-social use of the roads undermines this space and may lead to a wider sense of lawlessness that encourages other crime. This follows the 'broken windows' theory, popularised by Kelling and Coles (1996), which suggested that a failure to deal with low level criminality (such as vandalism) leads to further low-level crime and anti-social behaviour and to more serious crime due to an erosion of public space. As Bayley argues:

> A nation's roads are a crucial part of public space; they are probably the public space shared by the largest proportion of the population. .... If a key ingredient of crime prevention is demonstrating that a moral order exists that people should pay attention to, then it might be short-sighted to exclude the behaviour of people on streets and roads. ... Traffic regulation sends messages about order, lawfulness, and civility, sensitising people to the presence of rules that serve the community. ….(Traffic offences) may have the same effect on criminal risk taking, the fear of crime, and the public's sense of well-being as graffiti, broken windows, raucous music, and rude teenagers. (Bayley 1994 quoted in Aeron-Thomas 2003: 16)

This gradual recognition of the links between road traffic offences and other types of criminality begins to challenge the conception that road crime is not real crime and can contribute to a raised profile for roads policing. The recognition that criminals use the roads in the course of their criminality also contributes to an understanding that roads policing is not a distraction from other types of policing.

The contribution of new technologies

New technologies extend the capacity of roads policing

A crucial underlying determinant in all of the above discussion is the role that new technologies have played in assisting the effectiveness of roads policing and shaping its direction. As Chan argued, 'technology has always shaped policing – in both visible and invisible ways' (2003: 655).

Technology has always been integral to shaping the form and nature of roads policing. The invention of the breathalyser created the conditions for widespread enforcement of drink driving through enabling a standardised measure of impairment to be introduced. Similarly, the radar enabled speed limits to be enforced on both a more widespread and rigorous basis than was previously possible. Police radios and databases have been crucial for underpinning the driver licensing and vehicle registration system. These technologies have played an essential role in enabling road traffic enforcement to take place, and have led to immeasurable safety gains.

The rate of technological change within policing in general and specifically within roads policing has been rapid. Just as existing technologies have been fundamental to establishing the current nature of roads policing, new technologies are likely to play a major role in supporting day to day roads police work, in detecting and deterring road traffic offences, and in continuing the reduction in road casualties.

There is considerable potential for new technologies such as radio links or access to databases to assist the effectiveness and efficiency of everyday roads policing work. As Rose found,

> Our study of incidents confirmed that traffic officers are crucially reliant on access (via local

> controllers) to PNC and DVLA records and local databases for checks on both drivers and vehicles. Improvements to the technological tools used by traffic officers could enhance their roles significantly. (Rose 2000: 72)

Through this improvement, and through use of technologies such as ANPR and safety cameras, roads police become better equipped to enforce traffic law and to deter future offending. Southgate and Mirrlees-Black view use of technology as 'a response to increasing levels of traffic':

> If part, at least, of the response to increasing amounts of traffic is to be a higher level of traffic policing activity then ways must be found to provide the resources needed, but there are choices to be made between using human or technological resources. … If existing enforcement methods alone fail to deter many bad drivers – as seems to be the case – then the use of technology to detect offences and locate offenders may be the answer, quite apart from any manpower considerations. (1991: 106)

As a result of the deterrence mechanism, new enforcement technologies have considerable potential for major gains in casualty reduction. A recent Organisation for Economic Co-operation and Development (OECD) report on new technologies (including enforcement technologies) and road safety concluded that: 'It is estimated that safety technologies could reduce fatalities and injuries by 40% across the OECD, saving over USD 270 billion per year' (OECD 2003: 7). Assessments of individual technologies confirm the significant potential for casualty reductions: speed cameras have been found to reduce KSIs at camera sites by 40% (Gains et al. 2004: 6); red light cameras have been shown to reduce collision at treated junctions by up to 30% (Aeron-Thomas and Hess 2005). The casualty reduction potential of specific new technologies will be discussed in more detail in later chapters.

In all of these roles, new technologies are introduced on the basis of expectations of improved effectiveness and efficiency and extended capacity in policing:

> 'Technologies extend the physical capacity of police officers to see, hear, recognise, record, remember, match, verify, analyse and communicate' (Chan 2003: 655).

Similarly, the Police Science and Technology Strategy 2004-2009 views police technology as 'intended to accelerate the improvement of police capabilities', ranging from gathering and managing intelligence to conducting surveillance and exchanging data (Home Office 2004b: 8). Roads policing 'capabilities' to be improved through technologies include 'Prevent the use of the road by criminals'; 'To stop/detain offenders safely'; 'To effectively investigate collisions/accidents'; 'Ensure drivers are fit to drive'; 'Ensure drivers are qualified to drive'; and 'To improve road safety' (ibid 31-5).

It is important not to overstate the case. While extended capabilities are expected from new technologies, the pace of change can be slow and the operation of technology can be different from the expectation. Newburn warns:

> It is perhaps best not to overestimate the speed at which such change will take place. The extent to which technology has had an impact on public policing thus far is an indication of this. Computer technology has had a radical impact on our social, cultural and economic existence. And yet it is not clear that it has had a particularly dramatic impact on the police. … The bulk of day-to-day policing is not that dramatically different now from twenty years ago. (2003d: 717).

For roads policing in particular, this latter view was not widely held among the stakeholders interviewed for this project. While some aspects of police work remain similar and some types of new technologies merely assist roads police in functions that they already undertake, there was a general consensus that new technologies have significantly altered the form, methods and activities of roads policing.

However, attention will need to be given not only to the formal roles and uses of new technologies but also to how they operate in practice, including any unintended consequences. As Acroyd et al. noted in their study of the role of new technologies in policing:

> Any effort to comprehend the impact and role of IT in police organisations has to take account of the day-to-day working activities of operational police officers. (1992: 103)

The operation of technologies in practice, including barriers to effectiveness and unintended consequences will be a key consideration in later chapters in this report.

Technologies assist police but cannot replace them

In particular, concern has been expressed that new technologies should not be used to replace roads police. Opinion varied, however, about the extent to which this is already occurring. It was widely felt that the skills of roads police - including discretion, educative role and ability to respond to bad driving offences not detectable through automated enforcement – cannot be replicated by technologies.

> "There's a danger of technology superseding the human element of roads policing. Technology tends not to use discretion like police officers do."
>
> "Technology cannot replace policing, and we need to be very clear on that. Technology can assist policing; it cannot replace it. … Technology should always complement the work that we're going. We should use technology to its maximum to assist us in our aims and objectives, and if we can do that we've achieved something."

The ACPO/DfT/Home Office Roads Policing Strategy also recognises the important role that new technologies play – not in replacing enforcement, but in strengthening it:

> Technology cannot wholly replace the police: an adequate police presence on the road is also vital. For example, safety camera technology is successfully reducing speeding, collisions, deaths and casualties at the 5,000 or so fixed and mobile camera sites in Great Britain. … But physical police presence is needed to deal with speeding elsewhere on the road network, including the motorways, - and there are other significant problems which camera and other technology cannot yet detect, including drink and drug driving, careless and dangerous driving, and failure to use safety belts. (ACPO/DfT/Home Office 2005: 5)

It is crucial, therefore, to ensure that technologies complement the work of roads police rather than undermine them. This should be made explicit when new technologies are introduced.

Recommendation 9: The Home Office should incorporate a specific section on roads policing in future Police Science and Technology Strategies and develop guidance to ensure that new road traffic enforcement technologies assist rather than replace operational roads police.

Technology demands commitment of resources

In order to be deployed and used effectively, new technologies demand commitment of resources. Road traffic enforcement technologies can be expensive, both in terms of equipment and in terms of training. Operation of the increasing array of new technologies available to roads police – especially technology involving information management or new types of equipment – also requires new sets of skills that have not always been associated with roads policing. Among the interviewees for this project, opinion was divided about whether sufficient training to enable best use of new technologies is currently available. Most, however, recognised the new demands placed on the training regime by new technologies. Planning for staffing and training implications will need to be an integral element in the introduction of new road traffic enforcement technologies.

Recommendation 10: Skills for Justice should regularly evaluate the demand for new skills resulting from operational and technological developments in roads policing as part of its annual Police Sector Skills Foresight Report.

> I have to say that it frustrates me that I know I have technology there and at the minute I'm fighting to find funding for that technology. … We're trying to get the funding, and it's a fight, and yet that funding will save people's lives, and we need to do something about it.

Funding for roads policing technology ordinarily comes from the mainstream budget of local police forces. As discussed above, competing pressures and other priorities in local police budgets can severely restrict the resources allocated to roads policing and can form a barrier to the introduction of new technologies. In certain cases, national-level funding is made available to support the introduction of new technologies. The new AIRWAVE police radio system is a good example of this. This funding stream is somewhat rare, but consideration should be given to whether more national-level funding should be made available to support new technologies that may make policing more efficient in the long run. As discussed in chapter 4, mobile data entry terminals may be one such technology.

Innovative funding mechanisms have also been developed to support the roll-out of particularly promising technologies. In the case of both safety cameras and automatic number-plate recognition, hypothecation of fixed penalty fine revenue has been used to fund the operation and expansion of the technology. In both cases, hypothecation has proved to be an effective method of quickly rolling out new technologies, and both technologies have proven to be successful[2].

2 See Chapter 4 for further discussion of ANPR and chapter 5 for further discussion of safety cameras.

The 'netting-off' scheme for hypothecating safety camera revenue was established by the Vehicle (Crimes) Act 2001, after a pilot scheme involving eight police force areas. Under the scheme, revenue from fines from speeding and red light violations detected by camera is returned to Safety Camera Partnerships to cover the cost of enforcement and the roll-out of new cameras. Any excess funding is retained by the Treasury.

The hypothecation scheme used to fund ANPR – piloted in Project Laser in 23 police forces and extended nationally in the Serious Organised Crime and Police Act 2005 - follows a similar concept, but with two important differences. First, fine revenue is hypothecated directly back to police forces rather than going to an intermediate organisation such as a safety camera partnership. Second, the range of offences subject to hypothecation is considerably broader and includes offences (such as seatbelt violations and mobile phone use) that cannot be detected through use of the technology.

While both cases have been successful in promoting use of the technologies, they both produce a somewhat contradictory situation in which roads police enforcing the same offences through more traditional means cannot recover the cost of enforcement. An ANPR team who issue a fine after observing a seatbelt violation will be able to recover the fixed penalty revenue; a traditional roads policing officer observing the same offence will not have that option. Similarly, Safety Camera Partnerships can recover the enforcement cost for speeding offences detected by camera; there is no similar mechanism for speeding offences detected through police patrol.

Given this apparent contradiction, and given the pressures on roads policing resources outlined earlier in this chapter, consideration should be given to applying the hypothecation mechanism more widely.

Recommendation 11: The Home Office and ACPO should evaluate the case for extending the ANPR cost-recovery scheme to other roads police officers that enforce the same offences.

Chapter conclusions

Roads policing – including both traditional methods and automated enforcement – can make a major contribution to road safety and road casualty reduction. Research shows a strong connection between road traffic offending and road crashes; enforcement has been shown both to improve compliance with road traffic law and to reduce road casualty rates. The factors influencing driver behaviour are many and complex, and roads policing contributes to road safety in a number of ways, including both general and specific deterrence, education and partnership working with other actors.

Despite acknowledgement of the links between roads policing and road safety, there has been significant concern that road traffic enforcement has been considerably under-resourced and under-prioritised in recent years. A range of factors – from restructuring to civilianisation – has contributed to a reduction in the number of operational road police officers. More fundamentally, however, roads policing seems to have been lacking political support at a national level.

With a recent recognition of the links between road traffic offending and other types of crime, this situation may be changing. Recent figures show a recent rise in both roads policing numbers and in motoring offences dealt with by police action.

New technologies such as ANPR play a key role in blurring the divide between roads policing and mainstream policing. As will be discussed in more detail in later chapters, they also have major potential for contributing to reducing road casualties and assisting roads police in their work. However, technologies will not be enough on their own: to be effective they will need to be introduced in conjunction with a political commitment to road traffic enforcement and casualty reduction at both local and national levels.

Chapter 3

Concepts in Road Traffic Enforcement

Introduction

New technologies are not developed in isolation: they both influence and are shaped by wider trends. The last chapter examined the contribution of roads policing and new technologies to road safety and the changing role of roads policing within policing in general. This chapter explores the wider context in which new enforcement technologies are introduced and focuses on more qualitative and conceptual shifts in roads policing strategies.

The central thesis in this chapter is that new enforcement technologies have assisted and accelerated movements in roads policing towards the policing and management of risk. This implies a move away from a focus on deviance and enforcing the law for its own sake. Instead, there is a move towards an 'intelligence-led' approach based upon developing knowledge and intelligence about risk, and applying interventions to minimise its impact. This intertwines with related trends including the increased importance of information management and communication in policing, the 'diffusion' of enforcement to include other agencies, the expansion of surveillance and the development of preventative and situational means of securing compliance with the law. Within all of these developments technologies have played a key enabling role. However, these trends are not exclusive to roads policing but reflect and contribute to wider movements in the criminal justice system and within society as a whole.

Collectively, there is considerable potential for improving road safety through these trends in that roads policing adopts a safety management approach. Yet these changes are far from total, and – as noted in chapter 2 - appear to be occurring in the context of an overall reduction in the level of roads policing. A key element of later chapters in this report will therefore be to look at how roads policing operates in practice, how enforcement can become more effective in reducing road casualties, and how best use can be made of new technologies.

Roads policing and policing of risk

Sociologists and political and cultural theorists have identified over the last 20 years the emergence of a 'risk society' in which 'calculating and managing risks … has become one of our main preoccupations' (Beck 1998: 12). Ulrich Beck's seminal work in this area identifies a central problem in the new 'paradigm of risk society':

> How can the risks and hazards systematically produced as part of modernisation be prevented, minimized, dramatised, or channelled? (Beck 1992: 19)

Policing – both in its wider meaning of enforcing norms of acceptable behaviour and in its narrower sense of the operation of the police - is a key element of this process of risk minimisation. Adams (1995: 4) points towards a growing 'formal sector' of risk management, involving professionals and experts across the government, commerce and industry, with an objective to reduce risk. Through enforcement and prevention of proscribed activities that could lead to danger to others, policing is undoubtedly an integral part of this formal sector of risk management.

Several recent studies of policing, however, go beyond this, and identify a shift in orientation within policing and the criminal justice system as a whole to take account of the growing prominence of risk management. They posit a shift from the notion of enforcement as a concentration on deviance and individual offenders to an approach based on the policing, management and control of identifiable risks. Most work in this area has so far focused on other areas of criminal justice such as criminal law or community policing rather than on roads policing. However, this analysis applies particularly strongly to roads policing, especially given the identifiable links between traffic offending and road risk.

Feeley and Simon (1994) identify a movement towards 'actuarial justice' within criminal law. To illustrate this, they distinguish between 'Old' and 'New' penology:

> The Old Penology is rooted in a concern for individuals, and preoccupied with such concepts as guilt, responsibility and obligation, as well as diagnosis, intervention and treatment of the individual offender. It views committing a crime a deviant or anti-social act which is deserving of a response, and one of its central aims is to ascertain the nature of the responsibility of the accused and hold the guilty accountable. (Feeley and Simon 1994: 173)

Within roads policing, the 'Old Penology' approach could be reflected by a focus on specific contraventions and prosecuting individual offenders. This approach, they argue, has given way to an approach far more occupied with the management of risk:

> In contrast the New Penology has a radically different orientation. It is actuarial. It is concerned with techniques for identifying, classifying and managing groups assorted by levels of dangerousness. It takes crime for granted. … Thus its aim is not to intervene in individuals' lives for the purpose of ascertaining responsibility, making the guilty pay for their crime or charging them. Rather, it seeks to regulate groups as part of a strategy of managing danger. (ibid)

The assertion that 'it takes crime for granted' seems, at first, counterintuitive. Fighting crime is, of course, a central task of the police. However, rather than crime being an exception to the rule, under this new approach it is assumed as the norm, and strategies are sought to manage and control crime rather than to eliminate it. This is apparent from the National Intelligence Model:

> The law enforcement business is about the successful *management* and *reduction* of law enforcement problems. It involves *identifying* and *limiting* the activities of volume criminals and dangerous offenders, *controlling* disorder and tackling the many problems that adversely affect *community safety* and the quality of life. The specific outcomes required are improved *community safety*, *reduced* crime rates and the *control* of criminality and disorder (NCIS 2000: 11; emphasis added).

Similarly, within roads policing, goals often include reducing drink driving, managing speed and controlling and limiting the impact of other risky behaviours, rather than pursuing those engaged in such behaviours in order to hold the guilty to account for breaking the law. In more practical terms, this approach recognises that road traffic law violation is an extraordinarily widespread phenomenon, and therefore concentration is given to how resources can be channelled to mitigate and manage the impact of violations.

> I think that there has been a mental shift in the police service around enforcing the law for the sake of enforcing the law. I think traffic officers do now recognise that actually, the law isn't there for the sake of just being there, there is an end goal here, which is reducing risk and reducing death and injury.

Ericson and Haggerty apply a similar analysis in an extended study of policing in Canada, and explicitly relate the risk paradigm to technology:

> As society becomes more fragmented the focus of police work has shifted from traditional modes of crime control and order maintenance towards the provision of security through surveillance technologies designed to identify, predict and manage risks. (1997: xi)

A number of theorists see this risk-based approach as an element of what Foucault termed 'Governmentality' (Foucault 1991), in that it is a form of social organisation that governs behaviour without primarily relying on coercion. It is a form of power in that it effects compliance without direct and continual intervention (see Foucault 1977). This operates in a number of ways. Johnson argues that the risk-based approach

> has expanded the scope of governmentality beyond mere actuarial technique so that it now includes a wide variety of risk-based technologies: strategies of environmental modification (designing out crime); methods for identifying high-risk individuals and groups (offender profiling, geographical information systems); and policies for reducing criminal opportunity through temporal and spatial manipulation (situational crime prevention). (1997: 190)

All of these 'technologies' or strategies are evident within road safety. Strategies of environmental modification and situational crime prevention include changes to the road environment and road engineering measures to reduce road risk and make offending more difficult. Road safety research and use of intelligence-led processes to identify local problems categorise high-risk individuals and groups, which may be classified on the grounds of road user type, age or history of offending. As Feeley and Simon note, recidivism becomes an indicator of dangerousness and risk (1994: 179).

> The traditional route of financial penalty upon financial penalty upon financial penalty needs to be changed. … The essence of sentencing policy should be preventing future offending.

The 'new penology' that Feeley and Simon discuss in the judicial field is also evident within prosecution and punishment of road traffic offences. An increasing range of penalties for road traffic offences are aimed less at punishing the offender for breaches of the law and more at minimising the risk that the offender will pose in future. Police have been offering 'driver improvement schemes' as an alternative to prosecution for some careless driving offences for several years. More recently, some police forces have begun to offer 'speed awareness courses' as an alternative to penalty points for low-end speeding offences (typically for drivers just above the ACPO threshold for enforcement). Courts currently have powers to offer 'drink drive rehabilitation courses' to drink drive offenders in exchange for a reduced disqualification. Similarly, the 'High Risk Offender Scheme' enables courts to require high-end drink drivers – drivers caught at two and a half times the limit or above – to submit to medical examination to demonstrate that they no longer have a drink problem. The Road Safety Bill 2005 will introduce driver improvement schemes as a court option for drivers at risk of disqualification, and also introduces use of alcohol ignition interlocks as a court option for drink drivers; this will be discussed further in

chapter 7. In all of these cases, the criminal justice system becomes focused not on punishing violators for their transgression of the law but rather rehabilitating offenders and seeking to control their risk of reoffending.

In terms of enforcement, in roads policing strategies of risk management aim to control risk through identifying and isolating discrete groups or populations (e.g. minor traffic offenders, young male drivers), behaviours (e.g. speeding or bus lane infringement) and spaces (casualty and offending 'hot spots'), and developing interventions accordingly. Within this approach, effort is necessarily directed towards groups/areas/behaviours that are easily identifiable or measurable, as the intervention can be targeted and the effect in some way quantifiable. As the North report recognised:

> Police attention tends to be directed to the offences involving quantification, not because they are necessarily the most serious, but because they are more amenable to enforcement tactics. (DoT/Home Office 1988: 10)

The use of policing targets and numerical indicators is an extension of this, as targets are necessarily measurable. In road safety, reducing road risk – in terms of killed or seriously injured casualties - is itself the target or central indicator. However, within policing as a whole, managing road risk forms one out of a large number of targets and aims. It is important to note that risk management is not always based on a dispassionate calculation of risk in terms of reducing casualties; instead risks are ascribed with different values, which may involve perceptions of community concern and relative importance as well as probability and severity. As noted in the previous chapter, this may lead to the prioritisation within policing of non-lethal crimes such as vehicle theft above road safety, without deviating from a risk-management approach. In short, interpretations of risk may vary.

It should be noted that the distribution of risk is uneven. While an element of road risk will be experienced by all road users, some classes of road users and sectors of society are disproportionately exposed to risk. Pedestrians, cyclists, children and the elderly are particularly vulnerable. Road risk is also an indicator of social inequality, with children living in the most deprived areas three times more likely to be pedestrian casualties than their counterparts in better-off areas (Grayling et al. 2002: 6). The Department for Transport has set a Public Service Agreement target of addressing the significantly higher number of road accident casualties that occur in disadvantaged areas. Police enforcement strategies can also contribute to redressing this inequality, but the extent to which this is occurring is unclear.

What are the implications of this 'actuarial' or risk-based approach for roads policing? First, knowledge and communication become of key importance, due to the need to quantify risk and to identify groups, locations or behaviours for intervention. In this context, recent drives towards 'intelligence-led policing' can be interpreted as a knowledge management system. Elements of the community policing agenda are also tied up in this, in that they are concerned with community knowledge as a form of intelligence about where and why people feel that they are at risk. Increasing surveillance – both by camera-based technologies and through information management - can also be seen as part of this strategy of controlling risk through managing intelligence, but surveillance is often also an environmental strategy in its own right.

Secondly, enforcement becomes one element of a broader system of risk management on the roads, and roads policing becomes diffused into a broader system of ensuring compliance and controlling risk. Aspects of this trend include civilianisation of policing tasks, partnership working, decriminalisation of certain offences and increasing concentration on prevention through road and vehicle technologies.

As is explained in more detail below, new technologies have assisted this movement towards a risk-based approach to roads policing and accelerate these trends.

Intelligence-led policing: the importance of knowledge and communication

As Beck argued, in risk society knowledge and communication of information about risk gain a new level of importance, (1992: 23-4). Both Beck and Adams (1995) point to a growing industry based on knowledge and information about risk, including environmental consultants and specialists, actuaries, health and safety professionals, scientists, regulators and others. Knowledge and information about risk also gains a particularly strong profile within policing, to the extent that Ericson and Haggerty categorise police as 'knowledge workers' (1997: 10). Knowledge and information can take several forms, including 'intelligence', risk information, community knowledge and surveillance. As the phrase 'information technology' suggests, use of technology is key to the organisation, management, analysis and communication of information.

'Intelligence-led' policing can be identified as one of the most significant developments in policing in recent years, and is a reflection of these trends. Intelligence-led policing refers to a method of policing, rather than an objective. In England and Wales, all policing forces are expected to conform to the National Intelligence Model (NCIS 2000), which expounds the process of intelligence-led policing:

> The National Intelligence Model (NIM) represents an effort to promote effective intelligence-led policing on a national basis and to standardise intelligence-related structures, processes and practices across all police services in England and Wales. It is essentially the design for a comprehensive 'business process' to rationalise and systematise the ways in which the police service handles information and makes key decisions about the deployment of resources. (John and Maguire 2004: 2)

In its broadest sense, the National Intelligence Model can be seen as a model for managing, categorising and acting upon information.

> We are intelligence-led. We are working to NIM. I can't sit here hand on heart and say all forces are doing it perfectly yet. But everyone is trying.

As Tilley (2003) suggests, 'intelligence-led policing' is closely related to problem-oriented policing and community policing in that all originated from critiques of reactive or 'fire fighting' methods of policing. He writes:

> Intelligence-led policing is essentially about doing the practical business of policing more smartly, incorporating modern information technology and modern methods. … Intelligence-led policing takes the police essentially to be an enforcement agency, albeit one among many. It accepts that this enforcement role needs to be oriented among other things to partnership and community safety. (2003: 311)

As this quotation suggests, intelligence-led policing is linked to the risk-management paradigm. Knowledge about risk is an intelligence product that can be used within the model to direct enforcement efforts. This can include knowledge about target populations (e.g. offender profiling) or about risk at geographical locations (e.g. whole route strategies).

The National Intelligence Model is expected to apply to all areas of policing, including road traffic enforcement. It works on three defined 'levels':

- Level 1 covering local issues (primarily at Basic Command Unit level);
- Level 2 covering cross-border issues (at force and inter-force level); and
- Level 3 covering serious and organised crime, on a national or international scale.

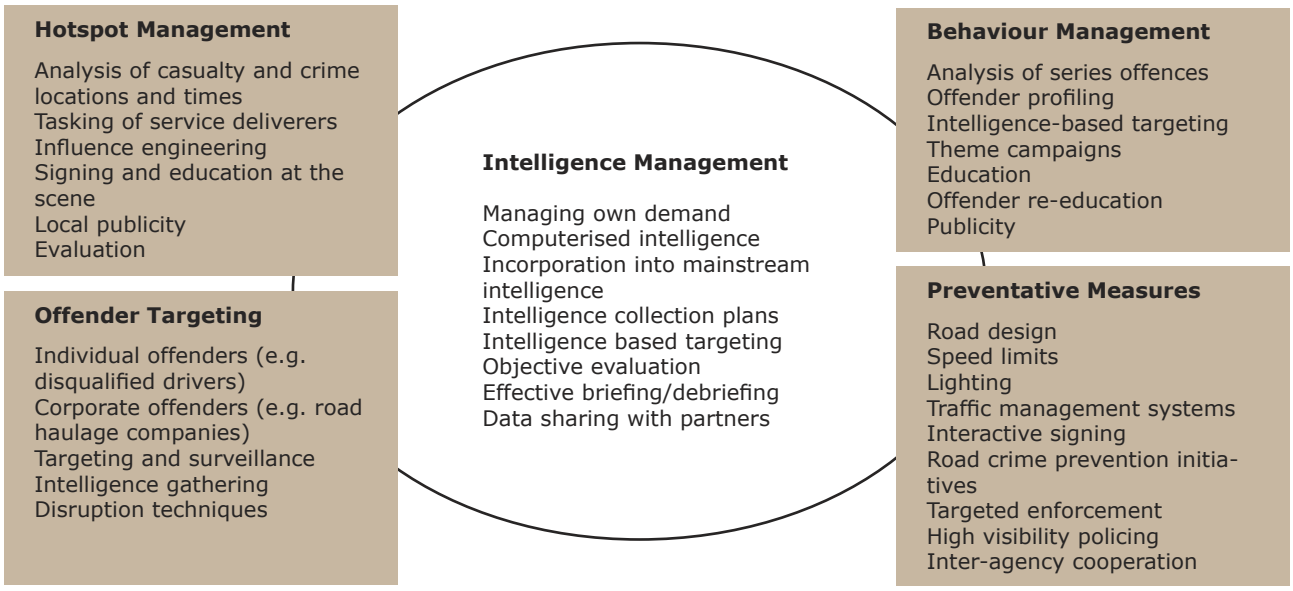
(John and Maguire 2004: 3)

Roads policing primarily lies within the first two levels, but given the need to 'deny criminals the use of the road', level 3 also applies.

Use of the model is now standard in all police forces, although a number of interviewees suggested the level of its application within roads policing varies from force to force. Evaluations of the model also suggests that uptake of the model was initially mixed, but is gradually progressing (John and Maguire 2004: 3-6).

Use of NIM is used as an indicator of effectiveness of roads policing in HMIC's baseline assessment framework (HMIC 2005b; HMIC 2004a). In its 1998 thematic report on roads policing, HMIC developed a model for what intelligence-led roads policing could look like; this is reproduced below.

An example of an intelligence-led road policing model



Particularly within the roads policing context, 'offender targeting' is an interesting example of intelligence-led policing. Chenery et al.'s influential research on illegal parking in disabled bays put forward a theory of 'self-selection', which suggested that those involved in minor deviation are more likely to be engaged in other types of criminality and thus 'self-select' themselves as targets for enforcement (Chenery et al. 1999). Concentrating on minor criminality therefore becomes a tool in combating major criminality. ANPR has followed this strategy with considerable success, as will be discussed in chapter 4: stops for vehicle tax evasion or no insurance have also led to the apprehension of major criminals and the removal of dangerous drivers from the road. This approach may have real benefits for road safety: as noted in chapter 2, minor traffic offenders are more likely to be crash-involved as well as committing more major traffic offences.

Chenery et al. argued that self-selection must be an active deviation from the law, rather than a condition of the individual, in order to avoid accusations of harassment. In practice, the line between this and 'offender profiling' may be less clear-cut. Officers report taking factors such as vehicle age or a feeling that there is 'something not quite right' into account when deciding to stop vehicles (Rose 2000: 71). Intelligence-led policing can thus often combine with intuition.

This targeting approach is not without its critics. As Garside argues, the idea of a limited criminal fraternity committing the majority of crime is an attractive but misleading one:

> It is manifestly incorrect to claim that half of *all* crime is committed by 100,000 offenders or nearly 10% of *all* crime is committed by 5,000 offenders. Moreover the suggestion that such individuals cause 'the most harm to local communities,' are responsible for 'the most crime, disorder and fear' and 'pose the greatest threat to the safety and confidence of their local communities' … is at best highly contentious. At worst, it is deeply misleading, and risks skewing crime reduction policy towards targeting those individuals most vulnerable to arrest (because they are already known about) rather than those who might cause the most serious harm or pose the greatest risk. (Garside 2004: 17-18).

While serious traffic offenders do undoubtedly cause considerable risk to other road users, they make up a small proportion of overall crash risk. For example, while the comparative crash risk for unlicensed drivers is between 2.7 and 9 times higher than for all drivers, an unlicensed driver was prosecuted in less than 4% of crashes involving a death or serious injury (Knox et al. 2003: 10-13). Concentrating enforcement on prolific offenders will assist in improving road safety, but will be unable to address all aspects of the problem.

Similarly, while an intelligence-led focus on high-risk roads appears attractive, violations and crashes will also happen elsewhere in the road network, suggesting that an exclusive focus on these sites would be insufficient. Indeed, a TRL review of enforcement literature found that a random approach to resource deployment can be effective:

> Theoretically it is likely to increase deterrence. In practice, the random allocation of stationary policing methods to different locations on the road network has been found to be effective, producing substantial impacts on accident rates and reductions in mean speeds and large distance halo effects. The main advantage of this method of traffic policing is that it requires relatively low levels of police manpower. (Elliott and Broughton 2004: 23-4)

Despite these qualifications, there was a strong feeling that an intelligence-led approach could contribute substantially towards orienting roads policing towards reducing road casualties. In particular, it was seen as a method of making smarter use of limited resources and as a way of concentrating policing activity towards the riskiest offenders without disrupting ordinary motorists.

> If it's intelligence-led policing, then the intelligence must be right. So you have to be sure that what's going in to the system is accurate, and what's being analysed in the system is accurate, and what you're plotting is accurate. … You can only do that if you have the technology to do it.

Intelligence-led policing is closely linked to use of technology. As Chan notes,

> Information technology, in particular, is especially suited for developing 'smart' policing strategies that are problem-oriented, intelligence-led and evidence-based. (2003: 656)

The Police Science and Technology Development Strategy suggests use of computer technology to manage intelligence and aid decision-making (Home Office 2004b). In roads policing examples of this include analyses of collision locations and patterns of offending using Geographic Information Systems (GIS) as tools for determining where to concentrate enforcement efforts.

Intelligence-led policing can also determine the deployment of technology. Some police forces cited

deployment of ANPR teams to locations that are known to be both crime and collision hotspots as an example of this. The siting of speed cameras at locations with a history of casualties and a proven speeding problem could also be seen as an element of this approach.

Risk management and widening engagement

A second area that can be associated with risk management and intelligence-led policing is the widening of policing to engage with or involve other stakeholders. Elements of this include a diffusion of policing beyond the police to incorporate other actors and agencies into the process of risk management, and renewed efforts to orient policing towards local communities.

Ericsson and Haggerty point towards 'a symbiotic relationship between the police and other bodies concerned with the management of risk', (1997: xi). As noted in chapter 2, the move to 'policing beyond the police' (in Crawford's [2003] phrase) manifests itself in a number of different ways. First, there has been a process of 'civilianisation' within the police. 'Civilian' or 'non-sworn' police staff assume greater roles in policing and carry out tasks that may have previously been performed by police constables. Community Support Officers are the most visible manifestation of this, but a similar process is occurring 'back of house'. Secondly, police work in partnerships to achieve risk management objectives. These can either be formal partnerships such as safety camera partnerships, or more informal co-operation. Third, there is increasing decriminalisation of certain traffic offences: enforcement becomes the remit of Local Authorities and other agencies, rather than police. Finally, there is considerable interest and scope in altering road and vehicle environments through technological means in order to ensure compliance without the intervention of police enforcement.

This has been theorised as an expansion from 'police' to a broader 'policing', with an extended range of individuals and agencies responsible for enforcement (Crawford 2003: 141). Police increasingly form only one element in a broader apparatus of enforcement and road risk management, and seek co-operation with other agencies. As McCahill notes:

> Many of the programmes of practical action which flow from strategies of control such as 'situational prevention' and 'risk management' increasingly are addressed not to central-state agencies such as the police but beyond the state apparatus to the organisations, institutions and individuals in civil society. (McCahill 1998: 54)

McCahill sees this in a primarily negative sense, as an attempt to 'off-load responsibility' for risk and enforcement and as an aspect of neo-liberal governance:

> As well as attempting to promote the consumerist responsibility of the 'active citizen' for the management of risk, the government's 'responsibilisation strategy' is also designed to off-load the responsibility for risk management onto local state and non-state agencies and organisations, hence increasing the government emphasis on public/private partnerships, inter-agency co-operation, inter-governmental forums and the rapid growth of non-elected government agencies. (ibid: 56)

However, this could also be seen in a more positive sense, as a process of incorporation of other stakeholders into the risk-management process. It has also been justified on the grounds of making more effective use of limited resources.

New enforcement technologies play an enabling role in this process: in moving away from traditional face-to-face enforcement towards more automated and technological means, roles traditionally played by police constables can be performed by others. For offences in which the power of arrest is not needed and technological evidence removes the need for police testimony that a violation has been committed, other actors increasingly replace roles previously played by police. Local Authorities use CCTV and automated camera evidence to enforce offences including parking, box junction violations and bus lane infringements; safety camera partnership staff process evidence from speed cameras; and police staff are increasingly used to operate technology such as breathalysers or to use computer technology to analyse intelligence.

> I actually believe that stopping people dying on the roads and making roads safer is part of making a whole community safer. It is part of a bigger picture.

A further element of the 'diffusion of roads policing' is the increased centrality of 'community policing' in national policing policy discourse in recent years (see, for example, the Home Office documents *'Policing: Building Safer Communities Together,' 'Modernising Police Powers to Meet Community Needs'* and *'Building Communities, Beating Crime'*). While the concepts of both 'community' and 'community policing' within these documents and within the wider literature is 'notoriously slippery' (Tilley 2003: 315), broadly speaking within community policing the community is expected to contribute to

enforcement in a variety of ways, including:

- Shaping forms of local policing by the police service;
- Examining local problems alongside the police service;
- Determining responses to identified issues;
- Implementing responses to issues as participants in community policing;
- Joint work with the police to address community-defined problems; and
- Informing or supplementing the operational work of police officers. (Tilley 2003: 316-7)

> You have to be careful you don't dismiss anyone; you have to engage with the community. Because if you don't bring the community with you, you get the *Daily Mail* scenario with people constantly attacking you. What we're trying to do is engage with the community, and then we can get results.

Aeron-Thomas classifies community participation in traffic law enforcement into four main types: consultation, volunteering, partnership and advocacy:

> Consultation is limited to helping the traffic police do a better job by providing them with information. … Volunteering and partnership efforts involve more time and commitment from the community but are still largely guided by the police. Advocacy includes campaigning for a wide range of actions from those which the police support fully, e.g. anti drink driving campaigns, to others which are not always appreciated by the police, especially senior officers who have to balance limited resources among competing needs. (2003: v)

In the UK context, consultation includes participation in Crime and Disorder Audits to identify issues and locations of community concern. Police cite 'community intelligence' as an important source of information to aid decision-making. Volunteering and partnership include 'Community Speedwatch' schemes in which community volunteers monitor traffic speeds and report offenders. Advocacy includes a large range of local road safety campaigns, including victims' groups and campaigns associated with a particular concern or location.

> "One of the problems with communities that that they'll all ask for extra resource but may not actually recognise what the problem is or why it's there. The contrast to that is that communities often have community intelligence about a whole range of things that are going on in the area, that the police service have no idea about. So the ideal is to merge the professional judgement and knowledge of the service with the strong local cultural and community understanding of the community."
>
> "You can only take the community with you if they're informed."

Community policing is associated with the risk management approach in several respects. First, the 'diffusion of roads policing' extends to incorporating local communities in the process of road traffic enforcement. Second, police use community knowledge as a source of intelligence about risk. In roads policing this can cause tensions: several interviewees reported that perceived risk was often very different from where the majority of casualties are located; intelligence-led and community-based policing strategies must then be balanced. These tensions can be resolved in part through clear communication with communities about levels and sources of risk. This is the third respect in which community policing ties into a risk management approach: police become 'risk communicators' (c.f. Ericsson and Haggerty 1998) in that they play a key role in developing information about risk and communicating risk to the public and to communities, through consultation, outreach and education programmes and media work. The centrality of this communicative role leads Johnson (1997) to label community policing as 'policing communities of risk'.

Risk management and the role of technologies

New technologies fit into the risk management approach in a number of ways, and later chapters will give a more detailed evaluation of the potential of specific new technologies in managing risk and improving safety. The contribution of new technologies can be classified into four broad themes.

First, technologies help to manage information and transform information into intelligence. Computerised records of driver and vehicle licensing and insurance enable the creation of a system of validation or entitlement to drive and record deviation from the norms of that system. Drivers presenting the most risk will often 'self-select' by operating outside of this system. Technologies such as databases and ANPR enable a risk-based approach through helping to identify populations of risk. These technologies will be discussed in chapter 4.

Second, surveillance technologies enable a concentration on specific driving behaviours linked to risk

(e.g. speeding and red-light running). This allows enforcement to be focused on these violations, but more importantly it enables the creation of an effective deterrent against these specific risky behaviours. This will be discussed further in chapter 5.

Third, technologies contribute to evaluating aptitude to drive at a particular point in time – i.e. assessing impairment. They can enable assessment to be made and boundaries between acceptable and unacceptable levels of impairment to be created. This is discussed in chapter 6.

Finally, technologies play a major role in changing the environment to limit risk and control opportunities for offending. This includes both changes to the road environment and to the vehicle environment. Methods of ensuring compliance with road laws go far beyond police enforcement. As noted in the North report:

> The most effective means of enforcement is to design or modify the vehicle, and the road and road environment, to prevent or discourage driving which is dangerous or contrary to law. Enforcement through this sort of technology does not depend on intervention by the police or the criminal justice system. (DoT/Home Office 1988: 42)

A number of interviewees raised the possibility of roads policing becoming 'redundant' due to developments in road and vehicle technologies. Existing technologies for self-enforcement include 'self-enforcing roads', traffic calming, 'psychological traffic calming' and seatbelt reminders, among others. Future technologies may include Alcolocks, ISA, and in-car fatigue and impairment detection devices. These technologies have potential not only to significantly reduce casualties but also to alter the focus and scope of roads policing in the UK. The implications of these technologies will be discussed further in chapter 7.

Chapter conclusions

In order to understand their use and implications, new technologies must be addressed within the broader context of their introduction. In the UK, new enforcement technologies have both assisted and been shaped by wider movements in roads policing – including a greater orientation towards the management of risk, an increasingly intelligence-led approach and a diffusion of policing tasks to incorporate other agencies and stakeholders. Within this, technology to manage information gains a new level of prominence, as data about drivers, vehicles and collisions are transformed into intelligence to help guide resource deployment or focus enforcement efforts. Surveillance technologies also contribute to these trends, as they allow enforcement to be undertaken by non-police bodies and are used to manage risks in particular locations. Impairment technologies allow aptitude to drive to be measured and quantified, while in-vehicle or road environment technologies seek to limit opportunities for offending.

There is considerable potential for these trends to contribute towards improving road safety: they help make more effective use of limited resources, contribute towards ensuring that roads policing is oriented towards casualty reduction, and broaden engagement in reducing road risk. The specific casualty reduction potential of new enforcement technologies will be discussed in the remaining chapters; collectively, however, they also contribute to a broader context that will assist safety gains to be made.

Chapter 4

Information and Technology

Introduction

The management and use of information for enforcement has been a major focus of new roads policing technologies. This includes databases that underpin the driver and vehicle licensing system and enable other forms of automated enforcement to take place; technologies such as ANPR that use these databases to identify drivers and vehicles that do not comply with this system; and new methods of collecting and analysing collision data to enable police resources to be better targeted. These technologies help to enable an intelligence-led approach to roads policing, and are closely related to wider societal trends concerning the expansion of information technologies and the management of risk.

This chapter assesses the role of information within road safety and discusses the current structure of managing driver and vehicle information. Automatic Number-Plate Recognition – viewed by many to be among the most exciting of new roads policing technologies – is considered in detail. Use of databases and information management technologies to develop collision databases and better understand risk is also assessed.

The role of information

> If the data is not right, then the rest of the system is flawed.

Management of information has been a key feature of technological development in recent years. The growing prominence of information and information technology in society has been well documented, with some theorists characterising the present as an 'information society' (e.g. Lyon 1988). This is not incommensurate with the 'risk society'; rather, the role of information, and information about risks in particular, is a key feature of the risk society (Beck 1992).

The growing prominence of information and use of intelligence is also one of the most significant aspects of recent changes in policing. Some aspects of the 'risk management approach' discussed in the last chapter have always been present in policing, with police using observation and intuition to concentrate on the groups and individuals that appeared most likely to cause trouble or commit crime. The key difference is the enormous amount of information now collected and made available at the roadside, and the use of this information to inform an 'intelligence-led approach'. Technology is central to the management, communication and use of this information and intelligence.

Within roads policing, this information is used in various ways: to verify identity of the driver or vehicle; to verify compliance of drivers and vehicles with laws relating to licensing and registration; to automate enforcement for some vehicle registration and insurance offences; and to develop intelligence about locations of road risk and about target populations most likely to offend and to be involved in collisions.

On a fundamental level, information underpins the current system of authorisation and entitlement to drive. Drivers wishing to use vehicles on public roads are obliged to cooperate with a complex system of validation and authorisation that involves verifying driving skill (through the driving test), vehicle condition (through MOT testing) and responsibility for the vehicle (through vehicle registration). Computerised databases are essential to the current operation of this system: the system as it currently operates has been enabled by modern technology.

This validation system is of utmost importance to road safety. Driver licensing ensures that drivers possess a certain level of skill and aptitude to drive and have not been disqualified due to contravention of driving law. MOT testing verifies that vehicles over a certain age are in a safe condition. Vehicle registration, meanwhile, assists enforcement and enables automated enforcement systems such as camera-based technologies. In addition - as discussed in chapter 2 - while offences that are detectable through database checks (such as vehicle documentation offences) may seem minor, there is a significant volume of research indicating that drivers who commit minor offences also commit major bad driving offences and other types of crime, and are also more likely to be crash-involved than other drivers.

As noted in the last chapter, use of information is also integral to an intelligence-led policing and a risk management approach. Using intelligence to target resources towards unlicensed, uninsured or untaxed drivers contributes to dealing with the drivers who present the most risk. Information is also used to develop geographies of risk: data on crashes and offending are used to develop strategies for deployment of police resources.

Driver and vehicle records

Vehicle and driver databases are key examples of using new information technologies for road traffic enforcement. However, the existence of computerised databases incorporating driver or vehicle details

is not particularly new. The Police National Computer (PNC) originated in 1968 as the National Police Computer; the name was later changed in order to clarify that while the computer is national, police forces remained local (Pounder 1984: 1). The core of the current PNC – the Phoenix database – was launched in 1995 (Bichard 2004: 115).

Data on drivers and vehicles are held by several different agencies and are used for a number of different purposes. In reference to vehicles, DVLA operates the vehicle register, which contains details such as the Vehicle Identification Number, Vehicle Registration Mark, VED status, and registered keeper details. VOSA are currently rolling out a computerised database of MOT records, including individual vehicle MOT histories. The Motor Insurance Bureau (MIB) – an insurance industry body – operates the Motor Insurance Database, which contains motor insurance policy information for vehicles and drivers. MIB also operates the Motor Insurance Anti-Fraud and Theft Register which holds details of vehicles damaged beyond repair; since 2003 there has been a computer link between this database and the DVLA vehicles register.

In reference to drivers, DVLA also operates the drivers register, which holds details of all licensed drivers, including penalty points. For drivers prosecuted for violating traffic law, a separate court record is created; at present there is no automatic link between this and DVLA's driver record.

Databases operated by the police include the PNC, which stores information on stolen vehicles and other vehicles of interest to police nationally and links to the DVLA vehicle record. Individual police forces also hold their own local intelligence databases, which will contain locally-collected information on vehicles. These databases tend to be structured in different ways according to each local force. However, roads police and ANPR teams exchange force intelligence databases via the National Roads Policing Intelligence Forum, and so will normally have access to the intelligence of other forces. In addition, particular operations also generate separate databases: for example, Operation Litotes incorporates a dataset of vehicles known to be associated with deception burglary.

These databases underpin other aims and are becoming increasingly important. Databases with driver and vehicle information are essential to the operation of automated enforcement technology. As will be discussed below, ANPR operates through comparing vehicle registration numbers with vehicle databases to identify vehicles of interest to the police: databases are integral to the system. Other automated enforcement systems such as speed and red light cameras and decriminalised enforcement of moving traffic offences also rely on vehicle registration databases to enable fines to be issued. Vehicle registration databases are also integral to systems related to London's congestion charging scheme and – in the longer term – may also be incorporated into road user charging systems. It is therefore of the utmost importance that the databases are accurate, up-to-date, secure, and structured in a way that allows them to be utilised efficiently and effectively.

However, there are a number of challenges and difficulties relating to the information infrastructure that undermine the effectiveness of enforcement. These include inefficiencies created by multiple databases, the absence of a link between driver and vehicle, difficulties in identifying drivers and inaccuracies within the databases themselves.

The system of multiple databases has created a number of problems. A Jill Dando Institute of Crime Science report cited three difficulties:

- It is not easy to see the up to date registration details, MOT information, and insurance arrangements at one time, making cross-checking difficult.
- Multiple entry of items of information, apart from being inherently inefficient, makes mistakes and inaccuracies more likely. […]
- There are particular problems with slow updates of databases. For example, it can take up to two weeks for the PNC and the DVLA databases to be updated after re-licensing. Clearly, real-time, accessible records are necessary to enable police and others to carry out their functions. (JDI 2002: 20-21)

The Bichard Inquiry into record keeping, vetting practices and information sharing was also critical of the system of separate intelligence systems:

> The disparate development of different local IT systems, many of which do not communicate with each other, has inevitably led to real difficulty in accessing all relevant information, which has in turn resulted in poorly informed decision making. Police forces need to address these problems urgently where they exist. (Bichard 2004: 29)

One of the principal recommendations of the Bichard Inquiry was the creation of a national intelligence clearing house as a way of addressing these problems. This is currently under development as part of the Information Management, Prioritisation, Analysis, Co-ordination and Tasking (IMPACT) programme.

A national data warehouse will make life easier, but then you've got to have someone to make sure the data on there is compliant with all the different regulations and you're not going to fall foul of storing the wrong sort of data or for too long or what have you. But from the other side of interrogating a central system – rather than at the moment where each force sends out an email to say can you look and see if this vehicle has passed through your ANPR – if you have a central point of contact and you tap into it from the back office, then that would make life from that side of things far easier.

Recommendation 12: The IMPACT programme to create a national intelligence system (as part of the Bichard Inquiry implementation) is a welcome and necessary development. The Home Office should ensure that the system is structured to facilitate ease of use by both ANPR teams and roads police.

Connecting drivers and vehicles

A more fundamental problem also exists, however, in that databases used by automated enforcement systems relate to vehicles, while culpability for road traffic violations lies with individuals. This gap between driver and vehicle is a major barrier to automated enforcement. This prevents ANPR from being used effectively to enforce unlicensed driving and also provides barriers to the enforcement of uninsured drivers. ANPR teams are also unable to verify remotely if a vehicle 'hit' due to an intelligence flag is being driven by the person to whom the intelligence relates. There are also difficulties regarding speed and red light cameras, as the driver at the time of the offence may not be the same as the registered keeper. The current system relies on the keeper identifying the driver who committed the offence. There have been reports of drivers at risk of disqualification passing their penalty points on to others; keepers of vehicles caught speeding have been acquitted on the grounds of being unable to remember who was driving at the time; and difficulties can arise in prosecution when multiple drivers with similar names reside at the same address or when drivers and vehicle keepers move address without updating their details.

Recommendation 13: The proliferation of automated enforcement systems has put new strains on vehicle and driver licensing, and the absence of an automated link between driver and vehicle licensing is a major barrier to effectiveness of automated enforcement. DfT and DVLA should commission a wide-ranging review of options on how to link drivers and vehicles for enforcement purposes.

You need the DVLA database for driving licences linked to vehicle registration.

Several partial solutions to these difficulties have been suggested, including both technological improvements and recasting the legal framework. First, it was suggested that databases need to be interlinked to be most useful. Especially for automated enforcement, it would be helpful for details of vehicle keepers to be linked to details of drivers. This could be achieved either through a single driver and vehicle database or through a 'virtual database' that provides real-time computerised links between existing databases (JDI 2002: 21). This would have immediate practical benefits for road traffic enforcement: for example, ANPR systems would be better able to detect vehicles registered to disqualified drivers. Difficulties in identifying the keeper of a vehicle (including fraudulent registrations) could be overcome by requiring a keeper of a vehicle to supply a valid driver's licence or company number at the time of registration. This would also ensure the keepers of vehicles (that have not been registered as off road) are entitled to drive those vehicles.

Recommendation 14: DVLA should require keepers of vehicles to supply a valid driver's licence (unless registering to a company or partnership or registering the vehicle off road) when registering the vehicle.

The technology in the courts – they're not words that fit very easily together. We've been waiting for a new national computer system for over 20 years. It's been through a number of different incarnations, and each one has failed. The latest one, Libra, we're waiting to find out what has happened after delay after delay after further delay. …

It should provide better links with other systems. So it should provide for more automated links with the police. Whereas in a number of areas, there's multiple entry in that the same details will be entered by the police; it will then come to the court to be entered; and we may have to then do further entries to go to DVLA. So there's a lot of repeating of administrative actions. That's one area where we're hoping that Libra or a new computer system will enhance what we do at the moment.

Databases are used throughout the criminal justice process, not just in enforcement. Better links between databases could make the criminal justice system more efficient. In particular, frustration was expressed at the bureaucracy and delays created by the lack of a direct link between the court service and the DVLA database. This prevents courts from having immediate access to driver endorsement records, and it also stops court disqualifications of drivers from registering directly on the PNC. This gap creates unnecessary delays – of up to several weeks – and also creates the potential for offenders to get away with using fraudulently obtained licences if there is no mechanism to swiftly check their integrity. It also requires multiple entry of the same data by different bodies. Computerisation and better links between all stages of the enforcement and prosecution process could improve the criminal justice system considerably. This technology is long overdue.

Recommendation 15: The lack of an integrated criminal justice computer system with direct links to the DVLA driver database and PNC is a major barrier to the efficient operation of the court service. DCA should bring forward an integrated criminal justice computer system as soon as possible.

None of these solutions, however, addresses the more fundamental challenge of the inability of current automated enforcement systems to determine who was driving at the time of the offence. In the longer-term, technological solutions to this could include smartcard licensing systems that enable vehicles to record who the driver is at a particular time. Versions of this technology are already in use by car clubs to track charges.

This issue could also be addressed through changes in the law, in particular making the keeper of a vehicle responsible for offences committed in that vehicle unless he/she can identify the offender. Currently, the registered keeper is seen as a proxy for the driver, and is sent the Notice of Intended Prosecution asking him/her to identify the driver after an offence (e.g. speeding) is detected. However this does not have a very firm basis in law, and there have been several high profile cases of vehicle keepers who have avoided prosecution by claiming not to remember who was driving at the time of the offence. 'Owner liability' would overcome this difficulty and also encourage vehicle keepers to be conscientious about lending their vehicle to others. This would contribute positively to road safety – not only by closing a loophole in the law, but also by encouraging greater responsibility. This is a long-standing issue, and was recommended both by the North 'Road Traffic Law Review Report' (DoT/Home Office 1988: 36) and the VERA2 project on cross-border enforcement (Wilson et al. 2004: 12). There is precedence in UK law: Schedule 6 of the Road Traffic Act 1991 establishes owner liability in relationship to penalty charges for parking. A number of other European countries including the Netherlands also use owner liability as the basis for automated enforcement.

> My view is that owning a car is a responsibility. So I should therefore be completely liable for how my car is used by other people. If I lend my car to somebody else and they speed in it, and technology catches my car speeding, and the notice comes to me, I should either be saying 'that is the person who did it', and that person should accept the ticket – or if not, it's down to me: I shouldn't have lent him the car in the first place. I am the owner, so therefore I am liable.

Recommendation 16: The Government should consult on bringing forward legislation to implement owner liability - in which the registered keeper of a vehicle detected committing an offence is legally regarded as the offender unless the registered keeper is able to identify the offender or prove that the vehicle had been taken without consent.

Database accuracy

Database accuracy is, in practical terms, one of the biggest barriers to the effectiveness of enforcement. Inaccurate or out of date data will enable some offenders consistently to avoid punishment while also inconveniencing many other motorists. It creates problems for automated enforcement, use of ANPR, traditional roads policing and court services.

A 2003 survey by the Department for Transport estimated the accuracy of driver records to be between 66 and 74 per cent. For vehicle records, the level of accuracy was estimated to be 68 per cent plus or minus 3 per cent (NAO 2005: 33). However, DVLA estimates that in approximately 90 per cent of vehicle records and 82 per cent of driving licences the information was sufficiently accurate to enable the police to trace the keeper (ibid). DVLA have agreed a target with the Department for Transport to improve the

accuracy of the current vehicle register to 97.5% by 2005/2006, and also aim to reduce persistent VED evasion by 50% by 2007 (DVLA 2005: 20).

Part of current levels of inaccuracy will be due to errors in data entry. Much is also likely to be due to drivers failing to update DVLA of changes in address or name. DVLA is addressing these issues through an advertising campaign reminding drivers to update their details; a 'data cleansing' programme aimed at removing minor errors; and the 'Barcoding All Relicensing Transactions' project, which reduces the time taken to update vehicle relicensing status from six weeks to less than three days. These programmes should lead to an improvement in database quality and accuracy; however, the success of these programmes is so far unclear: police involved in the Laser 2 ANPR pilot reported no improvement in DVLA database accuracy between 2003 and 2004 (PA Consulting 2004: 103). Further investigation into making best use of DVLA databases – including how accuracy can be improved – may be necessary.

A substantial proportion of the database inaccuracy may also be due to deliberate evasion. The Jill Dando Institute estimates that the vehicle underclass – vehicles on the road that do not comply with motoring laws – may number around 970,800 (JDI 2004: 2). Measures to deal with this issue include increased enforcement – e.g. by use of ANPR – and a move towards 'continuous registration' of vehicles. Both of these measures are discussed later in this chapter.

Recommendation 17: Database accuracy issues are perhaps the single greatest challenge to the effectiveness of ANPR and automated enforcement. DVLA should continue and intensify its barcoding and data cleansing projects. The National Audit Office (NAO) should conduct an audit of database accuracy.

There are a number of emerging technologies that change the framework of driver and vehicle information and licensing that may provide solutions to some of these issues. These include using databases themselves as enforcement mechanisms; changing structures of driver licensing; and improving methods of identifying vehicles.

One of the most interesting developments has been 'continuous enforcement', which allows automated enforcement of registration and insurance requirements from the record. This may contribute to improving database accuracy (as drivers have a more immediate incentive for registering their vehicles) and removes the requirement for offending vehicles to be caught on the roads. This implies a change in use of databases from a means of storing information about drivers and vehicles that is consulted by enforcement agents to a technology that is capable of proactively or automatically enforcing requirements – a very significant development.

DVLA introduced 'continuous registration' for Vehicle Excise Duty on 1 January 2004. Under continuous registration, drivers are responsible for either taxing their vehicle or declaring that they are no longer the keeper of a vehicle or that the vehicle is no longer being used on a public highway. Automatic £80 fines are generated for keepers who fail to tax their vehicle within one month. Within the first year of operation, this change in procedure led to over 1 million more vehicles being registered than previously – an increase of 3.4% (DfT 2005a). As continuous registration gives a strong incentive for keepers to inform DVLA when a vehicle changes hands, it is thought that this change contributes towards improving the accuracy of DVLA's record of vehicle keepers. This in turn will improve the efficiency of automated enforcement as it will be easier to trace the keeper of offending vehicles. It may, however, pose some difficulties for ANPR teams, who may intercept untaxed vehicles that have already been fined.

> Continuous registration … should help improve the vehicle database substantially. Because at all times, theoretically, a keeper has to be attached to a vehicle, and you're not let off the hook until you're able to pass the vehicle on to someone else. … So as that works through, hopefully that will mean an improvement in the quality of the vehicle database.

Continuous registration of vehicle excise duty may also indirectly lead to greater compliance with insurance and MOT requirements, as proof of insurance and MOT (if required) are needed in order to tax vehicles.

In early 2005, the Department for Transport consulted upon extending a similar system to enforcement of insurance requirements: 'Continuous Enforcement of Motor Insurance Requirements from the Record'. This would require a new offence of being the registered keeper of an uninsured vehicle. If this follows the trend set by continuous registration of VED, it would lead to a significant reduction in uninsured driving (currently estimated at 1 in 20 UK drivers [Greenaway 2004]). It would also ensure that drivers who continue to drive uninsured vehicles are wilful violators and have not simply forgotten to renew their policy.

Recommendation 18: The Government should bring forward legislation to enable continuous enforcement of motor insurance requirements.

Driver and vehicle indentification

The problem of identifying the driver of the vehicle is one that applies to both traditional and automated enforcement. Even when a vehicle is stopped by police, driver identification can still present a challenge. Police trained in interrogation techniques can be reasonably successful at identifying drivers at the roadside, through use of questioning and reference to databases. However this can be a time-consuming process, and driver identification can still be a problem. New solutions should be sought. In particular, a recommendation in the Highway Code to advise drivers to carry a Photocard driving licence could speed the identification process; the current advice merely notes that a driver must be able to produce documents when requested and may be required to report to a police station within 7 days. Mandatory carriage of driver licences has been suggested, but is controversial due to civil liberties implications. Other suggestions include roadside digital fingerprinting and photographing the driver. In the longer-term, in-car smartcard or biometric technologies could be used as a means of identifying the driver and also authenticating authorisation to drive.

Recommendation 19: Given the continued difficulties police can experience in identifying drivers, the Government should re-evaluate the case for mandatory carriage of driver licences and assess other options for identifying drivers at the roadside. As an intermediate measure, DfT and Driving Standards Agency (DSA) should update the Highway Code to recommend driver licence carriage and assess what proportion of drivers already carry driving licences.

The structure of driver records and the nature of the licence itself are changing. The Road Safety Bill 2005 contains provisions for electronic endorsement records. This will make the central record of endorsement more important than the information contained on driving licences themselves. This enables foreign drivers without a counterpart licence (on which endorsements are currently recorded) to receive fixed penalties and penalty points on an electronic record. In the medium term, this will enable abolition of the counterpart to the driving licence.

> The changeover from paper licences to photocard licences … would aid identification. It would help with the accuracy at the database, because one of the strange things at the moment is that you get your full licence, maybe at 18 years of age, and DVLA don't hear from you until you're 70. So the quality of the driver database is not very good. You can move house and you don't tell them, all sorts of things. You can die and nobody tells them. Photocard licences get exchanged every 10 years, and again that would help with the accuracy of the database.

Driving licences themselves are also changing. As well as abolishing the counterpart to the photocard driving licence, the Road Safety Bill 2005 will also enable the Secretary of State to recall the old paper licences and first generation photocard licences. Card-based technologies have developed considerably in recent years, and current 'Smartcard' technologies can cheaply and securely store a considerable amount of data. This should enable the driving licence to be based on a single-document smart card which could have all necessary information (including endorsement record, contact details and even biometric data), can be read on request (for example at police stations and VED post offices) and from which information can be readily accessed by the driver and others entitled to know (for example via internet or telephone networks, using proven successful technology already employed by financial and retail organisations). This would have a number of positive implications, including improving the ease and reliability of driver identification, enabling more reliable and secure access to endorsement records, and possible integration with future technologies such as licence interlocks or forms of road user charging.

> In court I produce this lovely clean licence, and I'm a disqualified driver. So you've got to check, therefore, the status of the driver that's in front of you. Do not trust the paper document.

Recommendation 20: DVLA should introduce Smartcard licences. The Government should begin the recall of paper licences once legislation is in place and proceed with phasing out the counterpart to the Photocard driving licence.

Technology is also under development to enable better identification of vehicles. Electronic Vehicle Identification (EVI) could allow greater ease of vehicle recognition across a range of applications,

including: crime tracking and tracing of vehicles; access control (e.g. to bus lanes); vehicle tolling; vehicle registration ownership obligation; vehicle excise duty; traffic management and driver information; traffic regulation and compliance (e.g. automated enforcement); vehicle life cycle (tracking a vehicle from manufacture to destruction at end of life); and traffic regulation (e.g. drivers hours and dangerous goods regulations) (EVI 2003: 19-20). A European-wide feasibility study on Electronic Vehicle Identification identified possible use in road traffic enforcement:

> EVI can make the applications that enforce compliance with the road safety regulations (speed, traffic light, over weight) more effective by accurately identifying the vehicle. As drivers recognise the increased effectiveness of these applications, compliance with road safety regulations is likely to improve and hence has the potential to contribute to reducing the number of people killed and injured on the roads. (EVI 2003: 22)

Interest in EVI is increasing for two main reasons. First, it could provide a useful tool for preventing problems such as vehicle cloning, ringing and forged number-plates – which appear to be increasingly used by criminals to evade automatic enforcement, recognition by ANPR systems and congestion charging - and would also be useful for combating theft. Secondly, road user charging schemes (currently under discussion at DfT) may use EVI to track vehicles for billing purposes. EVI has been controversial because its potential power for remote vehicle tracking leads to privacy fears. Privacy International nominated DfT for a 'big brother award' for its support for the project (Privacy International 2004). However, given the existing ability of police to track vehicles using ANPR and other technologies, it is unclear whether EVI would erode privacy further than is already the case.

Finally, new technologies can also contribute to enabling cross-border enforcement. With closer European integration and with growing levels of international-cross border traffic, roads police increasingly have to enforce offences committed by drivers or vehicles registered abroad. In France, for example, it is estimated that 25% of speeding offences detected involve foreign vehicles (Wilson et al. 2004: 1). Cross-border enforcement is currently problematic, as it is difficult for law enforcement bodies to track a vehicle or even access details of the driver once it has left the UK. While some bilateral agreements exist within mainland Europe to support exchange of information to enable cross-border enforcement, this is not yet typical. Several steps are underway to address this. First, as discussed above, the Road Safety Bill 2005 will introduce an electronic endorsement records to allow foreign drivers without UK driving licences to receive penalty points. The Bill also introduces a fixed penalty deposit scheme for foreign drivers (initially applying to HGVs), which will require a refundable deposit to be paid by offending drivers until a fixed penalty can be issued. European-wide solutions are also under consideration. The EC-funded VERA2 project drew up both recommended principles for cross-border enforcement in Europe and proposals for a system architecture for the secure data-sharing (the eNFORCE Network) to enable this (Wilson et al. 2004).

Recommendation 21: The UK Government should support the establishment of a European-wide data exchange system to enable cross-border enforcement and encourage the European Commission to introduce a new directive in this area.

ANPR

> We see ANPR as the way forward. … ANPR is good because it brings about roads policing in its truest sense. … It's roads policing because it's about safer roads, and that's safer roads free of crime, free of death and everything else.

Automatic Number Plate Recognition (ANPR) has been repeatedly identified by interviewees in this project as one of the most significant new technologies in roads policing. It enables a new method of policing in which vehicles of interest to police can be swiftly and easily identified and stopped, and allows enforcement of both traffic offences and other types of crime. It also allows vehicle stops to be led by information and intelligence. For this reason, use of ANPR was a central element in ACPO's 'manifesto' for the future of roads policing:

> The police have a duty to tackle criminality, in all its forms, including contravention of road traffic law much of which is aimed at poor driver behaviour. We intend to use the police National Intelligence Model (NIM) to focus enforcement activity in order to detect, disrupt and challenge criminal use of the roads. To do this we will make full use of modern technology, and in particular Automatic Number Plate Recognition (ANPR) systems which have the potential to revolutionise road policing. (ACPO 2002: 1)

Current ANPR systems work by scanning the number plates of passing vehicles and checking them against a number of databases, including the DVLA database, force intelligence databases and the PNC

to verify whether the vehicle is untaxed, unlicensed or otherwise of interest to the police. If it is, the ANPR system will alert the operative, who will confirm the information and send an intercept team to stop the vehicle. This allows appropriate action (such as issue of a fixed penalty notice) to be taken, and, if necessary, for the driver to be questioned or for the vehicle to be searched.

There are several variants of ANPR enforcement systems. Mobile ANPR vans can be linked with a motorcycle or car intercept team positioned further down the road; an ANPR unit can be self-contained within a single police vehicle that works as both ANPR operative and intercept vehicle; or ANPR technology can connect CCTV systems to a central dispatcher who will direct mobile intercept teams. Different methods are appropriate for different circumstances: for example, CCTV-linked ANPR systems may be most effective in town centre environments, as the cameras can monitor a vehicle remotely until an intercept team identifies a suitable place to stop the vehicle.

Automatic Number Plate Recognition technology has been in use in various forms for a considerable time. The first reported sustained use of ANPR in the UK was on a bridge over the M1 from 1982 to 1984, following an earlier prototype in use at the Dartford Tunnel (BSSRS 1985: 50). It has been suggested that early versions of ANPR were used to disrupt flying pickets during the miners' strike and monitor political activists such as hunt saboteurs, as well as to recover stolen vehicles and intercept criminals wanted by the police (ibid: 10).

Improvements in technology have enabled its expansion:

> The police have used ANPR systems at strategic points for a number of years, for example at ports, tunnels and in the 'ring of steel' around the City of London as part of counter terrorism measures. With the improvements in ANPR technologies (which has led to increased accuracy of the reading, and the ability to process, a greater volume of images) and an overall reduction in cost, police have begun to look to ANPR as a proactive tool to help address volume crime.
> (PA Consulting 2003: 5)

Current systems are capable of reading up to 3,000 number plates per hour on vehicles travelling up to 100 mph and can link to up to four cameras simultaneously. The systems are capable of reading both UK and most foreign number plates and make an accurate reading on around 95% of vehicles (PA Consulting 2004: 37).

The current incarnation of ANPR systems began in 2002, when as part of 'Project Spectrum' the Home Office provided a mobile ANPR facility to each police force in England and Wales. This was accompanied by the launch of the 'Laser 1' pilot programme to assess the effectiveness of ANPR-enabled intercept teams in nine police forces. This six-month trial was followed by a further trial in 23 forces of a 'hypothecation' or 'cost recovery' scheme to part-fund rollout of ANPR. Provisions to extend this hypothecation scheme nationally were incorporated into the Serious Organised Crime and Police Act 2005, and police are currently proceeding with national rollout of ANPR. ACPO have asserted an ambition for an ANPR system in every Basic Command Unit.

Evaluations of use of ANPR have proved to be highly successful. During the Laser 2 pilot in 23 force areas, ANPR teams achieved arrest rates 9 to 10 times the national average per officer (a total of over 13,000 arrests - including over 3,300 for driving offences) and recovered property and drugs worth over £8 million (PA Consulting 2004: 1). These findings provide a practical verification of earlier research demonstrating links between minor offences (such as vehicle documentation offences) and major offences: 26% of arrests originated from vehicle stops for no VED or current keeper (ibid: 6). These findings alone justify the current enthusiasm for ANPR within roads policing, and national roll-out of the technology will be welcome.

Recommendation 22: Police forces should continue with the expansion of ANPR national roll-out to meet ACPO's vision of an ANPR unit in every BCU.

Current legislative and technological developments may contribute further to the success of ANPR, and may in particular contribute further to its application to road safety. Currently, ANPR operators must process individual registration numbers through the MIB database (via the PNC) to verify whether a vehicle is insured. Provisions in the Serious Organised Crime and Police Act 2005 will enable the Police Information Technology Organisation (PITO) to create a new database – using the existing MIB database – of vehicles without insurance. This will allow uninsured vehicles to be automatically detected by ANPR systems. Similarly, efforts are underway with the computerisation of MOT certification to allow ANPR systems to detect vehicles liable for MOT that do not have an MOT certificate.

Both developments have considerable potential for enabling ANPR to be better used for offences relating to road safety. The swift introduction of these databases should be encouraged, and their effectiveness monitored once introduced.

Recommendation 23: DVLA, VOSA, PITO and MIB should ensure that ANPR teams have live access to 'no insurance' and computerised MOT databases as soon as possible.

Despite current enthusiasm for ANPR within roads policing and the wider road safety community, it should be remembered that ANPR is only indirectly safety technology. Vehicle registration offences are not dangerous activities in themselves, although as discussed above they undermine the licensing and registration system that underpins road safety. As a result, there is no current research demonstrating a direct casualty reduction achieved through use of ANPR.

ANPR may, however, contribute to safety in a number of ways that do not lend themselves to quantification. First, it enables an intelligence-led concentration on offenders that are more likely to cause road risk. Vehicle registration offences may not cause direct risk to others, but drivers without tax or insurance may be more likely to engage in dangerous behaviour. As discussed in chapter 2, research consistently shows that groups engaging in minor criminality are more likely to engage in major criminality and be involved in road crashes. ANPR is therefore a strategy of identifying high-risk groups and targeting resources towards those groups to control the risk that they present.

> We've got a dedicated ANPR team who are tasked via the National Intelligence Model. They probably do have an impact for road safety, because they are highly visible by the side of the road, and I think the public think that they are speed checks instead of ANPR checks.

Secondly, ANPR intercept teams provide a visible police presence on the roads, which serves as a deterrent and increases public confidence. Evaluations found that ANPR teams tend to be more visible than other officers, with 77% of their time spent in the field, compared to 57% for the typical police officer (PA Consulting 2004: 5). Police reported anecdotal evidence of improved speed compliance in the vicinity of ANPR operations, as drivers may confuse ANPR with speed enforcement.

> ANPR … has completely blurred the division of traffic being something to do with road safety, boroughs being something to do with crime. Actually, there's recognition now that traffic police have just as much to do with crime as they do with road safety.

Third, ANPR begins to blur the boundaries between roads policing and policing crime, which may help to reverse the marginalisation of roads policing discussed in chapter 2. ANPR is effective at enforcing both vehicle registration offences and serious crime, and highlights the links between the two. Some police argued that ANPR can be simultaneously targeted at both crime and safety: roads known to be used by criminals (e.g. particular urban A roads) can often be roads with the highest risk. ANPR deployment can be a response to both issues.

Finally, ANPR enables greater use of traditional roads policing methods. While ANPR technology enables offences to be detected through reference to databases, ANPR teams detect offences through observation as well as use of technology. In fact 44% of vehicle stops by ANPR teams occur as a result of observation – including observed bad driving behaviour as well as recognition of known criminals or suspicions about the vehicle. A considerable proportion of these 'observation stops' were due to observation of road traffic offences relevant to road safety: 17% of observation stops were due to no seatbelt; 7% were due to driving manner; 6% were due to observed vehicle defect; and 2.7% were due to mobile phone use (PA Consulting 2004: 67). In many ways, therefore, ANPR technology has led to a resurgence of traditional roads policing methods of observing offences and stopping vehicles accordingly. However, these figures mask considerable divergence between police forces: 0.5% of observation stops in the West Midlands were caused by driving manner, compared to 25.5% in Staffordshire; 0.8% observation stops in Greater Manchester were due to no seatbelt compared to 37.9% in Lincolnshire (ibid: 67).

Recommendation 24: ANPR units have clear potential to be effective in observing and enforcing offences that cannot be automatically detected (such as careless and dangerous driving), yet the extent to which this occurs in practice varies sharply from force to force. The Police Standards Unit should ensure that policing activities related to road safety feature prominently in the ANPR best practice handbook.

As well as the technology itself, the funding system for ANPR has also been innovative. Under the Laser 2 pilot scheme and now under powers contained in the Serious Organised Crime and Police Act 2005, police forces can recover the fine revenue from fixed penalty tickets issued by ANPR teams for a number of offences, including: seat belt offences; overweight vehicles and trailers; no MOT certificate; driving without a licence; driving without insurance; failure to stop for police; failure to identify the driver; offences relating to noise limits and motorcycle silencers; driving without proper control of the vehicle

or view of road ahead (including driving while using a handheld mobile phone); no number plate or obscured number plate; and no VED. In practice, this operates by ANPR teams being issued with fixed penalty pads identified by a special marker (e.g. a different colour) to allow them to be identified during processing.

The hypothecation scheme is positive in two respects. First, it provides an extra funding element to support rollout of ANPR. Second, many of the offences are important to road safety, and hypothecation of fine revenue encourages these offences to be taken seriously.

Hypothecation enables a significant funding source to provide support for ANPR; however, cost recovery is unlikely to meet the full costs of ANPR enforcement. During the pilot scheme, hypothecation contributed to less than 10% of expenditure incurred for staff costs alone:

> Overall the cost recovery process realised an additional £926,000 in total to the 23 Laser 2 forces over a nine-month period. While these monies did not cover the costs of the enforcement (approximately £12 million in the same period), these monies were seen to be worthwhile, for example in helping to improve the intelligence capability of the ANPR teams and providing the administrative support for the teams. (PA Consulting 2004: 123)

Among the challenges is a low payment rate: only 42% of tickets were paid, compared to an 82% payment rate across all police Fixed Penalty Notices (ibid: 117).

It is also unclear how the list of offences subject to hypothecation was selected. The offences cover not only those that are detectable through use of ANPR (such as no VED) but also offences only detectable through observation (such as mobile phone use and no seatbelt). While many of the offences are related to safety, the list is limited, and not all road safety offences subject to fixed penalty notices are included. In future assessments of ANPR and the hypothecation scheme, consideration should be given to how ANPR can be used to contribute most towards safety and in particular towards reducing risk for the most vulnerable.

Recommendation 25: The Home Office should review offences subject to hypothecation under ANPR and if practicable extend the scheme to offences vital to the safety of vulnerable road users, such as zebra crossing regulations and advance stop boxes for cyclists.

> One of the difficulties with ANPR is making sure that the data is live and is accurate. … There is a requirement to make sure that the database is right and accurate, so that the vehicle we believe we're stopping is the vehicle that we are stopping. Again, back to intelligence – if your intelligence is wrong, then it wrecks the rest of the operation. ANPR is excellent, but … you can have the technology, but unless you have the technology properly backed by the resources to deal with it, ANPR is useless. Therefore, you've got to have the commitment to the costing of ANPR, because it is expensive pieces of kit, but you also have to have the commitment to resource the backup that's needed for that.

While ANPR has been broadly successful, there are a number of challenges and limits that can prevent most effective use from being made of the technology.

The key problem identified by police is database accuracy. Systems such as ANPR can only be as successful as the data which they rely on. Police felt that inaccurate or out of date data not only led to inefficient use of police resources through unnecessary stops but also to reduced public confidence in the system, which could impact badly on other areas of police work. In the Laser 2 pilot, 'hits' leading to vehicle stops were judged by officers to be correct 83% of the time for local force databases, 79% for PNC checks, but only around 40% for DVLA 'no VED' or 'no keeper' databases. Disturbingly, the percentage of 'hits' judged to be accurate fell for all the databases between the Laser 1 and Laser 2 pilots, and despite a programme of bar-coding and database modernisation, DVLA database accuracy showed a continued drop in quality during the course of the Laser 2 pilot (PA Consulting 2004: 101-103).

> The DVLA database is very inaccurate – the one that's on ANPR. A number of the vehicles that show 'no tax disc' when we stop them have actually got a tax disc on them. Now I fully accept that their database is going to be a couple of weeks out … but when we get some people who get stopped several times because it shows no tax – and you know they've got a tax disc because we've stopped them before – it's very embarrassing.

Officers expressed frustration with the DVLA database in particular for its inaccuracy (although most acknowledged that steps were being taken to improve this) and for its lack of currency: as most ANPR teams receive the ANPR database monthly and vehicle registrations take time to process, information from the DVLA database in use by ANPR teams can be two months out of date or more. In practice this leads to ANPR operators checking 'hits' from the DVLA database manually against the PNC – an

unnecessary level of bureaucracy. As noted previously, measures to improve the accuracy of the DVLA database should assist with this, but more direct access to the database is also necessary.

Recommendation 26: DVLA and PITO should bring forward direct live access to the DVLA database as soon as possible.

Frustration was also expressed at the level of accuracy of the MIB database apparently due to delays by some insurance companies in updating driver details. The insurance industry has agreed with DfT a target of 95% of records to be updated within 14 days. This target, however, has not been met: as of January 2005, 89% of standard policy records, 52% of 'open cover' policies and 74% of vehicles under open cover policies met the 14 day target (PA Consulting 2005b: 23). This leaves considerable room for improvement. The Greenaway Report on uninsured driving recommended that real time data entry to the motor insurance database be introduced to aid enforcement (Greenaway 2004). However a subsequent PA Consulting report found that motor insurance data that is up to 7 days out of date are sufficient to support effective police ANPR enforcement (2005b: 38).

> The major new technology as far as roads policing is concerned is ANPR. … Criminals tend to be drivers, so they travel. And so that's where ANPR becomes useful. The hit rate for provincial forces like us is likely to be less, because we haven't got the same rate of criminality.

In rural areas or in operations targeting a particular crime type such as deception burglary, a low 'hit' rate also formed a limitation to the effectiveness of ANPR. The rate of positive reads varied substantially between forces in the pilot, from 1.7% for Hertfordshire to 6.3% for Northamptonshire; rates may also vary considerably within force areas. This is not yet an issue for most forces, as police registered more hits than they had resources to stop: nationally, intercept teams stopped 9.2% of vehicles that registered as a 'hit' (PA Consulting 2004: 61). However, if continuous registration and use of ANPR lead to improvements in compliance, this could become an issue more widely. This suggests that an intelligence-led approach to deployment of ANPR is necessary.

A further challenge comes from tensions arising from the dual usage of ANPR to enforce both major crime and road safety. Concern was expressed that when intercept teams are tied up dealing with minor crime such as no VED they will be unavailable to stop major criminals. Equally, there was concern that the success of ANPR in apprehending criminals and recovering stolen goods could lead to the resource being diverted away from roads policing, which could continue to undermine the effectiveness of road traffic enforcement.

The final challenge is one of resources. As well as capital costs of ANPR equipment and considerable staffing costs needed for its effective operation, continued investment of resources to update the databases that ANPR relies on will also be necessary. A long-term political commitment to ANPR is needed to ensure its success.

Better use could also be made of existing resources, through integrating ANPR with other systems. Some police forces have very successfully worked in partnership with Local Authorities to enable ANPR to be combined with town centre and traffic management CCTV systems. However this cooperation does not seem to be apparent in all areas, and not all new CCTV systems are compatible with ANPR. Joint enforcement operations using ANPR may also be possible between police and other national bodies using ANPR technology such as the Highways Agency, DVLA, VOSA and HM Revenue and Customs. As noted by the Laser 2 evaluation:

> Many Government departments and agencies … have invested heavily in ANPR technology. There has been little coordination of this activity. In some cases, this has led to duplication of effort and wasted resources. Now is a good time to take stock, to plan for future investment and make sure that there is best use from existing infrastructure. (PA Consulting 2004: 140)

Recommendation 27: Existing ANPR infrastructure - including cameras operated by the Highways Agency for traffic management purposes and by DVLA, VOSA and HM Revenue and Customs for enforcement purposes - should be made available to the Police to enable maximum use of existing resources.

Recommendation 28: The Home Office should issue guidance to Local Authorities to ensure that Local Authority CCTV systems are compatible with ANPR. Where appropriate, Local Authorities should be encouraged to develop joint operations with police.

> There's no reason ANPR can't be linked up to town centre CCTV systems, can't be linked up to helicopters, can't be linked up to other on-street furnishings, and almost get to the stage where you've got complete coverage across the country. I think that would have huge and significant effect on vehicle crime.

Collision analysis

In addition to databases of driver and vehicle information used for enforcement purposes, police also gather and utilise information relating to road casualties and collisions. Through analysis of these data, geographies of risk are created, indicating when and where crashes are most likely to happen, and enabling roads policing resources to be targeted according to intelligence.

Police are the primary source of data on road casualties: they attend injury collisions and record the details through STATS19 forms. Information collected includes location, road conditions, vehicles involved, time of day, injuries and severity, speed limit, weather and causation factors. These data are analysed in-force and by external bodies (e.g. local authorities, consultancy firms or TfL) and are then returned to police in a refined form: the data become intelligence. The data is also used to inform the annual statistical publication 'Road Casualties Great Britain'.

This intelligence is used in a variety of ways, including in the tasking of roads policing and in decisions about where to deploy technologies such as speed cameras. One force reported issuing cards to roads police to remind them of the areas and times when crashes most frequently occur.

The information gathered by police is utilised by a wide range of other actors. Ericson and Haggerty label police as 'knowledge workers', due to their role in gathering information that will be used by the whole range of bodies involved in road risk management, including Local Authorities, central government, public health bodies, insurance companies, vehicle manufacturers and safety organisations (1997: 10, 24). They view this 'risk communications' function as a central task of the police. Given its centrality in developing knowledge about road safety, its importance should not be overlooked.

Technology is essential to this process of conversion of data into useful intelligence. Computerised databases involving GIS mapping can create complex pictures of road risk and are able to identify swiftly problems as they occur. This information can also be combined with intelligence on offending, such as vehicle speeds and prevalence of drink driving. A recent PA Consulting report also suggested that STATS19 data could be linked to other databases such as the Highways Agency Journey Time Database, police command and control logs and databases recording variable message sign-setting (PA Consulting 2005a: 4-5). This could help road safety interventions be better targeted:

> There is more that can be done to look at the effects of speed and casualties and the complex relationships between cause and effects. By linking large databases together, using data mining techniques, better understanding can be developed and interventions can be targeted. (ibid. 13)

Recommendation 29: ACPO should encourage police forces to take advantage of Geographical Information Systems to provide detailed mapping of local casualty and collision hotspots and to enable an intelligence-led approach to roads policing.

Mobile data entry terminals

Technology should be able to assist this process of data collection. Police currently complain of having to record both crash and offender information multiple times on multiple forms, leading to a complex and bureaucratic system. Mobile data entry terminals present a significant opportunity for improving efficiency and accuracy and saving police time. They are currently under development.

> We still have to write the person's name, address, date of birth, where it happened, the vehicle details, the road where it happened and all those things so many times. You'd have thought that these days … with computerisation that you'd be able to put in somebody's details on a screen and just tick the boxes for the forms you needed, and it would just come up. … But we're not there yet. The red tape involved and the paperwork side of roads policing and in the police force in general is horrendous.

The structure of the system will be a crucial determinant of its effectiveness. Database workers have distinguished between mobile data entry terminals as a document management system, and systems that allow direct database entry. The latter may be most effective, as it would allow for data to be updated as quickly as possible. However, some form of accountability would have to be introduced into the system to monitor entries and to discourage partial or incomplete records. Mobile data entry terminals could also incorporate a Global Positioning System (GPS) function and GIS capabilities to provide more accurate information about the location of collisions and how the crash occurred.

> [Mobile data entry terminals] will have a massive impact. At the moment, when an officer attends a scene, they write it down on a piece of paper on a form, that form then going into a central unit and they enter it into a central computer. What this will then provide is direct entry into the central system, so that immediately, that's available to be shared, to be analysed, so you've got fast time access to an accurate system. So it will free up time of a number of people around the organisation, and also it will enable better research and better analysis of that data.

While there is clear potential for mobile data entry terminals to reduce police bureaucracy and improve the quality of collision data, in other countries mobile data terminals have not always had the effect that they are hoped for. Ericson and Haggerty noted in a study of policing in Canada:

> A police organisation introduced computers into patrol cars to permit direct entry of occurrence reports on the assumption that officers would no longer have to return to the office to complete their reports, meaning that they could spend more time on the street. However, many officers preferred to prepare their reports using computer terminals in the office and, according to office staff, actually spent more time than ever there. Ironically, the effect of new technology was less visibility to and more distance from the public. (1997: 416)

This suggests the introduction of mobile data entry terminals should be accompanied by evaluation to assess any unintended consequences. Given the possible long-term efficiency gains that mobile data entry terminals could deliver, the Home Office should consider a pilot project similar to that first used for ANPR to provide 'pump-priming' money and to assess the effectiveness of the new technology.

As well as mobile data entry terminals to record data, mobile data terminals could also communicate information to the police, giving them more information at the roadside. As noted by the Police Scientific Development Branch (PSDB):

> In the police environment, these devices offer patrol officers the opportunity to access a number of computer systems normally only accessible from police buildings. … Mobile Data Terminals can provide an effective tool to make the checking of suspects more efficient and safer, improve the efficiency of staff and enable a police officer to spend more of their time on patrol.
> (PSDB 2002: 6)

The Home Office Scientific Development Branch (HOSDB - previously PSDB) is currently undertaking development work on mobile data terminals for both communication and data entry.

Recommendation 30: ACPO should issue guidance encouraging police forces to roll out mobile data entry terminals in order to improve STATS19 collision reporting, facilitate issue of fixed penalty notices and provide mobile access to data. Mobile data entry terminals should include GPS and GIS capabilities in order to provide more accurate information about the location of collisions.

Chapter conclusions

Use of information technology can play a major role in roads policing and road safety. Effective use of information and intelligence allows targeting of resources towards the individuals, locations and behaviours that present the most significant risks. Enforcement of the minor offences may also contribute to the recognition that driving is a privilege that occurs within a carefully regulated system, and this system is of central importance for road safety.

Information technologies necessarily focus on data that are both discrete and quantifiable. They cannot directly address aggressive or other bad driving behaviour. The advantage of ANPR is that it enables observation as well as enforcement via reference to databases: it allows enforcement of vehicle registration offences, bad driving offences and criminal offences. However, given the conflicting aims of ANPR, it should not be seen as a replacement to traditional roads police patrols.

Instead, information-based systems should be viewed as establishing a base level of knowledge about a person's entitlement to drive. This needs to be supported with enforcement activity aimed at monitoring particular driving behaviours that may cause risk or assessing fitness to drive at a particular time. This can also be supported through the use of new technologies: surveillance technologies such as speed cameras are discussed in the next chapter, while impairment detection technologies are discussed in chapter 7.

Chapter 5

Surveillance and Technology

Introduction

Whereas the previous chapter focused on technologies related to the information infrastructure of enforcement, this chapter looks at new and emerging tools of enforcement that allow a focus on particular driving behaviours, such as speeding or red light violations. Much of this new camera-based technology links into the risk management approach by concentrating on prevention of certain types of behaviour that are known to be connected to crashes or casualties, rather than concentrating purely on breaches in the law. Other types of camera, especially those operated by civil enforcement bodies, focus more on traffic management.

This chapter addresses the role of surveillance technologies in road traffic enforcement. Surveillance technologies play an increasingly prominent role in road traffic enforcement, and operate by deterring drivers from offending by making them aware that their behaviour is being monitored. Speed cameras – among the most significant of these new technologies - are discussed in detail here as a case study. Red light cameras are also addressed. Surveillance technologies have also enabled a movement towards increasing 'decriminalisation' of traffic offences, and use of CCTV systems for civil enforcement is discussed. Surveillance technologies can also contribute to supporting mainstream roads policing. 'Video cars' are discussed an example of this. Finally, technology in this field is progressing rapidly, and two further possible future uses of surveillance technologies are highlighted: seatbelt detection and close following detection.

The role of surveillance

Surveillance through cameras has become an increasingly dominant feature of policing, enforcement and the urban experience, and is perhaps one of the most significant uses of new policing technology. As Norris and Armstrong have argued, 'from the moment we leave the privacy of our homes, we are under almost permanent camera surveillance' (1998: 3). This camera surveillance includes private security CCTV surveillance in places of work, shopping, leisure and transit; police or council-run CCTV for street crime reduction; and a plethora of cameras monitoring vehicles and roads. These include not only speed and red light cameras but also CCTV systems for civil enforcement, ANPR systems of traffic management and police video and ANPR surveillance. This represents a form of police intelligence, as discussed in chapter 3, in that it provides a continual supply of information about the movement of traffic and contraventions of traffic law. Police and other enforcement agencies can act on this information in a number of ways, including automating enforcement, vehicle stops or a more general monitoring of traffic conditions.

However, a number of theorists have suggested that surveillance goes beyond a form of information and constitutes a new form of 'policing space'. Cameras, according to this perspective, make the object of the surveillance aware that he or she is being watched, and he or she adjusts his/her behaviour in response. This is often conceptualised as an operation of power or 'social control'. As Raco argued (following Foucault [1977]),

> One of the main benefits of surveillance technologies and techniques is that they maximise the effectiveness of available resources by using the actions of subjects in their own governance. (2003: 1879)

In simpler terms, it means that surveillance is successful not by catching and prosecuting the maximum number of offenders, but by encouraging individuals to monitor their own behaviour and adjust it accordingly – in effect, encouraging drivers to police themselves.

Raco argued that surveillance represents a hybrid of 'situational' approaches to crime reduction, which seek to reduce opportunities for criminal behaviour through design, and 'governmental' strategies, which seek to modify behaviour (2003: 1872). In road traffic enforcement, cameras are seen as a situational measure to treat particular sites and as a broader enforcement strategy aimed at behavioural change.

Norris and Armstrong (1998: 7) directly relate this focus on camera surveillance to Feeley and Simon's concept of 'actuarial justice': instead of concern with 'diagnosis, intervention and treatment of the individual offender', cameras are 'part of a strategy of managing danger'. As will be discussed further below, this is particularly evident in technologies such as speed and red light cameras which are used with an explicit aim of reducing casualties and managing risk at particular locations.

Speed cameras

> We want to stop you speeding, not catch you speeding. … This is not about enforcement; this is about making our roads safer.

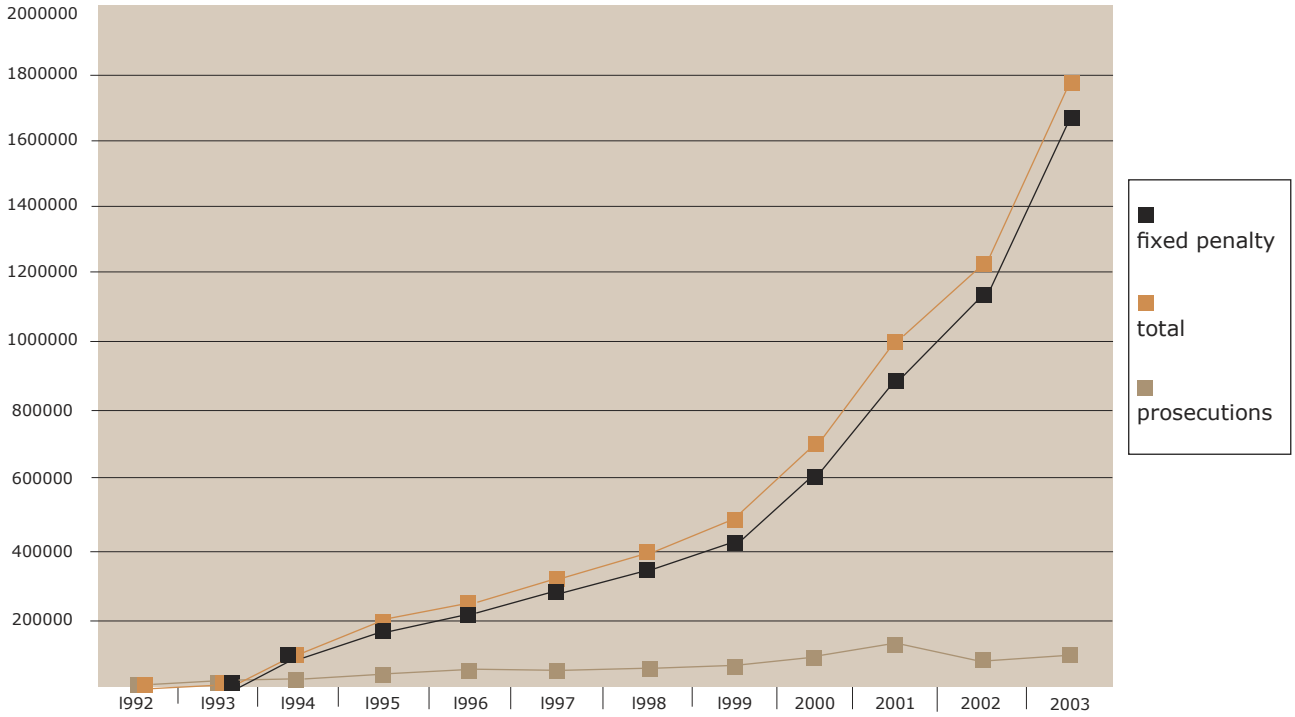
Speed cameras are among the most visible new enforcement technologies. They have also been among the most controversial, with a high profile debate about the use of cameras in the media. This section will provide an overview of current usage of speed cameras, address how they fit in to other trends identified in this report such as intelligence-led and risk management approaches to roads policing, and make recommendations for how best use can be made of the resource.

History

The first speed camera to be used in the UK came into operation on Twickenham Bridge in London in 1990. In 1991, the Road Traffic Act enabled more widespread use of cameras by clarifying powers relating to photographic evidence. The first major investigation of speed camera effectiveness was the West London Speed Camera Demonstration Project, operated by the Highways Agency, which began in October 1992. The study monitored speed and collision data for 36 months before and after at 21 signed speed camera sites and at control sites. It found that accidents at camera sites decreased by 12.3%; 8.9% of this decrease was a directly attributable to cameras. Fatal and serious casualties were reduced by 31.0%, of which a 12.1% reduction could be directly attributable to the presence of cameras. Fatal accidents showed an overall reduction of 69.4%; 55.7% is indicated to have been directly attributable to the cameras. (London Accident Analysis Unit 1997: 3).

Despite these findings, numbers of speed cameras remained relatively limited in the 1990s, and speeding offences detected by camera increased incrementally rather than exponentially, as the figure below[1] indicates.

Speeding offences detected by camera: England & Wales 1992-2003



In 1995, the Home Office commissioned a further review of cost effectiveness of speed and red light cameras. The report addressed 420 speed camera sites in 10 force areas and found that speed cameras generated five times their cost in casualty reduction benefits after one year and twenty-five times their

1 Sources: Fiti et al. 2005: 15; Wilkins and Addicot 1998: 13

initial cost after five years. Accidents fell by 28% at camera sites, and speeds were reduced by an average of 4.2 mph per site (Hooke et al. 1996: 24-25). The review also noted that cost could be a barrier to Local Authorities and police forces installing and operating cameras, and that the considerable net benefits generated by cameras 'do not … always accrue to those agencies who bear the costs of installing and running such cameras' (ibid 47).

These findings led to new funding mechanisms for cameras being sought. A pilot hypothecation scheme (initially with 8 police forces) allowing the costs of speed enforcement to be met from fixed penalty revenue began in 2000. Based on positive early findings, legislation enabling the national rollout of the hypothecation scheme was incorporated into the Vehicles (Crime) Act 2001. This enabled a rapid expansion in enforcement by camera, and there are currently over 5,000 camera sites (although only a proportion of these will have a camera in operation at a given time).

Operation

There are several different types of camera in use under the hypothecation or 'netting off' scheme, all of which are certified under the Home Office 'type approval' system. Mobile cameras are operated from a vehicle at the roadside, and can be deployed to different locations according to need. Among fixed cameras, the GATSO is the most ubiquitous. It uses radar to measure speed, and records a pair of photos of the offending vehicle onto wet film. Truvelo cameras can photograph the front or rear of a vehicle, and are activated by sensors within the road. RedSpeed cameras are also activated by a sensor in the road, and are fully digital: rather than police needing to collect the film from the camera manually, the images can be downloaded directly to the processing office via an ASDL line. SPECS systems operate through a pair of automatic number-plate recognition cameras measuring time over distance between two points, and so are used to control average speeds along a length of road, rather than just at a particular point. Different types of camera may be suitable for different types of road or different types of problem. In particular, individual cameras such as GATSO or Truvelo are typically used where there has been a cluster of collisions at a particular location, while SPECS may be most useful where a high density of risk is evenly distributed over the length of a route. However, as SPECS is considerably more expensive than other camera types, 'the use of time over distance equipment needs to be separately justified through site specific analysis' (DfT 2004a: 31).

Cameras under the safety camera hypothecation scheme are administered by safety camera partnerships, which are based in police force areas and are comprised of local authorities, the police, the Magistrates' Courts, the Highways Agency and other key stakeholders, such as local health authorities. Partnerships set out annual enforcement plans and submit them to the DfT for approval. DfT publishes guidelines (the 'safety camera handbook') governing the operation of the safety camera scheme, including allowable expenditure and criteria for the placement of new cameras. Under the hypothecation scheme, partnerships can reclaim the costs of enforcement, including expenditure related to installing new cameras, maintaining existing cameras, processing fixed penalties and some advertising and educational costs. However, general road safety expenditure is not allowed, nor are other speed reduction tools such as Community Speedwatch schemes (DfT 2004a: 50).

The handbook specifies that fixed camera sites should be between 0.4 and 1.5 km in length, and at least 4 KSI collisions per kilometre must have occurred at the site within three years. Mobile sites are between 0.4 and 5 km in length and must have had 2 KSI collisions per kilometre. For both types of site, speed surveys must indicate that the 85th percentile speed is at or above the ACPO threshold (speed limit plus 10% plus 2 mph), and that 20% of drivers are exceeding the speed limit in normal conditions. In addition, there must have been a site survey by an engineer to verify that 'no other cost effective engineering solution can be implemented to improve road safety' at the site. Up to 15% of enforcement hours are permissible at sites of community concern that do not meet these criteria (DfT 2004a: 30).

In 2003-4, cameras generated £112.2 million in fixed penalty revenue. Of this, £91.8 million was returned to safety camera partnerships to cover the cost of enforcement; the remaining £20.4 million accrued to the Treasury's Consolidated Fund (Hansard 11 July 2005: Column 786W).

The hypothecation scheme has been an effective method of enabling camera enforcement and funding the expansion of the safety camera programme. As noted above, however, the scheme has not been without critics. In particular, the policy of returning surplus funds to the Treasury has led to some critics labelling cameras as a 'stealth tax'. In response, both critics and supporters of cameras have argued that money from fines should be fully ring-fenced for road safety purposes. This is an attractive proposition. Full hypothecation would reinforce the message that cameras are placed on safety grounds and may increase public confidence in cameras. The £20 million that cameras accrue for the Treasury represents a very small contribution to the total in the Consolidated Fund, but could make a major contribution towards funding life-saving road safety improvements.

However, there are two difficulties with this proposal. First, safety camera revenue is an unpredictable

income stream, as it depends on a continued level of driver offending. For this reason, it would not be suitable to replace Local Transport Plan funding for road engineering improvements. Secondly, although Local Authorities are members of safety camera partnerships, they are not coterminous with them. Full hypothecation of revenue to safety camera partnerships may create boundary and jurisdiction issues about who administers local road safety advertising and engineering projects and how they are funded. There are two options for dealing with these problems. At the very least, spending guidelines for safety camera partnerships could be changed to allow further spending on educational initiatives and advertising regarding speed and red light cameras; if camera revenue dropped off this would indicate greater compliance and perhaps less of a need for advertising. These campaigns could be run in addition to, rather than in place of, local authority advertising and educational initiatives, just as national road safety advertising complements rather than detracts from advertising carried out at a local level. Another more interesting possibility is for surplus fine revenue to be used for a road safety innovation fund, to allow locally-relevant solutions to be developed for road safety problems. Projects supported by such a fund could either be led by Local Authorities or other organisations, would be short-term in nature, and would be aimed at testing new approaches in road safety. Such a fund would be in addition to and outside of mainstream Local Transport Plan funding, so the insecurity of the income stream would cause fewer difficulties.

Recommendation 31: The Government should fully hypothecate safety camera revenue by introducing legislation to allow 'surplus' revenue to form local road safety innovation funds. As an intermediate measure, DfT should revise Safety Camera Partnership guidelines to allow safety camera partnerships to spend more on road safety advertising and educational initiatives.

Research

As speed cameras have now been in use for a number of years, a considerable amount of evidence has been assembled evaluating their effectiveness. Research establishing links between speed and collision frequency and severity underpins the safety camera programme. Among the points established by speed research are:

- Speed is a major contributory factor to casualty collisions, especially crashes resulting in death (Mosedale and Purdy 2004)
- As a general rule, a 1mph reduction in average speed leads to a 5% reduction in collisions, and slowing the fastest drivers would yield the greatest safety benefits (Taylor et al. 2000)
- Speeders are disproportionately involved in collisions (Stradling et al. 2003)
- The faster the speed at impact, the more severe the resulting injury; for pedestrians struck by cars, the change between mainly survivable and mainly fatal collisions occurs between 30 and 40 mph (Ashton 1981).

> There is not in my belief the public mental link between speeding and death, and the reason for that is that … if on occasion they do 35 and nothing happens, that's reinforcing the behaviour.

The safety potential of speed cameras lies in their ability to contribute to speed reduction. The three-year evaluation of the hypothecation programme found that speed cameras were very effective at reducing vehicle speeds. Across all new camera sites, speeds dropped by 7% or 2.4 mph. At fixed sites, the number of vehicles exceeding the speed limit fell by 71%; at mobile sites this was 21%. Cameras were particularly successful in reducing excessive speeding (i.e. exceeding the speed limit by 15 mph or more): at fixed sites, this was cut by 80%; at mobile sites it fell by 28% (Gains et al. 2004: 5).

This speed reduction is associated with significant reductions in road casualties. The three-year review of the safety camera programme found that after taking into account national trends, there was a 40% reduction in the number of KSIs at camera sites, including 51% at fixed sites and 28% at mobile sites (Gains et al. 2004: 6). A smaller-scale study employing sophisticated techniques to account for possible confounding factors such as regression to the mean found that cameras contributed to a 4 mph reduction in mean speeds and a total reduction in collisions of 22% (including an 11% reduction in fatal and serious collisions) (Mountain et al. 2005: 742). International evidence also supports these findings. A recent systematic review of research on speed cameras in the British Medical Journal found that 'all studies reported a reduction in road traffic collisions and casualties'. At camera sites, collisions were reduced by between 5% and 69%; injuries were reduced by between 12% and 65%; and deaths were reduced by between 17% and 71% (Pilkington and Kinra 2005: 331-4). However, the report was critical of the design of many of the research studies, and argued that randomised trials or 'controlled introduction of

speed cameras with careful data collection' is necessary to improve the evidence base. Given the political circumstances surrounding speed cameras and the need to retain public confidence that cameras are appropriately sited at high-risk locations, new randomised trials may be unworkable. However careful data collection and monitoring of speed camera effectiveness will continue to be important.

Research also suggests that public support for speed cameras has consistently remained high, despite adverse publicity in some sections of the media. Opinion research commissioned as part of the three-year evaluation of the safety camera scheme found 79% of people questioned agreeing with the statement that 'the use of safety cameras should be supported as a method of reducing casualties'; 68% agreed that the primary use of cameras was to save lives (Gains et al. 2004: 7). The European-wide SARTRE3 survey found that 87% of UK drivers see 'driving too fast' as a cause of accidents, 78% support the use of cameras for speed enforcement and 38% have an expectation of being monitored for speed. In each of these cases, the UK ranks above the European average (SARTRE3 2004: 58-9). Similarly, in November 2003 a 'poll of polls' amalgamating six surveys found that support for cameras averages at 74% (Transport 2000 2003). Occasional newspaper polls, however, report findings at odds with other surveys (e.g. a 2003 *Daily Telegraph* poll found 'seven in 10 motorists think speed cameras are mainly revenue-raising devices that do little to reduce car accidents' [Johnston 2003: 4]). Broadly speaking, it could be concluded that public support for cameras remains high, but given the intense media interest in speed cameras, continued communication about their role and purpose will be needed for this level of support to be maintained.

Recommendation 32: Given the remarkable success of speed and red light cameras, DfT and partner organisations should include information on their casualty reduction potential and purpose in Think! advertising.

Speed cameras and the risk-management approach

The safety camera programme could be interpreted as an intelligence-led risk-management strategy (as described in chapter 3) in several respects. First, it requires data on driver speeds, collisions and casualties to be collected. Analysis of these data becomes intelligence on where violations are occurring and where they produce the most risk; this knowledge can then be used to develop appropriate interventions for controlling that risk. Second, speed enforcement isolates a quantifiable behaviour that causes risk (speeding), but also focuses on a group that are known to be more crash involved (speeders) (see Stradling 2003). The target population of speed enforcement is therefore selected on the basis of identifiable risk. Third, the safety camera partnership approach involves numerous stakeholders in the process of enforcement – a good example of 'policing beyond the police'. The strategy of surveillance also incorporates drivers themselves into this risk management process by persuading them to monitor their own behaviour. Finally, cameras are an intervention aimed at reducing risk at a geographically specific site. This blurs the divide between a road treatment and an enforcement strategy.

However, the stringent requirements that underlie this strategy have been criticised on the grounds that they prevent cameras from being used more widely as a means of managing risk. The casualty criteria lead to accusations that police 'wait for a death to happen' before taking action at a site. Under the criteria, risk is assessed on the basis of past collisions; perceived risk (which may affect road usage by cyclists and pedestrians and therefore casualty levels) is not measured. The requirement that at least 20% of drivers are exceeding the speed limit also prevents camera enforcement from taking place on roads where a small minority of speeders cause a problem. Hence, while the requirements lead to greater acceptability of cameras at a national level, at a local level they can undermine community confidence. At present, 15% of total camera hours are allowed to go to sites of community concern. In light of these difficulties, these guidelines may need to be revisited.

Recommendation 33: Subject to open and transparent local consultation processes, DfT should revise Safety Camera Partnership guidelines to enable more flexibility in placing cameras in areas of community concern.

One innovative way of addressing community concern about speeding is the Community Speedwatch initiative, which has been employed by a number of forces in the UK. In Community Speedwatch programmes, local residents participate in measuring speeds and identifying problem sites, and are trained in the use of speed detection equipment. Instead of fixed penalty notices, however, drivers are sent warning letters from the police. This method may be effective in communicating to speeding drivers the message that speeding is of serious concern to local communities, and empowers communities to take action on road risk. However, no comprehensive evaluation of Community Speedwatch schemes has yet been completed.

Recommendation 34: DfT should encourage and evaluate innovative initiatives such as Community Speedwatch.

The site definitions in the hypothecation scheme guidelines also prevent camera usage as a zone-wide treatment: enforcement is limited to specific sites. Local Authorities, Transport for London and the London Assembly are lobbying DfT for powers to undertake pilot schemes to enable them to trial use of cameras as an alternative to road humps in 20 mph areas (London Assembly Transport Committee 2004: 21). Technology is under development that could monitor vehicles entering and leaving a zone and calculate their speed based on time elapsed. This technology has considerable potential for use as a speed management tool in residential areas, and its effectiveness should be investigated.

Recommendation 35: DfT should commission a pilot scheme to explore the possibility of using speed-over-distance cameras as area-wide treatments. Depending on the results of the pilot, DfT should amend Safety Camera Partnership guidelines to allow camera enforcement of 20mph zones under the hypothecation scheme, where other options are impractical.

As argued above, the function of surveillance is the internalisation of behavioural change and the self-monitoring of behaviour. Speed cameras have seemingly been successful in this: speeding at fixed camera sites has been reduced by 71%, and excessive speeding has been reduced by 80%. As well as acting as a deterrent to speeding at specific camera sites, there is some evidence that cameras contribute to a general deterrence against speeding more widely: speed surveys show that the overall proportion of drivers violating the 30mph urban limit in uncongested conditions has steadily dropped from 69% in 1999 to 53% in 2004 (DfT 2005c).

As well as acting as a general deterrent, cameras may also act as a specific deterrent to discourage drivers who have been caught from reoffending. Recent evidence suggests that repeat offenders may be modifying their behaviour (at camera sites, at least) to avoid disqualification. While the number of fixed penalties issued for speeding has grown massively over the last 10 years (see chart above), the number of people disqualified for speeding or through 'totting up' has remained relatively stable, at 30-35,000 per year (Fiti et al. 2005: 37). This suggests that the deterrent effect of penalty points may be considerable; DfT is currently commissioning further research into this.

> More and more I'm concerned about how people 'surf' the cameras. They adjust their speed whenever they go past the camera. After they pass a camera they take off again. I'm not sure if that is achieving what we want to achieve. I would say we need technology to address that.

The current policy of publicising and signing camera locations and painting cameras bright yellow adds to the deterrent effect of cameras at particular locations; it also alerts drivers to the presence of a collision hotspot and may increase overall awareness of cameras. However this may also undermine the deterrent value of cameras away from camera sites. The RAC Report on Motoring (RAC 2005) identified the problem of 'driving under the radar': some drivers slow down at camera sites only to speed up again. This problem needs to be assessed. DfT is currently commissioning research into how drivers react to cameras. Possible methods of dealing with this issue include greater use of SPECS cameras; more use of mobile cameras; and the tactic of placing a mobile camera immediately after a fixed camera to respond to drivers increasing their speed. The issue of visibility of cameras may also need to be reassessed. The decision to require all cameras to be bright yellow appears to be informed by political compromise rather than research. Research from New Zealand suggests that covert cameras may be more effective in achieving a general reduction in speed. Similar trials should be conducted in the UK.

Recommendation 36: DfT should commission research into the comparative deterrent factors and effects on speed of overt and covert cameras and revisit the camera guidelines in light of the findings.

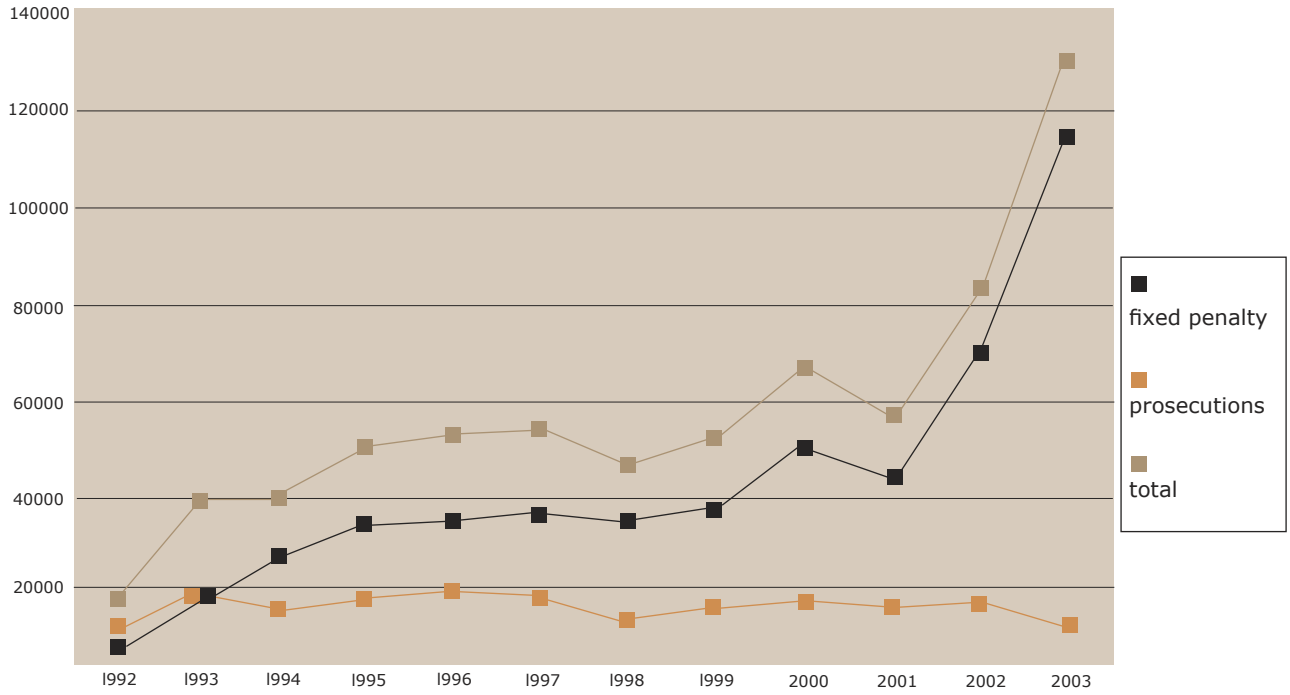
Red light cameras

Red light cameras are also part of the safety camera programme in the UK. They operate in a similar fashion to speed cameras: a roadside camera will take a photograph of a vehicle's number plate if a violation of a red light is detected. Like speed cameras, offences are processed by safety camera partnerships, and fine revenue may be hypothecated. Safety camera guidelines for the hypothecation scheme require a minimum of 2 KSIs at a junction over three years before a red light camera can be installed (DfT 2004a: 30).

> Red light cameras – the public seem less fraught about red light cameras. We don't seem to get any negativity about running red lights, or very little. But I'm not sure we aren't getting close from doing most of the junctions where you get a cost-benefit from doing it.

Both camera numbers and numbers of offences detected have been significantly lower for red light cameras than for speed cameras: around ten times more speed offences are detected by camera than red light cameras. However, hypothecation has enabled an expansion in enforcement of red light running, and offences dealt with have doubled within two years (see figure below[2]).

Red light offences detected by camera: 1992-2003



In the UK, red light cameras have been significantly less controversial than speed cameras. Public support for red light cameras remains high: the SARTRE3 opinion survey found 50% of drivers in the UK were 'very' supportive of red light cameras (compared to 37% for speed cameras). This is considerably higher than the European average (SARTRE3 2004: 183).

Research indicates that red light cameras are effective in reducing violations and reducing casualties. The 1996 Home Office review of the cost effectiveness of automated traffic cameras found that collisions fell by 18% at traffic light sites or by 0.48 per site per year (Hooke et al. 1996: 23); this leads to a benefit-cost ratio of 2:1 over one year and 12:1 over five years (ibid: 35). A summary of eight studies from Australia, Singapore and the USA found reductions in injury collisions of between 7% and 46%; however several of these studies noted small increases in rear-end collisions (Elliott and Broughton 2004: 41). As rear end collisions are often less severe, the reduction in right-angle collisions compensates for this. Similarly, a recent systematic review of research on red light cameras in *The Cochrane Library* found that red light cameras can reduce crash-related injuries by between 10% and 30% at camera sites and can reduce red light running by nearly 50% (Aeron-Thomas and Hess 2005). As with speed cameras, however, no randomised trials have been conducted, which suggests that the quality of research is less than ideal.

Red light cameras may be incorporated into a risk-management approach to road traffic enforcement in much the same way as speed cameras: they require data collection on violations and casualties; enforcement is by partnership rather than by police alone; surveillance encourages drivers to monitor their own behaviour; and cameras combine situational and behavioural strategies of enforcement.

Broadly speaking, then, red light cameras can be viewed as successful examples of new enforcement

2 Sources: Fiti et al. 2005: 15; Wilkins and Addicot 1998: 13

technologies that have made a significant contribution towards casualty reduction. Red-light running is substantially less common than speeding, however: only 12% of UK drivers self-report driving through amber lights (SARTRE3 2004: 57), compared to 55% of drivers who admit to speeding on a daily basis (RAC 2005: 24). The potential for long-term expansion of this technology may be therefore be limited, as saturation point is reached: some police have suggested that most of the sites where a red light camera would be cost-effective have already been treated.

CCTV and civil enforcement

Speed and red light cameras enforce criminal offences and are operated by police in partnership with other agencies. However, as well as surveillance by police, new technologies have also enabled surveillance and enforcement by non-police bodies. As discussed in chapters 2 and 3, an increasingly significant aspect of the 'diffusion of roads policing' is the progressive decriminalisation of a growing number of traffic offences and the increase in civil enforcement. Following recent legislation, offences subject to civil enforcement now include a range of moving traffic offences including box junction and bus lane violations and banned turns as well as parking.

New technology has been instrumental in bringing about this trend towards decriminalisation. While decriminalised parking was initially enforced by Local Authority-employed traffic wardens, enforcement of moving traffic offences tends to be conducted through camera-based technology. This ranges from standard pan-tilt-zoom CCTV technology to more complex recent innovations that automatically recognise violations. As the London Local Authorities Act 2000 enabled civil enforcement of moving traffic offences specifically in London, TfL has one of the most extensive civil enforcement programmes in the country, which covers bus lane violations, parking on red routes, box junction offences and banned left and right turns. There are three types of camera in use by TfL to enforce bus lane violations and moving traffic offences. First, manned CCTV systems involve pan-tilt-zoom cameras controlled remotely by operators, who will have the ability to select cameras and monitor different areas of road. When a contravention is witnessed, the operator will note the time and offence, and will review the recording and input details of the vehicle and offence into a separate system at the end of the enforcement period. Second, unmanned CCTV systems make continuous recordings of a site (such as a bus lane); a second lens will capture number-plates. The recordings are collected manually, and watched by enforcement officers who monitor contraventions. Third, cameras on buses are automatically activated (via microwave 'countdown' beacons) when a bus enters a bus lane, and the footage is viewed to record contraventions after a bus finishes its route. These technologies came into use in the mid-1990s. More sophisticated camera technologies are also under development which will use digital recording and transmitting and will no longer have to rely on operators to manually collect tapes from the roadside cameras and from buses. ANPR technology may be able to automatically detect and record vehicles entering bus lanes or box junctions. Future systems could also track patterns of traffic, and automatically recognise unusual behaviour, such as illegal U-turns.

Camera technology makes this decriminalised enforcement possible. It creates reproducible evidence, and so eliminates the need to have the testimony of a sworn police officer as a witness. It allows for the processing of a significant number of offences at relatively small enforcement costs. Operators also do not need to have the abilities of a police constable in terms of powers of arrest or skills in dealing with aggressive offenders, as enforcement is conducted remotely.

> The different skill level of people doing the enforcement in the civil arena compared to police officers is a point for discussion. … If you contrast a police officer who is highly trained in a police car doing active traffic management and road safety work – you can't contrast that individual with a lower-skill individual looking at a CCTV camera with all the technological enhancements to make it work. But I think the two could be viewed to be comparable.

Decriminalised enforcement as it currently stands deals primarily with traffic management rather than road safety. Offences such as bus lane violations, parking on red routes and obstructing box junctions are enforced primarily to deal with actions that cause frustration and delay to other road users, rather than offences with an immediate safety impact. However, decriminalised enforcement may nonetheless have safety implications. Enforcement of minor offences could help create a culture of compliance with traffic law more generally. The awareness that driving behaviour is being remotely monitored may also add to drivers monitoring their own behaviour.

> I think that once we start getting compliance and road users start complying with the Highway Code it can only be to the benefit of all, and we should start to see reductions in accidents and deaths and an overall improvement in road safety and road usage.

Research also indicates a strong connection between minor traffic offenders and serious traffic offenders and criminality (see chapter 2). If suitable co-operation exists between police and civil enforcement

bodies, information on offenders gathered by civil enforcement systems could be used as police intelligence for enforcing more serious crime. Data and intelligence-sharing between police and local authorities is crucial in this respect. In London, the Transport Operational Command Unit (a Metropolitan Police unit funded by TfL) is establishing a 'hierarchy' governing usage of CCTV: terrorist activity has the first priority on cameras, followed by major road traffic collisions, road traffic enforcement and other activities. In Sussex, decriminalised enforcement teams have joined NIM Level 1 tasking and co-ordination groups to control low-level crime.

> The Local Authority could give a ticket to someone that's gone across a yellow box junction, and that could be the number one criminal for the area. So how do we engage in that partnership angle?

As with other automated enforcement technologies, effective civil enforcement depends on the accuracy of databases and on up-to-date vehicle registrations. Cooperation with police will also be necessary to deal with fine evaders and deliberate violators who operate outside the vehicle registration system.

Recommendation 37: ACPO and the Local Government Association should develop a best practice manual on hierarchy of use of CCTV and sharing information and intelligence between police and decriminalised enforcement teams to ensure effective cooperation and to maximise effectiveness of the resource.

Despite these mutual gains between civil and police enforcement, concerns have been expressed about the impact of Local Authority enforcement on public support for traffic enforcement more generally. As civil enforcement bodies are permitted to retain penalty charge revenue from enforcement, there are fears that Local Authorities may not exercise the same amount of discretion as a police officer might do under similar circumstances. These concerns will need to be considered with a view to upholding public confidence in the road traffic enforcement system as a whole.

Technologies used for civil enforcement are subject to the same Home Office 'type approval' regime as policing technologies. This helps to ensure a high level of confidence about the technical integrity of the data and helps to avoid court challenges of the evidence. However, some difficulties with the type approval regime were reported, and this turned out to be an unexpectedly controversial issue. Manufacturers expressed frustration at the timescales required for type approval and the rigidity of the scheme: any minor change to an existing approved technology requires a complex type approval amendment process. Civil enforcement bodies complained that the type approval system tied them to specific manufacturers: once a manufacturer has type approval for a system, they will also maintain that system; this prevents Local Authorities from going out to tender and using the best value process. It has been suggested that a separate body should be set up to provide type approval for decriminalised enforcement systems. However, in considering any new system, ensuring the integrity and quality of the technologies will need to be paramount to maintain public confidence in civil enforcement.

Recommendation 38: Home Office and DfT should review the type approval process to take account of the particular needs of civil enforcement bodies and to ensure best value. Quality and integrity of evidence should remain the key consideration.

Video cars and motorcycles

In addition to automated enforcement, surveillance can also aid traditional police enforcement. One good example of this is video-equipped police cars and motorcycles, including unmarked vehicles. Most forces use video-equipped police patrol cars to record incidents and stops by police. A number of forces also use video-equipped 'plain vehicles' to monitor and record bad driving behaviour. Systems such as 'ProVida' can be used on marked or unmarked police vehicles to record video evidence of traffic violations, and can also be used to record the speed of the target vehicle, monitor position using GPS and link to ANPR.

In Sussex, Operation Roller focuses on anti-social driving, and uses an unmarked video-equipped vehicle to record dangerous driving behaviour, including problems such as close following and cars accelerating after speed cameras, on routes where dangerous driving has been identified as a specific concern. Camera-equipped 'plain motorcycles' are also planned for introduction. Camera footage is used either as evidence for prosecution, as a basis for a fixed penalty to be issued, or can be replayed to the driver as part of a warning. A similar strategy is used by Devon and Cornwall Police, who comment:

> The intention is not simply to prosecute, but to educate. … Using this system we can pull drivers

> over, sit them in the car and play back the video which shows them what they are doing wrong. You then tell them how they should be driving in the hope that they learn from it. (Devon and Cornwall Constabulary 2005)

These methods of policing have significant potential to assist road safety. This technology extends the capacity of police officers to monitor and record, and helps to enable prosecution for bad driving behaviour, which currently is often only pursued only after a crash has occurred. It thus manages to avoid the criticism that is often levelled at other types of camera for not being able to detect dangerous driving. However, this type of technology is both cost- and time- intensive, which limits widespread use.

Future surveillance technologies

This chapter has so far discussed existing surveillance technologies in use in the UK. However, technologies in this field are rapidly progressing, and future applications will be able to deal with a wider range of offences. One such application is 'close following detection' – cameras that are able to detect 'tailgating' vehicles that drive too close to the vehicle in front. This technology is currently under development for use in the UK, and has been used in the Netherlands and Israel for several years (IIHS 2002: 6). This technology could be particularly useful for targeting aggressive drivers who intimidate and endanger other road users. 'Tailgating' drivers can currently be charged with careless or dangerous driving, so a new offence is not necessary for the introduction of close following detection. However, experience with mobile phone use suggests that a specific prohibition of close following (either through primary or secondary legislation) would assist in making enforcement of this offence more common. UK trials of this technology could be combined with an education campaign about stopping distances and acceptable speed-distance ratios in order to promote better understanding of the dangers of this activity.

Recommendation 39: DfT and the Home Office should introduce trials of close following detection technology in UK. Given a positive outcome of these trials, the Government should introduce legislation to make close following a specific offence.

In Italy, new technologies have been introduced to address the problem of dangerous overtaking on roads where this has been identified as a particular risk. A combination of sensors in the road and cameras can detect if drivers illegally cross double white lines to overtake, record the number plate of the offending vehicle and initiate the automatic processing of a fixed penalty (Penner 2005).

Technology is also under development in the Netherlands that would enable automatic detection of seatbelt wearing, using cameras and image processing software to show if a seatbelt is present and to counteract windscreen glare. If a seatbelt is not worn, police will stop the vehicle. This technology may prove beneficial for road safety, as it automates enforcement of a key safety issue. As will be discussed in chapter 7, compliance with seatbelt laws can also be promoted by in-vehicle technology.

Recommendation 40: DfT should monitor international developments in technology to detect illegal overtaking and seatbelt use and, if successful, introduce trials in the UK.

Chapter conclusions

The various camera and surveillance technologies discussed here have made significant contributions to roads policing and road safety. In particular, speed and red light cameras have been shown to be highly effective in both reducing offending and cutting casualties at camera sites.

These technologies have also enabled the expansion of enforcement for offences where enforcement may previously have been more limited, such as speeding, box junction violations and banned turns. As noted by the North report, roads policing can be a key arena for contact between police and the public, and citizens are more likely to come into contact with police or courts as a suspect or victim of road traffic offences than in any other way (DoT/Home Office 1988: 30). For many, receiving a fixed penalty notice or a penalty charge will be one of the few times that they will have contact with the criminal justice system. One area that could therefore be explored is whether new technology can make this form of communication more targeted and more oriented towards delivering a road safety message.

Recommendation 41: DfT, DCA and safety camera partnerships should look at how automatic enforcement communications can be tailored to reinforce safety messages, including information on time and location of offence and casualty data of the camera site.

The expansion of automated enforcement has also meant that the complex relationship between camera enforcement and traditional police enforcement has increased in importance. Cameras can assist police who were previously engaged in speed or red light enforcement to fulfil other functions, but fears have been expressed that due to the low prioritisation of roads policing this enables roads police to be diverted away from traffic duties. Interviewees expressed the need to ensure that cameras supplement rather than replace roads police. Recent figures, however, indicate that this message may be increasingly understood: as discussed in chapter 2, there has been a recent resurgence in both numbers of roads police and numbers of offences detected, and over the last two years there has been an increase of 53% in the numbers of speeding offences detected by police patrol (see PACTS 2005).

Automated surveillance technologies can be viewed as tools for addressing particular problems at specific locations. A red light camera, for example, cannot be expected to detect other types of dangerous behaviour. However, there may be potential in future for maximising use of existing resources by linking systems. Some red light cameras, for example, can also monitor speed. Details of offending vehicles caught by speed and red light cameras and by civil enforcement teams could also be checked against other databases (e.g. for insurance, MOT or VED) to increase compliance across a range of offences.

While surveillance technologies operate by detecting observable illegal driving behaviours such as speeding or red light running, they can also tie in to a much broader range of strategies aimed at risk management. Rather than merely detecting the maximum number of offenders, they operate by encouraging drivers to regulate their own behaviour. This strategy cannot be viewed in isolation, however, but may be most effective when linked in to other enforcement methods such as verification of entitlement to drive, education efforts and traditional roads police patrols.

Chapter 6

New Impairment Technologies

Introduction

While database technologies authenticate authorisation to drive and camera technologies detect and prosecute against particular driving actions that contravene traffic law, impairment technologies focus on a much more subtle aspect: aptitude to drive at a particular point in time. They may focus on a particular cause of impairment, such as alcohol, drugs or fatigue, or they may assess impairment more generally through addressing aspects such as response times.

These technologies make impairment laws more effective through quantifying and measuring levels of impairment. With alcohol this is well-established – alcohol levels are taken as a direct indicator of level of impairment, based upon research developed over a number of years. With drugs and fatigue, this relationship is less well known, and so technologies may be less precise or less effective on their own – observational techniques and medical procedures are also currently used to determine impairment.

As they have been longer-established, alcohol tests are discussed here in detail as a case study, including questions such as whether the current legislative framework allows the most effective use of the technologies and what the implications of technological developments may be. Also discussed are techniques and technologies for detecting impairment through drug use, barriers to use of these technologies in roads policing, and longer-term technological developments that may transform the way that drug, alcohol and impairment testing is approached.

In each of these cases, impairment technologies may contribute to a risk-management approach: they single out categories of drivers most likely to cause crashes – those who are impaired through alcohol, drugs or fatigue – and enable enforcement resources to be targeted accordingly.

Alcohol testing

History

Technology has long been essential to the enforcement of driving impaired by alcohol. Early drink drive legislation depended heavily on subjective assessments of fitness to drive: for example, the Road Traffic Act 1930 defined drink driving on the basis of being 'under the influence of drink or drugs to such an extent as to be incapable of having proper control of the vehicle' (quoted in Corbett 2003: 75). As Corbett notes, assessing this was 'an imprecise art' (ibid).

Development of breath testing technologies to provide police with more objective measures of alcohol consumption began in the USA in the 1930s and 1940s. The modern-day breathalyser was invented in the USA in 1954. Following successful use of the breathalyser in the US and in other countries, use of breathalysers by UK police was authorised by the Road Safety Act 1967. The 1967 Act also set the blood alcohol limit at .80mg/100ml (or 35 microgrammes of alcohol per 100 millilitres of breath), created a new offence of failing to submit to a breath test and established conditions (discussed below) under which breath tests could be administered. Early breathalysers were awkward to use: they required the ends to be snapped off a crystal-filled glass tube before a mouthpiece and a bag were fitted; a change in colour indicated a positive reading. Until the passage of the Transport Act in 1981 which enabled evidential breath tests at police stations, the roadside screening breath test had to be followed by a blood or urine-based test at a police station. Despite these difficulties, the introduction of blood alcohol limits and police use of breathalysers led to sharp reductions in drink driving and to an initial 11% drop in road casualties (Sabey 1989 cited in Corbett 2003: 76). A long-term drink-drive monitoring project was established in 1979. Since that point, KSI casualties involving illegal alcohol levels have fallen by over two thirds, as a result of enforcement, educational campaigns and changes in public attitudes (Mosedale et al. 2004: 28).

Current situation

After more than two decades of significant advances in combating drink driving, casualties from drinking and driving have again begun to rise. In 2003, there were 560 fatalities and 2,580 serious injuries from crashes involving illegal alcohol levels; this compares to a low point of 460 fatalities and 2,470 serious injuries from drink driving in 1998 (Mosedale et al. 2004: 28).

Despite this increase, however, the number of roadside screening tests for alcohol has been declining, while the percentage of positive tests has been rising. In 2003, there were 534,300 tests, of which 20% were positive. This compares to a peak of 815,500 roadside screening tests in 1998, in which 13% were positive (Fiti et al. 2005: 38). This percentage rise in positive tests may be due in part to more selective testing by police. As policing becomes more intelligence-led, police may target breath tests more effectively and focus their resource on times and locations where they know that drink driving is occurring. This strategy may lead to fewer breath tests, but more drink drive convictions.

However, both the rising numbers of drink drive collisions and the rise in the percentage of drivers and riders killed while over the blood alcohol limit (from 15% in 1998 to 19% in 2003 [Mosedale et al. 2004: 29]) indicate that the prevalence of drink driving is rising. This may be as significant a factor in the rising

proportion of positive tests as policing strategies.

Despite guidance from ACPO specifying that all drivers involved in injury collisions should be breath tested, breath testing after collisions remains at 50% (down from a peak of 53% in 1999). This suggests that breath testing may not be being seen as a priority.

These aggregate data mask a considerable amount of regional disparity. For example, breath testing rates per 100,000 population were nearly nine times higher in Derbyshire in 2003 than in Hertfordshire, suggesting different levels of priority between forces (Fiti et al. 2005: 39).

Interpretation of data relating to drink driving and breath testing needs to be treated with caution, however, as some forces claim not to record all negative breath tests. This practice undermines a very useful indicator of roads police inputs and effectiveness.

Recommendation 42: Some forces claim not to record all negative breath tests. This undermines a very useful indicator of roads police inputs and effectiveness. ACPO should advise Chief Constables to ensure that breath tests are adequately recorded, and, when reporting the data, confirm that they are satisfied that it is an adequate reflection of reality.

Current procedures for alcohol testing (established under the 1967 Road Safety Act and revised by the Road Traffic Act 1988) are laborious. A driver may be stopped at any time, but may only be breathalysed if the officer has suspicion of alcohol use, or if there has been a contravention of traffic law or a crash. If any of these conditions is met, a roadside screening breath test will be administered. If this is positive, a driver will be escorted to a police station, where an evidential test that gives a precise measurement level of alcohol will be given. In practice, this can take some time, especially during busy periods. Finding someone available who is trained and authorised to use the machine can also be an issue. This has two negative consequences: first, the time lapse in between initial detection and the evidential test may mean that some drivers who were over the limit at the time of driving are under the limit by the time of the test. Second, it removes roads police from the road for considerable amounts of time. Even if the evidential test proves positive, this is not necessarily the end of the process: if the breath reading is below 50 microgrammes of alcohol per 100 millilitres of breath, the offending driver can request an alternate blood or urine test. This condition was originally introduced in 1967 to counter fears of breathalyser inaccuracy. Some police feel that with the current level of technological development, breath testing equipment is sufficiently accurate for this not to be necessary.

New alcohol testing technologies

While procedures for roadside breath testing have remained broadly similar since the introduction of the breathalyser, the technology has progressed substantially. Roadside screening breath tests are quicker, less cumbersome, more accurate, and easier to read than earlier versions of the breathalyser.

> Why are we doing it? Because we then can be intelligence-led, use our resources properly, and we can keep people on the streets for much longer rather than lose them having to go back to stations. Also, there's a hard-hitting message there. People see the vehicle. They know exactly what's going on. That in itself is an education message as well. That type of technology in relation to drink driving is what we do need.

Technology has also developed sufficiently to enable mobile use of evidential breath tests, which give a definitive reading of blood alcohol levels. The Serious Organised Crime and Police Act 2005 will enable evidential roadside breath testing for the first time in England and Wales[1] and remove the requirement for drivers who have failed a screening breath test to be taken to a police station before the second test can be administered. This should enable more efficient use of roads policing resources and higher levels of enforcement of drink driving. Mobile evidential breath testing equipment will require Home Office 'type approval' before it can be used. The first evidential roadside breath testing kits are expected to come into use in 2006 (Home Office 2005: 13).

The introduction of evidential roadside breath testing will be the first major change in drink drive legislation for many years. As such, it offers a unique opportunity to be used as a basis for renewed drink drive enforcement efforts. The availability of technology that can give more precise measurements of blood alcohol levels at the roadside also offers the opportunity for better data on drinking and driving to be developed. In particular, the last roadside survey of alcohol levels within the general driving population was conducted in 1990, and these data may now be outdated. The introduction of evidential roadside breath testing would be a good opportunity for a new roadside alcohol survey, which would provide better information on the scale of drinking and driving and the implications of legal changes such as lowering the drink drive limit.

1 Evidential roadside breath testing is already allowed in Northern Ireland

Recommendation 43: The introduction of evidential roadside breath testing will be the first major change in drink drive legislation for many years. DfT, Home Office and ACPO should use this opportunity to launch a renewed national drink drive advertising and enforcement campaign.

Recommendation 44: DfT, Home Office and ACPO should combine the rollout of the new evidential roadside breath testing technology with a national roadside survey of alcohol levels, which would provide useful data about levels of drink driving.

Technology has also advanced to the point of making roadside screening tests much quicker and less invasive than they may have been previously. In many countries these tests are used much more extensively than here, and do not require the qualifications of 'reasonable suspicion' of alcohol use, involvement in a crash or road traffic offence for them to be administered.

This practice is often referred to as 'random breath testing'. In most EU countries the police are entitled to use random breath testing, the only exceptions being Germany, Ireland, Italy, Poland and the UK. Random breath testing is strongly associated with levels of breath testing: 86% of drivers in countries where random breath testing is not allowed report never having been checked for alcohol within the last three years, compared to 65% in European countries where breath testing is allowed. In the UK, 91% of drivers report never having been checked for alcohol in the last three years, compared to a European average of 74% (SARTRE3 2004: 44). These figures reflect numbers of breath tests administered: in the UK, one breath test is conducted for every 67 inhabitants, compared to 1 in 4 in Finland, 1 in 8 in France, 1 in 9 in Sweden and a European average of 1 in 16 (ETSC 2003: 22).

Given the extent that technologies pervade other areas of policing, it seems surprising that a crucial element of impairment detection – the initial assessment of whether a breath test is necessary – must be made by observation alone. While some police feel that existing powers are sufficient for them to use their judgement, some drivers may be more effective than others at disguising their drinking, and a swift and non-invasive test would be better able to detect these drivers, especially those close to the limit.

Random breath testing will assist, but in the application of random breath testing it should be targeted.

Random breath testing is a misnomer, as extending powers of screening does not need to make policing 'random'. Instead, it could be used in an intelligence-led and targeted fashion, focusing on locations where problems are known to occur and carefully assessing the best methods of reducing drink driving. This could lead to more breath testing being carried out, especially in problem areas, and to more general deterrence. As discussed in chapter 2, research indicates that increasing drivers' perception of the probability of detection is key to improving compliance and reducing casualties, and this may be most effectively achieved by making enforcement unpredictable in terms of time and place, and deployed in a widespread manner to ensure broad coverage of the road network.

This would be a cost-effective means of deterrence. ETSC estimates that if drink-drive enforcement in the worst performing EU countries was increased to the European average of 1 breath test per 16 inhabitants, between 2,000 and 2,500 fatalities could be prevented per year, at a cost benefit ratio of between 1:36 and 1:55 (ETSC 2003: 27). For this reason, minimum levels of random breath testing are one of the main elements of the European Commission Recommendation on Enforcement in the Field of Road Safety (EC 2003).

In the UK, extended drink drive enforcement is widely supported by the public, even among self-reporting drink-drivers. A recent Home Office survey found widespread support for Random Breath Testing, with 86% of drivers in favour, including 70% of those drivers who had admitted to driving whilst over the limit (Brasnett 2004: 4).

One alternative to random breath testing that has been proposed is targeted breath testing, in which 'the police have powers to breath test at locations where it is reasonable to assume an amount of drinking has taken place' (DETR 2000: 34). This proposal was contained in the Government's road safety strategy *Tomorrow's Roads: Safer for Everyone* and in the 1998 consultation document 'Combating Drink Driving: Next Steps'. However, this was later 'deemed unnecessary as the police already undertake intelligence-led enforcement against drink-driving' (Hansard 5 January 2004 Column 48W). It remains unclear, however, whether stopping a driver at a location where drink driving is known to occur is sufficient grounds for requesting a breath test.

Recommendation 45: The Government should clarify police powers for 'targeted' breath testing and extend police powers for breath testing to allow roadside screening tests to be administered without need for 'suspicion' or offending.

New technologies may be able to assist with this dilemma. In some police forces in the USA (and other countries), police making roadside stops can use passive sensors for alcohol detection. These sensors detect the presence of alcohol in the air of a vehicle's compartment and indicate whether a breath test may be necessary. This can improve the effectiveness of drink drive enforcement, without inconveniencing drivers. As the Insurance Institute for Highway Safety (IIHS) describes:

> When police manning sobriety checkpoints use passive sensors to screen for alcohol, they're able to detect more impaired drivers than when they rely on judgment alone. The sensors identify the presence of alcohol and give the police an objective basis for further assessment of impairment. Using sensors also speeds up the process of going through checkpoints, which become more efficient and less inconvenient for motorists. (IIHS 2005: 6)

Recommendation 46: In some countries including the United States, passive sensors are used on police roadside stops to detect the presence of alcohol in the air of the vehicle's occupant compartment and to advise officers of whether a breath test should be required. DfT and the Home Office should commission trials of this technology in the UK, and, if necessary, the appropriate legislative changes to facilitate its use should be introduced.

Drugs testing

Drug driving is very much an emerging problem.

Like drink driving, driver impairment through drug use is a growing concern for road safety and was raised by a number of interviewees as a particular problem. In particular, it was felt that drug driving may be under-detected, and there was significant demand for new technologies to assist with this. However, unlike alcohol use, both the levels of drug driving and its relationship to impairment are difficult to determine. New technologies allow swift and simple drugs tests to be conducted, but their usefulness can be limited by the lack of a direct link to impairment.

Drug use appears to have been increasing over the last 20 years, both among drivers and more widely. A 2001 TRL study examined drug and alcohol incidence in fatal road accident casualties. At least one medicinal or illicit drug was detected in 24.1% of the sample; alcohol was present in 31.5% of the sample. While alcohol levels were broadly similar to a similar study conducted between 1985 and 1987 (which found alcohol present in 35% of the sample), drug use increased threefold between the two studies (from 7.4% in the earlier study to 24% in 2001) (Tunbridge et al. 2001a: 1). For drivers, 22.9% had traces of drugs in their bloodstream; for motorcycle riders this was 20.3% (ibid: 7).

Cannabis was the single most common drug type detected, in 11.9% of the total sample. However, the report noted that:

> Cannabis remains traceable in the blood stream for up to 4 weeks after it is taken by regular users, whereas its effect on driving is probably limited to a few hours at most after it is taken. Incidence in body fluids cannot therefore be directly related to any contributory role in accidents. (Tunbridge et al. 2001a: 1)

This absence of a clear link between the presence of drugs in body fluid and road collisions causes several difficulties for enforcement. First, as noted above, drugs may continue to appear in the bloodstream for a considerable period after their impairment effect has worn off. Second, while drugs such as cannabis undoubtedly impair driving skills and reaction times, there is considerable variability between levels of dosage and levels of impairment (Sexton et al. 2000: 3). This prevents drug levels detected in blood, saliva or sweat from being used as an indicator of impairment level in the same way that blood alcohol content is used. Third, while alcohol use is associated with more risk-taking behaviour and slower reaction times, behaviours that result from drugs such as cannabis may be more varied due to compensatory behaviour (e.g. cannabis users were found to drive more slowly) (ibid). The relationship between drug use and risk may therefore be more complex than that of alcohol.

While drivers with illicit drugs in their bloodstream may theoretically be able to be charged with possession, the charge of driving while unfit through drink or drugs relies on proof of impairment. As

noted above, this proof of impairment can be difficult to ascertain, and more research into this area would be welcome. As the TRL study concluded:

> These figures suggest that drink driving still represents the greater road safety problem but, given the complexities involved, it is also the case that the drug driving issue may prove the more difficult to resolve. (Tunbridge et al. 2001a: 2)

Recommendation 47: DfT should continue research into evaluating the extent of the drug driving problem and on linking drug use to impairment.

It is unclear how many people are prosecuted for driving while impaired through drugs. In 2003, there were 106,700 offences of 'driving etc. after consuming alcohol or taking drugs' (Fiti et al. 2005: 22) but no disaggregated data are available to indicate what proportion of this is related to drug use. In response to a recommendation that it should provide separate data on drink and drive offences, contained in PACTS' 1999 report *'Road Traffic Law and Enforcement: A Driving Force for Casualty Reduction'*, the Home Office responded that it would consider how new computerised arrangements for data collection could be used for specific collection of drug driving data (Home Office 2000: 1-2). However it appears that this action has not been taken forward.

Recommendation 48: The Home Office should provide separate data on drink and drug driving offences.

Testing for drug use currently occurs via medical assessment rather than through technological means. Roads police suspecting drug use may conduct 'Field Impairment Testing' (FIT), which consists of a series of tests including pupillary examination, balance tests and divided attention tests. FIT is not a test that offenders can pass or fail: instead, it gives officers grounds for suspicion of impairment. If suspicion of impairment is present, the offender will be referred to a police surgeon for a forensic medical examination, which may establish impairment more definitively. An early evaluation found that forensic analysis confirmed the presence of a drug in 92% of the drivers identified as impaired under FIT (Tunbridge et al. 2001b: 1).

Failure to comply with preliminary impairment tests became an offence in the Railways and Transport Safety Act 2003. A statutory code of practice regarding preliminary impairment test was brought into force in December 2004. The code of practice describes the tests and specifies circumstances in which they should be administered. Data on usage of field impairment testing powers are not yet available.

Police conducting field impairment tests must be fully trained and qualified to ACPO and BS EN ISO standards. In addition, approval to administer preliminary impairment tests from the chief officer is required. This can make field impairment testing an important but expensive resource. Police forces should ensure that sufficient capacity of field impairment testing is available.

Recommendation 49: DfT should evaluate FIT testing following the first year of operation of the code of practice, and make available data including usage and percentage that lead to medical checks and prosecutions. In addition, HMIC should audit FIT training and capabilities as part of its Baseline Assessment process.

> The thing with drink driving is that we've had it a number of years. We've moved on, because it used to be the bag years ago and it was very difficult to tell whether it was yellow or green, whereas now it's a technology, you blow into that, some of them come up with readings and they'll tell you very quickly whether its positive or negative, and you'll go to the station to get an exact reading.
>
> FIT testing isn't as simple as that. It's quite a complicated system of tests you have to get the person to do. … Even then, if they fail the test, you arrest them and take them into the police station and then you have to take blood and it gets sent away and it's done by the forensic scientist to say how much under the influence of whatever drug he's discovered in the blood, how that would affect them.
>
> So we could do with a better technology for drug-driving tests. … We don't have a firm, easy way of deciphering it and saying what they're under. So that's certainly a technology we could do with being developed.

Recent technological developments may also be able to assist in detecting drug use among drivers. Devices intended for use in the roads policing context that can detect the presence of illegal drugs in the

bloodstream have been developed. Testing kits such as D.Tec's Drugwipe or Cozart's RapiScan (among others) are now relatively low cost and could be used at the roadside. They give a reliable indication of the presence or absence of up to five drug types. However, they are not able to give indications to either the amount of drugs in the bloodstream or level of impairment.

> We do need a drug screening device. FIT is fine, but just gives you an idea, so we do need a drug screening device.

As UK law relating to drug driving requires evidence of impaired driving as well as presence of a drug, these devices are not currently widely used by UK police. This barrier has led to calls for a new offence of driving with an illegal drug in the bloodstream. This would allow drug driving to be enforced more extensively, using existing technologies. Proponents point out that drug use is already illegal, and a new offence would recognise the seriousness of driving after drug use.

> Let's make it a lot easier. If you have illegal drugs in your body, you should not be driving. So therefore there should be a zero tolerance.

However, as noted above, the presence of a drug in the bloodstream does not necessarily indicate impairment, which from a road safety point of view must be the crucial question. The impairment dimension also focuses enforcement on risk, rather than a general enforcement of drug use, and a new offence may detract from this strategy. There may be scope, however, to use the new roadside drug testing technologies more widely. In some circumstances, they may useful as screening tests to determine whether more comprehensive impairment testing needs to be carried out.

Recommendation 50: The case for a new offence of driving with an illegal drug in the bloodstream has not yet been made. However, in some circumstances it may be viable to use drug testing kits as screening devices to establish whether more comprehensive impairment testing should be carried out. HOSDB should continue work in this area.

Future impairment testing technologies

New technologies aimed at detecting and assessing driver impairment are currently under development. One example of this (labelled in the press as the 'impairmentometer') measures impairment not on the basis of substances in the breath or bloodstream but on the grounds of reaction times and hand-eye co-ordination. Prototypes of these devices are currently undergoing testing. This type of technology would respond to a number of concerns. First, it would be able to measure the impairment that results from drug use, not just the presence of drugs in bodily fluids. Second, it would enable detection of types of impairment that may currently cause problems but are difficult to assess, including impairment resulting from fatigue, legal and medicinal drugs, and the interaction between alcohol and licit or illicit drugs.

> I'm aware there lots of research going on in the Police Scientific Development Branch into impairment meters and those sorts of things. Some concern with that, in terms of what does impairment really mean? It's not just about drink or drugs. It's about an individual's fitness to drive.
>
> As you get older, your reactions are slower, so what impact does that have? It's not about the person who's drugged up or who's been drinking, it's about a lot of our driving population. Probably their reaction time isn't as fast as it used to be – so what do we do about that? And that has massive implications for the Government and what they do with that. If you took 100 people out and tested their reaction time, they'd all be different. Part of it links in with medication as well, eyesight: a range of issues we'll have to look at closely.

Driver fatigue is an area of particular concern and is a major contributory factor to road crashes. A recent study of seven major roads suggested that fatigued drivers may be responsible for 17% of injury crashes on those roads, and fatigue-related crashes are 50% more likely to involve death or serious injury (Flatley et al. 2004: 15-16). There are no current technological means of detection in use, although some new cars have lane departure warnings (which would be useful primarily on motorways) and in the longer term cars may be able to detect fatigue through monitoring eye movement (see chapter 7). DfT is currently assessing technologies specifically aimed at assisting in detecting driver sleepiness. A more generalised impairment measurement device based on reaction times and concentration would also be effective in enforcement of fatigue-related impairment.

The difficulty with such a device, however, is that it would also catch drivers that have a slower response time or worse hand-eye coordination due to age, as well as external impairment factors. While some may respond (with some justification) by arguing that older drivers who do not have good response times or hand eye co-ordination should not be driving, statistics do not show an age-related increase in total

number of accidents for the over 60s (although the collisions that do occur may be more severe due to increased physical frailty) (Holland 2001: 4). Experience is an important factor in safe driving, and many older drivers limit their own driving or engage in compensatory behaviour to reduce risk (ibid: 30-37). Even so, a certain level of responsiveness and hand-eye co-ordination is essential for safe driving. This level will need to be quantified to ensure that safer older drivers are not unduly disadvantaged. A public debate about assessing aptitude to drive – including questions of age and reaction times – would be welcome to give these issues proper consideration. New legislation will also be necessary for the device to be used as a roads policing tool (ACPO 2004).

Recommendation 51: An impairment measuring device could have very positive implications for road safety and would redress a number of other difficulties. There are a number of challenging issues surrounding impairment detection, including implications for older people, but these may not be intractable. HOSDB should continue development of impairment measurement devices. DfT should initiate a public debate (involving police, safety groups, representatives of the elderly and other relevant stakeholders) about what the base level of impairment should be and how the device could work in practice.

Chapter conclusions

Impairment through drink, drugs or fatigue remains a major road safety hazard. Technologies such as the breathalyser have played a major role in enforcement against impaired driving for many years. New technologies have a major potential to further improve this effort by making breath testing more efficient and less time-consuming, allowing drug-driving to be more easily detected, and developing new techniques to test impairment in a more generalised sense.

To be used most effectively, impairment detection technologies need to be supported by an enabling legal framework. Current legislation regarding alcohol testing is restrictive, although evidential roadside breath testing (introduced in the Serious Organised Crime and Police Act 2005) should make a significant contribution to efficiency. There are also questions as to whether the legislation related to drugs and driving is sufficient, with some stakeholders calling for a more widely applicable offence of driving with an illegal drug in the bloodstream. From a road safety point of view, however, the level of impairment needs to be the key concern. This is where a generalised impairment testing device would be most useful, as it would be able to address impairment through drugs, fatigue, alcohol or a combination of factors. Further development and new legislation will be required before the device is used in practice. In the longer term, the availability of a device able to measure driver impairment may provoke a reconsideration of laws related to impaired driving and enable the possibility of a single, separate offence of driving while unfit.

New technologies have the potential to radically alter the way that driver impairment is conceived and enforced. Impairment is currently often considered in terms of the presence of substances, such as drugs or alcohol. A more generalised impairment detection technology could shift the focus of testing towards an aptitude to drive at a particular point in time, and away from a preoccupation with the cause of the impairment. This may contribute towards a greater awareness among drivers about the dangers of driving while fatigued or impaired through the use of medicinal drugs. It would also encourage drivers to monitor their own aptitude and to ensure that they are fit to drive before beginning a journey. Through enabling enforcement to be targeted towards a category of drivers who pose the most danger, an impairment detection device could also contribute to the reorientation of enforcement towards the management of risk.

Chapter 7

In-Vehicle Compliance Technology

Introduction

Previous chapters have focused on new technologies used in policing and road traffic enforcement. However, these must be considered in the context of new and emerging technologies incorporated into vehicles themselves that shape the driving environment in order to assist drivers to comply with the law and to reduce the opportunities for offending. While in-vehicle compliance technologies are not enforcement technologies, they represent a different means to the same end: securing compliance with traffic law and reducing risk. Many police consulted were optimistic that these technologies could make aspects of roads policing redundant.

> My personal view is that the ideal will be to mitigate as much if not all of the risk, and therefore you wouldn't need the police service at all, in terms of roads policing. And I think that there are substantial technological gains to be had, technological means to do that.

Just as vehicle design has made a major contribution to reduction in vehicle theft, there is major potential for new technologies and changes in vehicle design both to encourage compliance with road traffic law and to improve road safety. In-vehicle compliance technologies range from technologies already in existence such as seat-belt reminders to systems at the development stage such as ISA, and vary from simple improvements such as digital speedometers that make it easier for drivers to comply with speed limits to complex systems related to insurance or road user charging that could make risky driving behaviour more expensive. Of these technologies, ISA was most frequently mentioned by interviewees as having the most potential for casualty reduction and for removing the need for speed enforcement. A few of these technologies are discussed below; many more are under development. Collectively, they offer the potential for radically altering the context of road traffic enforcement, and the implications for roads policing of changes to the in-car environment will need to be carefully considered.

> There's loads of things that can be done to mitigate risk. Enforcement is just a part of that at the moment. I think there's an opportunity to make road safety self-enforcing within the next twenty or thirty years, but I'm not sure that there is the political desire to grasp the nettle.

Seatbelt reminders

Seatbelt reminders are relatively simple existing technologies that have considerable potential to increase compliance with seatbelt laws and to improve the safety of drivers and passengers. Seatbelt reminder devices detect if a seatbelt is being worn (often including a weight sensor to detect whether a passenger is present) and will give an audible or visible signal if belts are not in use. Some variations of the technology include an interlock to prevent the vehicle ignition from functioning if a seatbelt is not worn.

Seatbelt reminders are not currently a requirement for vehicles in the UK. However, variations of seatbelt reminders are mandatory in other countries including USA and Australia. In 1972, the United States introduced regulations requiring new vehicles to have a buzzer-light that would activate for at least one minute if seat belts were not worn. Starting in August 1973, new vehicles were required to be fitted with interlocks to prevent the vehicle starting if seatbelts were not worn. While the buzzer light was ineffective, the interlock increased seat belt use from 28% to 59%. Despite its effectiveness in increasing compliance, the interlock requirement was met with public opposition and was subsequently overturned. Since 1975 vehicles have only been required to display a warning light and a 4 to 8 second audible signal if seat belts are not worn (Transportation Research Board 2003: 42-45)

More complex reminders are being developed in Sweden. These include sounds and pulsating lights that increase in intensity with speed and distance. Focus groups have indicated that these systems are successful in striking a balance between being both effective and not overly annoying (Williams et al. 2002: 293).

Individual manufacturers in the USA are also introducing more complex belt reminder systems that go beyond the minimal legal requirements. Toyota has introduced a continuous flashing light to alert front seat occupants to fasten their seatbelts, and Ford has introduced the 'Belt-Minder' system which involves both light and sound being activated after the initial belt reminder stops chiming. Evaluation of the 'Belt-Minder' system in Oklahoma indicated that it increased belt usage from 71% to 76% (ibid).

Seatbelt reminders are both relatively inexpensive and highly cost-effective. Based on the Swedish experience, a recent ETSC report suggests that unit costs for seatbelt reminders could be as low as €60. The benefits for mandating a continuous audible seatbelt reminder across Europe would outweigh the costs by 6:1 (ETSC 2003: 29). Research in Australia – which, like the UK, has a belt wearing rate of over 90% - calculated that the benefit-cost ratio for belt reminder systems for drivers (beyond the initial brief chime already mandated in Australia) would range from 5.1:1 to 1.4:1, depending on type of system (Fildes et al. 2002: 20). The research also noted from findings in previous research that if reminders

are successful in achieving a 95% belt wearing rate (as they have been in Sweden) up to 7,100 fatalities could be prevented across Europe, including over 350 in the UK (ibid: 5).

Many vehicle safety technologies (such as air bags and anti-lock brakes) are initially introduced by gradual market saturation and may be followed by mandatory requirements once a certain level of take-up has been achieved. This occurs because these types of safety technologies are thought to give vehicles a competitive advantage due to consumer demand for safety. However, this demand-driven approach may not apply for technologies such as seatbelt reminders, as the target audience is different: consumers most concerned about vehicle safety are likely to be those who already wear seatbelts. The safety contribution of seatbelt reminders occurs through providing a low level of annoyance sufficient to encourage 'part-time' belt wearers to fasten their seatbelts. Levels of introduction may therefore be limited if manufacturers depend purely on consumer demand, and mandatory requirements may need to be investigated.

However, as noted, several manufacturers including Ford, Toyota, Saab and Volvo are already voluntarily introducing seatbelt reminder systems beyond minimum requirements. As part of their assessment of a vehicle's crashworthiness, the European New Car Assessment Programme is also encouraging fitment through providing added bonus points to manufacturers who fit a seatbelt reminder to their cars. A recommended design specification has been developed to assist this (Fildes et al. 2002: 27). This suggests that negotiated agreements to encourage fitment of seatbelt reminders may be possible.

Recommendation 52: DfT should encourage the European Commission to establish standards for seatbelt reminders and seek an agreement with manufacturers to make them standard in new vehicles.

Alcolocks

Alcohol interlock devices – commonly referred to as 'alcolocks' – are technologies that require drivers to provide specimens of breath to prove sobriety before the vehicle ignition will function.

There are broadly two types of alcohol interlock device. The first is used as a court option to deal with recidivist drink drivers: convicted drink drivers may receive a shortened disqualification on the condition that they only drive a specified vehicle fitted with an alcolock. The second type is intended for more widespread use, and may be particularly useful as a fleet management tool.

Alcolocks were first introduced in California in 1986 and are now used as a means of preventing reoffending by recidivist drink drivers in parts of the US, Canada, Australia and Sweden (Mathijssen 2001: 5). An alcohol interlock programme will be introduced in Finland in 2005 (ETSC 2005: 1). These programmes have been broadly successful in reducing drink drive recidivism while the alcolock is in place. Research has indicated a reduction in recidivism of between 28% and 65% in the period where alcolocks are installed (Bax et al. 2001: 32).

> They work in other countries – America, Canada, many others. They're used there particularly to get people back on the road who would use their car for work or maybe other pressing needs. I think it's good, in that the public are still protected, the person can get back to work, and the technology seems to be nearly foolproof.

However, there are several barriers to effectiveness of existing alcolock schemes. First, in most research studies, levels of recidivism return to a comparable level to those not involved in alcolock programmes after the alcolock is removed (Voas et al. 1999: 1850). This suggests that alcolocks should not be used as a catch-all solution for repeat drink drivers, but may be need to be supported by education and rehabilitation programmes.

Second, levels of participation can be low. In the US and Canada, fewer than 10% of drink drive offenders agreed to enrol in interlock programmes, with the remainder choosing to remain suspended (*Addiction* 2001: 1705). This leads Voas et al. to note:

> Unless a procedure is found to increase the offender participation rate, interlock programs will have limited value as an overall control method for all DUIs. Nevertheless, a secondary objective of interlocks is to provide a means for offenders to meet critical driving needs without endangering the public. … For those offenders willing to go to the trouble and expense of participating in the program, the interlock meets that need. (1999: 1858)

Third, price remains a major barrier. In Sweden, participants must pay between €4,000 and €5,000 for the programme, which excludes the participation of many less well-off drivers. A trial in France charges offenders €1,260 (ETSC 2005: 1).

At the time of writing, provisions are contained in the Road Safety Bill 2005 to enable a pilot alcohol interlock programme to be introduced in the UK. In addition, DfT have commissioned a research project based on voluntary use of alcolocks by convicted drink drivers in Birmingham and Bristol, due to be completed in 2007.

In Parliamentary debates, objections have been raised on the grounds of potential fraud (see Lords Hansard 4 July 2005: column 425), including tampering with the device and the possibilities of drunk drivers getting others to blow into the alcolock device on their behalf. However, technological solutions to these issues include data recorders to monitor interference, sensors to verify breath samples, driver recognition systems including 'hum-tones' to verify the identity of the driver, and running re-tests. The latter would serve three purposes:

> (1) to prevent the possibility of a bystander providing an alcohol-free breath sample that would allow a driver with a high BAC to operate the vehicle; (2) to detect drivers whose BAC is still in the ascending phase and has risen beyond the set point after the vehicle was originally started; and (3) to prevent drivers from leaving the vehicle idling while they drink.
> (Bax et al. 2001: 18-19).

Combined with evidence from alcohol interlock programmes abroad, this suggests that alcolock technology may be sufficiently advanced to make an alcohol ignition interlock programme a feasible option for dealing with recidivist drink drivers.

Recommendation 53: The Government should progress with pilot schemes to allow alcolocks as a court disposal.

The second type of alcolock is sometimes referred to as a 'blow and go' device and may be both cheaper and technologically simpler. One example is the Alcokey, developed by Saab, which requires users to breathe into a small mouthpiece on the car's key fob, which is fitted with a breathalyser. If the amount of alcohol in the breath is above the permitted level, the engine will be immobilised. Saab is aiming to launch the device as an optional extra on the Swedish market by 2007 and it could be available in the UK thereafter. Once in serial production, the cost of the device is expected to be below £225 (Saab 2005).

This type of alcolock has considerable potential for widespread use, especially as a fleet management tool to enable managers to ensure that their drivers are sober and as a means of reducing risk. This approach is increasingly in use in Sweden, where 5-6,000 vehicles are estimated to be fitted with alcolocks; the majority of these are on commercial vehicles. From 2007, all trucks over 3.5 tonnes contracted for more than 100 hours by the Swedish Roads Administration will be required to be fitted with alcolocks, affecting 10,000-15,000 vehicles. The goal of the Swedish Government for 2010 is to require alcolocks for all governmental transport services (ETSC 2005: 2).

There is considerable demand for alcolocks, with the recent SARTRE3 survey showing that nearly 40% of UK drivers 'would find it very useful to have technical systems fitted to their cars to prevent drink driving' (SARTRE3 2004: 167). As well as a means of dealing with recidivist drink drivers and a fleet management tool, alcolocks could also in future have a wider application as a means of helping drivers comply with the law and reduce the need for enforcement. Alcolocks could be particularly useful for 'morning after' cases where drivers may not realise that they are still over the limit from the night before.

As of yet there has been little research on use of alcolocks in commercial transport or among the general population. This will be an important area to address in future, especially as alcolocks come on to the general market. A spokesperson for Saab has argued:

> In order to stimulate the introduction of the Alcokey on a broad front, consideration should be given to government involvement in the form of reduced fiscal-benefit values, or arrangements with the insurance companies to lower premiums on cars fitted with Alcokeys. (Saab 2005)

These are valid suggestions. However, until the effectiveness of alcolocks as a means of reducing fleet risk can be established, this type of government involvement may be premature.

Recommendation 54: DfT and the Health and Safety Executive (HSE) should evaluate the effectiveness of alcolocks as a fleet management tool and promote their use.

Event Data Recorders

Event Data Recorders – also referred to as Vehicle Data Recording Devices, Vehicle Accident Data Recorders or 'black boxes' – are another existing technology that may make a significant contribution to safety. EDRs are integrated into vehicle electronics and continuously record a wide range of vehicle performance data including speed and sudden acceleration and braking events. In the event of a crash, data relating to the immediate pre-crash and post-crash period can be extracted, allowing investigators to gain a better understanding of the events that led to the collision. EDRs are increasingly common in new vehicles, as they are incorporated into 'on-board diagnostics' systems that regulate and monitor Anti-lock Braking Systems (ABS) and airbag deployment. Even in vehicles without EDRs, electronics governing engine control, ABS and airbags may record similar information. However, they differ considerably from devices such as alcolocks because they do not interfere with vehicle performance in any way – indeed, drivers may not even be aware of their presence.

It has been estimated that 40 million passenger vehicles in the USA are equipped with EDRs – around 15% of all vehicles (Gabler et al. 2004: xii). It is likely that EDRs will continue to become more common both in the US and in the UK as an increasing number of vehicles are equipped with complex electronic systems.

The safety contribution of EDRs is thought to be twofold. First, EDRs may provide data useful to road safety researchers and crash investigators. Second, drivers who are aware of the presence of an EDR – and its possible use in determining fault in the event of a crash – may be more inclined to drive cautiously and to comply with traffic law. Equally, EDRs can assist in proving that a driver is not at fault after a crash.

While the safety benefit of more comprehensive crash data cannot be quantified, data-led research is crucial for understanding the cause of collisions and for developing solutions to safety problems. A recent report for the Transportation Research Board was effusive about the use of EDRs for crash data analysis:

> Widespread deployment of EDRs promises a new and unique glimpse of the events that occur during a highway traffic collision. The EDR in a colliding vehicle can provide a comprehensive snapshot of the entire crash event – pre-crash, crash, and post-crash. By carefully collecting and analyzing the details provided by the growing number of EDR equipped vehicles, the roadside / traffic safety research community has an unprecedented opportunity to understand the interaction of the vehicle-roadside-driver system as experienced in thousands of U.S. highway accidents each year. (Gabler et al. 2004: 183)

The report identified a large range of data of use to researchers that is or could be collected by EDRs, including not only speed, acceleration and braking information but also data on yaw and roll rate, seatbelt status and even occupant size classification (ibid: 38-40). This type of data could assist in improving safety in vehicle and roadway design as well as in understanding the cause of crashes.

These data could also be very useful for police road accident investigators. Some new technologies such as ABS currently make the task of accident investigation more difficult: factors such as speed could previously be evaluated though measuring skid marks; with ABS, vehicles no longer skid and so data are unavailable. EDRs would help to redress this problem by providing a valuable source of data and giving a more comprehensive picture of events leading to collisions.

Use of EDR data by police may also improve safety by providing a deterrent to the violation of traffic law. Drivers who are aware that information on their driving may be recorded and made available to police and courts in the event of a crash may modify their driving behaviour. As discussed in the chapter on surveillance technologies, this type of approach is oriented towards encouraging drivers to regulate their own behaviour rather than catching the maximum number of offenders.

The deterrent aspect of EDRs seems to be confirmed by research. Initial reports from police forces equipping their fleets suggest that fitment of EDRs lead to 'improved driver behaviour changes in police drivers' (Charlton 2005) resulting in reductions in police vehicle collisions of 20-25% (Northamptonshire Police 2005; Hansard 8 March 2005 col. 1460). This is particularly encouraging given the recent concern over the sharp rise in collisions involving police vehicles elsewhere in the country (e.g. Best and Eves 2004). Similarly, a Dutch study noted a crash reduction in EDR-equipped fleets of 20%, and a German study showed that young drivers made aware of a black box fitted to a vehicle forced a change towards driving habits (SWOV 1997). This research indicates that black boxes may be particularly effective as a fleet management tool – both through giving managers better data about the cause of collisions in their fleet and through encouraging fleet drivers to drive more carefully.

Recommendation 55: ACPO should issue guidance to encourage police forces that have not already done so to fit black boxes to police vehicles and combine their introduction with driver education and training. The Office of the Deputy Prime Minister (ODPM) and the Department of Health should replicate this for ambulance, fire and other emergency service vehicles. HSE and DfT should commission research into the safety potential of EDRs as a fleet management tool and include the results in guidance on work-related road safety.

Despite the fact that Event Data Recorders already exist in a significant number of vehicles and their considerable safety potential, it is clear that best use of the technology is not currently being made. There are a number of barriers to using data from EDRs, including questions relating to access to and ownership of data, the lack of a common design standard and the lack of privacy safeguards and protocols regarding their use.

While EDRs have been used by police in prosecutions following crashes in the USA and Canada, there is no record of this occurring in the UK (Hansard 8 March 2005 cols. 1458-1459). It is unclear whether ownership of data lies with the vehicle manufacturer or owner, and there are no express powers giving police access to data. This in effect makes the data unavailable to crash investigators. As the ACPO reported to the House of Commons Transport Committee:

> We have spoken to road death investigators around the country, they have described instances of vehicle manufacturers … who have turned round and said there is no information in this system. We do not believe them, particularly when you are looking at whether or not the liability could be theirs. There are now one or two companies who … will offer to extract that information for us at extreme cost. … We are not satisfied because we cannot even secure the evidence which is our primary role, so that we can put it before ourselves, the CPS or courts to make a decision on responsibility. (Transport Committee 2004: 44)

There are also no current standards governing design of EDRs, which may also complicate access to data and may limit the range of data available. In the United States, both the Society of Automotive Engineers and the Institute of Electrical and Electronics Engineers have recently released standards or recommended practices for EDRs. However, these are non-binding and no manufacturers currently meet the standard (Gabler et al. 2004: 6). Mandatory standards are, however, being proposed by the National Highway Traffic Safety Administration (NHTSA). NHTSA is proposing to:

> (1) require that the EDRs voluntarily installed in light vehicles record a minimum set of specified data elements useful for crash investigations, analysis of the performance of safety equipment, e.g. advanced restraint systems, and automatic collision notification systems; (2) specify requirements for data format; (3) increase the survivability of the EDRs and their data by requiring that the EDRs function during and after the front, side and rear vehicle crash tests specified in several Federal motor vehicle safety standards; (4) require vehicle manufacturers to make publicly available information that would enable crash investigators to retrieve data from the EDR; and (5) require vehicle manufacturers to include a brief standardized statement in the owner's manual indicating that the vehicle is equipped with an EDR and describing the purposes of EDRs. (NHTSA 2004)

This is a positive development that would help to overcome many of the barriers identified above. In Europe, work is progressing in this area through the VERONICA (Vehicle Event Recording based ON Intelligent Crash Assessment) project, which will evaluate current EDRs and deliver a list of recommended features (CORTE 2005). However, progress seems significantly less advanced than in the USA.

EDRs may also contribute to safety through possible integration of EDRs with 'eCall' systems that alert emergency services in the event of a collision. Research has indicated that improvements to response time by emergency services enabled through automatic emergency calls and better location information could reduce fatalities across Europe by 10% (eSafety Working Group 2002: 29). Possibilities for integration of 'eCall' with Event Data Recorders should therefore be encouraged.

Recommendation 56: DfT and DTI should encourage the European Commission to develop a common standard and type approval system for Event Data Recorders (EDRs), similar to that proposed by NHTSA in the USA.

Recommendation 57: The Home Office should develop protocols for access to EDRs, clarify ownership of data, clarify data protection, and introduce an offence of interfering with their operation.

Recommendation 58: DfT should encourage the European Commission to seek agreement with European car manufacturers to ensure new vehicles are fitted with EDRs by a specified date. At this stage it would be premature to require retrofitting of EDRs.

Intelligent Speed Adaptation

> The answer in terms of technology is probably … doing something around the Leeds experiment where the car cannot go physically above the speed limit. It's chipped, and controlled by satellite, and when you hit roads that are 30 you've got to do 30 maximum. … It's physically chipped; it will not go any faster. We're 20 or 30 years off that. But I think it's probably where the technology needs to go, because I don't think we're going to get enough public support for the enforcement of speeding – ever.

Intelligent Speed Adaptation is a system in which vehicles 'know' the speed limit on a stretch of road and can either advise the driver if he or she is exceeding the speed limit or automatically adjust the engine speed to prevent the speed limit from being exceeded. There are a number of variations. Advisory systems inform the driver of the speed limit and of violations by audible or visible warnings or through an 'active accelerator pedal' or a 'haptic throttle' which will vibrate or give resistance if the vehicle is above the speed limit. Voluntary systems are linked into vehicle controls and will automatically slow a vehicle to the speed limit, but the driver can choose to override the system. In mandatory systems, no override is possible. ISA can also be fixed, variable or dynamic. Fixed systems are based on the posted speed limit; variable systems allow lower speed limits at certain points, for example on the approach to pedestrian crossings or sharp bends; and dynamic systems allow variable speed limits based on factors such as time of day, congestion and weather.

Most ISA systems use GPS in conjunction with a digital road map with local speed limit information to communicate details of speed limits to the vehicle. However, a system using roadside beacons that communicate the speed limit is also possible, and has been used in one of the field trials in Sweden.

While national roll-out of ISA is not expected until 2019, the technology underpinning ISA is already in existence. Field trials of ISA are currently underway involving 20 ISA-equipped vehicles in Leeds (West Yorkshire) and Nuneaton (Midlands). The trials involve both private motorists and fleet drivers, and use a voluntary system based on posted speed limits. The project is intended to observe user behaviour with ISA and to prepare a system architecture for mass production of ISA. The project is expected to conclude in 2006 (Carsten and Fowkes 2001).

ISA trials have also been conducted or are underway in a number of other European countries including Sweden, Finland, Denmark, France, the Netherlands, Belgium, Austria, Spain and Hungary. The largest ISA trials to date have taken place in Sweden, where an advisory ISA system was installed in 5,000 vehicles (involving 10,000 drivers) in four municipalities. From the results of the trial, the Swedish National Road Administration has estimated that if advisory ISA was fitted in all vehicles, the number of road casualties would be reduced by 20-30%. The study also found no negative impact on travel times (and even a slight improvement): although maximum speeds were lower, there were also fewer stops and braking situations, leading to a smoother flow of traffic. There was a high level of acceptance in urban areas, and two out of three test drivers wanted to keep the system in their cars (Vägverket 2002: 3).

In Finland, a 'Recording ISA' system has been trialled with employees and young drivers. This is an advisory version of ISA that records speeds and speed limit violations. Summaries of average speeds and number of violations were regularly communicated to drivers and employers or parents. This system received positive feedback from both drivers and parents/employers, and led to a 25% reduction in speed limit violations (Tapio and Peltola 2003: 4).

The Leeds trials follow a previous study into 'External Vehicle Speed Control' (EVSC - the predecessor of ISA) that ran between 1997 and 2000. Based on simulation and modelling, the project predicted that the casualty savings from ISA could range between a reduction of 14% of KSIs and 18% of fatalities for advisory systems based on fixed speed limits to a reduction of 48% of KSIs and 59% of fatalities for a mandatory, dynamic model (Carsten and Fowkes 2000: 22). Casualty reductions on this scale are unprecedented in road safety, leading to considerable interest in and enthusiasm for the technology.

ISA was cited by a number of interviewees as the new enforcement technology that would have the greatest impact on improving road safety. In the long term, it has the potential for removing the need for speed enforcement, including speed cameras and road humps, as speed could be controlled by the vehicles themselves. This has led to considerable demand for ISA within the police and within the road safety community, but this is matched by recognition of the political and technological complexities of introducing ISA.

Precursors for the introduction of ISA include research on its effectiveness, development of the technology, roll-out of the appropriate technological infrastructure (including a digital road map of speed limits and a means for communicating this to the vehicle), and public and political support for the project.

As noted, research on the effectiveness of ISA is currently being supported in the UK by the Department for Transport and is also underway in a number of other European countries. The development of ISA is also supported by two projects at a European level: SpeedAlert focuses on the technical and functional requirements of an advisory ISA system, while PROSPER looks at technical, legal and organisational barriers to ISA implementation.

As demonstrated by the field trials in the UK, Sweden and elsewhere, functional ISA technologies are already in operation and will continue to be developed on the basis of the trials. However, this needs to be supported by the roll-out of a system architecture to support ISA. In the UK this has only occurred so far in areas where field trials are taking place. Of particular importance will be a central speed limit database or a national digital road map containing details of local speed limits. Consideration will also need to be given to how the map is updated when new speed limits are imposed. The second important element of a system architecture that will need to be introduced is a mechanism for communicating speed limits to vehicles. This could occur through manual updates of the digital map, telecommunication systems such as mobile telephony or digital radio, or through locally transmitting infrastructure such as roadside beacons (SWECO 2005: 10). Possibilities for integrating this communication with other vehicle telematics systems – for example those associated with driver information systems or road user charging – should be investigated.

Public support for ISA will also be crucial to its implementation. While some of the more extreme motoring groups are already campaigning against it, the idea of ISA is popular among the general public. A MORI poll in 2002 found that 70% support advisory ISA systems, and 58% would want ISA to be mandatory on residential streets (MORI 2002). There is also growing consumer demand for ISA. The SARTRE3 survey found that 34% of drivers would find it useful to have a system fitted to their cars to prevent them from driving over the speed limit - an increase of 10% since 2002 (SARTRE3 2004: 167, 240). This consumer appetite could be increased by integration of ISA with other driver assistance technologies such as route mapping and traffic alerts. This has been the approach of RONCALLI, an Austrian trial of advisory ISA. Data on speed and speed limits were displayed in dashboard units, along with information on road conditions, accident hotspots and areas where children or the elderly were likely to be present (e.g. near schools). While there may be risks associated with this approach – including driver distraction issues – it may also facilitate the introduction of ISA as a consumer and driver assistance technology.

Consumer demand on its own, however, is unlikely to bring about the introduction of ISA. Political support will also be necessary. In addition to sponsoring research and ensuring an infrastructure is in place to support the system, governments can encourage the development of ISA by initiating a public debate on the technology (similar to the debate initiated by the Secretary of State on road user charging) and committing themselves to use of ISA in their own vehicles. In Belgium, the Flemish government introduced ISA in 40 municipal vehicles in Ghent as a means of trialling ISA and supporting its development. In the UK Transport for London is assessing the option for equipping buses, taxis and its own fleet vehicles with ISA and in the longer term giving a congestion charge discount to ISA-equipped vehicles. This is a very positive step forward, and a similar level of leadership on ISA would be welcome on a national level.

One of the advantages of a fleet-led approach to the introduction of ISA is that once a level of saturation with ISA is achieved, it may start to perform as a means of 'mobile traffic calming' that could also restrict other drivers to the limit. The EVSC project found that the rate of benefit began to decline after 60% saturation (Carsten and Fowkes 2000: 21). An introduction of ISA through vehicle fleets may also lead to a greater public understanding and acceptance of the technology before it begins to be introduced to private vehicles.

Recommendation 59: DfT should commission a definitive national digital road map, including local speed limits. If necessary, the Government should introduce regulations requiring Local Authorities to inform the Secretary of State of changes to local speed limits.

Recommendation 60: Central Government, Local Authorities and other bodies should commit themselves to introducing ISA on their own vehicles, in order to contribute to knowledge about the workability and acceptability of ISA.

Other future in-vehicle compliance technologies

There are a number of other potential uses for vehicle technologies to improve safety and encourage compliance with traffic law, either under current development or envisaged for the future. These include systems to detect fatigue and impairment and vehicles that monitor authorisation to drive. Vehicle technologies develop very quickly, and a strategic approach to support for technologies that aid compliance will be necessary.

Increasingly, vehicles are under development that can monitor the behaviour of drivers and respond by providing information and warnings. A number of higher-range vehicles already on the market are equipped with 'lane departure warning systems' that can alert drivers on major roads if they begin to drift out of their lane. Types of warning can include audible signals such as buzzers or physical measures such as a vibrating driver's seat. This type of system is particularly useful for dealing with distraction and fatigue. In the longer-term, systems are also under development that would enable vehicles to evaluate driver impairment (from fatigue, alcohol or drugs) by monitoring factors such as eye movements, force exerted by the driver's hands on the steering wheel, and the vehicle's position in lane and in relation to surrounding vehicles. Such a system could advise drivers to take a break or warn them that they may not be fit to drive. However, concern has been expressed that fatigue warning systems may inadvertently encourage drivers to extend their driving hours (Thomas 2005: 13).

There is also considerable potential for vehicles to monitor authorisation to drive, including ensuring that the driver is licensed and insured. Smartcard licence readers could be introduced in vehicles to check driver details against licence and insurance databases, and could be linked to an interlock to ensure that unlicensed and uninsured drivers would be unable to start the vehicle. This type of system would also enable vehicle owners to specify which drivers are authorised to use the vehicle, which would be useful for fleet management and to prevent theft. It could also record who is driving the vehicle at a particular time, which could help redress the gap between identification of the vehicle and of the driver, discussed in chapter 4. Versions of smartcards for monitoring use of vehicles are already in use in some car share schemes, but as of yet the technology is not in use for enforcement.

A strategic approach will be necessary to ensure that these and other compliance technologies are introduced and distributed quickly and appropriately. Government should co-operate with vehicle manufacturers, road users, academic specialists, road safety professionals and other key actors to ensure that safety remains a key priority in vehicle design and that new safety technologies are used effectively.

Recommendation 61: DfT should convene a high-level forum comprising government departments, researchers, car industry representatives and consumer groups to review and monitor the implementation and effectiveness of new vehicle technologies and to discuss how future vehicle design can contribute to road safety.

Chapter conclusions

The vehicle technologies discussed in the chapter have the ability to radically change the context in which road traffic enforcement takes place. They will be able to perform various functions: technologies such as licence and insurance interlocks verify entitlement and authorisation to drive; alcolocks and impairment warning systems check ability and fitness to drive; seatbelt reminders and Intelligent Speed Adaptation assist compliance with road traffic regulations; while Event Data Recorders will help investigate those accidents that do occur.

Technologies that alter the in-car driving environment to increase compliance may be supplemented in future with technologies that alter driver behaviour through financial means. Particularly significant developments include black boxes to calculate insurance premiums. In the UK, Norwich Union is piloting its 'Pay-as-you-drive' insurance scheme, which records vehicle location and other data using GPS and calculates premiums on the basis of miles driven. In the young drivers scheme, a higher premium applies for night driving, when young drivers are at higher risk. While compliance with speed limits and other road traffic laws does not currently affect premiums, the technology would make this possible. In Ireland, for example, AXA Insurance's 'Traksure' scheme uses similar technology to reward young drivers who comply with speed limits and penalise those who do not.

All of these technologies represent an extension of the 'policing' of compliance and management of risk beyond the realm of roads police alone. Of all the technologies discussed in this report, these have the greatest potential to reduce road casualties, with early assessments of ISA projecting that it could reduce KSIs by up to 48%. In doing so, the role of roads policing may change dramatically, as key functions such as speed enforcement may become redundant. However, even with improved in-vehicle compliance technologies, roads policing will continue to play an important role in helping to enforce risk that cannot

be controlled through other means and acting as a deterrent to dangerous driving behaviours that cannot be prevented through technology.

Chapter 8

Conclusions

Overview

This project has assessed the changing nature of roads policing in the context of rapid technological and operational developments. These trends include an increasing orientation towards intelligence-led policing and the management of risk; the growing prominence of information management and communication in policing; moves towards enforcement by other types of police and other agencies; increasing use of camera surveillance; and the development of in-vehicle technologies to encourage compliance with road traffic law.

Road traffic enforcement is an integral element of road safety. Enforcement campaigns – whether using new technologies or traditional methods – have considerable scope for reducing road casualties. However, roads policing has often been considered 'peripheral', and there has been a long-term decline in roads policing numbers. In order to be most successful, roads policing needs appropriate financial, political and public support.

> Improvements to databases, improvements to the exchange of information, identification (use of photograph or fingerprints to confirm identities), avoiding dual or multiple inputting of the same information, a ready exchange of information between systems … If we were to have all the things that we've discussed today, it would make a huge difference.

New technologies contribute to the effectiveness of roads policing, through providing practical support to traffic officers, enabling automated enforcement or by guiding the deployment of resources. This report has addressed the use of several of these technologies and developed recommendations for making more effective use of technology and improving the efficiency of road traffic enforcement. In particular, improvements to the information infrastructure and new ways of linking drivers to vehicles will be needed.

Technology and the risk management approach

This report has argued that new roads policing technologies assist and accelerate movements in policing towards the policing and management of risk (and away from a focus on deviance and individual offenders). Risk management and effective use of technology feature strongly in an 'intelligence-led' approach to roads policing – an approach that implies developing knowledge about road risk (e.g. about location, time and offender characteristics) and directing resources and strategies accordingly. This intertwines with trends towards partnership working, decriminalised enforcement and increasing concentration on alternative means of ensuring compliance (including environmental measures such as road engineering and in-car technologies such as ISA and alcolocks). These trends have positive implications for road safety in that roads policing adopts a safety management approach.

> I'll put it politely: there are too many dinosaurs who don't like change.

These shifts are not total, however, and there remain a number of challenges. First, gathering and communicating intelligence and information about risk is essential to this approach. This requires effective joint working between government departments and between different stakeholders at a local level. Second, the interface between technology and more traditional roads policing is complex but important, and it is essential that enforcement technologies are oriented towards supporting roads policing rather than replacing it. Finally, the rapid pace of technological change is not always met by equivalent changes in culture, and new strategies and technologies need to be championed at both force and national level in order to gain acceptance.

An enabling legislative framework

In order to maximise the gains from new technologies, an enabling legislative framework is essential. Technology develops rapidly, but the process of legislative change can be slow and difficult. It is therefore important to ensure that the legislative framework supports both current and future technologies at all stages of their development. First, the type approval system needs to be both highly robust in order to maintain public confidence about the integrity of evidence and responsive enough to facilitate new developments. Second, legal mechanisms enabling funding for new technologies – such as hypothecation of safety camera and ANPR revenue – have been very successful in supporting the diffusion of new technologies. An expansion of this approach would be welcome. Third, road traffic laws and regulations need to be framed in a manner that both promotes safe driving and enables enforcement to take place. In some cases, the introduction of enforcement technology requires a change in the law. The introduction of the breathalyser in conjunction with the 1967 Road Traffic Act that established blood alcohol levels is a good example of this. New enforcement technologies that may require new laws in order for them to be used include close following detection and a generalised impairment measurement device.

Legislative changes that would assist in improving enforcement and reducing road casualties include: removing the restrictions on breath testing to allow more widespread and targeted enforcement; the introduction of 'owner liability'; 'continuous enforcement' of motor insurance requirements; a specific offence of close following; a revision of legislation on impairment; and legislation to clarify police access to Event Data Recorders.

Funding issues

Funding and resources for the development, rollout and operation of new technologies are crucial for their success. Different approaches to the funding of enforcement technologies have been taken. Some, such as video cars or breath testing equipment, are funded through mainstream police budgets. For others, however, more innovative approaches have been used, including hypothecation of fixed penalty revenues and grants from central government used as 'pump-priming' money to facilitate the initial introduction of technologies. Different types of technologies will lend themselves to different funding arrangements. For speed and red light cameras, hypothecation has been very successful, in part because the volume of offences processed by the cameras and the amount of fixed penalty revenue collected from those offences is enough to cover the costs of enforcement. For ANPR, however, revenue recovered under hypothecation represents only 10% of operating costs, and has had to be supplemented by mainstream police expenditure and support from central government. Other technologies, such as mobile data entry terminals, may make significant gains in terms of efficiency but do not directly generate revenue, so will need to be funded by other means.

Improvements to funding mechanisms recommended in this report include full hypothecation of safety camera revenue for road safety; revision of the safety camera handbook to allow enforcement of 20 mph areas and a wider range of sites under the hypothecation scheme; a reassessment of the offences included in the ANPR cost recovery scheme; and greater use of 'pump-priming' funding to support technologies that will improve the efficiency of roads policing in the longer term.

> If you're going to use technology as an enforcement mechanism, the biggest thing that you need to do is get the public onside.

Public and community support

Public and community support for these changes will also be essential. New technologies should not be seen as 'anti-motorist'. Rather than inconveniencing drivers, the technologies described in this report allow enforcement efforts to be targeted towards offenders who cause the most risk or are also engaged in other types of crime. Public support for road traffic enforcement is already strong. As noted in chapter 2, around 75% of all drivers report being in favour of more enforcement, with over 35% being 'strongly in favour' (SARTRE3 2004: 157). This includes substantial support for new technologies: 78% support speed cameras, 68% support in-car speed limiters, 75% support black boxes for crash investigation and 70% support electronic vehicle identification (ibid: 61-7). Effective communication about the function and use of new policing technologies will continue to be important to ensure that this support continues.

Involvement of the community will also be important. Roads are part of public space, and illegal or anti-social use of vehicles can erode the quality of life in local communities. Intelligence-led strategies that base resource deployment on information about the location of offending and crashes need to be supported with 'community intelligence' about problems and locations of particular concern. Through initiatives such as 'Community SpeedWatch', technologies can support community policing.

A strategic approach

Finally, a strategic approach to roads policing and road safety is necessary. A number of developments of key importance to roads policing - such as the decriminalisation of moving traffic offences, the introduction of new civilian police staff such as CSOs and new types of officer related to traffic, and the rollout of new enforcement technologies – are perceived to be occurring in a piecemeal fashion. In this context, recent initiatives such as the Police Science and Technology Strategy and the joint ACPO/DfT/Home Office Roads Policing Strategy can be seen as positive steps towards creating a strategic vision for the future development of roads policing. A renewed recognition at a national level – for example in the National Policing Plan - of the importance of roads policing and its role in reducing road casualties will be necessary to support this vision. It is hoped that the themes and issues identified in this report will contribute to informing such an approach.

List of Recommendations

Roads policing and road safety

Recommendation 1: DfT and the Home Office should fully recognise the contribution that road policing makes to road safety and ensure roads policing is oriented towards casualty reduction.

Recommendation 2: Given its position as a European leader in road safety, the UK Government should promote the EC Recommendation on Enforcement in the Field of Road Safety and set a positive example for other European countries to follow. If take-up of the recommendation proves to be limited, the UK Government should press for an EC Directive on enforcement.

Recommendation 3: The Department for Transport and the Home Office should conduct research into methods of roads policing and their relationship to casualty reduction, including optimum levels of policing.

Recommendation 4: Her Majesty's Inspectorate of Constabulary should conduct a new thematic inspection of roads policing to provide better data on current levels and methods of roads policing. Areas of inquiry should include not only estimation of road policing numbers but also a 'skills audit' and assessment of compliance with the National Intelligence Model.

Recommendation 5: The Home Office should assess the role of Community Support Officers, Highways Agency Traffic Officers and police staff in relation to their contribution towards road traffic enforcement. The Home Office should seek to clarify different types of officer related to traffic.

Recommendation 6: DfT, Home Office and DCA should conduct a wide-ranging review of all traffic offences to evaluate the impact of civil enforcement. This review should lead to a strategy aimed at bringing consistency into decisions on which offences should be subject to civil enforcement.

Recommendation 7: The Home Office should reaffirm the importance of roads policing in future National Policing Plans and include the Roads Policing Strategy as an appendix.

Recommendation 8: As noted in the ACPO/DfT/Home Office Roads Policing Strategy, more detailed indicators both of roads policing activity and of outcomes need to be developed. These could be used at a local level to assess local priorities and to inform Police Authorities, police consultative committees and Crime and Disorder Partnerships. The Home Office should collate this information and publish an annual report of roads policing indicators.

Recommendation 9: The Home Office should incorporate a specific section on roads policing in future Police Science and Technology Strategies and develop guidance to ensure that new road traffic enforcement technologies assist rather than replace operational roads police.

Recommendation 10: Skills for Justice should regularly evaluate the demand for new skills resulting from operational and technological developments in roads policing as part of its annual Police Sector Skills Foresight Report.

Recommendation 11: The Home Office and ACPO should evaluate the case for extending the ANPR cost-recovery scheme to other roads police officers that enforce the same offences.

List of Recommendations

Information and technology

Databases & driver records

Recommendation 12: The IMPACT programme to create a national intelligence system (as part of the Bichard Inquiry implementation) is a welcome and necessary development. The Home Office should ensure that the system is structured to facilitate ease of use by both ANPR teams and roads police.

Recommendation 13: The proliferation of automated enforcement systems has put new strains on vehicle and driver licensing, and the absence of an automated link between driver and vehicle licensing is a major barrier to effectiveness of automated enforcement. DfT and DVLA should commission a wide-ranging review of options on how to link drivers and vehicles for enforcement purposes.

Recommendation 14: DVLA should require keepers of vehicles to supply a valid driver's licence (unless registering to a company or partnership or registering the vehicle off road) when registering the vehicle.

Recommendation 15: The lack of an integrated criminal justice computer system with direct links to the DVLA driver database and PNC is a major barrier to the efficient operation of the court service. DCA should bring forward an integrated criminal justice computer system as soon as possible.

Recommendation 16: The Government should consult on bringing forward legislation to implement owner liability – in which the registered keeper of a vehicle detected committing an offence is legally regarded as the offender unless the registered keeper is able to identify the offender or prove that the vehicle had been taken without consent.

Recommendation 17: Database accuracy issues are perhaps the single greatest challenge to the effectiveness of ANPR. DVLA should continue and intensify its barcoding and data cleansing projects. The National Audit Office should conduct an audit of database accuracy.

Recommendation 18: The Government should bring forward legislation to enable continuous enforcement of motor insurance requirements.

Recommendation 19: Given the continued difficulties police can experience in identifying drivers, the Government should re-evaluate the case for mandatory carriage of driver licences and assess other options for identifying drivers at the roadside. As an intermediate measure, DfT and DSA should update the Highway Code to recommend driver licence carriage and assess what proportion of drivers already carry driving licences.

Recommendation 20: DVLA should introduce Smartcard licences. The Government should begin the recall of paper licences once legislation is in place and proceed with phasing out the counterpart to the Photocard driving licence.

Recommendation 21: The UK Government should support the establishment of a European-wide data exchange system to enable cross-border enforcement and encourage the European Commission to introduce a new Directive in this area.

Information and technology

ANPR

Recommendation 22: Police forces should continue with the expansion of ANPR national roll-out to meet ACPO's vision of an ANPR unit in every BCU.

Recommendation 23: DVLA, VOSA, PITO and MIB should ensure that ANPR teams have live access to 'no insurance' and computerised MOT databases as soon as possible.

Recommendation 24: ANPR units have clear potential to be effective in observing and enforcing offences that cannot be automatically detected (such as careless and dangerous driving), yet the extent to which this occurs in practice varies sharply from force to force. The Police Standards Unit should ensure that policing activities related to road safety feature prominently in the ANPR best practice handbook.

Recommendation 25: The Home Office should review offences subject to hypothecation under ANPR and if practicable extend scheme to offences vital to the safety of vulnerable road users, such as zebra crossing regulations and advance stop boxes for cyclists.

Recommendation 26: DVLA and PITO should bring forward direct live access to the DVLA database as soon as possible.

Recommendation 27: Existing ANPR infrastructure - including cameras operated by the Highways Agency for traffic management purposes and by DVLA, VOSA and Customs and Excise for enforcement purposes – should be made available to the Police to enable maximum use of existing resources.

Recommendation 28: The Home Office should issue guidance to Local Authorities to ensure that Local Authority CCTV systems are compatible with ANPR. Where appropriate, Local Authorities should be encouraged to develop joint operations with police.

Information and technology

Collision data

Recommendation 29: ACPO should encourage police forces to take advantage of Geographical Information Systems to provide detailed mapping of local casualty and collision hotspots and to enable an intelligence-led approach to roads policing.

Recommendation 30: ACPO should issue guidance encouraging police forces to roll out mobile data entry terminals in order to improve STATS19 collision reporting, facilitate issue of fixed penalty notices and provide mobile access to data. Mobile data entry terminals should include GPS and GIS capabilities in order to provide more accurate information about the location of collisions.

List of Recommendations

Surveillance and technology

Speed and Red Light Cameras

Recommendation 31: The Government should fully hypothecate safety camera revenue by introducing legislation to allow 'surplus' revenue to form local road safety innovation funds. As an intermediate measure, DfT should revise Safety Camera Partnership guidelines to allow safety camera partnerships to spend more on road safety advertising and educational initiatives.

Recommendation 32: Given the remarkable success of speed and red light cameras, DfT and partner organisations should include information on their casualty reduction potential and purpose in Think! advertising.

Recommendation 33: Subject to open and transparent local consultation processes, DfT should revise Safety Camera Partnership guidelines to enable more flexibility in placing cameras in areas of community concern.

Recommendation 34: DfT should encourage and evaluate innovative initiatives such as Community Speedwatch.

Recommendation 35: DfT should commission a pilot scheme to explore the possibility of using speed-over-distance cameras as area-wide treatments. Depending on the results of the pilot, DfT should amend Safety Camera Partnership guidelines to allow camera enforcement of 20mph zones under the hypothecation scheme, where other options are impractical.

Recommendation 36: DfT should commission research into the comparative deterrent factors and effects on speed of overt and covert cameras and revisit the camera guidelines in light of the findings.

Surveillance and technology

CCTV and traffic enforcement

Recommendation 37: ACPO and the Local Government Association should develop a best practice manual on hierarchy of use of CCTV and sharing information and intelligence between police and decriminalised enforcement teams to ensure effective cooperation and to maximise effectiveness of the resource.

Recommendation 38: Home Office and DfT should review the type approval process to take account of the particular needs of civil enforcement bodies and to ensure best value. Quality and integrity of evidence should remain the key consideration.

Surveillance and technology

Future surveillance technologies

Recommendation 39: DfT and the Home Office should introduce trials of close following detection technology in UK. Given a positive outcome of these trials, the Government should introduce legislation to make close following an offence.

Recommendation 40: DfT should monitor international developments in technology to detect illegal overtaking and seatbelt use and, if successful, introduce trials in the UK.

Recommendation 41: DfT, DCA and safety camera partnerships should look at how automatic enforcement communications can be tailored to reinforce safety messages, including information on time and location of offence and casualty data of the camera site.

New impairment technology

Alcohol

Recommendation 42: Some forces claim not to record all negative breath tests. This undermines a very useful indicator of roads police inputs and effectiveness. ACPO should advise Chief Constables to ensure that breath tests are adequately recorded, and, when reporting the data, confirm that they are satisfied that it is an adequate reflection of reality.

Recommendation 43: The introduction of evidential roadside breath testing will be the first major change in drink drive legislation for many years. DfT, Home Office and ACPO should use this opportunity to launch a renewed national drink drive advertising and enforcement campaign.

Recommendation 44: DfT, Home Office and ACPO should combine the rollout of the new evidential roadside breath testing technology with a national roadside survey of alcohol levels, which would provide useful data about levels of drink driving.

Recommendation 45: The Government should clarify police powers for 'targeted' breath testing and extend police powers for breath testing to allow roadside screening tests to be administered without need for 'suspicion' or offending.

Recommendation 46: In some countries including the United States, passive sensors are used on police roadside stops to detect the presence of alcohol in the air of the vehicle's occupant compartment and to advise officers of whether a breath test should be required. DfT and the Home Office should commission trials of this technology in the UK, and, if necessary, the appropriate legislative changes to facilitate its use should be introduced.

List of Recommendations

New impairment technology

Drugs testing

Recommendation 47: DfT should continue research into evaluating the extent of the drug driving problem and on linking drug use to impairment.

Recommendation 48: The Home Office should provide separate data on drink and drug driving offences.

Recommendation 49: DfT should evaluate FIT testing following the first year of operation of the code of practice, and make available data including usage and percentage that lead to medical checks and prosecutions. In addition, HMIC should audit FIT training and capabilities as part of its Baseline Assessment process.

Recommendation 50: The case for a new offence of driving with an illegal drug in the bloodstream has not yet been made. However, in some circumstances it may be viable to use drug testing kits as screening devices to establish whether more comprehensive impairment testing should be carried out. HOSDB should continue work in this area.

New impairment technology

Impairment testing

Recommendation 51: An impairment measuring device could have very positive implications for road safety and would redress a number of other difficulties. There are a number of challenging issues surrounding impairment detection, including implications for older people, but these may not be intractable. HOSDB should continue development of impairment measurement devices. DfT should initiate a public debate (involving police, safety groups, representatives of the elderly and other relevant stakeholders) about what the base level of impairment should be and how the device could work in practice.

In-vehicle compliance technology

Seatbelt reminders

Recommendation 52: DfT should encourage the European Commission to establish standards for seatbelt reminders and seek an agreement with manufacturers to make them standard in new vehicles.

In-vehicle compliance technology

Alcolocks

Recommendation 53: The Government should progress with pilot schemes to allow alcolocks as a court disposal.

Recommendation 54: DfT and HSE should evaluate the effectiveness of alcolocks as a fleet management tool and promote their use.

In-vehicle compliance technology

Event Data Recorders

Recommendation 55: ACPO should issue guidance to encourage police forces that have not already done so to fit black boxes to police vehicles and combine their introduction with driver education and training. ODPM and the Department of Health should replicate this for ambulance, fire and other emergency service vehicles. HSE and DfT should commission research into the safety potential of EDRs as a fleet management tool and include the results in guidance on work-related road safety.

Recommendation 56: DfT and DTI should encourage the European Commission to develop a common standard and type approval system for Event Data Recorders (EDRs), similar to that proposed by NHTSA in the USA.

Recommendation 57: The Home Office should develop protocols for access to EDRs, clarify ownership of data, clarify data protection, and introduce an offence of interfering with their operation.

Recommendation 58: DfT should encourage the European Commission to seek agreement with European car manufacturers to ensure new vehicles are fitted with EDRs by a specified date. At this stage it would be premature to require retrofitting of EDRs.

List of Recommendations

In-vehicle compliance technology

ISA

Recommendation 59: DfT should commission a definitive national digital road map, including local speed limits. If necessary, the Government should introduce regulations requiring Local Authorities to inform the Secretary of State of changes to local speed limits.

Recommendation 60: Central Government, Local Authorities and other bodies should commit themselves to introducing ISA on their own vehicles, in order to contribute to knowledge about the workability and acceptability of ISA.

In-vehicle compliance technology

Future technologies

Recommendation 61: DfT should convene a high-level forum comprising government departments, researchers, car industry representatives and consumer groups to review and monitor the implementation and effectiveness of new vehicle technologies and to discuss how future vehicle design can contribute to road safety.

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