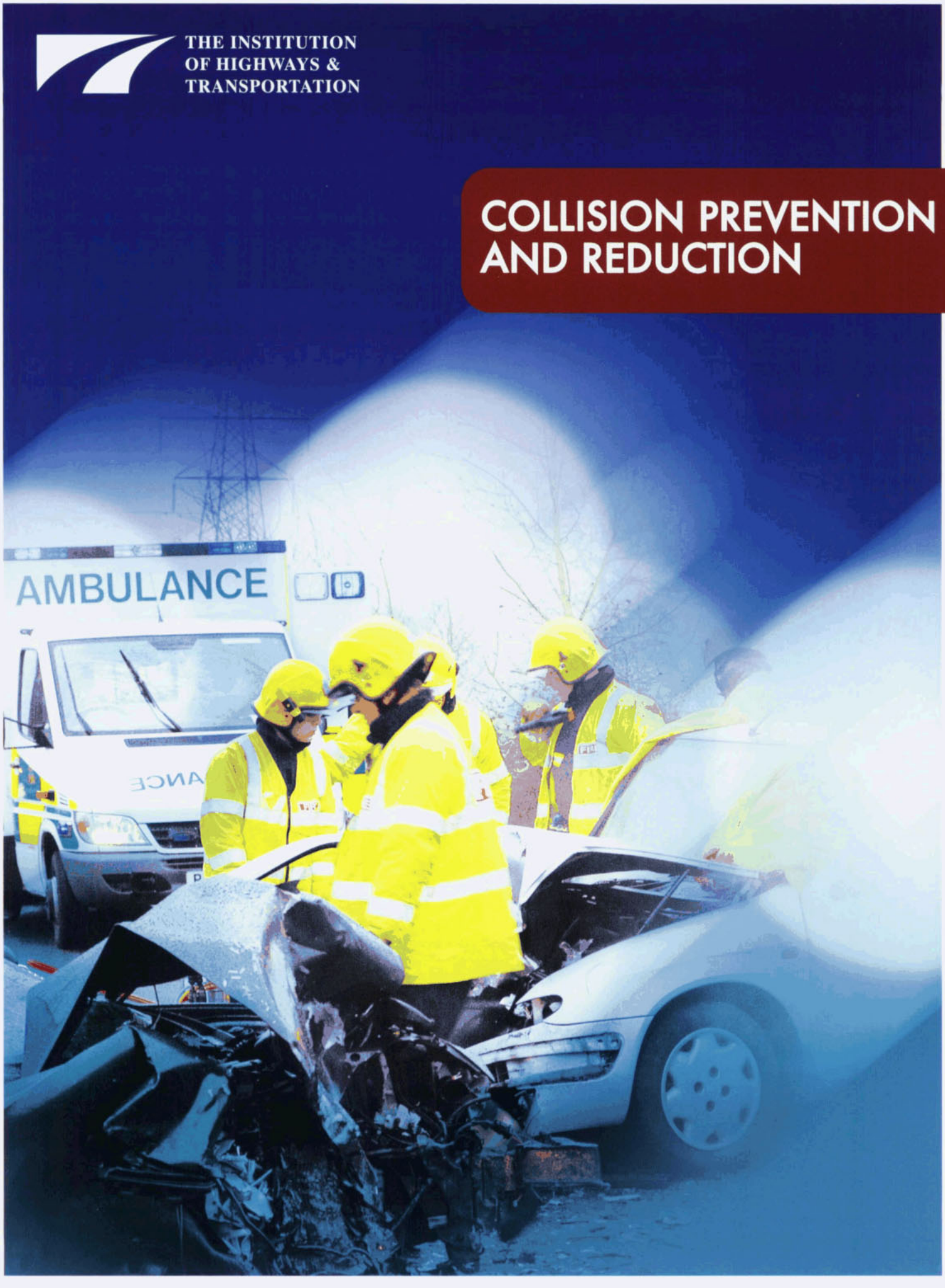
THE INSTITUTION
OF HIGHWAYS &
TRANSPORTATION

COLLISION PREVENTION AND REDUCTION



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Judith Barker

These guidelines are dedicated to the memory of Judith Barker MIHT who wrote Element 5 of the document.

Judith worked at TRL from 1990 until her early death in May 2003. She specialised in Road Safety Engineering and led many research and consultancy projects on safety schemes for rural and urban roads, as well as developing and testing innovative ideas on road signs and markings. She was highly skilled and knowledgeable on the analysis of casualty data and developed methodologies for these data, which have been widely adopted. Her work at TRL has had a profound effect on our knowledge of how to reduce road accidents. Judith was highly respected by her peers in the Road Safety profession and her presence is sadly missed.

IHT is pleased to acknowledge Judith's contribution to Road Safety by dedicating these guidelines to her memory.

Contents

Foreword

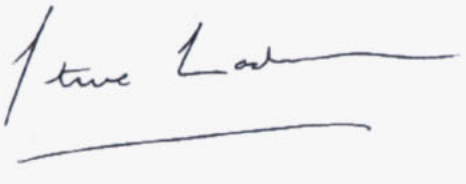
By Dr Stephen Ladyman
Minister of State for Transport

Great Britain continues to be a world leader in road safety. Our casualty rates are among the lowest in Europe, and we have a long history of developing and applying the latest techniques to improve the safety of our roads.

We are now seven years into our road safety strategy, Tomorrow's roads – safer for everyone. We are making good progress towards our challenging casualty reduction targets for 2010. And we are beginning now to think about our next set of targets from 2010 onwards.

Local authorities and their partners play a vital part in making our roads as safe as they are. Around 90% of all accidents occur on local roads and the most successful authorities have reduced killed and seriously injured casualties on their roads by over half since our targets were set.

But the more we achieve the harder it will become to achieve more. By drawing on best practice from around the country, these guidelines show how, through a systematic approach to the delivery of road safety, we can meet the challenge.



Dr Stephen Ladyman
Minister of State for Transport

Preface

COLLISION PREVENTION & REDUCTION

MESSAGE FROM ALISTAIR HAYDOCK IHT PRESIDENT 2006-2007

Safety is the most important responsibility of anyone involved in transport. It is a global issue: road traffic crashes kill nearly 1.2 million people worldwide every year, and injure millions more. They are the second leading cause of death for people aged 5 to 25 years, with devastating impact on families and communities. The UK has one of the best road safety records in the world, yet still around 3,200 people are killed and 29,000 are seriously injured each year. In total, there are over 270,000 road casualties, in nearly 200,000 crashes, and about fifteen times that number of non-injury incidents.

Road safety is no accident. Road safety happens through the deliberate efforts of individuals and many sectors of society, governmental and non-governmental alike. Every one of us has a role to play: Ministers for Transport, Health and Education; health care providers; motoring associations; educators; students; insurers; vehicle manufacturers; road users; the media and victims of road traffic crashes and their families.

The United Kingdom Government, Local Authorities and the IHT have a long record of accomplishment and sustained interest in road safety, and it remains one of the cornerstones of the Institution and of UK Transport Policy.

IHT first published its Accident Reduction & Prevention guidelines in 1986 with an update in 1990. We are pleased to continue this tradition of best-practice with this Collision Prevention & Reduction (CPR) guideline. This document is a completely new version that provides comprehensive and practical guidelines for policy-makers and practitioners in the field of CPR on our roads.

There is a strong case for up-to-date CPR guidelines. There have been radical changes in the nature of local government and its delivery of road safety engineering - including the increased use of externalised bodies and changes in the funding available for road safety projects. This document has been designed for use by local authorities (at all tiers), consultants and road safety auditors.

IHT welcomes feedback from users on the content of its guidelines and would encourage any comment be directed to technical@iht.org

I would like to thank all those involved in the production of these Guidelines, particularly the Steering Group members, the Managing Editor, authors, peer reviewers, consultees and all those who contributed material. I must also particularly thank our sponsors – the County Surveyors' Society, Department for Transport and the Rees Jeffries Road Fund – who have made this Guideline possible.

On behalf of the Institution, I am pleased to commend Collision Prevention & Reduction to all with an interest in road safety policy and practice. I am sure it will make a worthwhile contribution to professional practice and, over time, to people's daily lives.

Alistair Haydock

Alistair Haydock
President 2006-2007

In 1980 the Institution of Highways and Transportation (IHT) produced a set of guidelines, aimed largely at local authorities, which was designed to encourage more focused delivery of road safety engineering activities in the UK. That document was called Highway Safety Accident Reduction and Prevention Guidelines.

Broken promises mean broken lives

Introduction

The World is Changing

In 1980 the Institution of Highways and Transportation (IHT) produced a set of guidelines, aimed largely at local authorities, which was designed to encourage more focused delivery of road safety engineering activities in the UK. That document was called Highway Safety Accident Reduction and Prevention Guidelines. The Guidelines were updated in 1986, winning the Volvo Road Safety Award that year, and an international edition was published in 1990. Since then the IHT has been very active in producing guidance on improving road safety on UK roads, with guidelines on Road Safety Audit (RSA), on providing for cyclists and on facilitating journeys on foot - just some of the topics where user safety is a high priority, and where the Institution has stepped in to disseminate good practice and sound advice.

How much the world has moved on since the mid nineteen-eighties has been starkly demonstrated in the area of public service procurement and provision, including the highways and transportation niche where road safety usually resides. Any idea of simply updating the 1986 edition would be doomed to failure; the whole landscape of service delivery has changed, with a culture and operating environment that would be almost unrecognisable to engineers of the last century.

The purpose behind the original edition of this document was to help embed collision prevention and reduction in a public service setting. For some local authorities that meant making special resources and funding available for the first time; for others it meant adjusting the way they already attempted to stem the tide of human injury on their roads. For everyone it meant looking to the guidelines to see how to deliver this life-saving public service. Those guidelines set the agenda for collision reduction for the ensuing decade and beyond. They were not simply about reporting existing practice.

So it is from this bedrock that the 2007 edition of the Guidelines has been built. These Guidelines have been designed to draw together the best practice within the road safety community, and to extrapolate that practice to deal with the state of near-continuous change in the operating environment in which road safety practitioners find themselves.

The Guidelines have been built around a framework of five elements: data, structure, systems, finance and monitoring. The diagram illustrating this framework can be seen here where the five elements are shown enveloped within a policy sphere; not another element,

Diagram 1

but a cultural atmosphere, a set of environmental parameters, without which none of the five elements would be able to function properly, and without which they would not be useful as a framework to bring about

improved road safety for our communities.

The thrust of these Guidelines is to show that these five elements are interlinked, that each of the five is needed in order to optimise road safety service delivery and that a sound, sustaining policy environment is needed to establish the five elements and keep them operating well. This last point is vital: casualty reduction on public roads is always going to be a war of attrition; any let-up will only mean one thing: more unnecessary death and injury on our roads, affecting members of our communities. This makes having a sound policy environment, from the strategic level down to the level of local service delivery teams, of vital importance. Unsupported policy means broken promises, and, in the sphere of road safety, broken promises mean broken lives.

The Five Elements in Brief

Element One: Data

Collision data paints a global-to-local picture: over a million people are killed on roads around the world each year[1]; fewer than a hundred may have died on roads in a local authority area. Neither of these facts is more important, they just vary in scope. Local decision-makers may regard the second piece of data as much more pertinent to planning resource allocation over the next few years, and to them the availability and quality of such localised data is very important, especially in the modern climate of target-driven resource budgeting. Element One deals with this hierarchy of data, from the national level down to the local, and how it is used to inform decision making. This section steps outside the confines of traditional 'STATS19' collision data and takes a look at other kinds of collision-related information in a wider context. The section addresses the question of data's fitness-for-purpose and the strengths and weaknesses of various types of data and the analytical tools used to manipulate them, including an assessment of Geographic Information Systems (GIS) and conventional, non-spatial database systems.

Element Two: Structure

Reorganisation in local government over the last twenty years has sometimes been a traumatic process. One of the benefits has been encouraging innovative procurement in public services and a shift in focus to delivering neighbourhood-led services. There is less prescription than ever before on the 'best' structure to manage the road safety function, including engineering for casualty reduction. This does not mean that 'anything will do', as long as road safety is in there somewhere. The strength of an organisation's commitment to casualty reduction is measurable in the design and strength of the structure used to deliver it.

Casualty reduction requires specialist skills in road safety work to be brought to bear in ways that maximise synergies with other people – inside and outside the organisation – who are working to similar goals, or who have contributions to make to delivering casualty reduction. Element Two shows how to have a strong, road safety oriented, structure calling on the best existing practice along with the results of important research into the structural characteristics of high-performing local authorities.

Element Three: Systems

Nothing in these Guidelines undermines the tried and tested methods of collision investigation and prevention that have been so widely used across the UK in the last two decades, and that have been the catalyst for so many successful road safety engineering schemes, large and small. What Element Three shows is that an integrated approach to using these methods can make them even more productive in the early twenty-first century. After a brief overview of the traditional tools of the road safety engineer's trade, with appropriate references to more detailed coverage, the section discusses building these methods into a context-sensitive system for bringing about safer travel. This includes Urban Safety Management, Road Safety Audit, network safety strategies and Rural Safety Management. It is a common misconception that systems are about processes and procedures, that getting those things right means getting the system right. This attitude overlooks one vital component of a functioning system: people. As well as a war of attrition, road casualty reduction is one where battles will be won or lost on the basis of alliances made with people sharing similar goals. A small, under-funded, specialist team may well cut a heroic figure in the seemingly unequal struggle against road death and injury, but this battle does not need any heroes; it needs to be won, and Element Three will help with a discussion of the 'who' of systems, as well as the 'how'.

Road safety interventions should improve the streetscape..

[1] World Report on Road Traffic Injury Prevention, p.3 (WHO 2004)

..in ways that look beyond simply reducing casualties

Element Four: Finance

The introduction of Local Safety Schemes (LSS), the removal of Transport Supplementary Grant ring-fencing, the longer-term view of the Local Transport Plan (LTP), the bear-pit that can be the Single Capital Pot (SCP) and the replacement of 'netted off' revenue from camera enforcement by a Road Safety Grant: the recent history of collision reduction in the UK has also been a mini-history of the ebb and flow of local government finance. Many local authority road safety engineers may sometimes have felt adrift on these shifting currents, having to make the best of this year's budget, trying to keep a stock of schemes for the boom years and having sharp prioritising techniques for the leaner years. Element Four shows it does not need to be like that. The benefits are potentially great: synergistic schemes brought about by a multidisciplinary approach and reducing reliance on, for example, low budget traffic calming schemes with narrow aims that give predictably narrow outcomes. The section will demonstrate that road safety practitioners have a vital role to play in building schemes that enhance our cities and towns, with road safety benefits built in. This will mean a change of mindset toward medium and long-term thinking, with the reduction or abolition of the 'March Madness' of the twelve-month capital cycle. This section seeks to change the practitioner's position from being pushed about by the ebb and flow of finance, to skilfully surfing the crests and troughs in available money to bring about desired goals.

Element Five: Monitoring

The ancients believed the four elements of earth, air, fire and water were underpinned by a latent fifth element. Similarly, monitoring is of quintessential importance to the work of road safety professionals. However, it should be latent only in the sense of being less publicly obvious than the design, consultation and construction phases of road safety interventions, not in the sense of being almost non-existent. Element Five shows road safety practitioners the importance and usefulness of meaningful monitoring. The section also discusses the kind of monitoring required for the type of schemes developed from the financial cocktails discussed in Element Four and using the organisational alliances described in Element Three. This section opens the way to measuring success in order to replicate it and diagnosing failure in order to avoid repeating it.

Integration and Excellence

These Guidelines make no apology for repeatedly laying emphasis on the integrated and interdependent nature of the five elements and their policy environment. Collision prevention does not forgive uneven effort; working hard to have a sound collision database and good analytical tools does not compensate for a poor structure, fragmented systems of working, spasmodic finance or half-hearted monitoring. There is a skill to diagnosing the collision prevention outputs of the five elements and establishing which part of the system needs more attention. These Guidelines will help everyone involved in managing and delivering road safety services develop that skill and apply it to bring about continual improvement in dealing with a global killer: avoidable road death and injury.

Better health, better safety

Element One: Data

1.1 Introduction

Across the globe there is scope for serious debate about which agencies and which professional disciplines can bring maximum leverage to bear on the problem of reducing the toll of death and injury on our roads. This debate will continue, although the answer which seems to be emerging is that only by agencies and professionals working together will the most effective solutions be found to this global killer. Increasingly public bodies will be able to work with the private sector, not just as a part of the solution to road safety issues, but also to gain better intelligence on collision clusters and hazardous locations.

There is no doubt that a variety of models exist for describing and attacking the road safety problem:

- The clinical approach, treating road collision death and injury as a pandemic health hazard.
- The socio-behavioural approach, treating the problem as a phenomenon of societal norms conflicting with individual safety.
- The environmental approach, looking for solutions based on road infrastructure re-engineering.

Despite their obvious differences, these models all have one common need: data. It is unquestionable that the data needs to be of the best, or at least the most consistent, quality available.

1.2 Types of Road Safety Data

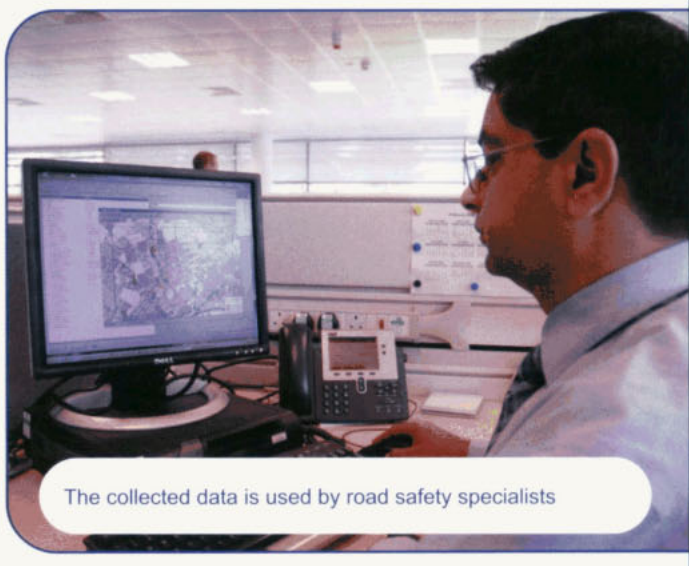
1.2.1 STATS19

When most road safety professionals in the UK talk about 'accident data' they are usually referring to that collected by the police about road traffic collisions involving human injury, often referred to as 'STATS19', named after the form used for many years to record the information. Most police authorities use an adapted version of the form, adding fields of particular interest to them or the local authorities responsible for collision investigation in their area. The basic pattern for managing this data relies on the police to collect it, perhaps storing it in a format suitable for their purposes, and exporting it to the relevant local authorities in their area and then onward to the Department for Transport (DfT). Sometimes, particularly in metropolitan areas or shire counties, there is a single shared database, with client data application software tailored to the needs of the police and local authorities distributed across the offices and stations of each organisation.

It is important to remember that, although STATS19 data is collected by police forces across the UK, the data is also collated nationally. This allows local

Police attending collision scenes are the vital first step in collision prevention and reduction

authorities to compare their own data with the national picture, potentially useful when deciding on spending priorities in road safety work. Probably the most useful source of this collated data is the annual report Road Casualties Great Britain (published by the DfT) and Road Accidents Scotland (published by the Scottish Executive), but all authorities can request more specific extracts from the national data.



The collected data is used by road safety specialists

The strengths of STATS19 data include:

- The data is collected and formatted with a degree of consistency across all police forces, meaning that data can be aggregated regionally and nationally.
- Since January 2005, this has extended to inclusion of a national set of contributory factors within STATS19. Previously each police force had either used a prototype set of factors designed by Transport Research Laboratory Ltd (TRL) or used a local set of factors, or recorded none at all.
- The data is quite detailed and treats the collision circumstances, the casualties and the vehicles involved as three subsets of data, linked by a common reference number.

- The coverage of the data is reviewed jointly by the police, the local authorities and the DfT in consultation with other users every five years, and this review process and all handling of the national dataset are subject to the rigorous standards of the Government Statistical Service.

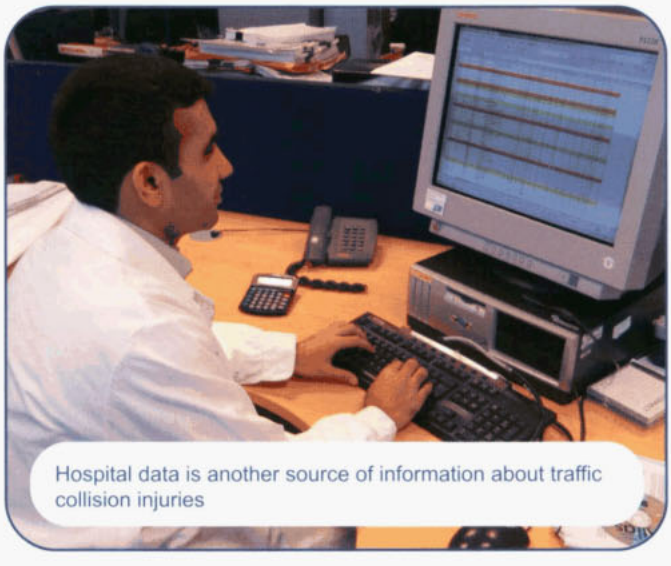
The weaknesses of STATS19 data include:

- Despite the legal requirement in most circumstances to report road traffic collisions resulting in human injury and encouragement by insurance company procedures to do so more widely, under-reporting and misreporting are endemic. Research in Britain indicates that there are two to three times as many serious injuries occurring on the road as are recorded in the STATS19 database[2].
- Injury traffic collisions are greatly outnumbered by those involving only damage to vehicles, which go largely unreported. This under-reporting closes off a large and potentially valuable source of information.
- There has been an increasing trend in recent years for road traffic collisions involving slight injury to be reported after the event and at a local police station, rather than by an officer at the scene of the incident. Inevitably, the data from such reports will not be of the same quality.
- Pressure on police resources, often accompanied by a hesitancy on the part of road safety practitioners in explaining the importance of the data to front-line police officers, have contributed to considerable variation in the quality of reported information. Filling in a multi-page report form to the necessary level of accuracy may not seem the most important task to be completed when a reporting officer is faced with injured casualties, traumatized witnesses, traffic management responsibilities and the myriad pressures of a typical collision scene.

Despite the widespread availability of STATS19 data in the UK, there are other kinds of road safety related data available, something which can be overlooked by the police and local authorities. This is understandable, given the effort required in collecting, storing and distributing STATS19; the information is usually to hand, and is the result of a significant resource investment. Why look anywhere else?

1.2.2 Hospital Data

If STATS19 data records injuries in road traffic collisions, it might seem likely that they will be broadly comparable to the local hospitals' Accident and Emergency (A&E) records. Research indicates that this is not the case, with nearly three times as many seriously injured road traffic casualties in national hospital databases than in the national STATS19 data[3]. Not only are the numbers different, but the patterns of reporting vary considerably. There are several reasons for this. Firstly, under-reporting in STATS19 data; a slightly injured casualty, particularly if no-one else was involved, might attend the A&E department, possibly at their journey's end, and not report the incident to the police. Cyclist casualties seem particularly prone to this kind of under-reporting. Secondly, the area covered by a hospital's A&E department is rarely coterminous with a police force area, resulting in casualties from a road traffic collision being reported to the police in one area and recorded on a hospital database in another. Thirdly, the injury classification methods used by the police and A&E departments differ, meaning there is little compatibility between slight and serious injury numbers between the two datasets.



Hospital data is another source of information about traffic collision injuries

The strengths of hospital traffic casualty data include:

- A thorough, clinically-based approach to injury description and assessment.
- A complementary set of data about road collisions.

The weaknesses of hospital traffic collision data include:

- The data is part of a much larger A&E dataset.
- The data is weak on circumstances of the collision.

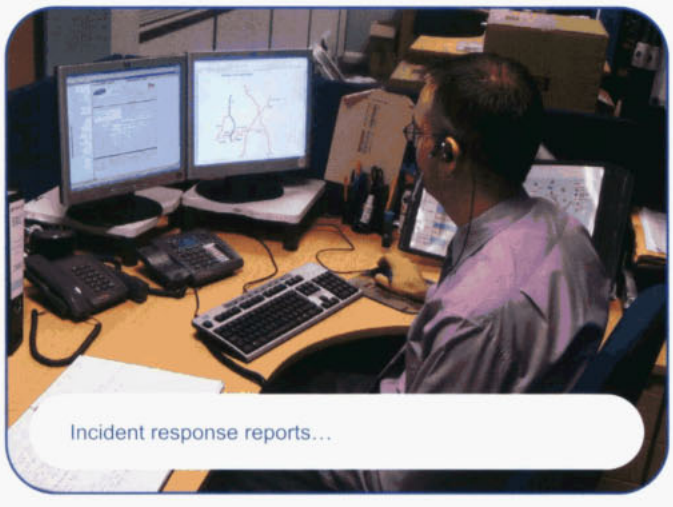
Much information that is basic to road collision investigation is of no relevance to medical treatment of casualties.

- Issues of confidentiality make it complicated to negotiate access to hospital data, and even when access is secured the data can be hard to collate in terms of local authority or police areas.

[2] Road Safety Research Report No.69 Under-reporting of Road Casualties – Phase 1 (DfT 2006)
[3] Comparison of Hospital and Police Casualty Data: A National Study (TRL Report 173)

1.2.3 Asset Management and Maintenance Data

Road collisions often lead to the collection of other kinds of data which can be used to improve understanding of road safety issues on a given network. This data could include maintenance records, where crews are repeatedly called out to particular locations to repair signs and barriers, or it could include repeated requests for traffic management by police forces on major roads.



Incident response reports...

...lead to more information...

...that can be used to make roads safer

Example: Using Incident Response Records in Area 8

URS/Carillion, the Managing Agent Contractor (MAC) for trunk road Area 8, became aware of a high number of overturning lorry incidents at the M40 Junction 10 Interchange with A43. These collisions often did not result in reported injuries but the police called out the MAC to many non-injury incidents to provide traffic management and emergency infrastructure repairs. Using the log kept within the Network Control Centre, it was possible to show the number of incidents and also how long the junction was closed. The closures usually created major congestion on the surrounding network for several hours while the vehicles were recovered. Using this information to calculate congestion and delay costs it was possible to bid for funding to carry out some safety remedial works in the form of yellow transverse bar markings on the M40 northbound slip exit road and the installation of a vehicle actuated sign to warn approaching HGVs that they were travelling too fast.

1.2.4 EuroRAP

EuroRAP is an acronym for the European Road Assessment Programme. It is an independent organisation and constitutes a sister programme to the highly-regarded European New Car Assessment Programme (EuroNCAP) vehicle crash testing programme. The organisation was founded by motoring organisations and other authorities. At the time of writing EuroRAP has thirty members in almost twenty countries.

The stated formal objectives of EuroRAP are[4]:

- To reduce death and serious injury on European roads rapidly through a programme of systematic testing of risk that identifies major safety shortcomings which can be addressed by practical road improvement measures.
- To ensure assessment of risk lies at the heart of strategic decisions on route improvements, crash protection and standards of route management.
- To forge partnerships between those responsible for a safe roads system - motoring organisations, vehicle manufacturers and road authorities.

EuroRAP has three international protocols that have been developed to be applicable on roads anywhere in the world. The protocols are[5]:

- Risk Rate Mapping: Colour coded maps showing the risk of death and serious injury faced by road users.
- Performance Tracking: Identifying whether fewer people are being killed or seriously injured on a road over time and identifying effective countermeasures.

[4] Quoted from www.eurorap.org/what_is_eurorap(accessed 08/01/06)
[5] From Arctic to Mediterranean – First Pan-European Progress Report (EuroRAP AISBL 2005)

- Star Rating: A rating to show how well a road protects a road user in the event of a crash. This is intended to complement the EuroNCAP star rating for vehicle safety.

EuroRAP literature identifies four main types of collision that account for the majority of serious and fatal road injuries in Europe: head-on collisions; collisions with unfenced roadside objects; side impacts at junctions and collisions with pedestrians and cyclists.

The publication of EuroRAP risk ratings lists those main road sections that are 'most improved' and those that are consistently higher risk. Although EuroRAP results always stress the efforts of road authorities to improve infrastructure and reduce crashes, release of the results has become something of an annual media event, possibly regarded with trepidation in some quarters. News media tend to latch on to the 'killer roads' that have been deemed to merit a 'black' rating under the EuroRAP system of risk ratings, often giving local authority officers and elected members a hard time in the process. At least one major shire county was forced to re-prioritise its road safety engineering programme when it was revealed that two long lengths of road in the area were rated as 'black'. This kind of pressure has lead to an uneasy relationship with EuroRAP for many road safety professionals.

Looking at the issue as objectively as possible, the strengths of EuroRAP include:

- Raising the profile of road safety issues and emphasising the relationship between vehicle, environment and road user.
- Engaging the road user as a 'consumer' of roads and highlighting the importance of road safety investment.
- Raising awareness of the variable risks faced by road users over different routes and as they move from one road section to the next.
- Providing a focus for road safety problems and network safety upgrading, especially on longer routes that cross highway authority borders.
- Providing a consistent methodology for quickly evaluating road safety risk on long routes.

The critics of EuroRAP contend that its weaknesses include:

- It tends to focus on rural areas, where the majority of road deaths occur.
- It takes a 'macro-safety' approach to the road environment, emphasising network safety improvements. This can undervalue the significant amounts of 'micro-safety' work that a local authority may have carried out in its area.
- Much of the data used in EuroRAP is not new, but re-formatted data from other sources.

In the summer of 2006 the UK Highways Agency undertook pilot studies with the AA Motoring Trust to establish the usefulness of road protection scoring systems (RPS) like those used in the EuroRAP protocols. These indicated that across a network the use of RPS gives broadly similar results to the conventional use of collision data, but can give a more accurate assessment of risk when used on individual routes. The lower the number of collision records available for analysis (for example, because of using only three years of data or studying a short length of road) the more useful RPS can be in establishing risk.

1.2.5 Research

It is all too easy working in a local authority environment to get carried away by the demands of collecting, validating, storing and presenting raw collision data at the expense of giving enough consideration to what to do with it. This can be a severe hindrance to putting the data to work. Why not look at previous research for inspiration and techniques? In the last twenty years extensive and valuable road safety related research has been carried out in the UK and in other countries whose problems have much in common with ours, much of it underpinning modern practical approaches to the work.

Sources of research findings can be divided into two kinds: primary sources, where the actual research is reproduced; and secondary sources, which make use of or reference the research but reproduce it only in part.

Primary sources include:

- The DfT's own research database, which can be found at: www.dft.gov.uk
- The Scottish Executive's transport research about road safety problems in Scotland www.scotland.gov.uk/Topics/Transport
- The Transport Research Laboratory Ltd (TRL) website: www.trl.co.uk
- The EU Community Research and Development Information Service (CORDIS): www.cordis.lu
- The US Transportation Research Board: www.trb.org
- The Transport for London research database: www.tfl.gov.uk

Secondary sources of research information describe or make reference to primary research work and the results that flow from it. These are often published in books and guidance. Likely secondary sources include:

- A Road Safety Good Practice Guide, published by the DfT
- World Report on Road Traffic Injury Prevention, published by the World Health Organization (WHO): www.who.int
- PIARC Road Safety Manual (World Roads Association): www.piarc.org

1.3 Analysing Injury Collision Data

Given the significant resources allocated to the collection, validation and storage of raw injury collision data, it makes sense to give some thought to the process of analysis; how to analyse it, what tools to use, and some of the pitfalls.

1.3.1 Two Halves

The information about an individual injury collision could be split into two subsets that can be characterised as: 'where the collision occurred' and 'what happened'. The former is known as 'spatial data' and the latter could be described as 'circumstantial data'. Early computer systems used in road safety work were good at analysing circumstantial data, especially from STATS19 sources because it stores most of the field information as numeric codes. Spatial data was harder to analyse, with application developers resorting to clever, if crude, techniques such as testing for collision 'densities' within Ordnance Survey grid squares. Geographic Information Systems (GIS), designed specifically for spatial analysis, were originally available only to the larger shire counties and metropolitan authorities and were run on mainframe-type computers. Applications developed specifically for road safety work were rare.

1.3.2 Spatial Analysis

During the 1990s comparatively low-cost GIS systems designed to run on the PC platform became widely available. This led to a proliferation of 'third-party' applications designed specifically for the various disciplines likely to be found in local authority engineering departments, including road safety. This had the effect of mainstreaming GIS in road safety work and many local authorities have added GIS facilities to their collision data systems or switched to entirely GIS-based systems.

The move to GIS-based collision database systems has brought benefits and some unforeseen drawbacks. The benefits include:

- New ways of looking at the distribution of injury collisions across an area.
- A visible link between spatial and circumstantial elements of collision data.
- The potential to use true spatial analysis to see relationships between injury collisions and other spatial information, such as pavement management information and street inventory data.
- The potential to relate collision occurrence in detail to land-use, locational and population data.
- Enabling collision data to be more accessible and more easily understood by the public.

There is a note of caution to be sounded over embracing GIS-based collision analysis. As with any IT procurement process, careful consideration of what the system will not do is as important as the new functionality it brings, and is often harder to discover, since it is less likely than the latter to be given prominence by the supplier. Some of the unforeseen drawbacks are:

- Reduced statistical analysis functionality. Sometimes the tools are not there at all or are not obvious; the emphasis is largely on the spatial side of the data, with less emphasis on the statistical side.
- Reduced focus on the injury collision trends across the area, usually as a result of concentrating on problem sites or even individual injury collisions.
- Some software is incapable of true spatial analysis (the capacity to analyse one set of spatial data with another, for example collision locations and pavement condition information), or is implemented in such a way that the only information it uses is collision data. This negates one of the powerful advantages of GIS; the ability to see relationships with other spatial data.

Example: 'See Me' Bags in Durham

Data analysis by Durham County Council unearthed over-representation of traffic casualties among elderly people, and lack of conspicuity as the key issue. This led to a regional initiative to improve the situation. Thousands of shopping bags were provided to elderly people in an effort to make them more visible to drivers, both during the day and at night. The bags are made of strong white nylon, which is highly visible during daylight and incorporates a reflective strip that reflects car headlights at night. The bag also carries the initiative's branding – 'See Me'. The bags have been distributed with the help of various outlets and partners such as Age Concern. Each bag contains a leaflet about the importance of being conspicuously visible to drivers.

Data-led investigation brought to light risks for elderly pedestrians in the North East – and an innovative aid

Example: Knowsley's Intelligent Ice Cream Vans

In May 2000, the Road Safety Team at Knowsley MBC received a fatal casualty report in which a two-year-old child had been crushed under the wheels of an ice cream van (ICV). It was decided to examine other instances where collisions had involved these vehicles. Although there is no STATS 19 code for this type of vehicle, a search on the plain language description found nineteen child pedestrian casualties injured in the vicinity of an ICV during the previous five years; two were fatalities and two involved serious injury.

Two separate factors appeared to be contributing towards these incidents:

- ICV drivers were unable to detect the presence of small children in the immediate vicinity of their vehicle, the vehicles having a number of blind-spots at ground level.
- Children – having bought an ice cream – were emerging into the path of a passing vehicle.

The Road Safety Team consulted: the ICV Alliance (a representative body of ice cream traders), the Council's Licensing Section (responsible for issuing Trading Permits) and, subsequently, equipment suppliers and vehicle installation technicians. This resulted in three measures to address the 'blind-spots':

- Movement sensors mounted on the front and rear bumpers to detect a child at the front and rear of the ICV.
- Special panoramic wide-angled side-mirrors to detect children who may be sitting on the kerb at the side of the vehicle when it is stationary.
- A small convex mirror mounted at the top of the passenger-side door, allowing the driver to view the front near-side of the van down to the kerbside level.

Although the problem of children running out from behind the ICV could not be eliminated, traders reported that the ICV itself was often masked by other vehicles whilst parked. They believed that where the van was seen and recognised by other motorists, drivers were more cautious whilst passing.

In order to raise the conspicuity of a trading ICV, a high-intensity orange strobe-light was proposed for the driver's side of the vehicle, just below roof-level height. This light would be activated when the ice cream pump was switched on.

The cost of all of the equipment described above and fitting for each ICV amounted to £625. Twenty-four ICV were licensed to trade in the Borough, so the cost of equipping them all amounted to over £15 000. This was approved by the Council and financed from the LSS budget in the LTP Capital Programme.

In recognition of the potential for casualty reduction, the Licensing Committee approved an addition to the Trading Permit stipulating that all mobile traders working within the Borough must have this equipment fitted to their vehicle as a condition of obtaining a trading licence.

After a review in 2005 the front infrared detectors were replaced by ultrasonic equipment and the rear infrared sensors were replaced by a video camera with infrared night vision coupled with an in-vehicle screen.

In the four years after the scheme was initiated, there were 6 casualties – an average of 1.5 per year. These included two that occurred in the presence of a 'rogue trader' – an unmodified ICV from a neighbouring authority area, which was prosecuted by the Council's Licensing Section. The scheme showed a first year rate of return of 875% and won the 2004 IHT/British Petroleum Road Safety Award for child casualty reduction.

Intelligent ice cream vans save lives

1.3.3 Network Analysis

This is an interesting development gained from merging spatial analysis and 'traditional' descriptive analysis. Transport Research Laboratory's (TRL) SafeNet software makes use of algorithms derived from a programme of empirical research carried out since the early 1980s into geometric, traffic and circumstantial variables that contribute to collision frequency. Using this information, in addition to the existing collision data for a given network, it is possible to build a network model to predict likely changes in collision patterns across the network. This can be used to estimate the impact of road safety interventions, new developments or even major road building projects. As with all network modelling tools, the validity of the results depends on the level of detail and accuracy of the data input. Collecting the necessary detail to get the highest level of validity for anything but a small network is expensive. Despite this, the network analysis approach has much to offer in the struggle to better predict collision patterns, and may help overcome the much-debated phenomenon of 'accident migration', where changes to the road network and associated changes in the pattern of traffic see the level of road collision risk decrease in some places and increase in others.

1.3.4 Statistics

Statistics and their use can be a source of anxiety to those specialising in road safety work who have not benefited from training in the relevant techniques and lack ready access to advice from colleagues who have.

The basic purpose of statistics when dealing with injury collision data is to draw sound conclusions from data and qualify the conclusions drawn to guard against their being used to support poor decisions. By providing a set of parameters, the results can be seen in a context that allows the reader to make sense of the data, and helps them in good decision making. These guidelines are not designed to give a grounding in basic statistics, there are excellent printed and online sources for that, but perhaps a few simple definitions will help demystify the subject:

- Validity. The strength of conclusions drawn from data, often related to answering a question about the relationship between two sets of data.
- Reliability. The repeatability of data or results. This establishes how unlikely a result is to have come about because of a 'blip'.
- Significance. An estimate of the probability that an observed change would not have come about by chance if there had been no real effect. This is very useful in monitoring the effect of road safety interventions having regard to the inherent variability in relatively small numbers of collisions.
- Control. The use in assessing the effect of a road safety intervention of data from a comparison area or set of sites not subject to the intervention to estimate how collision numbers would have changed without the intervention where it has taken place.

No-one should be put off by statistics: results can mean less, be meaningless or even positively misleading, without them. Statistical tools will be discussed in more detail in Element Five: Monitoring.

Example: Young Drivers in West Norfolk

Norfolk County Council had been making good progress on their road safety killed and seriously injured (KSI) target for 2010, but the downward curve hit a flat spot in 2004. Closer geospatial examination of the data showed that, while the general trends were mainly in the right direction, the west of the county was not performing well. Detailed analysis of the data showed that young, male car drivers and occupants were the root of the problem. This information was added to other data from the emergency services and health sector, and was used to inform an educational marketing campaign with these objectives:

- Bring about a reduction in the numbers of road deaths and serious injuries by generating a new approach and attitude towards driving by the target group.
- Emphasise the consequences they could face by building a clear picture in their minds of inappropriate driving behaviour.
- Create a high recall of the key messages to drive home the devastating consequences of bad driving, including permanent disability.
- Create fear around the punishments for driver error - if you speed, drink/drug drive or use a mobile phone while driving, you can face points on your licence, court fines or even worse, injury or death.
- To link the campaign to the ongoing work by Think, Department of Transport road safety initiatives, http://www.thinkroadsafety.gov.uk/
- To make Norfolk a safer driving area.

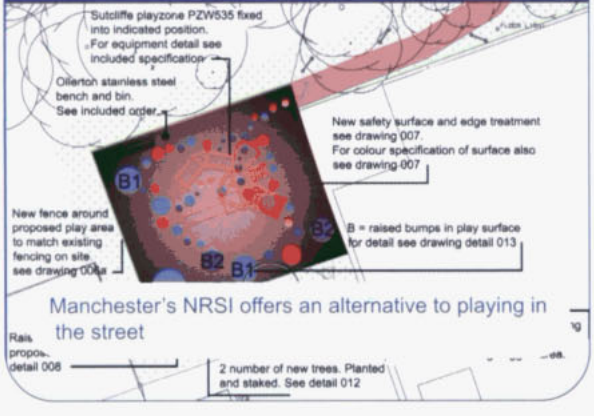
Intelligent use of data identified young male drivers at risk in West Norfolk

1.4 Other Data

Not all data relevant to road safety is collision data. Research shows that demographic and socio-economic factors can have a strong link to road collision risk. For example, children from the lowest social class are five times more likely to be killed in a pedestrian collision than their peers from the highest social class. Indications are that this problem has worsened over the last few decades and, if unchecked, may continue to worsen[6].

Example: Neighbourhood Road Safety Initiative in Manchester

Manchester City Council made a successful submission to the DfT to take part in the Neighbourhood Road Safety Initiative (NRSI), a project to investigate the link between social deprivation and road safety and to identify suitable interventions to improve the situation. The submission drilled down through both the injury collision and social deprivation data, starting from the strategic premise that the majority of Manchester City wards appear in the top 10% of the National Index of Multiple Deprivation, down to identifying particular areas of interest and making connections between child pedestrian casualties and those geographical areas. One example of this kind of analysis gave the result that in particular areas a child casualty was 2.5 times more likely to be seriously injured than in the rest of the City and children travelling to and from school are 1.5 times more likely to be involved in a collision than the Manchester average[7]. The ensuing interventions took a variety of forms, from traditional road safety engineering work to modern play space to offer children an alternative to playing in the street.



Manchester's NRSI offers an alternative to playing in the street

Other data that could be used to add value to existing injury collision data include:

- Speed information. There is an established link between vehicle speed and collision rates[8] and between differential speed and collision risk[9]; this information could be used to establish patterns of risk across an area, in addition to injury collision data.
- Traffic flows. Raw numbers of collisions give a poor estimate of actual risk to individual road users. Combining appropriate indicators of amounts of traffic with collision numbers can be used to show real road collision risk across an area or a range of sites.
- Weather data; changing weather patterns and periods of exceptional weather can have an effect on collision patterns and should be taken into account, especially regionally.
- Maintenance routines, for example vegetation cutting.
- Street furniture replacement and repair logs.
- Network events, such as diversion for long-term road works.

1.5 Using Data to Inform Decisions

Arguably the most important activity involving data of any kind is using it to inform a decision-making process. Otherwise data has little use; no matter how much time and effort is put into the collection, validation and storage of injury collision data, it only comes into its own when used to make decisions about road safety. These decisions are made at all levels: nationally, regionally and locally. The decisions are made by elected representatives, technical staff and managers. The decisions may be made by central government, affecting long-term road safety policy for the whole UK, or locally, choosing the type of intervention to use at a specific location. Common ways to use the data include:

- Setting priorities; deciding on which areas of activity in which to invest finite resources.
- Identifying safety problems that lie outside expected 'norms'; local situations that are worse than comparable ones regionally or nationally.

Example: A Regional Approach

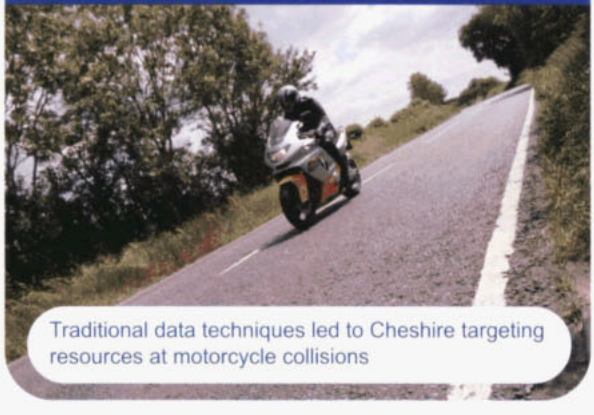
The North West Regional Road Safety Group have established a cross-disciplinary Research Steering Group, comprised of road safety engineers and those involved in education, training and publicity (ETP), as well as representatives from the region's police enforcement function. The Group's task is to oversee a research programme that will identify significant injury collision trends in the region and then commission research to determine the reason for those trends. The results from this research will be used to influence road safety and other relevant policies at the regional level, cascading downwards to the individual authorities where they are affected.

[6] Tackling the Road Safety Implications of Disadvantage (DfT 2003)
[7] Dealing with Disadvantage: Manchester Submission (unpublished MCC 2003)
[8] The relationship between speed and accidents on rural single-carriageway roads (TRL511 2002)
[9] The effects of drivers' speed on the frequency of road accidents (TRL421 2000)

Example: Motorcycle Trends in Cheshire

Members of Cheshire County Council's Accident Investigation Team noted from routine analysis of their collision data that motorcycle collisions resulting in death or serious injury were increasing on certain routes within the County. This is an example of the use of traditional circumstantial analysis along with awareness of the spatial element of the data.

This alert has led to Cheshire County Council setting aside funding from their Local Safety Scheme forward programme to specifically address motorcycle casualties on those routes. This included retrofitting safety barriers with 'motorcycle friendly' inserts and the use of roadside posters on high risk routes.



Traditional data techniques led to Cheshire targeting resources at motorcycle collisions

1.6 Data in the Future

Looking at the short- and medium-term horizon, there is scope for data quality and quantity for the analysis of road safety problems to increase vastly. GIS will be common, not just at the data storage stage as they are now, but also at the data collection stage: the scene of the collision. Given the will, collision data will be linked to digital road maps to provide detailed location and scene description information. Instead of estimating the OS grid reference for locating a collision in the database, the reporting officer will position the location on a portable electronic map, thus identifying the link or intersection. Pre-collision manoeuvres will be identified by tracing them on the same map. Some circumstantial information, for example on road categories and speed limits, will be supplied automatically from the GIS database.

In the longer term, new and more reliable data on collision dynamics and collision pre-conditions could be supplied by factory-fitted black box data recorders, possibly triggered by airbag deployment. This could be enhanced with information on skidding problems automatically provided by vehicle stability systems. All this data will require post-incident analysis.

If current trends continue, along with advances in vehicle and road environment safety, serious injury collisions may become very rare events, enabling a detailed investigation of those that do occur. Rather than waiting for collisions to occur and then implementing remedial measures, the focus may well be on how to manage the network in a safe and environmentally friendly manner. A large number of information and analysis tools will be available to assist network managers in their task. Such tools will include real-time access to information on current network performance and predicted future status.

Element Two: Structure

2.1 Introduction

It is a widely accepted idea in management theory that the way an organisation is put together has a huge impact on how it performs, and is at least as important as the money and assets invested, the quality of planning and the human resources recruited to carry out the organisation's activities. The structure is so important because it acts as a framework for all those other resources to operate within. The structure is the vehicle that the organisation uses to navigate its environment. Choose the wrong design of vehicle and the organisation might be too expensive or unwieldy to operate, or too ineffective to deliver. These things are as true for the public sector as they are for the private sector, although there has been a lag between the private sector acting on modern organisational design principles and the public sector catching up. But the catching up is happening; it is hard to find a local authority in the UK that has not been through at least one major reorganisation in the last decade. Sometimes the change has been externally driven; for example Local Government Reorganisation in the late 1990s. More recently change has tended to be internally driven, as local authorities have been trying to find ways to improve their service delivery, both to meet the aspirations of local elected members and customers, and to access the kudos and increased freedom from scoring highly in the Government's local authority performance monitoring system. Structural change has also come about because of more relaxed procurement methods, with public-private partnership and framework agreements helping to solve long-standing problems with resource smoothing and technical recruitment.

No discussion of organisational structure would be complete without discussing the slippery concept of culture. Organisational culture is the management theorist's equivalent of the biological and philosophical enigma of the soul. Both concepts have similar problems: disagreement on definition or whether it even exists; a lack of tangible phenomena that can be used to make perceptible changes; and a suspicion that if it does exist, it might be quite important. A lot of organisational changes are actually attempts at producing cultural change using what is seen as its only tangible proxy; the structure.

These issues are not going to 'just go away'; structural change will remain a familiar part of the public service landscape as long as organisations seek to improve service delivery in a changing world. This section will help to illustrate not only a 'survival guide' for structural change for road safety practitioners, but also guide senior managers on how to weave improved road safety service delivery into their change agenda.

2.2 Traditional Structures

In the1980s and for most of the 1990s Highway Authorities[10] in England and Wales typically had a team of staff devoting their time to accident reduction and prevention (ARP) and another team devoted to road safety education, training and publicity (ETP). In some authorities these teams were managed by a single road safety manager, and were physically co-located, but in many they operated completely separately, sometimes in different departments and different physical locations. There was little private sector involvement or partnership working. The word 'little' is appropriate here because there were the beginnings of moves toward a combined approach with external partners, usually on the part of road safety ETP teams. The burgeoning capital budgets that started to become available at the end of the 1990s did little good for these revenue-driven teams, so imaginative use of partnerships and sponsorship arrangements was essential to delivering good quality ETP activities in many local authorities.

For the engineering side, the watchword was 'focus'. There was much consternation in ARP teams around the UK when ring-fencing was taken away from Local Safety Schemes (LSS), the main source of funding for local authority road safety engineering schemes. It was felt that this would lead to elected members and senior managers 'taking their eye off the ball' and to an unseemly scramble to make sure that road safety engineering work suffered no disadvantage in the local annual spending review. The view was that it was much better to keep the ring-fence, get on with building schemes aimed solely at reducing casualty numbers and seek to influence non-road safety led capital works through the then-new process of Road Safety Audit (RSA). With hindsight what was seen as focusing resources on the road safety problem is starting to be seen now as taking too focused an approach, or as 'silo thinking'.

There is little doubt that the traditional structures helped deliver excellent reductions in casualty numbers during the last two decades of the last century. But it would be misguided to think that they would continue to offer similar reductions in the twenty-first century, even if other pressures were not affecting many road safety practitioners under wider organisational restructures.

2.3 Forces of Change

There are two main kinds of forces for change affecting road safety work in local authorities: external forces and internal forces.

[10] In Scotland, Roads' Authorities took care of road safety engineering while the Police were responsible for ETP activities.

2.3.1 External Forces

These are the forces from outside the organisation, often transmitted through restructuring to meet wider needs:

- Continuous improvement; the annual performance monitoring review has led many local authorities to carry out extensive restructuring to achieve better service delivery, as measured through their performance monitoring score.
- The availability of more innovative procurement techniques, permitting close working in partnerships and framework agreements with private sector organisations. These have helped with two subsidiary pressures:
  - Shortage of qualified, experienced technical staff and the resource smoothing problems associated with recruiting such people.
  - Reducing revenue overheads in a capital-led environment. This effectively permits the local authority partner to capitalise the human resource costs of works by using the private sector partner's staff, reducing pressure on revenue budgets.
- A modernising influence trying to move public service provision away from a paternalistic approach to a culture of service provision that mixes social benefit with responding to local needs voiced by local people.
- Government targets and the national road safety strategy.

2.3.2 Internal Forces

These are from within the organisation, often supporting, or calling on for support, the external forces for change:

- Expectations from elected members and their constituents to deliver better services, often tied to a call for a more local focus.
- A new generation of local authority middle and senior managers with training in organisational design and change management, along with aspirations to make structural and cultural change to improve service delivery.
- The realisation that many of the easier victories in casualty reduction seem to have been won. This is epitomised by marked reductions in simple, single site safety schemes in annual programmes. What remain are largely collision problems that are more intractable, requiring a more sophisticated multidisciplinary approach that traditional structures can inhibit.
- The recognition that objectives like regeneration and social inclusion call for challenges faced by neighbourhoods, communities and sometimes whole cities to be addressed holistically and that risk on the roads is often one of the interrelated elements of these challenges.

2.4 Modern Structures and Road Safety

The structure of a public sector organisation has a significant impact on its ability to provide effective road safety services. There is no 'golden rule' to designing the structure, but the advantages of favourable forms of structure have become clearer in the light of research into the relationship between structure and local authority road safety performance.

A study carried out on behalf of the Department for Transport (DfT)[11] found that structures within local authorities have an impact on casualty reduction performance.

The results of the study can be summarised like this (the findings of the study that are connected to structure and culture have been highlighted in **bold**):

- In general, those local authorities whose strategic aims make clear reference to road safety are the better performers.
- **The better performers have a culture of casualty reduction, the poorer ones do not.**
- **The better performing local authorities coordinate all the work on the road network, in particular schemes relating to safety and maintenance.** The officers also actively seek external sponsorship to enhance low-cost initiatives usually associated with ETP.
- **In the better performing local authorities, all road safety practitioners work closely together and deliver casualty reduction on an objective basis.**
- The better performers use their collision databases in an appropriate way to make an objective judgement of where casualty reduction funding can be spent most effectively.
- The better performers carry out monitoring on an overall and project-by-project basis. Monitoring enables them to assess and evaluate past projects to give beneficial input to new projects.

The connection between structure and culture may be amorphous and hard to pin down, but clearly a 'culture of casualty reduction' will struggle to take root in a structure that does not nourish it. This means building relationships and pathways into the structure that ease the exchange of road safety information and activities throughout the organisation, making it easier for other teams and departments to contribute to casualty reduction, and not making it the preserve of one part of the organisation.

This indicates a need to break down 'organisational silos' and actively engage with adjacent teams, non-engineering departments and outside bodies to ensure that road safety is delivered in an integrated approach rather than as a specialist or stand-alone initiative. For example, excellent work has been achieved by some local authorities in getting road safety into school

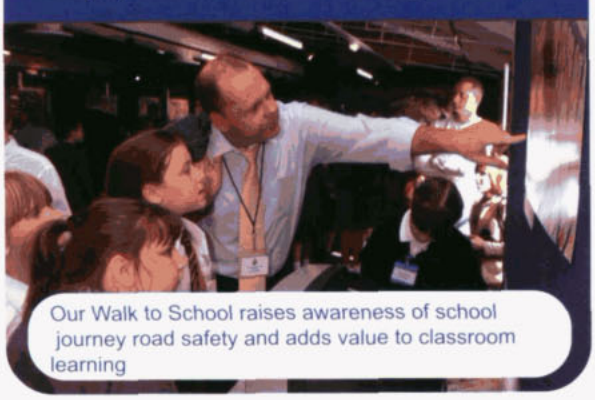
[11] Assessing the Casualty Reduction Performance of Local Highway Authorities (DfT 2004)

Example: Liverpool City Council

The City has taken an inclusive view of the structure and working with other organisations. Among other projects, the City has developed Our Walk to School (OW2S). Year 5 pupils (nine- to ten-year-olds) map and film their walk to school and highlight the Road Safety issues that affect their own school environment. Training for teachers in cartography skills and in the use of multimedia technology is provided by John Moores University. On completion of the films and maps the pupils then identify possible solutions and submit bids for these solutions to the Road Safety Team. The acceptable solutions can then be implemented. The project fulfils the learning outcomes for Year 5 National Curriculum Geography and ICT as well as encompassing visual, auditory and kinaesthetic learning styles. The pupils will have the opportunity to have their map included in a unique, limited-edition atlas. This project also provides approximately 50% of a School Travel Plan which will enable the schools to obtain additional funding.

This initiative enables schools to deliver this project either as an 'out of school activity' accredited through The Children's University or alternatively as a school based activity. Evidence from the pilot project which involved 15 north-Liverpool schools demonstrates that the schools are able to produce schemes of work based on the achievement of the Year 5 learning outcomes. Schools have also intimated that they will deliver the project for at least three years after the initial funding has ended. The pupils not only raise awareness of the benefits of walking to school amongst their peers but also through the wider school community thus helping to increase the health of residents in their own community.

The safety of the school environment will also be improved due to the road safety measures implemented as a direct result of this initiative. Community engagement informs the pupils' bids. The pupils also have the opportunity to liaise with Liverpool City Council and to take responsibility for changing their urban environment in a positive way.



Our Walk to School raises awareness of school journey road safety and adds value to classroom learning

lesson plans for Personal and Social Education (PSE), Geography, and Information and Communication Technology (ICT). Other partnerships with health Primary Care Trusts (PCT) have also proved successful in engaging partners early in the planning process to ensure that the optimal schemes can be developed with a 'cocktail' of funding from diverse sources.

The study found that better-performing local authorities have some form of area or local committees supporting local service delivery. This is most successful where local input to the decision-making process is tempered by objective data and significant strategic and financial central control so that local services are delivered through centrally allocated budgets and areas submit bids for funding. Within this process there need to be criteria that are designed to ensure that integrated transport schemes within local programmes address more than one aspect of the transportation mix, with road safety a key element in that mix.

Example: Cambridgeshire County Council

Following a rigorous review, Cambridgeshire County Council began a major 'reshaping' programme. The first phase to create three new Offices was completed in March 2004. The new Highways and Access Directorate was created within the Office of Environment and Community Services.

In the Highways and Access Directorate there were six new Services, one of which was Road Safety Services: Road Safety, Accident Investigation and Prevention and Safer Routes to School (SRtS) teams together with the Community Speed Watch function. Prior to this the SRtS team and Community Speed Watch function had been located in another service at a different location. Additionally, the Road Safety team had some staff based in Cambridge and the rest in Huntingdon.

The structure consists of three teams: Accident Investigation, Road Safety and SRtS with each team leader reporting to the Head of Road Safety Services plus a small administrative and business support group also reporting to the Head of Service. The function of these teams remains largely unchanged. The Community Speed Watch function has become the responsibility of the SRtS team.

The new Service grouping will be responsible for effecting a significant reduction in casualties and the promotion of safer and healthier travel. It will play a key role in achieving casualty reduction targets within the County.

Interaction with the County's Divisional Offices is very important, along with the maintenance, traffic, market town, and development control functions. These are relationships that need to be developed and maintained.

Cambridgeshire is growing; making links with the Sustainable Infrastructure Directorate essential, particularly in respect of Road Safety Audit. Accident Investigation has strong professional links with the Traffic Signals Team, which will need to be maintained. Both Road Safety and SRtS teams have strong links with the Education Service and it is essential that these are maintained.

Officers are already gaining the advantage of better interdiscipline communication resulting in better service delivery. In order to optimise the service provided, it is expected that the teams currently delivering the service will eventually all be co-located.

The benefits of this approach include:

- Improved longer-term planning for casualty reduction strategies.
- More synergy between the different disciplines.

This will enable a greater coordination of projects to deliver the targets for modal shift and reduce casualties.

- A single point of contact on highway safety issues for elected members and members of the public.
- The opportunity to develop and deliver long-term integrated programmes for casualty-reduction related activity and to create cross-discipline project teams where appropriate.

It would also seem from the study's findings that those local authorities that combined engineering with ETP under a single road safety manager have indeed been on to something. This is the simplest way of making sure that 'all road safety practitioners work closely together'. It seems that integrating the planning and operation of people working to the same targets, but by different means, leads to better performance.

According to the study another facet of structure in better-performing local authorities emphasised the links and working relationships between all those involved in the delivery of casualty reduction across a wide geographical area. There is evidence that collaboration and cooperation with adjacent authorities has produced positive results, allowing a strategic approach to large-scale engineering and road safety campaigns. This would include cooperative initiatives with the Highways Agency. It may seem that structure has little to do with this, but breaking down silo thinking between organisations and promoting partnership approaches is unlikely to happen if internal silos have not been dealt with first. The structure, along with its implicit culture, must encourage this.

In summary, the road safety function in a local authority has to be able to:

- Deal with wide, strategic issues, contributing to large schemes and initiatives in partnership with other teams, departments and outside bodies with similar agendas.
- Operate with a local focus, providing expertise, information and routes to funding for local area or neighbourhood teams to produce 'a culture of casualty reduction'.

This requires a degree of flexibility and an open attitude to building and improving relationships across all levels, but this will be hard to achieve if the structure does not nurture it and provide pathways for those relationships to thrive.

Given these findings, local authorities are recommended to adopt the following principles:

- Casualty reduction aims, objectives and targets should be included in high level policy documents, indicating how they contribute to performance monitoring scores, Best Value Indicators and other national and corporate initiatives.
- One service should take a leading role in casualty reduction and identify a person who is accountable for delivering all aspects of casualty reduction – a Road Safety Manager.
- The Road Safety Manager should work closely with internal and external partners to develop overarching strategy and agree actions and responsibilities of all partners, reviewing the strategy on a regular basis to ensure that it is embedded into scheme and initiative development.
- Other services and organisations that contribute to road safety such as Police, maintenance departments, local Health Authorities, Social Services, Education, Fire and Rescue and the Highways Agency should identify their commitment to casualty reduction in their policy documents and individual business plans. They should also identify a named contact for the Road Safety Manager.
- Local forums should be formed with area or neighbourhood teams, to develop, agree, implement and monitor local road safety action plans. These would be delivered by the local teams, assisting integration with other activities and initiatives.
- Collision data should be held, monitored and analysed centrally to support the local teams and the Road Safety Manager, who should coordinate and procure research and data collection to inform good practice and aid decision-making.

2.5 More on Silos

2.5.1 Identifying Silos in Organisations

How can people in an organisation tell when silo thinking is prevalent? Here are a few tell-tale signs, tailored to the road safety function:

- Conflicts between scheduling of road safety works and works carried out by other budget holders, for example maintenance work. In the worst cases these conflicts become apparent only when New Roads and Street Works Act (NRSWA) road space booking is requested.
- Arguments over the priority of schemes from different budget holders, instead of getting past logistical problems and looking for synergies from combining the schemes.
- Considering some aspects of road safety intervention as the province of another team or department, for example regarding surface treatment and resurfacing as 'maintenance's job'.
- Getting caught out at the consultation stage of a scheme when some previously unknown local issue comes to the fore. The issue was probably not 'previously unknown' and may have been old news to the local area team, Housing, Education or Social Services departments or the local Primary Care Trust.
- Adopting a 'turn the handle' approach to delivering road safety, for example placing a high priority on delivering a programme of capital schemes inside a financial year and within budget, but with little or no reference to the wider implications of those schemes to other teams, departments and local people.
- Road safety delivery is seen as the responsibility of a small team within the organisation and not as a goal or objective of the whole organisation.
- Seeing local action groups or organisations as a hindrance rather than a potential source of help.

2.5.2 Breaking Down Silos in Organisations

Previous influences on delivering road safety have led to some organisations thinking in a very focused way and in turn this has resulted in silo thinking. Breaking down such apparently impermeable walls is not easy. The principles derived from research on better-performing local authorities will help, as described previously, but here are some general tips, again tailored to the road safety function:

- Avoid linear thinking, analysing the process of road safety engineering as a linear process involving inputs, then a process followed by outputs, all within one team or service area.
- Think instead in terms of outcomes, perhaps picturing the desired outcome and thinking in terms of what 'colours' internal and external partners might be able to bring to the scene.
- Keep in touch with partners between schemes as far as possible to avoid the impression that contact is only made when 'the road safety people need something'.
- Form a Road Safety Forum to provide a marketplace for the services, information and inputs that partners can supply, as well as an information exchange for latest news of initiatives. This could be a real or virtual forum, but previous experience shows that the members need to be senior enough to have the authority to sanction involvement, but 'operational' enough to prevent the forum deteriorating into a high level 'talking shop'.

Suggested themes for such a forum include:

- Communications
- Policy
- Education and training
- Enforcement and management
- Monitoring and evaluation

Example: Tackling Drug Driving in the North East

During 2002 Northumberland County Council expressed concern about drug driving and requested the Local Authority Road Safety Officers Association North East group (LARSOA NE) to determine whether or not drug driving was an issue.

Progress was made through the 12 local authorities and three police forces as co-opted members. Research showed that in the Durham police force area in the first six months of 2002, more than half of 21 fatal casualties tested positive for drugs. These drugs may have contributed to the collisions. As some drugs can stay in the system for lengthy periods, proving a link between drug usage and collision causation is difficult. Nevertheless, the implication was that more than half the drivers in Durham may have drugs in their system when driving a car. These drugs may be illicit, prescribed, or over-the-counter purchases where a user has simply failed to heed advice on the label.

In an effort to tackle the problem, LARSOA NE approached the local authority Drugs Awareness Co-ordinators (DACs) to assist in the development of a regional anti drug drive campaign. The expertise of the DACs proved to be invaluable, and they were keen to assist with funding as the campaign would assist in raising awareness of drug-taking dangers.

The funding package for the first phase consisted of the DACs pooling regional resources to secure £40 000, LARSOA NE identifying £15 000 and Durham Police contributing £5 000.

It was agreed to implement a high profile radio and poster publicity campaign to raise awareness of the effects of taking drugs on the ability to drive. As there is no legislation for limits, unlike alcohol, the campaign could not focus on enforcement. The focus was on medication affecting driving performance, and the effects of driving while under the influence of illicit drugs.

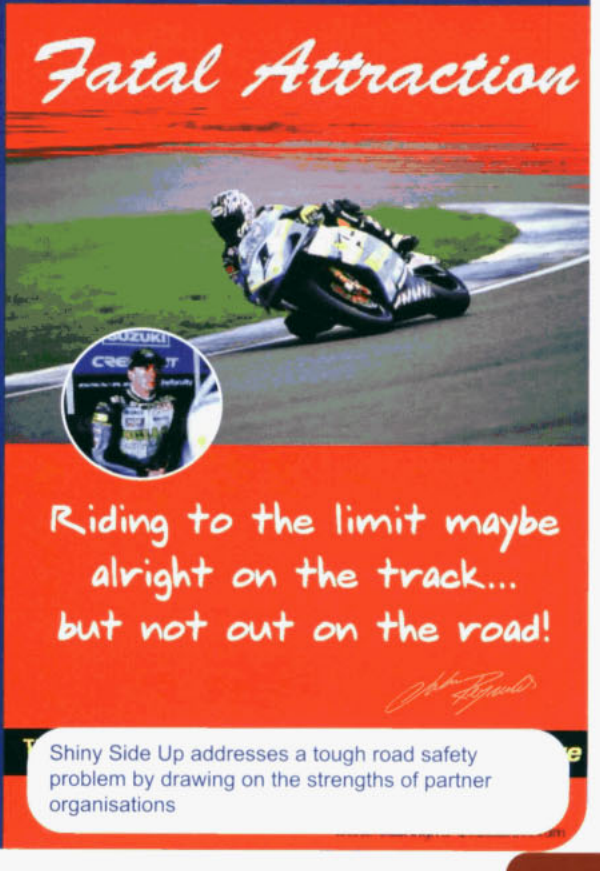
The brief to the advertising agencies was to produce a high impact campaign to raise awareness amongst the driving public of the risks involved in driving a vehicle under the influence of any type of drug.

The illicit drug element of the campaign was targeted at the younger driver, and the prescribed drugs at the older driver. The general message was that drugs of any kind taken by any driver can have serious consequences.

Initial research into awareness amongst young drivers, which consisted of an online survey on radio station websites, showed that less than 1% of young drivers knew the penalties for drug driving, or knew it was illegal. By the time the North East 'Drug Drive' campaign reached its fifth phase research showed that awareness of the penalties for drug driving had reached 50%.

Example: The Shiny Side Up Partnership

The Shiny Side Up Partnership (SSUP) was initiated in 2001 in response to a significant increase in fatal collisions involving the riders of sports bikes in Nottinghamshire. The name derives from the darkly humorous biker phrase advising how best to stay safe on a motorcycle: 'keep the shiny side up.' SSUP consists of: Derbyshire County Council, Derby City Council, Nottinghamshire County Council, Nottingham City Council, Nottinghamshire Police, Leicestershire County Council, Leicester City Council, Northamptonshire County Council, Rutland County Council and the Highways Agency. The aim of SSUP is to reduce the number of motorcyclists killed or injured on East Midlands' roads. SSUP has produced a number of resources and promoted a range of events to engage the interest of these riders. The campaign has addressed the attitude and behaviour of the sports bike rider rather than promoting training. Resources include an innovative video with thought-provoking messages featuring Superbikes racer John Reynolds and a series of high-visibility signs placed at collision 'hotspots' on popular routes during the peak riding season with messages for both riders and drivers. During the 2002/2003 racing season at Donington Park SSUP carried out a number of interactive events with the sports bike riders. These led to the setting up of a rider database, the distribution of a dedicated newsletter and the 'Too Hot To Handle' survey.



Shiny Side Up addresses a tough road safety problem by drawing on the strengths of partner organisations

2.6 Structure, Culture and the Future

Looking back over the last twenty years or so it is apparent that enormous change has been wrought in public sector service delivery, and road safety has provided a microcosmic view of those changes. Discrete provision of engineering and ETP within monolithic organisations with very narrow channels of responsibility and virtually no cooperative agenda, is slowly giving way to public/private partnerships, multidisciplinary teams and broadly conceived schemes aimed at providing better human environments with road safety built in.

These changes have not been painless, and there is no reason to think future changes will be either. Improved change management and the wider recognition of the ubiquity of change will help – organisational cultures may start to expect change as a matter of course. This is not to sanction 'change for change's sake', but is a recognition that, as past structural change has been driven by movement in social and macroeconomic currents, future change may be also driven by technological and environmental agendas.

2.6.1 Forces for Change in the Future

Forces for future change may well include:

- Continuing shortages of qualified, experienced people. Partnerships will come under increasing strain if neither partner is able to muster appropriate human resources to design and implement schemes.
- 'Knowledge poverty'; the shortage of information on the casualty reduction performance of large-scale, multidisciplinary approaches such as the broadly conceived schemes mentioned earlier.
- Increasing pressure from the media, public and politicians to deal with danger perception, rather than simply reacting to injuries and deaths that have already occurred.
- Technological changes such as road infrastructure hardware interfacing with in-vehicle warning and control systems.
- Gradual movement toward the notion of managing road safety risk in real-time, treating it as a constantly changing variable that can be measured and influenced by network management protocols.

2.6.2 Structuring the Future to Cope

These forces for change will act at various times to varying degrees and differently at all levels of the public/private sphere, but structures will need to be altered to cope with them. This might lead to:

- Combined public/private partnerships covering larger areas, for example Highways Agency areas. These would provide:
  - Client and contractor services to diverse geopolitical areas, giving significant economies of scale and allowing scarce specialist human resources to be efficiently used.
  - A framework for the new network management technologies to be applied over larger areas.
  - Seamless services to the end user, with no apparent distinction between trunk and local authority roads.
  - A logical complement and resource pool to local service delivery teams.
  - Coherent and consistent road safety strategies in every part of the road hierarchy, from policy formation to delivery on the ground.
- A representative, national database for the collation of road safety scheme performance data to replace existing arrangements. This is long overdue and near-universal use of web-based information distribution means stronger national emphasis on information-sharing is the missing link.

Element Three: Systems

3.1 Introduction

'Systems' in the context of the five elements of casualty reduction refers to the techniques and methods used to put raw data to the task of revealing the true extent and degree of road safety risk on a network and then proposing solutions to reduce that risk. This goes beyond an explanation of methods of data analysis and into an exploration of the systemic use of these methods across urban and rural networks. It also includes the human aspects of these systems: looking at how to build relationships between road safety practitioners and other people; those who can help implement the methods and even those who will live with the road safety interventions that will be the result. This draws on the 'open systems' philosophy, with its emphasis on removing barriers to co-operation and seeking the involvement of those with similar goals.

3.2 Basics

Any sustained reading of the news media at a local, regional and even a national level will invite recognition that, to a journalist, the word 'accident' lies naturally next to the word 'hotspot'. Road safety practitioners take a more scientific view in dealing with what they refer to as 'problem sites': one fatal collision, no matter how tragic, does not make a 'hotspot'. Despite this both the lay person and the professional understand the basics of the problem. It is intuitive that collisions accumulate at locations where road safety risk is higher than normal; any glance at a network collision plot confirms this. So, the most basic system to apply to the road safety problem is to seek out those locations where the numbers of collisions appear to be highest. There are three main shortcomings to this approach:

- The first is that it makes no estimate of the real risk to an individual road user; if two similar locations have the same number of injury collisions per year but one carries twice the traffic then clearly a person travelling through that location faces half the risk they would on the road less travelled.
- The second is that the frequency of injury traffic collisions at a location tends to oscillate around a long-term average, given no other changes in risk, so that looking for locations where the frequency is high can be the same as looking for locations where the frequency is about to fall. This is the 'regression to the mean' (RTM) that can make accurately evaluating the success of road safety interventions difficult.
- The third is that the method is basically reactive and makes no allowance for changing network risk or the perception of danger turning into the reality of an injury collision.

Nevertheless, applying this basic approach has been at least partly responsible for the success that local authorities have enjoyed in the last twenty years in reducing the numbers of casualties across their networks, particularly the numbers of killed and seriously injured (KSI) casualties. There are comprehensive explanations available of how the basic method should be applied[12], but four main tools derived from it are summarised below.

3.2.1 Single Sites and Short Lengths

This has been by far the most common way to employ the basic method, often using a simple method of inspecting collision plots for clusters or getting a geographic information system (GIS) to do it instead. A threshold number of injury collisions is chosen to suit local circumstances, for example five in three years. Investigations are then prioritised according to frequency and tractability.

Single site safety intervention

3.2.2 Routes

This has also been a popular way to employ the basic method, often with the further refinement of calculating the number of collisions per million vehicle-kilometres from a formula using the length of road and the average annual traffic flow. These can then be compared with other routes in the area, or values for similar roads taken from Road Casualties Great Britain[13] and investigative priorities set accordingly.

Route safety intervention

[12] Road Safety Engineering Manual (RoSPA 2002)
[13] For example Road Casualties Great Britain: 2005 Table 26 (DfT)

3.2.3 Areas

This method became more widely used as demand increased for traffic calming measures in residential areas. It is very difficult to make meaningful comparisons of road safety risk between areas competing for funding. Investigations and the schemes that may follow from them have often been prioritised according to the ratio of child pedestrian casualties, KSI index or some other casualty-based variable. Collisions per head of population is often a useful indicator for residential areas, but collisions per unit area is less informative.

Area safety intervention

3.2.4 Mass Action

A further refinement of the basic method has been to search for unusually high numbers of a particular type of collision, or a combination of reported environmental variables that can lead to collisions, and apply a suitable intervention at all appropriate locations across the network. This is called a mass action plan, and is probably the least used of the traditional tools of the road safety practitioner in the UK. The reasons for this are not clear, but may relate to the high cost of interventions across a large area and a lack of understanding of the technique by managers. Examples include:

- Laying anti-skid surfacing to all pedestrian crossings with pedestrian casualties in wet conditions involving skidding vehicles.
- Installing 'passively safe' signs on a series of bends showing loss of control collisions and where primary safety interventions have been tried or are inappropriate.

3.2.5 Programme Building and Economic Appraisal

The traditional way to put together a road safety engineering programme relies on using the four methods described above to carry out a number of investigations, examining the collision records for commonalities or collision factors that are out of line with local or national norms and proposing engineering interventions that should reduce the number of collisions. This is developed into a safety scheme programme of proposed engineering interventions, which on local authority roads would be funded from the Local Transport Plan (LTP), typically from a block called Local Safety Schemes (LSS). These LSS are given a coarse economic appraisal based on the estimated collision reduction potential of the proposed intervention in its first year, a contemporary monetary value of prevention of injury traffic collisions[14] and the anticipated cost of the intervention. The resulting indicator is called the First Year Rate of Return (FYRR) and has been used to prioritise schemes when capital funds have not been available to complete the whole programme. This kind of economic appraisal has been adapted and built into the Continuous Value Management process used to evaluate proposed minor schemes on trunk roads and motorways.

3.3 Moving Beyond the Basics

It is hard to imagine a time when the four basic tools described above will no longer be relevant, but that is not to say they could not be improved or used more effectively, or that new tools should not be used. New tools that address the shortcomings of the basic method described above should be particularly interesting to road safety practitioners and their managers.

3.3.1 Risk Assessment and Management

It is easy to get into a routine of dealing with road safety work on a day-to-day basis and lose sight of one of the fundamental building blocks of the activity: the management of risk by the elimination or control of its associated hazards. There are many ways to define hazard and risk; for the purposes of these Guidelines these definitions apply:

- HAZARD: A hazard is anything that can cause harm. This can be physical, economic, strategic, or time based harm.
- RISK: A risk is the chance that someone will be harmed by the hazard.

Risk is the likelihood of a hazard being reached or hit by a road user multiplied by the resulting consequences if the hazard is reached or hit. Hazards may be within or

[14] Highways Economic Note No.1 (DfT published annually)

beyond the highway boundary and include vehicles, pedestrians and roadside objects such as street furniture. The consequences of interest to road safety practitioners include injury to all types of road users.

The concept of risk management assumes that risks exist and must be controlled to an acceptable level by focusing on measures to be taken to eliminate or lower risk in targeted operations. A risk management framework should:

- Identify the hazards.
- Assess the level of risk for each hazard.
- Make decisions on and implement suitable actions to eliminate, minimise or control each hazard.
- Mitigate the remaining risk.

The triangular framework shown here

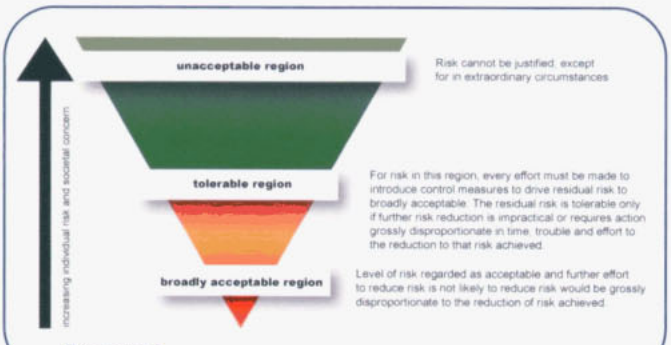


Diagram 2

represents increasing levels of risk from the bottom to the top of the triangle. The region at the bottom of the diagram represents the 'broadly acceptable' risk. Risks falling into this region are regarded as minor or insignificant and adequately controlled, requiring no further action. Resources expended in further reducing the level of risk would be better used elsewhere giving a greater cost benefit. The levels of risks here are comparable to those that people regard as acceptable in everyday life. Examples of risk in this region might be:

- Separation of non-motorised users from fast moving traffic.
- Traffic calming in residential areas.
- The use of passively safe lighting columns placed at an optimum distance back from the edge of the road.
- The use of a vehicle restraint system in front of a solid lighting column close to the running lane.

Current best practice seeks to ensure that most situations are designed to be within the 'broadly acceptable' level of risk.

At the other end of the scale is the 'unacceptable' risk. On an existing road these are those that by examination and assessment indicate an 'unacceptable' level of risk or have shown, by collision records, a situation where safety is at an 'unacceptable' level.

The zone between the 'unacceptable' and the 'broadly acceptable' regions is the 'tolerable' region. Risks falling into this region are typical of risks people are prepared to tolerate in order to secure benefits.

These risks are accepted in the expectation that:

- The risks are kept as low as reasonably practicable (ALARP).
- The risks are reviewed to ensure that they continue to be ALARP.

'Reasonably practical' means that the cost of controlling or removing the hazard is proportionate to the benefit it would achieve.

If a risk falls into the 'tolerable' region, then the risk needs to be lowered as far as reasonably practical. Reviewing the questions given below will help in the creation of road safety interventions that reduce risk using ALARP principles:

- Can the hazard be removed? For example, is it necessary to place that sign in that position?
- Can the hazard be relocated to a safer position? For example, can the sign be relocated further from the running lane?
- Can the hazard be redesigned and made less aggressive? For example, passively safe posts?
- Can the hazard be protected by a vehicle restraint system?
- Can the road layout or cross-section be revised to lower the risk? For example, can the new access be relocated to increase visibility?
- Can other measures be taken to improve the situation? For example, can a speed limit be imposed? This could offer a solution if the risk needs to be lowered over a considerable length of a route.

If a solution that produces a 'broadly acceptable' level of risk cannot be found then an effective approach for demonstrating that risks are ALARP is to review the risk level associated with each of the options, then choose the lowest risk option within the tolerable region, unless this option is not reasonably practical, in which case attention should pass to the next safest option. This procedure is particularly useful in identifying step changes in risk and the sacrifice between various options, giving a strong indication of the lowest risk option that is reasonably practical.

3.3.2 EuroRAP and Road Risk Rating

A detailed look at the way data is collected and used under EuroRAP is described in Element One: Data; here it is appropriate to consider what such techniques might bring to the road safety practitioner's toolbox and how they might be merged into road safety systems. Road safety risk rating (or road protection scoring) systems offer the road safety practitioner:

- A consistent methodology for assessing comparative risk across a network.

- A contribution to realising the concept of 'self-explaining roads', where each length of road and the risk associated with it is self-evident to the road user.
- Clarification of the urgency of getting at road safety problems that have previously been resistant to traditional tools, for example collisions scattered across a network, not clustered.
- A head start toward a time when road safety risk will be dealt with in real-time or near real-time. The first requirement for such a future approach is not technological; it is a change in mindset to treating road safety risk as a real-time variable in the road environment.

3.3.3 Road Safety Audit

Road Safety Audit (RSA) in the UK means 'the evaluation of highway schemes during design, and before the scheme is opened to traffic, to identify any potential safety hazards which may affect any type of road user and to suggest measures to eliminate or mitigate those problems'[15]. The process was developed in the UK in the early 1980s when road safety practitioners noticed road safety problems developing on relatively new roads. While it can no longer be considered an innovative safety tool it remains an effective proactive approach to road safety.

Section 39 of the Road Traffic Act 1988 states that local authorities 'in constructing new roads, must take such measures as appear to the authority to be appropriate to reduce the possibilities of accidents when the roads come into use'. This is important because it is widely interpreted that carrying out RSA on new roads, and where changes are made to existing ones, contributes to satisfying this legal requirement.

In 1990 the Institution of Highways and Transportation produced a set of RSA guidelines that were taken up by many UK local authorities. In 1991 RSA became mandatory for motorway and trunk road schemes with the introduction of the design standard HD19/90 and advice note HA42/90.

This introduced a 3-stage process:

- Stage 1 – Preliminary Design
- Stage 2 – Detailed Design
- Stage 3 – Prior to Opening

The IHT guidelines were updated in 1996 and the HA standard in 1994 and again in 2003. The latest version of the standard requires monitoring stages in the form of Stage 4 audits, 12 and 36 months after construction.

Stage 3 Road Safety Audit team on site

The IHT guidelines sit alongside the HA standard as the recognised best practice documents in the UK. The IHT guidelines are sometimes referred to by local authorities, and others, as a benchmark for carrying out RSA. Not everyone welcomes RSA unreservedly; some local authorities question the need to carry out RSA on all schemes and there is growing disquiet amongst those involved in urban design and public realm schemes who may see RSA as a potential barrier to delivering innovative schemes. This does not have to be the case; auditors and designers can work together to deliver safe, innovative schemes:

- By making use of interim RSA, a facility for interaction between auditors and designers.[16]
- By auditors giving careful thought to the assessment and management of risk using the principles described earlier.

It is very difficult to quantify the benefits of RSA in financial terms. Some qualitative benefits include:

- It attempts to establish the safety implications of the interaction between various design elements.
- It is the only proactive safety mechanism currently widely employed.
- It contributes to satisfying legal requirements.
- It is relatively low cost compared to the wider costs of casualties.
- It reduces the risk of collisions and the need for remedial work.
- It raises the profile of safety in design.

Adopting the latest standard HD19/03 for use on local authority roads has seen the cost of RSA rise. The problem of increased RSA costs reinforces many project managers' view that RSA is a necessary evil, one of many 'hoops' a project must be put through to get it on the ground. It is perhaps understandable for construction project managers to think like that, but it is inexcusable for road safety practitioners and their managers to think the same way. RSA has a proven

[15] HD19/03 Road Safety Audit DMRB Vol 5 Sec 2 (DfT 2003)
[16] Ibid. Section 2.43

record of decreasing road safety risk compared to projects that have not been subject to RSA[17]. This makes it not just a reactive tool to improve the safety of new road designs but a proactive tool for improving road safety across a network. Taking this view moves the costs of RSA from 'irritating but necessary' to 'money well spent'. For this to work several factors must be in place:

- Some means of quality control of RSA resources, whether in-house or contracted out. A periodic 'reality check' of RSA reports allied to a realistic interpretation of the qualification and experience levels suggested in HD19/03 would help provide this.
- If full implementation of HD19/03 on all road schemes is not feasible, then a clear policy should be drawn up setting out which projects should be subject to RSA. It is unwise to apply ad hoc criteria on a project-by-project basis; not only will this compromise the road safety benefits of RSA, it will leave the local authority and the project manager vulnerable to possible litigation in the future.
- A healthy respect for the recommendations in RSA reports. This is easier if the two factors above are in place.
- A management culture that sees the contribution of the RSA process as an aid to delivering quality and safe schemes and the input of the auditors as contributing to designers' professional development.

3.3.4 Network Modelling

The use of network modelling applications specifically tailored to collision analysis is described in Element One: Data. There is no doubt that building a detailed model of all but the smallest network is expensive, but the potential rewards are significant:

- A move away from a reactive approach to road safety to one where changes in risk might be predicted, treating road safety risk as a near real-time variable of network performance.
- A powerful tool for producing or checking RSA, increasing the level of objectivity in RSA recommendations.
- A more intimate knowledge of the road safety characteristics of the network, where 'what-if' scenarios may provide clues to subtle changes in the network to bring about casualty reduction.

3.4 Open Systems

3.4.1 What 'Open Systems' Mean

The term 'open systems' is borrowed from the IT world; it describes systems with components and protocols that are not exclusive to one proprietor and that can be emulated and added to by other people. This may seem anti-competitive, but the advocates of open systems point to the rapid development in the capabilities and applications of such systems when designers are not hindered by closed specifications and patent law.

In the field of road safety, 'open systems' describe any aspect of the systemic application of techniques and methods to promote safer travel that are deliberately inclusive. Such systems have no closed gates, are easy and intuitive to use and actively seek the input of people from other teams and departments, even from outside organisations.

3.4.2 Open Working Relationships

Modern thinking on human relationships at the international, racial and social level tends to focus on the concept of the 'other'. Even relations between the sexes and individuals can be analysed in terms of the assumed values, prejudices, attitudes and learned behaviour of one person or group of people toward another person or group. This focuses on the typically human tendency to think about 'us' and 'them' and to build metaphoric walls between 'us' and 'them'. The bricks from which these walls are built are made of 'difference', both perceived and real.

A simple example of this is the artificial boundaries often placed between road safety practitioners dealing with engineering interventions and their colleagues working in education, training and publicity (ETP). Both groups have the same target in reducing road casualties, but still 'difference' can get in the way. For example the engineers may think of the ETP people in terms of what they are not, that is to say, they are not engineers, while the ETP people may consider that the engineers are obsessed with building things, to the detriment of the so-called 'softer' aspects of specifically targeted training and publicity that could accompany and amplify the casualty reducing potential of engineering works. So each group sits behind the artificial and metaphorical walls, secure in the knowledge of the importance of their own work and that the 'other' is doing only half a job.

Given that it is fairly common for these boundaries to exist between road safety engineering teams and their ETP counterparts, even when they are physically co-located, how much harder then to break down the artificial walls, or 'silos' between other groups that do not share the road safety agenda. But that last phrase is in itself an example of 'closed' or silo thinking, concentrating on the difference rather than the shared. Other groups, departments and organisations should also be working to the casualty reduction targets that most local authority road safety practitioners are, and they are often working to a similar agenda, with safer travel a shared aspiration. As in the wider world, the way to stop thinking in terms of 'otherness' is to come out from behind the walls and have a closer look at

[17] Road Safety Audit, the Danish Experience (FERSI 1995); Accident Countermeasures: Literature Review (Transit NZ 1992)

just how few differences there are. The advice given on road safety forums in Element Two: Structure will help overcome the problem.

3.4.3 Open Management

Whole libraries have been written on the subject of management, with new volumes seemingly added daily, and it is not within the scope of this book to wade in to the morass, advocating certain approaches over others. On the other hand, open systems need open management; it is often managers who set themselves up as 'gatekeepers' within organisations, controlling the flow of information and activity within teams and across team boundaries. No-one is disputing that 'managers need to manage', but if that control is too tight then the systems cannot be open. Sometimes the organisation's structure encourages such office feudalism, and the advice in Element Two: Structure can help to move away from such closed structures.

Open management starts with the style of management and the communication culture that goes with it. There is no such thing as a fixed, 'best' management style. Styles of management are considered to operate on a continuum, with extremely autocratic styles at one end and a 'laissez-faire' approach at the other. A capable manager operates along that continuum, usually away from the margins, varying the style according to the circumstances. For example, a manager might convene a team meeting to discuss the future operational needs of the team, a consultative style of management, but is unlikely to do so if there is, say, a sudden security alert in the building. The instruction to 'get out, now', an autocratic style of management, would be perfectly acceptable in that case! People working in a professional environment appreciate their work-related opinions being taken seriously, so for most of the time a consultative style of management encourages team building and open thinking. Although this example is at a team level, the approach should cascade through an organisation.

Open management should build on the inclusive approach to team building by looking to build relationships outside the team, department and organisation, with those with shared values and agendas. Some management tools can help with this:

- System mapping. This is an excellent tool for visualising the components of a system and looking for overlaps that indicate possible synergies to be gained from improved relationships with other parts of the system.

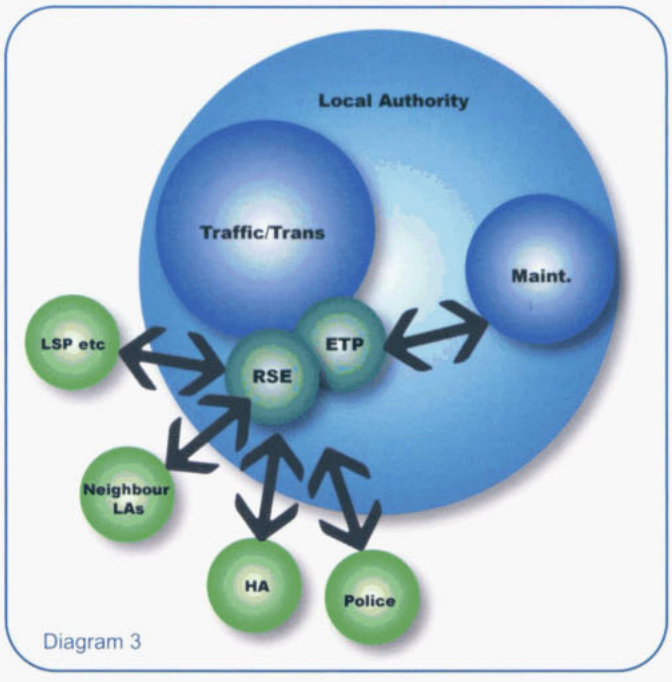
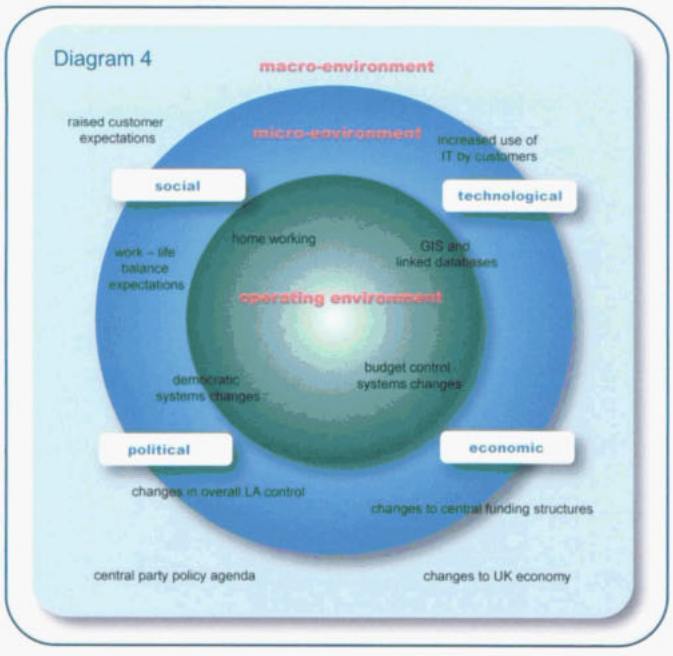


Diagram 3

- STEP analysis. Capable managers are rarely surprised by change, usually because they carry out what management theorists call 'environment sweeping', looking for factors and indicators that might point to future change. STEP is a tool for formalising that activity and is an acronym:
  - Sociological. Looking for patterns of change in society, at a local or national level. This could include raised customer expectations, changes in patterns of living and attitudes to work and leisure.
  - Technological. Awareness of improvements in technology, both within the workplace, for example GIS, and the wider world, for example the World Wide Web.
  - Economic (sometimes also Environmental, making this STEEP). Awareness of changes in funding structures, including drastic change. For example the Single Capital Pot and the replacement of safety camera netting-off with a central road safety fund.
  - Political. No local authority manager needs to be told of the need for political savvy, but this should translate into an understanding of the pressures brought to bear by and upon politicians and how this might affect road safety policy, locally and nationally.

These factors should not simply be listed; show them on a diagram like the one shown here. Locating the factors in the near, or operating environment, the micro-environment and the macro-environment, will give clues to their likely impact. STEP analysis should not be regarded simply as a defensive tool; it can alert the manager to changes in the environment that can be put to use in the cause of open systems, and in this case, for furthering road safety objectives. The important thing is to look. If road safety managers do not look, then they will not know until it is too late.



3.4.4 Open Minds and Innovation

The concept of 'open-ness' runs like an artery through the philosophy of open systems; if any part of the system has a tendency to exclusivity then that part of the system is by definition 'closed'. Besides developing open working relationships and adopting open management, the most robust way of defeating such a tendency is to encourage open minded approaches to road safety work. This includes:

- Using human resources from non-engineering disciplines, whether from other teams or departments for particular projects, or having permanent team members with backgrounds in education, psychology, geography and other disciplines outside engineering.
- Encouraging innovation. If a road safety practitioner or manager find themselves defending an existing practice on the basis that 'we've always done it this way', this should trigger a metaphoric alarm bell. Stifling innovation is a hallmark of closed thinking.

3.5 Consultation

3.5.1 Why Consult?

The DfT document A Road Safety Good Practice Guide[18] emphasises that it is not simply road safety practitioners who have the ability to impact and influence the road safety strategy of a local authority. No-one is excluded from accessing and utilising the road network so it is important that road users are given the opportunity to enter into discussion about road safety improvements. However, each individual road user is different in terms of their perceptions and beliefs[19] and, as a result, all road users can have some bearing over the level of risk to which they expose themselves. For this reason, all consultees and stakeholders should work together towards achieving a 'common goal' (A Road Safety Good Practice Guide, page 6).

This 'common goal' can be achieved through effective communication. Communication is a powerful mechanism for building understanding and securing the support required to deliver change successfully. As the Cabinet Office notes, a local authority which involves the public in decision-making symbolises its commitment to being open and accountable, demonstrating a democratic way of thinking[20]. Government is, after all, a democracy and at the heart of democracy is the general public[21].

Road safety practitioners are aware that some proposals can have far reaching consequences for the public and stakeholders. A thorough and effective consultation exercise is required. Over recent years, consultation has become a key part of the policy making process particularly in light of Best Value and local authority initiatives for achieving Best Value goals. A large amount of guidance is already available on how to consult, emphasising the need for a clear, concise and accessible approach. Development of the process is still a priority in order for citizens, as end users, to feel that their input is valued.

Communication with the general public can sometimes seem a chore; a hindrance to the process of scheme design and implementation. This overlooks the fact that the outcomes can be invaluable. Measures introduced as solutions to road safety problems need to suit the locality and this is where public consultation is considered an important part of the process. This is why consultation should be regarded as a way of working more efficiently[22].

3.5.2 How to Consult

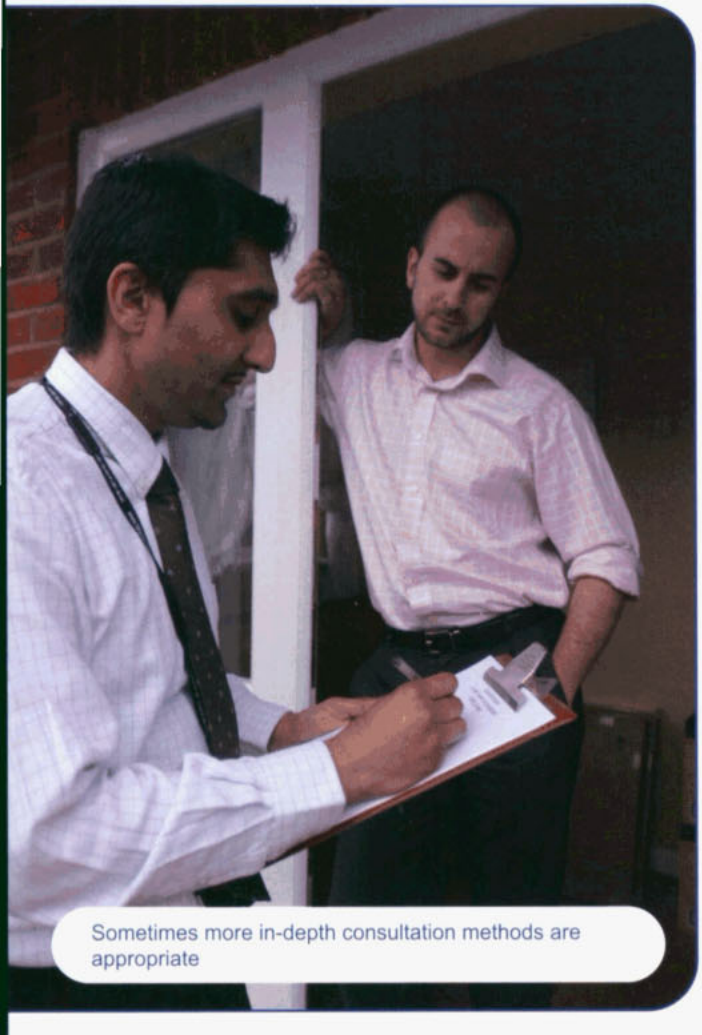
There are three important steps to remember that will lead to meaningful consultation:

- Choose the type of consultation.
- Choose the technique to be used.
- Feed back the results of the consultation to those consulted.

Focus groups can provide a test bed for road safety proposals

[18] A Road Safety Good Practice Guide (DfT 2001)
[19] Risk, hazard perception and perceived control (TRL560 2003)
[20] Consultation Guidance – Why Consult? http://www.cabinetoffice.gov.uk/regulation/consultation/consultation_guidance/the_code_and_consultation/why_consult.asp [accessed on 28/02/06]
[21] Citizens as Partners: OECD Handbook on Information, Consultation and Public Participation in Policy-Making p.19 (OECD 2001)
[22] Connecting with users and citizens – user focus [page 2](Audit Commission 2003)

A familiar form of consultation – the public exhibition



Sometimes more in-depth consultation methods are appropriate

Example: Nottingham City Council: Consulting on a Home Zone

Kennington Road represents a small pocket of deprivation in Nottingham. Before a Home Zone was introduced the roads, street lighting, housing, play areas and open spaces were all in a poor state of maintenance and the residents had little motivation to look after their environment. Many simply wanted to be rehoused. To change residents' attitudes it was necessary to involve them in all aspects of the design of the Home Zone. The school in the area became a focal point for public involvement which included choosing a layout, selecting materials at a 'mini-Traffex' exhibition, circulating information and regular steering group meetings. This level of involvement helped the residents to build up a sense of ownership of their estate and a commitment to looking after it. This was evident after the construction work, when residents identified the perpetrator when some of the newly planted trees were cut down.

There are several key drivers behind working towards achieving more meaningful involvement. These include the following:

- The Race Relations Act (1976, amended 2000) places the onus on local authorities to consult with minority and ethnic groups. This goes alongside the Disability Discrimination Act (DDA) which, since 1999, has demanded that service providers make changes to the way in which their service is provided. The DDA and RRA place a demand on the local authority to involve all community members in decision making regardless of ability or racial background.
- The Local Government Act (2000) encourages local authorities to prepare a strategy to support and promote the economic, social and environmental well-being of their area.
- Best Value helps to develop local strategic partnerships where there is a need for extensive consultation. Best Value puts a duty upon the local authority to continually engage with local communities in order to ensure the highest quality service delivery to the public.

Example: Solihull Metropolitan Borough Council's Consultation Strategy

Solihull MBC's consultation strategy has 4 main principles:

- Only consult where there is a real decision to influence.
- Make the most of resources - join up wherever possible and share results widely.
- Use Plain English and keep consultation jargon-free.
- The category of consultation will be highlighted in Cabinet reports to ensure Members are aware of how much the consultation influences decision-making.

Description	Definition – the circumstances under which this category of consultation would be used	Example of this category of consultation
Category A: **Information gathering**	I am testing out satisfaction with services which will inform future planning. I don't need to make a decision now but I am gathering information which I may use later.	Questionnaire on satisfaction with waste recycling
Category B: **Seeking Views**	We will be making a decision or planning service changes so we are seeking information/your general views to help us make that decision or plan changes	Consultation on a draft strategy before taking the final version to Members
Category C: **Making choices**	We have a number of options and are seeking your views/ preferences before making a decision. We are taking a 'vote' on options and your preferred option will be reported to the relevant decision making body	Workshop to obtain views on design options for park facilities
Category D: **Generating Ideas**	We are seeking your views on an issue which is at an early stage. We do not have definite options at this stage, so we want you to help us generate ideas/options so we can jointly identify and agree a way forward	Consultation to identify the locations of community sports equipment across the Borough
Category E: **Participation/Joint Decision Making**	Let's jointly agree what needs to happen and how. We will be making decisions together.	Working party to identify suitable amenities and services in a Community Centre.

Consultation Process

1. Before starting anything - contact Communications Division to discuss.
2. Prepare documents and send to Communications for overview / sign off.
3. Conduct consultation and collate the results.
4. Use to inform Members' decisions (stating the category).
5. Share results and actions with Communications.
6. Feedback to participants.

Citizens' Panel

Solihull's Citizens' Panel gives the opportunity to get a balanced view; it is a geographical and socio-economically representative group of 1000 residents.

Panel members are recruited by a research company (residents cannot self-select to be on the panel) and agree to take part in at least four telephone interviews per year.

3.5.3 When to Consult

Road safety practitioners should consult on all interventions where changes to people's environment are made. The aims of the consultation process are:

- To gain public acceptance of road safety interventions; this lies at the heart of producing a degree of 'ownership' and successful behavioural change to maximise success.
- To understand the public's perception of road safety and to show how and why proposals will enhance the environment and well-being of the consultees.

3.5.4 Who to Consult?

In order to achieve the 'common goal', and meet road safety targets set by Government, partnership working is important as illustrated in the National Road Safety Strategy[23]. Partners and consultees will include individual road users, including residents and businesses, emergency services, voluntary groups, road user associations, motoring organisations, elected members, parish councils and local area committees.

It is crucial to involve the right people and to provide feedback on the outcomes of consultation. Feedback contributes to reducing scepticism and builds confidence that input into a consultation exercise has a genuine impact on possible outcomes. Ongoing involvement should be encouraged wherever possible. After research involving voluntary organisations, the Audit Commission found that they considered 'consultation as an event [that] is far less satisfactory and meaningful for service users...than ongoing meaningful involvement'[24].

3.5.5 Potential Problems and Risks

Problems can include[25]:

- Lack of interest, commitment or trust in the consultation exercise: consultation, community engagement and communication give a local authority identity, where increased transparency encourages participation thus improving the quality and effectiveness of the actions undertaken by a local authority. Failure to communicate can often leave the public and stakeholders feeling unnecessarily excluded. Equally, poor communication will make partnership working a more onerous task.
- Respondents may not understand the major issues and therefore underestimate the importance of participation. As a result some responses may contain little detail and therefore add little substance to the debate.
- The range of opinions expressed within the responses may be diverse leading to an inconclusive exercise as a result of the lack of consensus.
- Policies or proposals may require alterations to accommodate the feelings of the local community.

A further problem can stem from the consultation giving a forum for people with an agenda not connected to the intervention, or even to road safety in general.

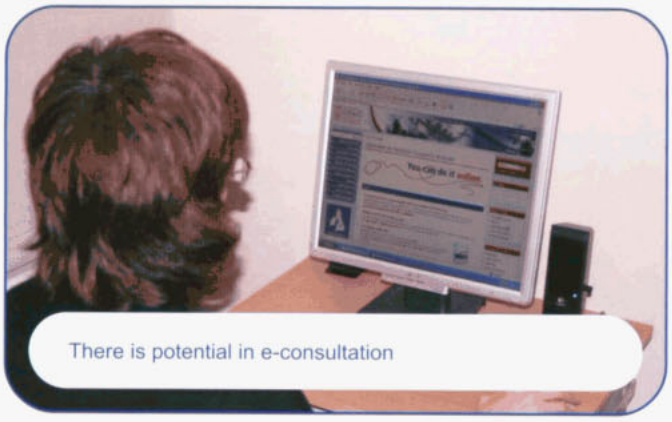
3.5.6 Consultation in the Future

Most local authorities have an overarching community engagement and consultation strategy in place. At present the majority of consultation guidance and strategies provide no indication of the ways in which the consultation process may develop; neither do they touch upon the importance of new technologies and the changing world. However, the Audit Commission's guidance Connecting with Users & Citizens draws attention to the importance of modernising communication and community involvement by embracing the concept of wider choice and new technology.

Each road safety practitioner must work with the world in which they live; it is constantly evolving and new technologies are emerging that offer wider access to information. Further, the PACTS (Parliamentary Advisory Council for Transport Study) research document Policing Road Risk notes that these new technologies 'extend [our] physical capacity...to see, hear recognise, record, remember, match, verify, analyse and communicate'[26]. The public as a whole has access to higher levels of income, better education and more opportunities. All of these factors have resulted in a demand for greater transparency and understanding of the actions of central and local government[27].

Pioneering and experimenting with new technologies has proved that there is true potential in e-consultation and e-democracy. However more serious and sustained testing is necessary which will require full support from central government. Further, there will always be those who either prefer to opt out and be consulted by more traditional means or who will have difficulty in accessing the technology needed to contribute. As a result, technology will never be more than part of the answer to what some have seen as a decline in democratic participation[28]. New technologies will enhance the democratic process, not change it completely.

[23] Tomorrow's Roads: Safer for Everyone (DfT 2000)
[24] Connecting with users and citizens – user focus p.4 (Audit Commission 2003)
[25] Consultation Guidance – Why Consult? http://www.cabinetoffice.gov.uk/regulation/consultation/consultation_guidance/planning_a_consultation/risks.asp [accessed on 28/02/06]
[26] Policing Road Risk p.20 (PACTS 2005)
[27] Citizens as Partners... p.19
[28] E-participation and the Future of Democracy (Interact 2003)



There is potential in e-consultation

Example: A Case Study in e-Consultation[29]

The Royal Borough of Kensington and Chelsea carried out an 'e-consultation' to ascertain whether internet technology could do two things:

- Increase the numbers of participants.
- Provide feedback, creating a two-way process.

Stakeholders, partners, staff and the general public of the locality were involved, entering their comments and responses into an online form (specially designed by an outside consultancy) over a 10-day period where the user had the option to log on as many times to make as many changes as desired. The results were then posted on the site and could be searched and grouped in a number of ways. Technical support was provided by telephone and email.

Advantages:

It was found that information was gathered from all participants – not just those who are outspoken or high profile. Feedback was offered to participants and the quality of the information submitted was considered higher and well thought out due to the time window during which participants could input their responses being long enough to encourage revisiting the site to edit their input.

Disadvantages:

The following issues were raised:

- Passwords and IDs required simplification, making the process inclusive in terms of ease of use for those who are not proficient internet users.
- The need for good quality support and reducing the amount of time the process took.

More information is available within the Audit Commission document and from the Information Systems Strategist at The Royal Borough of Kensington and Chelsea.

3.6 Bringing it all Together

3.6.1 Principles of Safety Management

So far this section has described the diverse ingredients needed to create modern, effective systems to deliver road safety. These include:

- The basic method of collision reduction and its four applications:
  - Single site treatment.
  - Route treatment.
  - Area treatment.
  - Mass action treatment.
- Risk management and road risk rating systems.
- Road Safety Audit.
- Network modelling.
- 'Open systems' approaches to managing resources, people and relationships.
- Consultative dialogue with the public.

Ingredients alone are not enough; understanding the techniques to bring these ingredients together is vital. This understanding was advanced by the publication in 1999 and 2003 of guidelines on rural and urban safety management.

3.6.2 Urban Safety Management

In 2003 the DfT published the Urban Safety Management Guidelines to complement and update strategically the more technical guidelines published in 1990. These updated guidelines encourage a strategic approach to road safety in urban areas. According to the guidelines, a good urban safety strategy[30]:

- Formulates a safety strategy for the urban area as a whole.
- Integrates safety with other urban strategies, for example transportation, land-use planning, Safer Routes to Schools.
- Considers all kinds of road users, especially vulnerable road users.
- Considers the functions of different kinds of road.
- Integrates existing casualty reduction efforts into the strategy.
- Uses opportunities where other policies and strategies may help to enhance safety (for example improving safety within an urban regeneration project).
- Encourages all professional groups to help to achieve safety objectives.
- Guards against possible adverse safety effects of other policies.
- Encourages residents and all road users to become actively involved in the process and thereby take ownership of it.

[29] Connecting with users and citizens – user focus pp.32-35(Audit Commission 2003)
[30] Urban Safety Management Guidelines (DfT 2003)

- Translates the strategy and objectives into local area safety schemes.
- Monitors progress towards the safety objectives.

Combining the above with the advice within these guidelines will help those engaged in building modern systems that are very effective in delivering road safety in urban areas.

Urban safety management brings a range of techniques and disciplines to bear on providing a safe, pleasant environment

Again, combining the above with the advice within these guidelines helps those engaged in building modern systems that are very effective in delivering road safety on rural road networks.

Rural safety management addresses the needs of all road users, while recognising the dominance of motor vehicles

3.6.3 Rural Safety Management

In 1999 the IHT published the groundbreaking Guidelines for Rural Safety Management (IHT 1999), to provide a counterpart for the earlier guidelines on Urban Safety Management. These guidelines designed specifically for rural road networks identified the key features of a rural safety strategy:

- Classifying the rural road network by a functional hierarchy.
- Formulation of a hierarchical strategy for different types of road. This makes a contribution to the 'self-explaining roads' approach.
- Addressing the needs of all kinds of road users, while recognising the dominance of motor vehicles. This has become even more important with the completion of the National Cycle Network and the full application of the Disability Discrimination Act.
- Making use of the full range of collision reduction approaches in programmes for rural road safety.
- Cooperation with enforcement authorities to target speeding and poor driving on high-risk routes.
- Targeted ETP initiatives to encourage safer road use.
- Monitoring the performance of the strategy, with iterative change built in to the system.
- Input to land-use planning processes.

Element Four: Finance

4.1 Introduction

Whatever the various reasons road safety practitioners may have had for joining their profession, it is unlikely that 'handling' substantial sums of money was high on the list. Despite this, the protocols and systems used to move capital and revenue around in the public arena are a fixture of the public servant's life. Familiarity and dexterity with the technicalities of budgeting and funding streams can reap the reward of adding value to road safety services. In the area of road safety finance, 'adding value' can mean even greater casualty reduction.

This Element looks mainly at local government as the main channel for road safety funding. The link between local and strategic road safety service delivery in Scotland, Wales, Northern Ireland, and London and on the English trunk roads is also examined.

4.2 Local Government

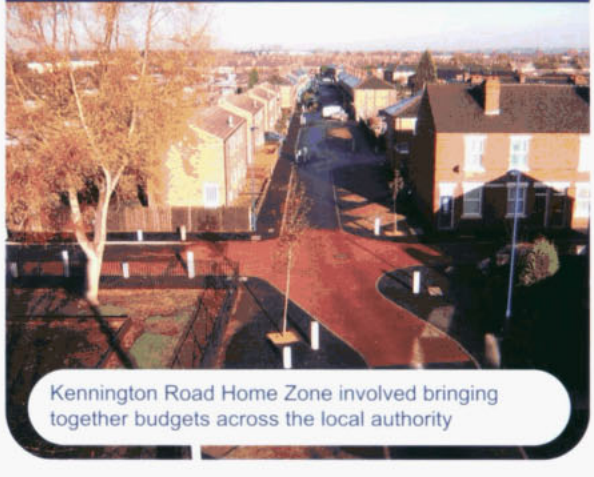
Since its inception in the Transport Act 2000, the Local Transport Plan (LTP) capital allocation for road safety schemes has grown significantly, and remains the primary source of finance for road safety. Revenue investment by local authorities has not kept pace. To deliver the expanded capital programme staffing levels have risen substantially and the cost of this has been partially met by fee earning which is used to supplement revenue investment. There has also been a wide range of opportunities to increase road safety budgets through the introduction of self-financing initiatives, competitive bidding and partnership working. The combined effect of this has resulted in the need for improvements in financial management, particularly in the monitoring of income and expenditure. The inclusion of short-term projects, often requiring high staffing levels, has also created financial difficulties. This is particularly true when these projects are wound up and staffing levels have to be adjusted to match the predicted workflow. Consequently the financial management skills required for delivering road safety in a local authority are now comparable to those needed for running a small-to-medium business enterprise.

4.2.1 Integrated Transport and Road Safety

Since the first LTPs were produced there has been a significant shift in how road safety is delivered by local authorities. The removal of road safety ring fenced finance and the creation of a Single Capital Pot (SCP) was a cause of concern because some organisations felt that the overall investment in road safety would decline. This has not been the case, and road safety has been mainstreamed within the provision of an integrated transport programme. This process has been helped by the inclusion of Best Value Performance Indicators for casualty reduction, and a cultural shift towards improving safety. Most local authorities still work on the basis of block allocations for budget management and accountability, although block holders now have more flexibility to combine their finance to produce integrated schemes.

Example: Financial Management at Nottingham City Council

In Nottingham all schemes are progressed through a Project Executive Group where the block holders discuss the justification of the schemes within the overall transportation programme. At this stage the schemes can be expanded to produce a comprehensive package of works that cater for all road users and the long-term maintenance implications. This is an example of the SCP helping to break down the silo mentality. In practice this has worked well within planning and transportation. In some cases there have been significant areas of co-operation. In the delivery of the Kennington Road Home Zone in Nottingham there was a joint capital investment with Housing and Highways co-operating to deliver a national demonstration project.



Kennington Road Home Zone involved bringing together budgets across the local authority

The integrated transport picture is not all rosy. For example, it is not proving easy to mesh integrated transport policies with schools' reorganisation and housing regeneration programmes. Closer working relationships are needed between those responsible for capital investments to ensure that the rationale behind the creation of the SCP is realised. Some of the national demonstration projects have shown the benefits of collaborative financial investment, and this should be pursued in all local authorities.

4.2.2 Safer Routes to School

Since 1999 a substantial amount of LTP funding has been spent on improving the safety of children's routes to school. This has been supported by the production of school travel plans which are now funded through the Department for Education and Science. This has been a successful initiative, although take up has not been universal; some schools have been unwilling to devote scarce resources to produce these plans, and in some cases education departments have not seen the journey to and from school as their concern. Safer Routes to Schools work should be complementary to the school travel plan process, and both should be coordinated with any schools reorganisation programme.

Solihull's award-winning Tudor Grange SRtS scheme

SRtS offers a chance to close the gap between road safety and sustainable transport

4.2.3 Road Safety and Development

One indicator of a growing economy is an increase in investment in residential, retail and commercial private developments. These offer opportunities through the planning process for improved environmental conditions and road safety. In new housing developments, for example, home zone principles can be incorporated into the preliminary designs. Design guides can be issued to developers to give clear examples of what a local authority expects. There is also potential for commuted sums to be invested in the vicinity of new developments. These can often be secured for sustainable transport measures such as cycle routes, bus infrastructure and pedestrian facilities. Securing agreements with developers should be seen as a cooperative process leading to high quality designs that offer safety, sustainability and a pleasant built environment. These are all saleable features for a developer as well as offering benefits, at minimal cost, to the local authority.

4.2.4 Local Area Agreements (formerly Public Service Agreements)

Local Area Agreements (LAAs) set out the priorities for a local area agreed between central government and the local authority, the Local Strategic Partnership, and other key partners at the local level.

LAAs simplify some central funding, help join up public services more effectively and allow greater flexibility for local solutions to fit local circumstances.

LAAs help to devolve decision-making, move away from a 'Whitehall knows best' philosophy and reduce bureaucracy. LAAs were formerly known as Local Public Service Agreements (LPSAs).

4.2.5 Partnership Working

The financial benefits of partnership working are substantial. This is particularly true where economy of scale and the elimination of duplicated effort can be achieved. For example, the Midlands Safety Camera Partnership jointly funded consumer research, the development of targeted publicity and the delivery of educational activities. None of this work could have been achieved successfully by an individual member of the partnership, and the approach was recognised as outstanding in the 2005 Prince Michael Road Safety Awards. Economy of scale can also be achieved in the delivery of engineering schemes by partnering with other highway authorities or contractors.

Eample: Surrey County Council LPSA

Surrey County Council (SCC) entered into a LPSA with the intention of further improving the services provided to local people. The LPSA had twelve targets, seven of which were selected from a core menu which was set out by central government and from which local authorities choose at least one target from education, social services and transport, with the other five targets locally determined.

SCC set out to achieve more demanding performance targets than those it would be expected to achieve in the absence of the LPSA. Initially central government provided pump priming for the twelve projects within LPSA but agreed to pay a Performance Reward Grant (PRG) equivalent to 2.5% of local authority net budgets, divided into twelve equal segments, if the targets are achieved. The PRG is geared: If at least 60% of the target is reached, then 60% of that segment of the reward grant is paid back. If 59% or less is achieved, no grant is paid for that target.

The format and process for developing a LPSA has a number of benefits:

- It focuses on a few specific and measurable outcomes.
- It enables authorities to identify freedoms and flexibilities that they would like to negotiate with the relevant government department (with an interest in stretching the target).
- It provides a reward grant.
- It is a structured and focused approach that helps to agree the tactics for achieving the targets in a way that makes best use of resources.

Example: Achieving Synergy in Rusholme, Manchester

The Rusholme Safety and Regeneration Scheme combined environmental improvement work with a road safety scheme. Combining the two elements provided good value for the extra investment, and opened up the opportunity to draw in European Regional Development Funding (ERDF) to supplement transport capital funding and a DfT grant. Some environmental improvements and the cost of renewing the whole of the street surface were offset by the cost of constructing the road safety element of the scheme. There was also a benefit in maintenance terms, enabling a contribution from the capital maintenance budget. Wilmslow Road is one of the busiest bus corridors in Europe, and improvement of the bus facilities attracted a contribution from the South-East Manchester Multi-Modal Study (SEMMMS). A development at the junction of Hathersage Road providing accommodation for key workers with retail outlets on the street frontage contributed £38 000. The contribution was in lieu of providing a pedestrian facility across Hathersage Road, which was a condition of the planning consent for the development. The funding matrix for the project is summarised below:

DfT	Minor Works Capital	SEMMMS	MCC Capital maintenance	Developer	ERDF	Total
£1M	£696k	£498k	£200k	£38k	£703k	£3.135M

To access the ERDF funding stream it was necessary to prepare a business plan demonstrating: the need for investment; benefits to the community and added value. With this type of grant, performance is measured against the target output, and the targets identified for Rusholme were:

ERDF Outputs	Target	Achieved
Length of route improved (km)	3.8	3.8
Area of land improved (ha)	0.29	
Community safety initiatives	2	2
Environmental initiatives supported	1	1
Marketing initiatives supported	1	1
New investment as a result of capital investment	£2.5M	
Residents securing employment	30	

Example: B-Moor Together and Bradford City Council

B-Moor Together is part of the Local Strategic Partnership in Bradford, delivering social, environmental and economic improvements to the residents of Bradford. B-Moor Together has developed a local partnership of agencies, local people, community centres and other key people in the Bradford Moor area of Bradford, who are working together to improve the quality of life for those living and working in the area. The Neighbourhood Action Planning (NAP) group was created in 2005 after a year of community consultations about what local people would like to see in their area. Neighbourhood Renewal Funding (NRF) of £20 000 has assisted in providing local improvements along with match funding elements from the NRSI and Regen 2000 (a local service provider). It became clear from NAP meetings that there was an opportunity to assist with one particular project that would address local safety concerns and promote healthy activity at the same time. Bradford Moor Park was run down and unattractive, leading children to play in the busy streets outside their homes. A park redevelopment would encourage parents to take their children to the play area, resulting in reduced child road casualties.

The aims of the project were to:

- Redevelop and revitalise Bradford Moor Park with modern play facilities, street lighting and fencing.
- Encourage and promote healthy sports in the park.
- Reduce heavily localised collisions in the area.

Bradford City Council committed £10 000 from NRSI as part of the Safer Places to Play project. The NAP group committed £3 000 of their original £20 000 of NRF money towards the project and an opportunity arose from the NRSI central team in Manchester to bid successfully for up to £40 000 for a Neighbourhood Focused Project. Through building relationships with other departments within Bradford City Council it was clear that other funding could be available. Representatives from Sports Action Zone also attended the NAP meetings and provided £4 000 towards structured healthy sports activities through the summer. After some discussion with the Parks and Landscape Department, a further £40 000 was made available towards the project. In that instance, road safety staff worked out the criteria needed for park redevelopment and how projects would be prioritised. Total funding reached £93 000 and over 1400 local people voted on the best design for the Park.

Sometimes partnerships originate from outside the organisations normally involved in road safety work. It is important to be alert to the possibility of encouraging and empowering such initiatives if road safety benefits are likely to follow.

Example: Stoke-on-Trent City Council

A local group of dads on a former coal-mining estate with high levels of disadvantage originally wanted to expand the cycle training, which they volunteer to assist the City Council with, and provide bikes so children who did not have access to a bike could take part. After an initial discussion it was obvious the dads wanted to move beyond that and expand their services to the whole community, in essence to become a community hub for sports and community trips.

A project was created to embrace their ideals and funding was sought through the NRSI - the project was going to have road safety and regeneration elements, for example 'quick wins' through expanded cycle training and safer playing facilities for children off the road, and longer-term 'skills and community pride' outputs.

The project consisted of: a secure storage facility for the dads' equipment (a converted old school boiler house left over from a school rebuild); large amounts of various sports equipment and community trips organised by the dads. As well as £23 600 of NRSI funding, the dads had previously bid for small-scale funding, and were subsequently successful with their own bid to the Robbie Williams' 'Give it Sum' charity for £30 000 to sustain their activities beyond the original time scale. Encouraged by road safety staff at the City Council, the dads were surprised at how easy it was to bid for funding, once initial reticence and inexperience was overcome. Funds have been successfully bid from: 'Give it Sum'; Community Chest; Children's Fund and NRSI. While in essence the project was for road safety, the by-product of community cohesion means that funding could be sought from other regeneration funds as well.

4.2.6 Self-Financing Road Safety Initiatives: Safety Cameras

In 2000, eight partnerships piloted a 'netting off' procedure whereby the revenue from paid fixed penalty charge notices was used to purchase safety cameras, finance increased enforcement and provide relevant road safety education. The process was subsequently

rolled out and made available to all Police Authorities and their partners. In each case the finance was administered by a local authority. From 2007/8 the netting off procedure was replaced by an allocation to local authorities through LTP settlements. This funding can be used to sustain current levels of enforcement, or local authorities may choose to spend it on other casualty reduction activities. The change broke the link between income from paid penalty charge notices and expenditure. Consequently spending projections within LTPs have to be adjusted to accommodate the new financial arrangements, particularly revenue allocation to police forces to support a justified level of enforcement. Delivery reports to the DfT will document the outcomes from this spending.

4.2.7 Self-Financing Road Safety Initiatives: Driver Improvement

Adapting one of the recommendations of the North Report[31], Driver Improvement Schemes are now offered as an alternative to prosecution for due care and attention offences. The cost of these courses varies widely across different local authorities. This is partly due to differences in how the courses are run, but mainly due to subsidies from other road safety budgets. Some course providers levy no charge for theory trainers and administrative support. Some courses use higher numbers of drivers in cars, use local authority buildings at no charge and provide very frugal catering. Clearly each local authority needs to account for all the cost of running courses, balancing between the charge to the driver and the council tax payer and maintaining a high standard of training.

Real costs of Driver Improvement Schemes vary widely across the UK

4.2.8 Self-Financing Road Safety Initiatives: Speed Awareness

The Association of Chief Police Officers (ACPO) has produced guidance on the provision of speed awareness courses and several service providers already offer them as an alternative to a fixed penalty charge and penalty points. These courses can be self-funded from the costs charged to motorists and go some way to refuting the charge that safety cameras' main function is merely revenue raising.

4.2.9 Self-Financing Road Safety Initiatives: Civil Parking Enforcement

Civil parking enforcement is not necessarily seen as a road safety initiative. However, given the long-term reduction in focus on roads policing it should be seen as providing road safety benefits by improving driving standards. In some cases the processes can lead to direct safety benefits, such as the improved enforcement of junction protection and parking restrictions in the vicinity of schools. Powers to enforce non-endorsable moving traffic offences will be made available to all Highway Authorities (Roads Authorities in Scotland) in 2007 under the Traffic Management Act. The financial processes involve the establishment of independent trading accounts that are subject to financial scrutiny and audit. Robust and efficient systems are needed to cope with the large volume of payments likely to be generated, providing customers with a variety of ways making payments. Procedures are also required for handling a substantial number of cash payments and integrated IT solutions are necessary to provide the tracking of offences, from detection through to payment. With all self-financing initiatives there is a potential surplus. Spending this surplus is often controlled by conditions that that are imposed to ensure that 'profits' are not diverted away from justifiable transport expenditure. To help the self-funding initiatives to retain credibility and support from the motoring public it is important to demonstrate that any surplus has been spent on improving the transport network from which the income was derived.

Civil parking enforcement can raise driving standards

[31] The Road Traffic Law Review 1988

4.2.10Competitive Bidding

Competitive bidding has been used by the DfT to develop new road safety initiatives, to introduce schemes that can showcase best practice, to demonstrate how road safety research can be implemented, and to show how a holistic approach to safety can be applied to areas, road lengths and conurbations. The NRSI, the Home Zone Challenge and the funding for Urban Mixed Priority Routes are just a few of the competitive bids that have occurred since the turn of the century. Preparing bids requires an investment of staff resources that in many cases will fail to lead to a programme of work. A one-in-five success rate is considered acceptable by leading authorities involved in competitive bidding because the bid costs can be justified by the expanded programme of works. Success rates lower than this draw finance and staff resources away from core road safety activities.

Winning a competitive bid imposes an immediate strain on a local authority, particularly with projects that have short lead-in times and tight deadlines for completion. In the initial stages there is often a lack of staff resources, an incomplete project management plan and risks associated with the delivery of the initial proposals, particularly if there has been limited consultation in the preparation of the bid. All these factors increase financial risk, particularly if payment is based on results. In the worst cases, authorities have been unable to deliver these projects on time or on budget. In some cases what was proposed was not what was delivered, and in a few instances nothing was delivered at all. In recent years the DfT has understandably tightened financial management of these schemes in an attempt to address these problems. Payments are made against completed work packages as specified in the management of the programme.

Local authorities should reduce their financial exposure by submitting bids only where they can clearly deliver a project that meets the specified criteria. The bid must accurately cost the proposals because overspending could fall on a local authority's revenue budgets. Project management principles should be applied at the bid stage to predict the income and expenditure profile as well as the additional staffing requirements. In most cases there is a substantial lag between expenditure and payment that often runs over the year end. This should be accommodated in the financial planning. It is particularly difficult to recruit experienced staff for short-term projects and even more difficult to retain them as a project approaches completion. To help overcome this, at least one permanent member of a road safety team should be allocated to each project and temporary or agency staff should be recruited to provide cover.

4.2.11 Sponsorship

Road safety can attract sponsorship from both local and national organisations. At a local level, road safety publicity material can carry sponsors' logos, companies can sponsor events, businesses can provide quiz prizes and equipment can be donated for road safety use. It is difficult to predict the level of sponsorship that can be achieved, but could typically amount to about £5 000 per year.

Example: Safe Drive Stay Alive

Surrey Fire & Rescue Service launched a new road safety initiative called 'Safe Drive Stay Alive' aimed at educating Surrey's young drivers about driving behaviour and its consequences. 'Safe Drive Stay Alive' is a stage show delivering a hard-hitting message to young drivers and making them aware of their responsibilities on the road and the potentially lethal results of ignoring them.

A series of eleven shows were attended by around 4 000 16- to 18-year-olds. The show is based around a video reconstruction of a road traffic collision. It traces the events leading up to the collision and then follows the actions of the emergency services dealing with it. At appropriate moments the video is paused whilst serving members of the emergency services and hospital staff talk about their own experiences dealing with road traffic collisions. Perhaps the most poignant messages come from the parents of a young person who died in a real road traffic collision and from a person disabled by the actions of a younger driver.

The show is an excellent example of partnership working with Surrey County Council's Road Safety Officers, Surrey Police, Road Peace, Surrey Ambulance Service and the Royal Surrey County Hospital all participating and supporting the shows. Associated costs were funded by Exxon Mobil, Air Products, the esure insurance company and Surrey Safety Camera Partnership. The shows were also endorsed by ex-Formula One driver Damon Hill and former Premiership footballer Matt Le Tissier who both attended the VIP launch.

4.2.12Tapping Other Sources of Finance

There are other, complementary channels of funding available if road safety benefits can be demonstrably linked to broader benefits.

These include:

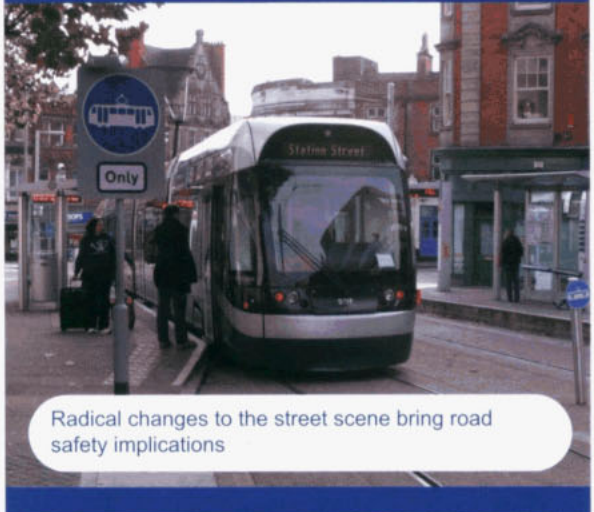
- The Development Agency.
- Regional Development Fund.
- EU Funding.
- Regeneration and Renewal.

4.2.13 Integrating Road Safety ETP and Engineering

Road safety education, training and publicity (ETP) budgets have not grown at the same rate as their engineering counterparts, and complementing scheme delivery with good publicity taps into the skills and resources available in ETP without compromising fragile revenue budgets. In some cases the introduction of new technology or facilities needs to be backed up with practical safety advice which can be delivered through ETP.

Example: Road Safety Publicity and the Nottingham Tram

When the tram network was introduced in Nottingham, children, cyclists, motorcyclists, pedestrians and vehicle drivers all had to be prepared for trams running in a city that was not accustomed to it. This was enabled by a cross-subsidy between the road safety education budget and the capital programme.



Radical changes to the street scene bring road safety implications

Cross-subsidising budgets made it possible to prepare road users for sharing the road with the tram

4.2.14 Road Safety Research

Research is time consuming, expensive and difficult to justify unless it leads immediately to a scheme or programme of works. For this reason it is useful to develop a partnering arrangement with nearby universities. Where a piece of research would be of benefit to authorities in general, a university may be able to secure funding from a Research Council to employ staff to work alongside an authority's own team to carry out work which it would be beyond the authority's budget to fund wholly, and for which its own team might not include all the required research skills. For research of more local concern, university staff may be able to arrange for students, as part of their courses, to undertake suitably defined elements of the work at little cost to the authority. A key to successful student involvement of this kind is commitment on the part of the staff responsible for their courses, and understanding by the authority that the students are working by agreement, rather than under a contract of employment.

Research synergies could be gained by being alert to joining research projects run by the DfT or the Transport Research Laboratory Ltd (TRL) or at least monitoring their results through the trade press. Similarly, international research can have applications on UK roads.

Example: Two Universities and a City Council

Nottingham City Council has arrangements with both Nottingham University and Nottingham Trent University to provide research opportunities for students. Current research includes the development of downloadable cycling and walking maps for use with hand-held GPS devices to establish where casualties actually live, and understanding the collisions and behaviour of road users in the city centre at night. In each case the council provides equipment, database access, computing facilities and advice. The time-consuming data collection and analysis is provided by the students themselves. This means a £20 000 research project can be delivered at a cost to the authority of only £1 000.

4.2.15 Outsourcing and Consultancy

Most local authorities employ consultants for road safety work. This may be to overcome short-term staffing difficulties, to benchmark internal costs, to prepare for outsourcing or to provide technical expertise. Consultants work to a brief, so considerable thought should be given to drafting this important document. Failure to be specific about expected outcomes can lead to disappointment and conflict

between consultant and client. Consultants are typically procured through some form of competitive tendering process that should include a quality assessment. This quality assessment should always demonstrate the ability of consultancy staff to undertake the work. Many local authorities employ consultants under framework or partnership arrangements; bringing benefits to both. Local authorities gain demand-responsive access to a wider range of staff resources, some that are hard to find. The consultants get experience in kinds of work that are often rare in the private sector. These mutual benefits are particularly evident in road safety work.

4.2.16 Financial Considerations: Legality

All local government financial activity is bound by regulations that are invariably specified in a corporate handbook. Anyone managing finance must be aware of these regulations because non-compliance can result in anything from a reprimand to immediate dismissal. Some financial actions may seem logical, will benefit the authority and yet still be illegal. For example, there are often justifiable grounds for charging for services provided. However, there must be a legal basis on which these charges are made, and frequently the authority will only be allowed to recover costs. Signing off incomplete works, allowing works to commence before an order has been placed, splitting works into chunks to avoid tendering, paying for goods that have not been delivered, raising orders after an invoice has been received are just a few examples of the type of irregularities that financial auditors will pick up. These irregularities are particularly common at year end when budget holders are desperately chasing invoices and trying to sign off as much completed work as possible to spend their budget allocation. Good financial management is essential in current road safety delivery because of the complexity of the projects that are managed and the range of activities that are undertaken. It is not uncommon for ten trading accounts with a combined revenue and capital expenditure of over £10M to be managed by a road safety manager.

4.2.17 Financial Considerations: Efficiency

Improved procurement and efficiency savings are currently expected to reduce local authority revenue budgets by 2% per year. Unfortunately many authorities are simply imposing a 2% cut across most budget headings - including those used to deliver road safety. As local authorities become leaner this arbitrary 'top slicing' approach can cut into staffing budgets. In road safety ETP staffing budgets are most vulnerable because they are usually funded from revenue. Managers should ensure that the importance of ETP activity is well understood by those allocating revenue budgets and look for every opportunity to tie ETP activity to capital work or self-financing initiatives. This will help avoid cutting essential ETP activity and promote closer working with ETP colleagues.

4.2.18 Financial Considerations: Evaluation

Traditionally the First Year Rate of Return (FYRR) mentioned in Element Three: Systems was the main justification for a road safety engineering scheme. Schemes offering a FYRR of less than 100% were usually rejected because there were enough schemes offering higher returns to absorb the budget. After 20 years of road safety engineering work most of the schemes offering such a high potential rate of return have already been delivered. This has resulted in a decreasing FYRR. The mainstreaming into LTP activities is moving road safety towards an integrated approach to scheme delivery. Schemes that combine such things as maintenance, bus priority measures and pedestrian facilities are hard to evaluate using FYRR, leading to examination of alternatives such as full or partial cost/benefit analysis and 'whole life' costing (see www.webtag.org.uk, the DfT's website on transport appraisal).

4.2.19 Financial Considerations: Risk

Financial risk management is fundamental to delivering major projects. The process identifies potential risks, estimates their severity and the likelihood of their occurrence. Where possible these risks are eliminated or reduced. In some cases contingency plans are prepared to deal with them, especially where there are penalties for not delivering a project on time. More detailed risk assessments are justified on any scheme above £500 000, innovatory projects or activities that have inherent risks.

4.3 Strategic Road Network Safety Funding: Highways Agency

English trunk road and motorway road safety funding is co-ordinated by the Highways Agency (HA). The HA does this centrally and through its 14 Areas via:

- Major projects /TPI (Targeted Programme of Improvements) schemes valued at more than £5M and identified mainly through multimodal studies. They are then subjected to a cost/benefit analysis on an individual 'whole life' basis and funding allocated accordingly. This ensures only robust schemes go forward.

- Smaller improvements led by the HA Area team and managing agent – contractor (MAC). These are valued at less than £5M and are subject to the continuous value management (CVM) process as Local Network Management Schemes (see below).
- Technology improvements led by the Tech MAC for the local HA Area. A justification process is used to assess each scheme.
- Maintenance – The HA has an obligation to maintain the network in a safe and serviceable condition in line with minimum 'whole life' cost. This means maintaining or improving road safety is an important element of the assessment of maintenance schemes (see below).
- Collateral benefits from other programmes, for example the provision of improved crossings for non-motorised users (NMUs).

4.3.1 Smaller Improvements (Local Network Management Schemes)

These are improvement schemes valued at less than £5M. They are individually evaluated and scored using the CVM process. This process is used to assemble a prioritised programme of schemes. The CVM score is based on a Project Appraisal Report (PAR) drafted using prescribed directions. The PAR is a key document where the need for the project and its costs and benefits (including those that are hard to quantify in monetary terms) are brought together to aid in deciding the value and priority of the project. CVM scores for road safety schemes are primarily evaluated in terms of net FYRR, injury severity index, traffic flow and other non-safety related impacts of the scheme.

4.3.2 CVM Workshops

Schemes are presented by the Area team (HA and MAC) to the CVM workshop, whose attendees include representatives from technical safety and standards teams and a member of the regional programme team. The attendees jointly score each scheme based on the PAR and other related supporting information. This ensures that a technically sound programme is scored, with consistency in scoring from other Areas.

It is important that schemes taken forward to CVM are presented in a way to focus on the prescribed scoring criteria and relevant HA strategies such as the Business Plan and Strategic Safety Action Plan.

4.3.3 Maintenance Schemes

These are identified from pavement condition information, visual inspection and local collision data. From this information a scheme is developed in line with HA CVM guidance for maintenance schemes. Schemes are split into two main categories: over and under £100 000; the submissions for the higher band require more detail.

The road safety element in assessing maintenance schemes relies on the relationship between recorded collisions, particularly those involving skidding in wet conditions, and pavement condition information such as low SCRIM and low texture depth.

4.3.4 Area Safety Action Plans

From 2007 all HA Areas prepared Area Safety Action Plans (ASAP). The purpose of an ASAP is to give a coordinated and synergistic approach to road safety across an Area's trunk road and motorway network. The ASAP is drawn up using interdisciplinary help from within the HA/MAC and from external partner organisations such as the police, local authorities, neighbouring HA Areas, road user groups and regional bodies.

Example: Prioritising Safety and Streamlining Delivery in HA Area 7

A Scheme Identification Study (SIS) carried out by AMScott, the Area 7 MAC, at A52(T) Bardill's Roundabout near Nottingham investigated options for improving safety, capacity and accessibility in line with HA priorities. The SIS identified both safety and economy options. The economy improvements were more complex and needed a longer time frame to access the much higher level of funding so it was agreed to progress the safety measures as a stand alone scheme. This was subject to the scheme obtaining a good CVM score, based on the safety scheme having at least one year's life prior to the changes wrought by the economy scheme. Careful consideration was given to:

- The casualty savings early construction of the safety scheme would bring.
- Minimising abortive work between the two schemes.
- Minimising disruption by using off-peak and night time lane closures and combining with urgent maintenance work at this location.
- Using resurfacing techniques designed to reduce traffic management costs and minimise disruption to road users.
- Negative PR incurred by appearing to implement an improvement only a year or so before other works.

In order to obtain a good score the PAR required robust justification based on the number and severity of collisions, and the number of collisions predicted to be saved during the first year (4.3 injury collisions, or about a third of the annual total) based on experience of using similar measures at other locations.

4.4 Strategic Road Network Safety Funding: Scottish Executive

In Scotland, trunk road and motorway road safety funding is co-ordinated by Transport Scotland (TS), both centrally and through four Operating Company (OC) units. This takes four forms:

- Major projects identified through the Strategic Roads Review and multimodal studies. These are given individual 'whole life' cost benefit analyses, with funding allocated to the most robust.
- Smaller improvements led by TS and the four OCs. These can be identified via the basic systems described in Element Three: Systems, although typically they tend to come from route studies, and from local representation. The proposals are subject to a generic scheme appraisal process to ensure value for money. Proposals targeting casualty reduction are included in this category.
- Maintenance schemes provided under the TS obligation to maintain the network in a safe and serviceable condition with minimum 'whole life' cost.
- The Traffic Scotland branch of TS develops, operates and maintains a national driver information system. Giving drivers real-time information to make intelligent route choices promotes safety through reduced frustration and improved journey times.

Local authorities in Scotland receive funding directly from the Scottish Executive (SE) for use of transport initiatives, including road safety. These funds are not ring-fenced and form part of a block allocation to cover the cost of a range of services. The SE has also provided ring-fenced funding to local authorities for 20 mph Zones, Safer Routes to School projects, Home Zones, cycling, walking and Safer Streets projects. For their part local authorities have been tasked with developing Local Transport Strategies which include road safety elements.

4.5 Strategic Road Network Safety Funding: Welsh Assembly

The Welsh Assembly Government is the Highway Authority for 1,709 kilometres of motorway and trunk road in Wales, with responsibility for safety engineering and highway maintenance solutions. Since 2000 the Welsh Assembly Government has funded Local Trunk Road Safety Schemes.

Local road safety is funded in Wales through a variety of channels.

- Local authorities each year receive non-hypothecated grants direct from the Welsh Assembly Government that can be used for any purpose in delivering their services. This can include road safety improvement schemes.
- Since 1999 the Welsh Assembly Government have provided Transport Grant funding to local authorities to undertake Safer Routes to School schemes, many of which have been effective in reducing casualties around schools.
- Since 2000 Welsh local authorities have received direct funding in the form of a Local Road Safety Grant that is used to address local safety problems.

4.6 Strategic Road Network Safety Funding: Northern Ireland

As the Unitary Road Authority in Northern Ireland (NI), the Roads Service is responsible for the funding of engineering measures to address road safety issues and ensures that all roads expenditure has a positive impact on road safety. The Roads Service does this in three ways:

4.6.1 Major Schemes

These are appraised under the five UK criteria; Environment, Safety, Economy, Accessibility and Integration to ensure that they represent the best solution in environmental and sustainability terms. They are subjected to cost/benefit analysis as part of an economic appraisal; only robust schemes go forward.

4.6.2 Local Transport and Safety Measures

The budget in this category is allocated to Divisions on the basis of a number of weighted indicators which include collision history and is targeted at:

- Pedestrians.
- Cycling.
- Buses.
- Collision remedial works.
- Traffic calming.
- Safer Routes to School.

4.6.3 Maintenance

In maintaining the network the Roads Service has a duty under Article 8 of the Roads (NI) Order 1993 and activities which improve the condition, skidding resistance, structure and profile of roads and footways all help improve road safety.

Maintenance schemes on motorways and trunk roads are identified from pavement condition information, traffic flow information and visual inspections.

On other roads the roads maintenance budget is allocated across the four Roads Service Divisions on the basis of need, using a range of weighted indicators tailored to each maintenance activity.

4.7 Strategic Road Network Safety Funding: Transport for London

Transport for London was set up in July 2000 as the new central body for managing the road network and delivering the Mayor's Transport Strategy. A London Road Safety Plan (LRSP) was published in November 2001 that spelt out a clear road safety strategy, along with casualty reduction targets and an investment plan to enable delivery of the targets. The LRSP also contained guidance as to how casualties were to be reduced, including forming partnerships and working together.

4.7.1 Road Safety Budgets in London

Road safety funding is more than £42M (2006 level) a year in London, of which about £30M is allocated to London boroughs and the rest spent centrally. The allocation is part of Transport for London's (TfL's) annual business plan, which is part of the Mayor's budget and is approved by the London Assembly. TfL budgets now contain an element provided from borrowing, as well as from central government as part of the regular Spending Review. TfL has five-year budgets, which encourage longer-term planning and give assurance for planning larger schemes.

4.7.2 London Road Safety Unit (LRSU)

The LRSU maintain and manage the ACCSTATS casualty database, which is used for the annual in-depth analysis of collisions and casualties in London. This analysis is the foundation stone for the programme, providing high-risk site identification and helping focus on road safety interventions that give value for money. An automatic monitoring process reports the casualty before/after analysis automatically every month. This is very useful in checking schemes are working as expected. There is also an important monitoring and research programme that ensures an in-depth understanding of the road safety problems in London.

4.7.3 Road Safety in the Boroughs

The £30M for borough road safety schemes was allocated via a Borough Spending Plan until 2006; this was changed to Local Implementation Plans (LIPs). The principles are very similar, however, as the boroughs bid for money from TfL for road safety schemes in their areas. These schemes are often engineering-based, but can also be for local ETP interventions. These can even be linked to specific local demographic groups. Many of these schemes span more than one year and borough projects are often split into design and build stages. Schemes are selected on the basis of casualty reduction potential.

4.7.4 Road Safety on the Main Routes

The remaining road safety budget is spent centrally by TfL on the Transport for London Road Network (TLRN), which is managed directly by TfL, and on pan-London ETP initiatives. The TLRN carries the majority of the traffic in the capital, so there are a number of high-risk sites with large numbers of casualties. TLRN sites and route lengths are reviewed every year and compared to the average for central, inner and outer London. Sites above the average are identified for potential treatment.

Delivering ETP initiatives that cover the whole of London has proved to be very effective. Budgets are sufficient to allow campaigns to be designed specifically for London and its casualty problems, and can include high exposure through cinemas and broadcast media.

Example: 'Look Don't See' campaign

Two-wheeled motor vehicle (TWMV) collisions are a major problem in London and have been rising steadily since 1997. They are the only casualty target where London was above the baseline in 2000. This is mainly due to a large increase in the number of TWMV trips made in the capital. TWMV collisions are difficult to treat directly with engineering measures, so ETP campaigns are the main intervention. An in-depth TWMV casualty study was undertaken to identify the main collision causation factors, and an advert produced that used 'invisible' vehicles to make the point that drivers do not always see the motorcycle. This was very well received and won several awards. It was also instrumental in TfL being awarded the Prince Michael Award for Road Safety for TWMV in 2004.

4.7.5 Child Casualties in London

Child safety is a high priority for the Mayor and great strides have been made in reducing collisions involving young people. TfL's strategy is to keep them aware of road safety dangers from the cradle to the grave. This starts when they approach three years old and they then have access to the 'Children's Traffic Club' booklets and information, completely free of charge. This is followed at age seven with the 'A-Z Tales' delivered in schools, which wraps road safety around citizenship. This is followed at age 11 with theatre in school, and later with 'teens' campaigns, such as the successful 'don't die before you've lived' campaign.

Example: Children's Traffic Club

Children's Traffic Club (CTC) has proven to be effective in European countries including the UK. The research indicates that children who have been through CTC are 20% less likely to be involved in collisions as a child and young adult. In 2003 TfL launched CTC in London and the materials are provided free of charge to all three-year-olds. By 2005 child casualties in London had fallen by 62% from the 1994-1998 baseline, well in excess of the national 50% reduction target to be achieved by 2010.

4.7.6 Reaching Targets

London has been successful in reducing casualties in the new millennium. By 2005, killed and seriously injured casualties had fallen 45% from the 1994-1998 baseline, well below the 40% national target to be achieved by 2010. The positive factors for London have been

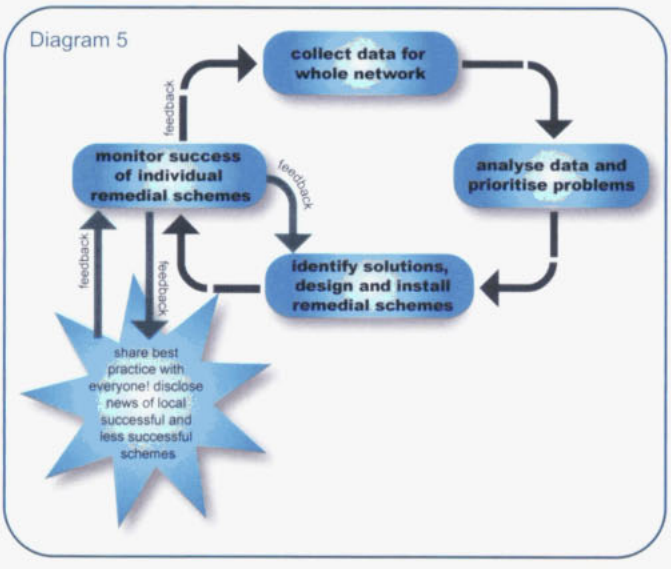
- The excellent London Road Safety Plan and a clear strategy.
- High levels of investment, with budgets through to 2010.
- Road safety engineering interventions based on collision analysis.
- Centralised activities that give pan-London benefits.
- Borough schemes that are relevant to the local situation.

Element Five: Monitoring

5.1 Why Monitor?

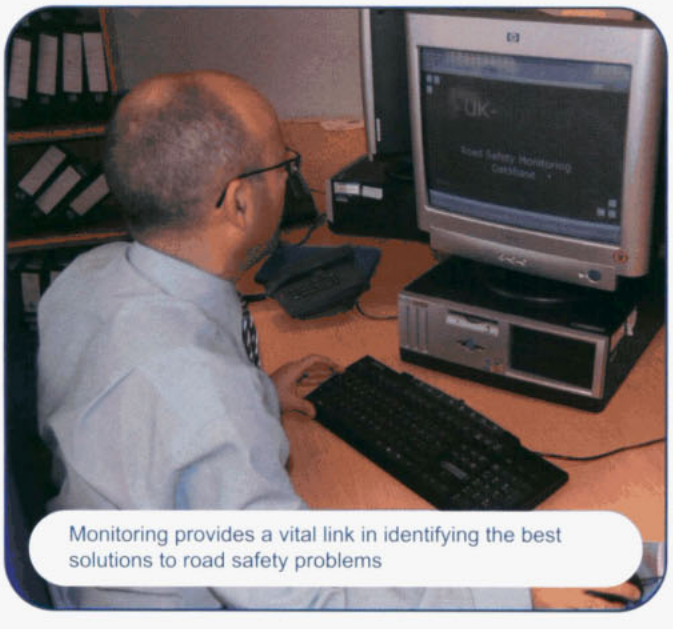
The safety cycle of monitoring and feedback as shown here

Diagram 5



is fundamental to good safety management. Without knowing which parts of the network are performing badly, or what types of collision problems are occurring over the whole network it is difficult to:

- Make sound decisions on how best to solve problems.
- Best spend the available resources.
- Answer questions on network performance.
- Justify strategies, priorities and actions.
- Judge how effective new ideas are.
- Compare the effectiveness of different measures.
- Identify emerging problems, particularly resulting from a new scheme.
- Review strategies, priorities and actions.
- Share good practice with other organisations.



Monitoring provides a vital link in identifying the best solutions to road safety problems

The following sections give some guidance on what to monitor and how to monitor and provide feedback. There is also advice on monitoring multidisciplinary or partnership projects and monitoring road safety education, training and publicity (ETP). A list of useful references is given at the end.

5.2 What to Monitor?

There are two levels of monitoring that need to be carried out in parallel: monitoring the performance of the whole network and monitoring individual elements of that network that have recently been, or are planned to be, subject to change, perhaps through a road safety engineering intervention. The results of monitoring should be fed back into the safety cycle to:

- Review and adjust local investigatory levels.
- Identify the most effective interventions for the future.
- Justify expenditure, refine budget splits and bid for future funding.
- Identify where improvements in scheme performance may be made.
- Share good and bad practice outside the local network.

Monitoring should be a near-continuous process, as databases are updated and road schemes mature to the point where sufficient 'after' data has been gathered to make a meaningful assessment of road safety performance.

5.2.1 The Whole Network

The use of various types of data to monitor the road safety performance of a network is described in some detail in Element One: Data. Methods of putting that data to use are described in Element Three: Systems.

5.2.2 Individual Schemes

It is the detailed monitoring and feedback parts of the safety cycle that can be most tempting for local authorities to neglect. One argument often voiced against monitoring is that 'the money is better spent treating more roads'. While a balance does need to be reached on how best to spend budgets, it is most important to identify:

- Any schemes that make matters worse.
- What makes successful and cost-effective schemes.
- Long-term performance of schemes.

It is important to note that this information is needed for both road safety interventions and other types of road scheme.

Collision records should be examined for every scheme, perhaps as part of the preparation for an annual safety report or a Stage 4 Road Safety Audit. It is recommended that some level of speed monitoring

be undertaken for every safety scheme. The level of monitoring should increase for schemes incorporating new, untried elements, and for intricate or large schemes.

Better monitoring is being encouraged through incentives and improved systems, databases, information and advice. Resources are shared among those who can provide the best evidence of need and cost-benefits and, increasingly, financial providers demand proof that the money has been well spent before further funding is made available. In some cases, monitoring is now a contractual part of a consultant's project brief with penalties if the level and quality of monitoring undertaken is unsatisfactory.

The essence of monitoring individual schemes is to find out how road user behaviour changes after implementation, with particular reference to the effects of behavioural changes on collision and casualty numbers.

5.2.3 Statistical Testing

Collision numbers for individual schemes may be quite low and variable, and the rare and random nature of road collisions can lead to quite large fluctuations in frequencies occurring on a section of road from year to year, even though there has been no change in the underlying collision rate. A useful rule of thumb is that the fact that there have been N collisions there, however precise and poignant that may be for those affected by them can, in the context of thinking about the future, be interpreted no more precisely than to say that the chances are that the true average for a similar period lies between $(N - \sqrt{N})$ and $(N + \sqrt{N})$.

This means that it may be many years before any reductions resulting from a single scheme can be proved, but firm indications can be obtained sooner than this by combining data from a number of schemes of generally similar kinds carried out over a period of years.

It is recommended that at least three and if practicable five years of 'before' data should be available for each scheme and corresponding 'after' data should be assembled for a similar period. Even so, monitoring can begin within months of completion – indeed it should do so in order to pick up any unforeseen increase in collision occurrence. Any increase should be investigated, even though it could have arisen by chance, in case it reveals a need for corrective action. It is important to remember that under-reporting and misreporting mean that the recorded collision data for a given location is a sample of the true collision problem.

Statistical analysis is used to assess whether changes are likely to have occurred by chance and to place confidence intervals on estimates of the effects of interventions[32]:

- The chi-squared test can be used to test the significance of differences between observed numbers of collisions and numbers that would have been expected if a scheme had not been implemented.
- Log-linear modelling[33] can not only carry out the chi-squared test or its equivalent, but also estimate the percentage reduction achieved and its confidence interval whilst allowing for factors such as trend and seasonal variation and taking account of different periods for which data is available for different schemes.
- The Tanner k test enables some of what log-linear modelling offers to be achieved by hand calculation.
- Linear regression also enables some of what log-linear modelling offers to be achieved by hand calculation, for example in estimating trends and relating numbers of collisions to amounts of traffic at different sites.

Increasing levels of monitoring make it increasingly advisable for road safety teams to procure basic skills in log-linear modelling using one of the available software packages.

Effects on numbers of collisions should be expressed in terms of the change, or percentage change, in collision numbers 'after' compared with the numbers that would have been expected if a scheme had not been implemented. For practical purposes, this expected number can often be taken as the number in an equal 'before' period, perhaps simply adjusted for trend or for exceptional changes in traffic. For innovative schemes or others of particular interest, a control group of sites where no change has been made may be used to estimate the expected numbers.

One circumstance in which the need for further adjustment of the expected numbers arises is where sites have been selected for treatment on the basis of their relatively large recent collision numbers, and the only available 'before' data includes the period on which the selection has been based. In such cases, the expected numbers should if practicable be adjusted for the 'regression to the mean' (RTM) phenomenon. This is because a section of road with a very high collision frequency one year is likely to have a lower collision frequency the next year, whether it has been treated or not.

The statistical technique for adjusting for RTM is well established and is known as the Empirical Bayes Method. To apply the technique, 'before' collision data is required for a number of sites which would be candidates for implementation of schemes like the one being monitored, but are representative of the distribution of 'before' collision numbers at such sites (as distinct from the treated sites, which have been chosen for their atypically high numbers of collisions). This is easier said than done, because identifying such a representative set of sites or otherwise estimating the

[32] Rees D G (2001) Essential Statistics - fourth edition. London: Chapman and Hall/CRC
[33] Agresti A (1996) An introduction to categorical data analysis. Chichester: John Wiley

distribution of their collision numbers is at best time-consuming and to some extent subjective, and at worst really difficult. Inclusion of sites that would not be seen as candidates for the treatment concerned even if they had enough collisions can lead to overestimation of adjustment for RTM.

For these reasons, it may not be practicable to adjust reliably for RTM in every case where it would be desirable in principle to do so. Where adjustment is judged impracticable, it should be recognised that some overestimation of the effect of the schemes is most likely to result. This can be minimised by using the longest practicable periods of 'before' data, including if possible periods preceding and following the period covered by the data used in choosing the sites for treatment.

Whether or not measuring changes in collision numbers is possible, behavioural changes can be monitored in the short term as likely proxies for changes in collisions in the long term. Some of the most direct observable proxies are provided by conflict studies, in which near-collision situations that arise many times more frequently than, but in proportion to, 'actual' collisions can be counted in meaningful numbers in affordable periods of observation. Diversion of traffic to alternative routes and relocation of crossing by pedestrians or risky manoeuvres like right turns can also be readily observed and related to changes in risk.

There is a now well proven correlation between speed and collision risk and between speed variability and collision risk on urban roads[34], so if a scheme achieves reductions in vehicle speeds or reduces speed variability on urban roads, one might reasonably expect collisions to be reduced also. Consequently, important traffic parameters to be investigated for most schemes will usually be vehicle speeds and traffic flow. Changes in speeds are a measure of a change in behaviour, indicating that drivers have reacted directly to the measures in a quantifiable way. A measure of the effect of the scheme on speeds is usually obtained by automatic or manual spot speed measurements but is sometimes assessed by measuring changes in journey times. The most common statistical test used to test for significant changes in the distributions of vehicle speeds is the t-test[35] and the confidence intervals of observed changes can be readily estimated.

Particularly for an innovative road scheme it is important to assess other aspects and other measures of behavioural changes that may be monitored. These might include:

- Changes in traffic composition and volume.
- Vehicle manoeuvres.
- Vehicle headways.
- Compliance with traffic control devices.
- Pedestrian crossing patterns.
- Changes in the quantity and nature of street furniture collision damage.

These behavioural variables do not give a direct measure of the magnitude of safety improvement since their precise relation to injury collisions is uncertain. Despite this drawback, objective measurements can be worthwhile since they can give an indication of any potential changes in safety.

Aside from monitoring actual changes in safety it is also important to monitor the perceived effects of a road scheme. The aesthetics of a scheme are extremely subjective. They are also likely to be very scheme dependent in that a particular measure in one location may be generally welcomed, whereas the same measure might cause disquiet in a more environmentally-sensitive area. There may be a conflict of interest as drivers need clear, bold measures, which catch their attention, whilst most residents are likely to prefer features which blend harmoniously with the local environment.

Some non-safety monitoring may also be desirable, especially for innovative schemes – for example to determine any changes in noise, emissions etc.

5.3 How to Monitor?

There is no one prescribed method of analysis; it should be data led. It is best to look at the collision 'picture' from as many angles as possible and a pattern is likely to evolve. There is a lot of published advice regarding analytical and statistical methods, some of which can be found at the end of this section. It is also useful to introduce some consistency into the monitoring process to allow comparison between the results for different years and between different treatments. If the results from several schemes of a similar type can be amalgamated then the evidence of effectiveness will be much more robust.

5.3.1 The Whole Network

Overall monitoring of a network should be undertaken at regular intervals and at least on an annual basis, as discussed in Element One: Data. Trends should be assessed by comparing the state of the network over periods of equal length and any recurrent problem types or locations identified. It will not usually be possible to attribute changes to specific events or actions. Changes in the collision record of a network will be due to a combination of factors: local changes (such as new road layouts or ETP programmes) and wider changes (such as new laws or national safety campaigns). A local road engineering scheme may not only change the behaviour of drivers at the scheme but also change their behaviour when driving elsewhere.

Collision frequencies at single locations will be small and subject to random variation from year to year. Therefore, it is generally advisable to consider five-year rolling average collision frequencies for trend or 'before and after' analyses – for example, compare the average

[34] Taylor, Lynam and Baruya (TRL 2000); Taylor, Baruya and Kennedy (TRL 2002)
[35] Rees D G (2001) Essential Statistics - fourth edition. London: Chapman and Hall/CRC

number of collisions for last few years with that for the previous five year period.

5.3.2 Individual Schemes

The monitoring studies for measuring the effects of safety schemes are usually by 'before and after' analysis of factors that are likely to have a bearing on the safety of road users at the particular treated site. An element of this approach is to compare treated road sections with similar untreated (or 'control') locations, but there can be real practical difficulties of finding untreated roads that are sufficiently similar and that will not be affected by treated sites.

In 'before and after' analyses, 'before' measurements should be completed as close as possible to the time when the scheme is implemented. 'After' measurements should commence one month after work is completed. It is often desirable to take several sets of 'after' measurements, at various time intervals after the scheme is introduced, to investigate the extent to which any initial effect is sustained and to allow for seasonal variations. It is most desirable to have a 'control' in situations where outside influences are thought to have affected the treated road sections - for example, when a major external change occurs at the same time as the implementation of the scheme, or during the monitoring period. An example of such a change might be a far-reaching national change like the seat belt law, or a sudden sharp increase in the price of fuel. If something like this happens in the 'after' period, then finding an appropriate 'control' becomes important, or direct 'before and after' comparisons will be misleading.

It is desirable to consider 'before', and where possible, 'after' periods of at least three years. It is still likely for small schemes that any change will be indicative only and not be statistically significant, but it will give an indication of any success and can help to provide a robust case if combined with the results from other similar schemes. In addition to monitoring overall collision frequencies, the types of collisions should be examined to ensure that the targeted types have reduced and that other problems have not been created. It is also prudent to check the surrounding network to ensure that traffic, and collisions, have not simply migrated from the treated roads.

Example: Transport for London's Traffic Accident Diary System (TADS)

TADS is a tool linked to the Greater London road traffic accident database to enable monitoring of accidents before and after the implementation of safety schemes. Details of the scheme such as name, location, cost, implementation dates and remedial measures are input; 'before and after' collision and casualty monitoring reports can then be automatically generated as more 'after' data becomes available.

The reports give an overview of collisions or casualties month by month, thereby providing confidence that the scheme is meeting its objectives, or highlighting the need for a more detailed accident analysis and possible early intervention if numbers are found to increase.

Accident comparisons are made between each month following implementation and the same calendar month most recently preceding implementation. This is done to eliminate the effect of any seasonal variation. The actual implementation period is also excluded from the study to eliminate any unusual circumstances related to the period of work.

5.3.3 Stage 4 Road Safety Audit (RSA)

Until 2003 the compulsion to monitor the safety performance of road schemes existed only in that the Department for Transport (DfT) require the performance of safety schemes to be reported via Local Transport Plan (LTP) progress reporting and the Highways Agency (HA) required schemes paid for from safety funds to be subject to the road safety element of the Continuous Value Management process. These two frameworks were supplemented by the introduction of a fourth stage in the RSA process, described in the updated standard[36]. This requires a safety performance review for all road schemes after construction, at the point where 12 months and 36 months of post-construction collision data have been collected. As with other parts of the Design Manual for Roads and Bridges (DMRB), this standard is mandatory for trunk roads and motorways, but only advisory for local authority roads. Given the widespread acceptance of RSA in local authorities, it is hard to see any strong resistance to implementing RSA Stage 4, despite the logistical and financial difficulties that may be involved.

Fragmentary or inconsistent application of RSA carries the threat of legal vulnerability, as discussed in Element Three: Systems. Implementation of a consistent and managed monitoring framework that satisfies the needs of RSA Stage 4 effectively 'kills two birds with one stone'; it provides a strong basis for a monitoring framework that will meet the needs of the local authority, while helping to comply with the revised RSA standard.

[36] HD19/03 Road Safety Audit DMRB Vol 5 Sec 2 (DfT 2003)

5.3.4 Speed

It is recommended that some level of speed monitoring be considered for every safety scheme. The quantity and complexity of monitoring should increase for schemes incorporating new untried elements, and for intricate or large schemes.

Changes in 85th percentile speeds have traditionally been used for speed assessment, although revised guidance on setting speed limits focuses on the mean speed. Equipment that records individual vehicle speeds also offers the potential for more detailed speed distribution parameters to be accurately determined which may be particularly useful in the assessment of more innovative schemes. The positions within each scheme at which speeds should be measured can only be determined for a particular scheme. Ideally measurements would be made (in both directions) at:

- Each entry to a scheme.
- At any spots where collisions tended to occur.
- In the vicinity of each individual measure or element of the scheme.

The spots at which speed measurements are made must be chosen carefully to avoid unwanted variability; for example on the approach to a measure but not in close proximity to other speed influencing features, such as pedestrian crossings or junctions. Be careful about the times of speed measurements; low peak hour speeds may mask an off-peak speeding problem.

Flow and speed monitoring points must be chosen with care

Other types of monitoring are advised, particularly for large schemes, innovative schemes, and any scheme which will significantly affect the lives of road users, businesses, or residents.

The easiest way to monitor perceived effects is through opinion surveys and other consultation tools, described in Element Three: Systems. The survey sample should be chosen with care to be as representative as possible and to provide enough data to be able to test the statistical significance of the results. It should be remembered that those who have strong feelings are the most likely to respond to a postal survey, and their views may not be representative of the views of the majority. Surveys need to be well designed, remembering what information is required from the results. It is good practice to carry out a small pilot survey to identify any problems with the design when the survey can be modified easily.

Consultation tools can also be used to monitor the perceived effects of improvements

Example: Liverpool City Council Monitoring 1

The 'Outline Project Brief' used to specify work projects in the Liverpool City Council-20/20 Liverpool-ELL partnership contains a section on predicted collision/casualty savings.

All outline project briefs give details of the collision record for the previous 3 year period and the predicted collision savings that the proposed scheme is likely to generate. The brief also details which LTP targets the scheme will contribute towards. This information is used in reporting performance in the LTP Annual Progress Report and also for completing the DfT's annual Investment Monitoring Return.

There is also 'before' and 'after' monitoring of all engineering schemes in terms of:

- Collisions.
- Traffic speeds.
- Traffic volumes including through traffic.

Neighbourhood Renewal Fund Engineering Schemes

A condition of NRF funding for engineering schemes is that monitoring is undertaken and reported on a quarterly basis. The monitoring is against a number of categories:

- Project milestones.
- Project outputs.
- Expenditure.
- Project beneficiaries.
- Ward/priority neighbourhoods.
- Gender.
- Ethnicity.
- Age.
- Disability.

5.3.5 Monitoring of Road Safety Education Training & Publicity (ETP)

Monitoring the effectiveness of road safety ETP has often been described as 'too difficult', sometimes resulting in little effort being made to collect reliable data on what works and what does not, and too much reliance on subjective judgement by practitioners.

The most effective way to monitor road safety ETP is to create partnerships and use their own monitoring systems to gather the data required. This is not only time efficient but will comply with organisations' own quality assurance systems.

Successful partnerships are created through identifying the outputs/targets for the partnership organisations and then developing a road safety initiative that benefits the organisations by helping them to achieve their outputs or targets.

Monitoring of Driver Improvement and Speed Awareness programmes might elicit subjective and objective monitoring data:

- Subjective feedback data from participants.
- Objective data on reoffending rates.

Example: Liverpool City Council Monitoring 2

Further Education Colleges receive funding from the Learning and Skills Council for the number of students enrolled and retained and their achievement levels. If a road safety course can be developed which matches the learning outcomes of a particular course such as AutoCAD visualisation techniques, colleges will be willing to deliver the training, monitor it and evaluate it. They will also collate data on the learners' profiles from their management information system (MIS) and track progression.

The following list provides examples of ways in which Liverpool City Council's Road Safety Team have monitored projects in 2006.

The information gathered is both qualitative and quantitative:

- College MIS data which provides a learner profile using such information as name/date of birth/address/gender/ethnicity/post code/employment status/attendance/retention/achievement/progression data matched against initial assessment data.
- Minutes from Road Safety Committee meetings.
- Attendance lists and evaluations from training sessions and events.
- Photographic evidence.
- Monitoring of projects through schools' pupil achievement data such as SATs.
- Content of schools' bids for road safety initiatives.
- Identification of road safety hazards in maps and films.
- Schools' schemes of work.
- Completed questionnaires (teachers/pupils/parents/residents) after road safety solutions implemented.
- Including a 'comments box' on parental responses to school consent letters.
- Learning outcomes from accredited courses.
- Evidence from learners' files.
- Students' multimedia presentations outlining road safety solutions.
- Consultation with teachers and other education professionals.
- Target audience's registration for CDs on a website to include post code, ethnicity, employment status, gender and so on.
- Referral interviews from Connexions/Youth Offending Team.
- SKAT analysis (skills and attitude surveys).
- Registers of children and trainers.
- Baseline assessments of pupils' road safety knowledge.
- Quizdom[37] results.

[37] Quizdom is an interactive educational tool using handheld infrared technology.

Qualitative monitoring can come from a wide range of stakeholders

5.4 Feedback

Safety strategies need to be data led to introduce an objective and consistent approach. Strategies should be regularly reassessed and will require adjustment as the results of monitoring indicate the most effective approaches to solving problems. It is important that results in one area can be compared and considered in combination with those from other areas. It is imperative to use appropriate and good quality data to allow sound and objective assessments to be made.

Feedback should be internal within the department containing the road safety function and between other departments; and external between stakeholders and partnerships. Results should be published where appropriate and shared with other bodies, for example to contribute to a national database.

Early results are often very encouraging, but most innovative measures suffer from a novelty effect, which reduces with time. It is therefore important not to rush to stakeholders with these early results, as they are unlikely to be sustained. Ideally, wait for the twelve months 'after' measurements to be analysed, before announcing results.

5.5 Data, Information and Advice

Useful sources of data, advice on how to collect good data, and methodologies for data analysis include:

- Various DfT information, data and publications many of which are available free of charge from the DfT website at www.dft.gov.uk - in particular:
  - 'Road Casualties Great Britain' (published annually).
  - 'Transport Statistics for Great Britain' (published annually).
  - 'A Road Safety Good Practice Guide' (2001, 2006).
  - 'Urban Safety Management Guidelines' (2003).
  - 'Traffic in Great Britain' (published quarterly).
  - STATS19 and STATS20 collision reporting forms and guidance.
  - 'Full Guidance on Local Transport Plans: Second Edition' (2004).
  - 'Technical Guidance on Monitoring the LTP2 Mandatory Indicators' (2006).
  - Traffic Advisory Leaflets.
- Various HA trunk road information, data and publications many of which are available free of charge from the HA website at http://www.highways.gov.uk - in particular:
  - 'Operational Folder - Operational Guide to the Safety Strategic Plan'.
  - 'Route Management Strategy Guidance'.
- 'Guidelines for Rural Safety Management' (IHT, 1999).
- 'Road Safety Engineering Manual' Royal Society for the Prevention of Accidents (RoSPA, Birmingham).
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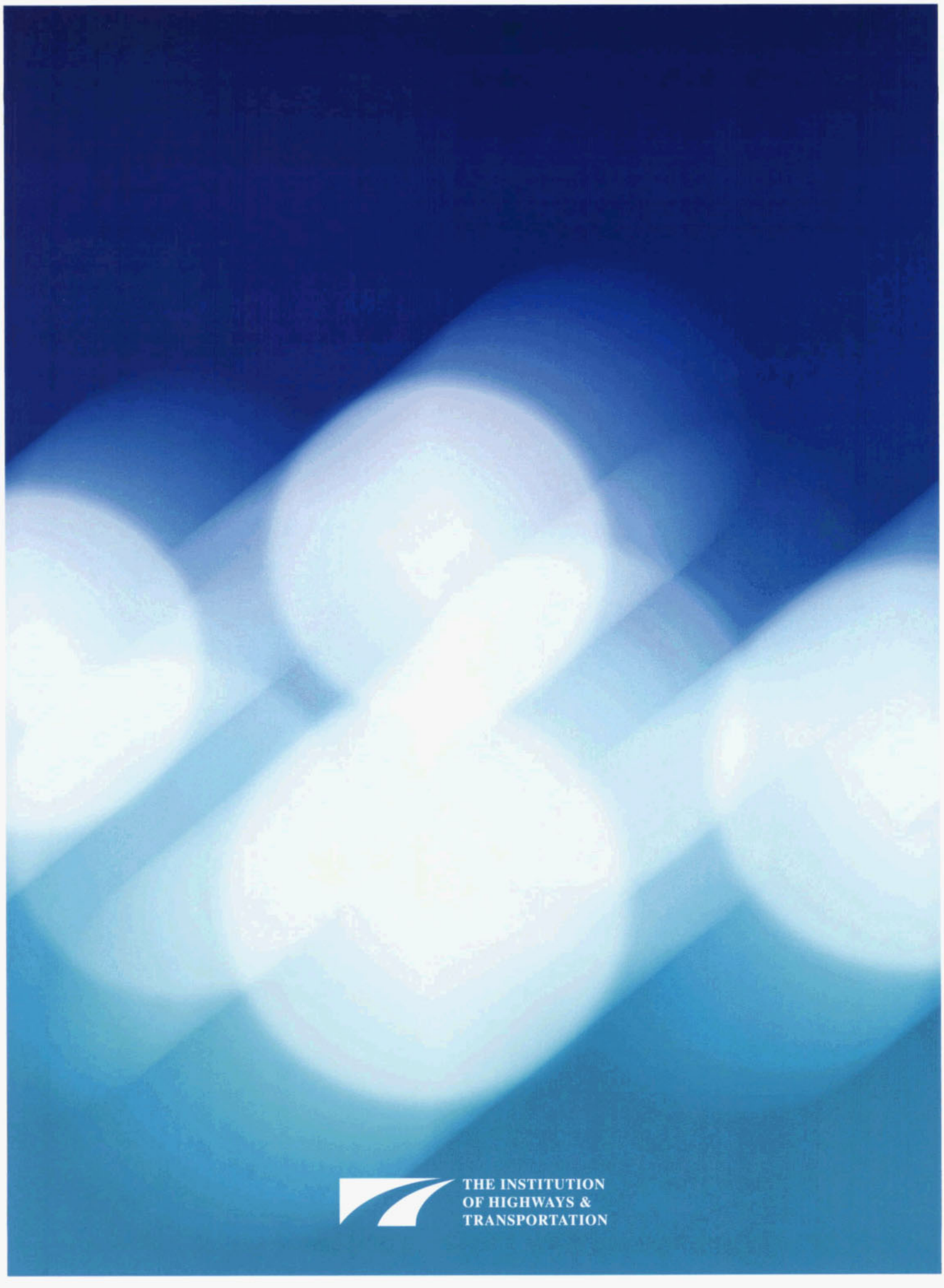

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