Department for Transport

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THE INSTITUTION OF HIGHWAYS & TRANSPORTATION

URBAN SAFETY MANAGEMENT GUIDELINES

Road Safety Strategies for Urban Communities

Although this report was commissioned by the Department, the findings and recommendations are those of the authors and do not necessarily represent the views of the DfT.

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Published by the Department for Transport.
Printed in the UK, September 2003 on material containing 75% post -consumer waste and 25% ECF pulp (cover) and 100% post-consumer waste (text).

Product code 03 TSRLM 01311/USM.

Contents

one What is Urban Safety Management?

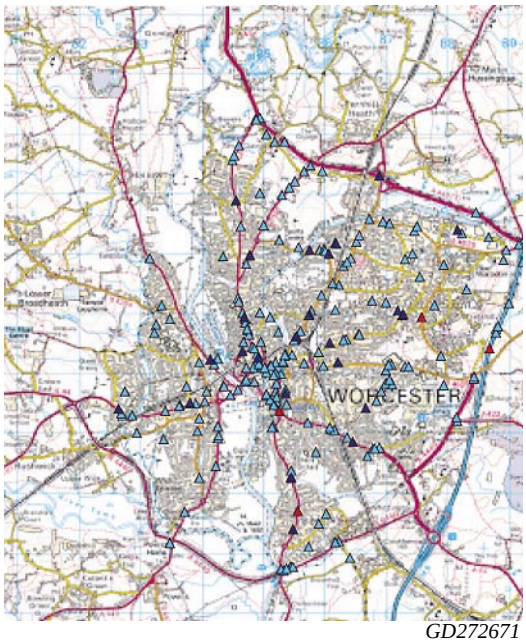
1.1 A vision for road safety

Traditionally, road safety in towns and cities has been approached on a piecemeal basis, tackling individual problems as they arise. But towns and cities do not work like this. Traffic and pedestrian movement is part of the essential way that a place lives. It affects the whole urban area. Urban Safety Management (USM) looks at whole communities and sets a vision and strategy for road safety management which becomes proactive rather than reactive. This USM approach has been shown to yield significant benefits in casualty reduction.

1.2 What does it mean?

- USM develops and implements a vision and a strategy for the traffic safety of the whole urban community.
- USM brings together many of the activities that can affect safety: road safety, traffic management, education, enforcement, and policies for transport and land use.
- USM is based on the expertise, knowledge and opinions of everyone concerned or affected - the public, the politicians and the practitioners.
- USM aims to reduce road accidents by encouraging everyone involved in managing an urban area to see safety as part of their role.
- The USM methodology, as set out in these guidelines, is based on bringing together all these policies under a strategy which will deliver reductions in death, injury and damage in traffic collisions.

Road accidents in urban areas often fall into one of two categories; they may be concentrated in high risk sites (‘accident cluster’ sites) or they may be ‘scattered' throughout an area (in this context closely linked accidents sites along a route or corridor are often considered as clusters of accidents). Measures and methods to deal with clustered accidents are well established and widely used; however, scattered accidents can pose more of a problem to road safety practitioners.



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The USM approach uses an area-wide and multi-disciplinary approach that considers safety in the whole area, to reduce the incidence of accidents of all kinds, including the scattered ones. USM involves many aspects of urban management: that is traffic safety, engineering and law enforcement, road engineering and maintenance, public transport, land use planning, economic development, environment, health, education and welfare. strategy for the traffic safety of the whole urban community.

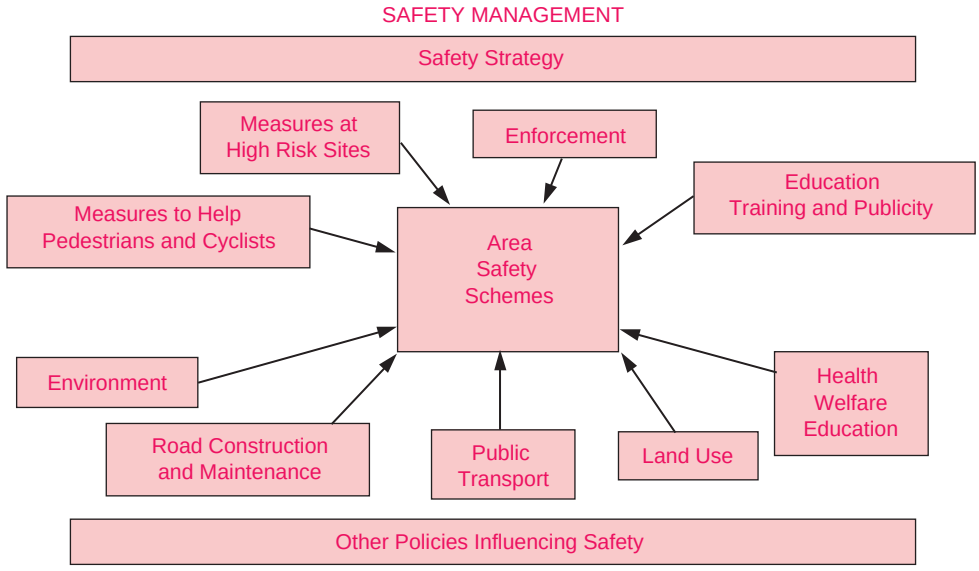


Figure 1. Elements of Urban Safety Management approach

1.3 The principles

USM defines the principles of a good safety management strategy as one which:

- formulates a safety strategy for the urban area as a whole;
- integrates safety with other urban strategies (e.g. 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 (e.g. improving safety within an urban regeneration project);
- encourages all professional groups to help to achieve safety objectives;
- guards against possible adverse safety affects of other policies;
- encourage residents and all road users to become actively involved in the process and thereby take ownership of it;
- translates the strategy and objectives into local area safety schemes;
- monitors progress towards the safety objectives.

1.4 Background

In 1990 the Institution of Highways and Transportation published the first guidelines on Urban Safety Management[1] based on research led by TRL in the 1980s. Since then experience and techniques used in the Urban Safety Management (USM) approach have been further developed. The EU project called DUMAS (Developing Urban Management and Safety) and the Department for Transport's Gloucester Safer City Demonstration Project showed USM in practice. This document brings together the current thinking on USM and provides new guidelines for its use, supplementing the advice given in the original guidelines. It is aimed at those whose job it is to decide policy on safety management in an urban area and at the appropriate elected representatives.

There are many elements in an urban safety strategy, as illustrated in Figure 1 taken from the DUMAS project research report[2]. It can be seen that bringing together the different bodies and the professional skills required is a significant management task.

[1]INSTITUTION OF HIGHWAYS AND TRANSPORTATION (1990) **Urban Safety Management Guidelines.** Institution of Highways and Transportation, London

[2]EUROPEAN COMMISSION (2001). **Dumas Final Report.** European Commission, Brussels

1.5 Why use USM?

The USM approach has been shown to reduce casualties in towns and cities by tackling accident problems on a broad front. The approach is relevant to all built-up areas in which drivers have substantial choice of route – from large villages or small country towns to the largest cities. For free-standing towns of up to at least 100,000 population, the approach can be applied to the urban area as a whole. In larger cities, it will usually be more practical to divide the urban area, by careful use of boundaries such as rivers and railway lines (but not usually roads as they can sever communities), into sub-areas each of which can be considered as a whole. The approach requires all interest groups to work closely together to raise the profile of traffic safety in town management and planning.

The OECD[3] recommends the USM approach for the following reasons:

- In urban communities, multiple objectives are set concerning the promotion of local activities and the movement of traffic, often under competing interests. In this context, road safety problems cannot be treated separately.
- Accidents are usually dispersed across an urban area. However this distribution is subject to fluctuation. Therefore, it would be inappropriate to design countermeasures for individual accident sites only.
- Safety measures are more effective if they form part of a comprehensive safety policy. To ensure maximum impact complementary measures of a policy should be identified and co-ordinated.
- Traffic safety may not be a leading priority issue for local policy makers or citizens. Therefore, as well as direct safety initiatives, there is a need for embedding safety measures in other policies.
- Integrated safety programmes help local authorities compile a complete picture of existing problems before defining priorities for action.

1.6 The ideal road hierarchy

Not all roads are the same. The aim of identifying a road hierarchy is to distinguish the role each road plays in the movement of vehicles, the movement of people on foot or in wheelchairs, and as part of the local urban

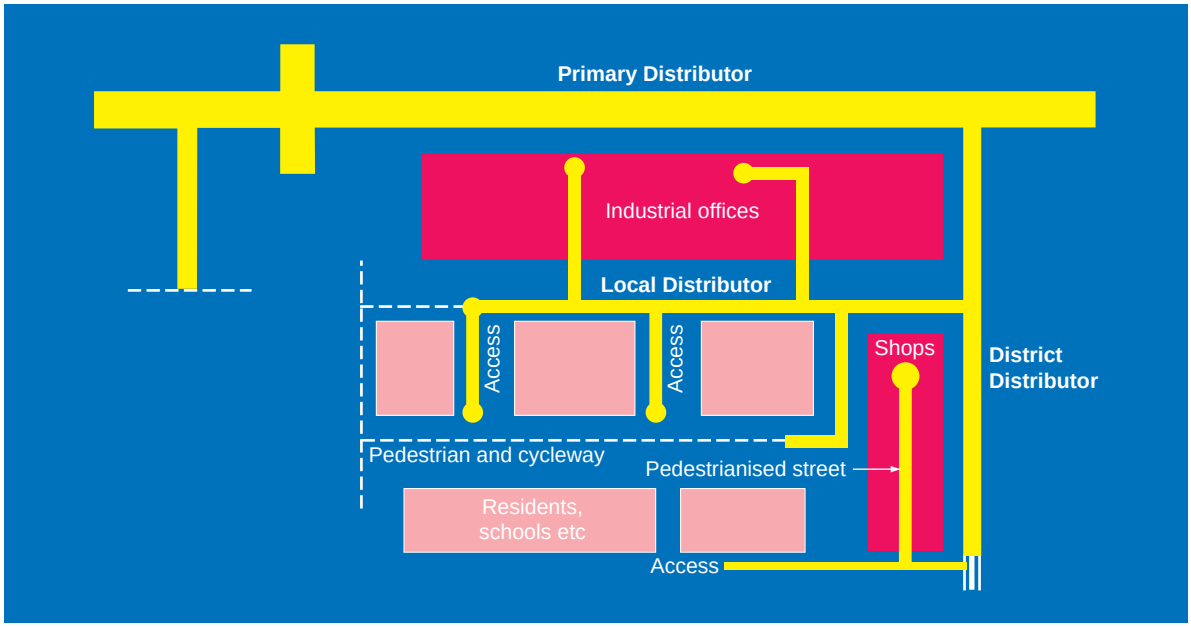


Figure 2. Ideal schematic hierarchy of urban roads

[3]OECD (1990) **Integrated traffic safety management in urban areas.** OECD, Paris

environment. One of the fundamental processes of USM is to define and establish a road hierarchy so that motor traffic can be concentrated onto the roads appropriate to its journey purpose. Improvement proposals, maintenance allocations and environmental standards all relate to the different tiers of the hierarchy, so that the character of each road is developed to best suit the functions that it has to fulfil.

The hierarchy described here represents an ideal which is very unlikely to exist in practice. But it is valuable to understand what the ideal represents when trying to establish a realistic hierarchy for an urban area.

In an ideal situation roads can be categorised into five tiers and complemented by additional routes for walking and cycling. However, in a real network, roads may not be identified with one tier and compromises have to be made. In particular, many urban roads form 'mixed priority routes' where several functions have to co-exist on the road and alongside the road. In deciding the functions of a road it is important to take into account the requirements of public transport users and the size and routes of public transport vehicles and the priority given to them. Figure 2 and the subsequent text describe an ideal hierarchy – see also Section 11.7 of Transport and the Urban Environment.[4] In doing so, the term pedestrian includes users of wheelchairs and aids to walking, blind and partially sighted people and those with prams, buggies, trolleys or luggage.

Primary Distributors: Ideally these roads should be used by through traffic, with no pedestrians or frontage access to properties. They are suitable to carry all forms of motorised transport. The standard of roads that will fit this category and the volumes of traffic carried are likely to vary considerably. If the design standard of such a road is low, significant benefits may result from improving it. They often form barriers severely limiting the places where pedestrians or cyclists can cross.

[4]INSTITUTION OF HIGHWAYS AND TRANSPORTATION (1997) **Transport and the Urban Environment.** Institution of Highways and Transportation, London

District Distributors: Ideally these roads are intended for more local traffic, linking the urban centre to the main industrial and suburban areas and the primary distributors. There should be minimum pedestrian activity, but measures for pedestrian safety may well be required.

Local Distributors: In an ideal hierarchy these roads are where vehicle journeys leave the immediate neighbourhood of their starting point or near their end. They are predominantly the more substantial roads running through residential areas, providing a link between access roads and the district distributors. There is provision for pedestrian movement, with pedestrian crossings to help people to cross the road. There will often be frontage access to homes and other buildings.

Access Roads: These roads are for access traffic, i.e. traffic requiring access to individual homes and businesses. They must also be designed to cater for those vehicles making regular collections and deliveries, for emergency vehicles and for pedestrians and cyclists, and to provide appropriate surroundings for the frontagers' homes and other premises. Where new roads are being built (e.g. when there are new housing developments) careful design can include speed management measures to improve pedestrian safety.

Pedestrian Streets: These are for pedestrians only, often with commercial properties lining the street, often high streets that have been pedestrianised. Cyclists may be allowed to use them. Some may be regarded as partial pedestrian streets since they may allow public transport vehicles including taxis, or allow access for some motor vehicles, perhaps at restricted times.

Ideally roads in each tier should link with roads of the same tier or one immediately above or below it in the hierarchy. This will give the driver a clear impression of changes in the road type and therefore an indication of the safe speed at which to travel. It will also help to avoid faster vehicles travelling directly from a primary distributor to an access road, causing potential safety concerns for pedestrians and cyclists.

Routes for Walking and Cycling

Access roads and the three tiers of distributors together provide routes for all journeys by motor vehicles in the area concerned. Corresponding provision for walking and cycling should begin by identifying the pattern of journeys that people in the area concerned would like to make on foot or cycle, and then adapt the road system to create a network of safe and attractive routes for them. It may be necessary to change the location of public transport stops. Personal safety as well as road safety needs to be taken into account in any proposals.

Such networks as a whole should achieve a high degree of connectivity and individual routes should be direct and uninterrupted in respect of the journeys that people would like to make. Routes will typically consist of a mixture of sections of footpath or cycle path separate from any carriageway, wholly pedestrian areas with or without admission of cyclists, footways or cycle tracks alongside carriageways, and carriageways or other surfaces shared with motor vehicles. Where routes cross appreciable flows of motor vehicles, careful attention should be given to the location and design of the crossing point. Where the routes are not separated from carriageways or where surfaces are shared with motor vehicles, the layout should moderate the speeds of the latter, so that motor traffic uses each road in ways that are consistent with the safety and convenience of pedestrians and cyclists.

This should result in as much as is practicable of the motor traffic travelling on distributors where pedestrians and cyclists can be separated from the motor traffic. Those whose routes cross the distributor can be provided with safe and convenient opportunities to do so, notwithstanding the possibly heavy flows of motor traffic. Routes for walking and cycling should follow local distributors, access roads,

pedestrian streets or separate footpaths or cycle paths to the greatest extent that is consistent with the objective that these routes should be direct enough to be attractive to their intended users.

The more the local distributors and access roads are used for walking and cycling, the more aware drivers will become of the likelihood of encountering pedestrians and cyclists, and thus reduce the risk that motor vehicles will pose to them. On public transport routes, whether on-street bus or light rail routes or services on segregated tracks, the stopping places should be served by the network of routes for walking and cycling.

1.7 Assessment of roads within the hierarchy

While the ideal hierarchy just described is a useful starting point, the real roads may not fall easily into these tiers. However, it is important to identify how the local network can most appropriately perform the functions required by the area. Discrepancies between the engineering characteristics of the roads and the functional road hierarchy are almost inevitable, but the starting point is to identify the functions currently being performed by each road. Diversity of activity on a road and discrepancies between its engineering characteristics and the mix of functions it is performing are often associated with unusually high levels of accident occurrence. This may be because of an initial unclear definition of function or because the road and its use have been allowed to develop without adequate management.

Where a road has more than one function it is important to ensure that particular attention is paid to pedestrian traffic and more priority given to pedestrian movements, especially around residential and shopping areas. It is imperative to establish at an early stage whether there are conflicts between the existing functional road hierarchy and local land use, and to establish priorities. A common problem is the barrier effect created by distributor roads. These may cut between residential areas and shops or schools, and may, therefore, have a requirement for significant pedestrian crossing movements.

It is important to recognise that roads are not just arteries for movement but are also used as public spaces and can have a significant effect on community activity and quality of life.

But traffic flows are an important consideration and should be taken into account, and should be studied in detail in establishing the ideal road hierarchy. In many towns main roads may serve multiple functions and there will be a need to balance very carefully the provision for heavy vehicle flows whilst catering for vulnerable road users who are currently at great risk.

Each road in the network needs to be examined in terms of its current function and its observed performance of that role. If there are problems on a route in terms of the level of traffic, traffic mix, poor accident history or environmental quality, there are really only two options to consider:

- Alter its role by transferring all or some of its functions to other roads;
- Retain its role, and introduce specific measures to improve its performance at the chosen level.

Local area schemes will be needed to modify the road network to achieve the overall objectives of safety whilst not inhibiting the movement of vehicles and people to any significant extent. In many cases this will inevitably take a long time but the existence of an overall strategy will assist in enabling the problems to be tackled in a logical order and in seizing every opportunity to make progress. Analysis of the issues (see section 3.5.1) will allow a set of objectives to be established for each section of major road or residential area, as illustrated in Figure 3.

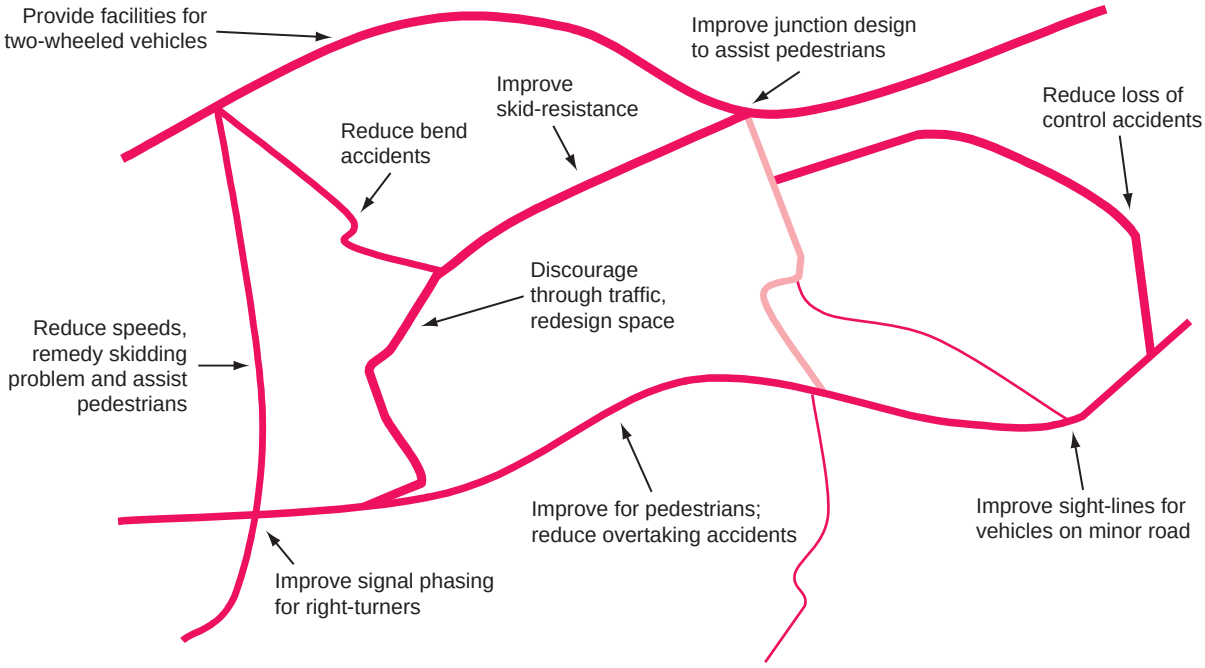


Figure 3. Typical objective setting for sections of a network

When first examined, the network may well contain some high risk sites or route sections where accidents cluster. It will usually be possible to treat these very cost-effectively at an early stage. But once cluster sites have been treated, other parts of the road network are unlikely to exhibit single dominant accident types for which there is obvious treatment.

The accidents will tend to be scattered and may result from a combination of factors including conflicting turning movements, speed differentials between motor vehicles and other traffic, pedestrians' need to cross roads, and arrangements for parking.

One direct consequence of this is that the safety objectives will normally differ in nature between levels in the hierarchy. Examples are:

Main Roads (Primary or District distributors): safer crossing points for pedestrians and cyclists; improve capacity to take vehicles away from local distributors; improve junctions.

Local Distributors: reduce through traffic, reduce speeds, protect and control parking; provide safer crossings for cyclists and pedestrians, provide cycle paths,

Access Roads: minimise motor vehicle movement except for access; keep speeds low.

The Research Background to USM two

Background

There has been much research on USM in the past and the method was shown to be successful[5] in a research project led by TRL which applied the USM methods in five towns in the UK. The project showed that the installation of low-cost measures of various kinds applied on an area-wide basis reduced injury accidents by an average of 13 per cent. By introducing traffic calming in residential areas, injury accidents may be reduced by more than 50 per cent, with greater reductions recorded for child accidents.[6] Following this research project, the IHT published the first USM guidelines,[7] and these were endorsed by the then Department of Transport (DoT) in a Traffic Advisory Leaflet.[8] In the light of this guidance, many Local Authorities began and have continued to carry out local area safety schemes in which the engineering aspects of USM have been implemented with considerable success in particular neighbourhoods and their surrounding main roads, but the strategic approach required to realise the full potential of USM for urban areas has not been broadly applied.

Gloucester Safer City

To demonstrate this full potential, the Gloucester Safer City Project was sponsored by the then DoT and ran from 1996 to 2001. The project was a demonstration of the application of the USM technique to a free standing city. The aim was to demonstrate to Highway Authorities that USM could substantially reduce road accidents and casualties if towns were treated using safety engineering in a strategic manner, with safety integrated into other town policies and activities. £5m was provided through the Local Roads Capital Settlement and the DoT invited Local Authorities to bid for this opportunity to carry out the demonstration project. The city of Gloucester was selected from 29 authorities who put in bids.

The safety aims of the project were to be achieved through traffic management measures, physical engineering measures, land use measures, enforcement and education training and publicity, using the USM methodology.

The project showed that by using this methodology it was possible to have a significant effect on the numbers of injury accidents in the city. They decreased overall by about 25%, and by 38% per cent in the areas which were treated with engineering measures.[9]

The project showed the value of an overall strategy and of appropriate management structures. The strategic approach was shown to be an effective tool, both in developing the measures and in offering justification for the way the project was implemented. The delivery of the project elements (both by engineering and via other routes such as education, training and publicity) was based on an overall strategy which helped the project team to maintain the initial impetus and to demonstrate that there were not going to be any ‘forgotten’ areas. Gloucester also showed that with enthusiasm and hard work it was possible to persuade residents and businesses in the city that safety was a high priority. ‘Branding’ the project and an on-going effort to inform residents of progress were key to maintaining the high profile of safety in the city.

A wide variety of well tried and innovative measures were used (see Appendix A).

[5] A M MACKIE H A WARD AND R T WALKER (1990). **Urban Safety Project 3. Overall evaluation of area-wide schemes.** Department of Transport TRRL Research Report RR 263. Transport and Road Research Laboratory, Crowthorne

[6] D C WEBSTER and A M MACKIE (1996). **Review of traffic calming schemes in 20mph zones.** Transport Research Laboratory Report 215, TRL, Crowthorne

[7] INSTITUTION OF HIGHWAYS AND TRANSPORTATION (1990) **Guidelines for Urban Safety Management.** Institution of Highways and Transportation, London

[8] DEPARTMENT OF TRANSPORT(1990). **Urban Safety Management Guidelines from IHT.** Department of Transport , London

[9] A M MACKIE and PAT WELLS (2003). **Gloucester Safer City – Final Report.** Transport Research Laboratory Report , TRL, Crowthorne

DUMAS

In 1997 the DUMAS project was established to try to encourage the wider use of USM. DUMAS was a 1.2 million Euro project with ten partners from nine countries. The project brought together European experience and expertise on Urban Safety Management, including practical examples from ten towns. In the UK Gloucester was a major part of the project, showing the operation of USM in practice. The objectives of the DUMAS project were to encourage the implementation of USM and to produce robust frameworks for the design and evaluation of urban safety initiatives. DUMAS achieved this by bringing together the existing knowledge on the effects of safety measures with the overall planning and management of urban safety programmes, particularly the interactions between engineers, politicians and the general public to illustrate best European practice.

The DUMAS Design Framework defines potential interactions in order to make urban designers, planners and engineers more aware of the effect of their strategies on others. It builds on ideas from nine European countries who developed a vision of Urban Safety Management within its context (Figure 4).

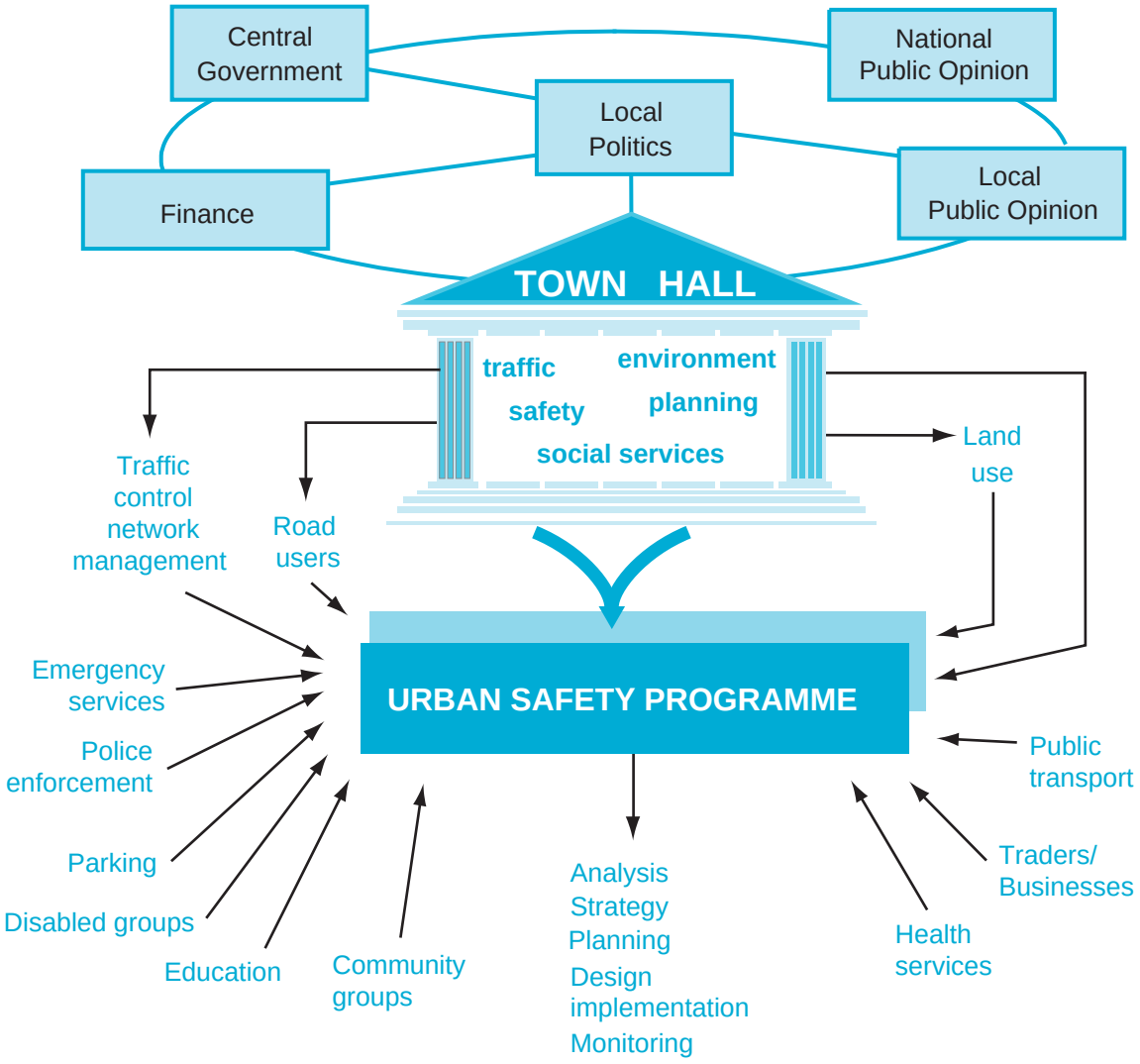


Figure 4. DUMAS vision

This vision of a safety programme which is linked to, and has influence on, a wide variety of urban functions is one of the major results of the DUMAS programme. Gloucester was a demonstration of this vision in practical terms.

3.1 The first step

USM has to be a conscious step. It is different from the way safety has been managed in the past. So the first step is the overall strategic one. It is essential to have commitment which will not fade away as soon as the inevitable problems arise.

3.2 Developing a vision for the urban area

Development of a vision for an urban area is not easy. Everyone will want different things from the process. But identification of the issues behind these differences early in the process will mean that a shared understanding (if not always full agreement) can be reached. It is important to involve as many people as possible. It also helps if there is someone who strongly believes in the process and who acts as its 'champion'. This may be an elected Councillor, an official, a committed local citizen or someone from a pressure group. This champion may act as a public face for USM, or may act in the background ensuring that the momentum is maintained over time.

The vision is not just about a road safety strategy. It should contribute in many ways to the development and quality of life of the urban area and all its communities. Therefore it must have strong links with, and be compatible with, planning policy and transport policy as set out in the Local Plan and or the Local Transport Plan.

3.3 Co-ordinating USM

Urban Safety Management is a comprehensive and systematic approach to road accident prevention and casualty reduction in towns and cities. To formulate and execute such a comprehensive safety strategy, there is a need for a strong co-ordinating road safety group of professionals that is multi-disciplinary in nature, backed by an appropriate steering group of elected representatives.

They should be charged with the responsibility for initiating and implementing USM and its associated accident reduction programmes. Success will involve:

- Strategic thinking and planning
- Synergies with other urban programmes and strategies
- Involvement of local people, community organisations and businesses
- Attention to detail in the design with safety audit of prime importance.

3.4 The USM Framework

The objective of the USM Framework presented here is to provide a guide to Local Authorities wishing to implement USM. It does not contain answers, but aims to provide the questions which need answering; it then attempts to describe an action plan that experience has shown can be successful. DUMAS formulated a recommended framework for the USM approach. This has been adapted and is summarised in Figure 5. As the diagram makes clear this is not a purely sequential process. There are many stages of iteration as what happens at one stage informs the process and helps to develop the ideas. But there is an overall flow from the initial need to build a vision of what the process is trying to do, right through to the monitoring which demonstrates that the whole strategy is being delivered.

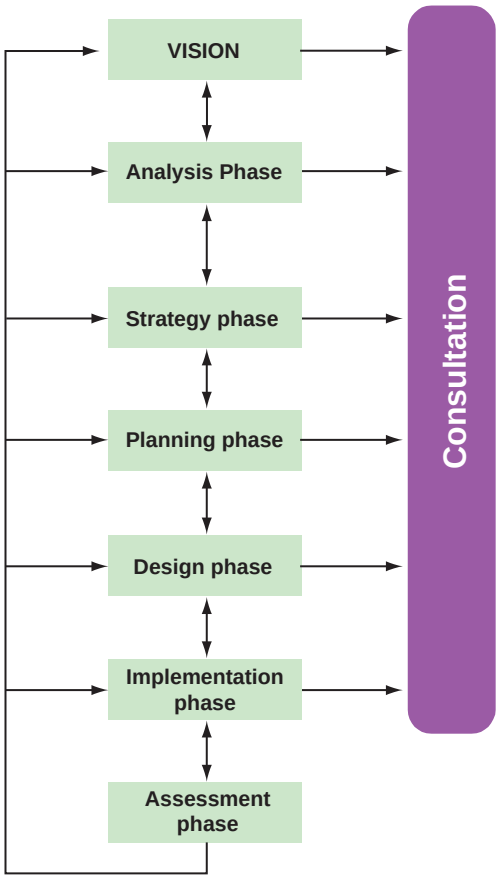


Figure 5. The USM Framework – implementation of USM in an urban area

The sections below give detail of each stage of this process.

3.4.1 Political leadership and vision

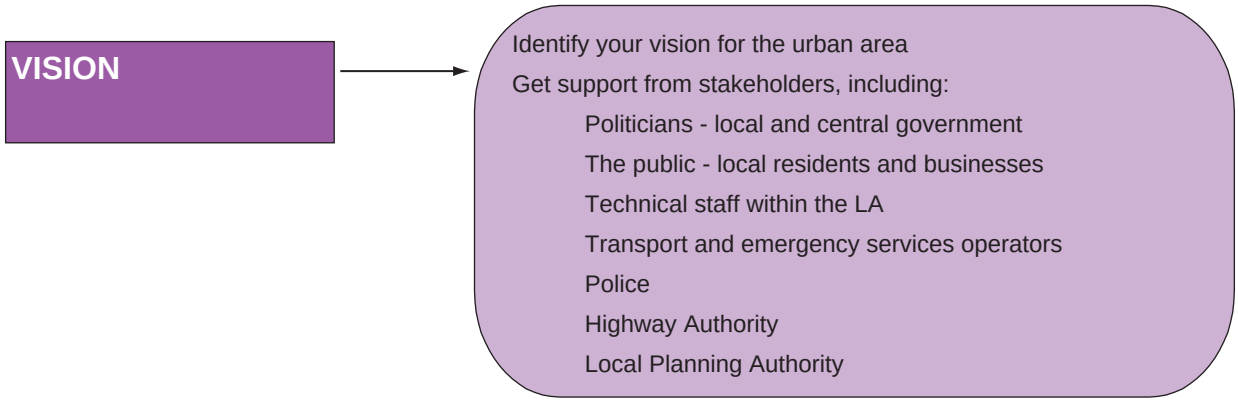
Safety forms part of the overall vision for the urban space. As such it is part of the political environment. The strategy which delivers road safety has to be part of the strategic approach to managing the whole urban area. Other issues such as urban regeneration, dealing with disadvantage and urban planning are more overtly political but safety must not try to evade the need to work within the political framework.

Experience has shown that getting the support of local politicians for the programme is one of the most important requirements for success. Implementing measures will not always be popular, so it is vital that road safety remains a high priority with the decision makers in the face of periods of public criticism and even possible loss of votes. Time spent in bringing together supporting facts about accidents and convincing the important local politicians to support the programme, is time well spent.

This first stage of obtaining 'ownership' of the process is essential. If the vision of the safety strategy is sufficiently robust then even changes to the political makeup of the Authority will not overturn it. But without a shared vision the process will risk being subject to pressures which will affect its ability to deliver road safety.

It is unlikely that local political support can be achieved without first fostering interest in and support for casualty reductions. Probably the most critical area for support lies with the local people, so local public opinion is critical. Experience has shown that many urban communities know very little about the accident risk - "accidents always happen to other people, not to me". Bringing home the fact that accidents do happen is most important. Awareness of the environmental effects as well as the safety benefits will also affect public opinion.

Lack of finance is often thought of as a stumbling block to planning and implementing USM. Indeed USM schemes do require a lot of resources over time. However, much can be achieved by making best use of existing resources to achieve a broad range of aims. Combining USM ideas with maintenance is often cost effective. Within Local Transport Plans



projects which deliver safety can be combined with other initiatives, such as neighbourhood renewal and regeneration, to maximise value for money. It is possible to achieve added safety value from other policies and partnerships.

3.4.2 Setting up the management structure

After establishing the overall vision and bringing the diverse skills together, the next step is setting up the management structure. It is vital that all parties are involved from the start, especially in the formulation of the objectives and targets for the process.

A possible model which has been used in other European countries starts with a main USM professional team which consists of all the 'major players' such as the chief executive, senior professionals and 'champion'. This is the team which sets out the overall vision and is responsible for formulating the casualty reduction targets and setting the strategy. They consult on the vision and strategy (as shown in Figure 5). The strategy formulation is vital to the project and should define the way in which the casualty reductions will be achieved.

Again in simple terms this might involve reducing flows on some dangerous routes, along with reducing speeds more generally. Flow changes can be managed through road engineering, but also through better provision of public transport, parking, and traffic control.

Sub-teams can deal with specific elements of the strategy (e.g. design, implementation, assessment). The USM approach is multi-disciplinary. The sub-teams will consist of members from several professional groups who will need to maintain close communications.

Among the key groups will be:

- Safety engineers: introducing features to help vulnerable road users (cyclists and pedestrians) using road engineering, 20mph zones, etc, making roads safer for traffic by managing flows to reduce conflicts , and reducing speeds.
- Police: managing enforcement: reducing speeds, improving driving behaviour.
- Public transport operators: locating stops with safety in mind and reducing traffic flows by improving public transport.
- Road Safety Officers: affecting behaviour through education, training and publicity, safer routes to school and travel plans.
- Network managers: using traffic management techniques, such as pedestrianisation, road closures and mini-roundabouts to manage flows, improving junctions, managing flows with traffic signals. This might include reducing 'rat-running' by improving the capacity of the main roads and reducing the capacity and speeds on the residential roads.
- Land use planners: ensuring that new traffic generators are in the most appropriate locations and have appropriate connections to the transport network.

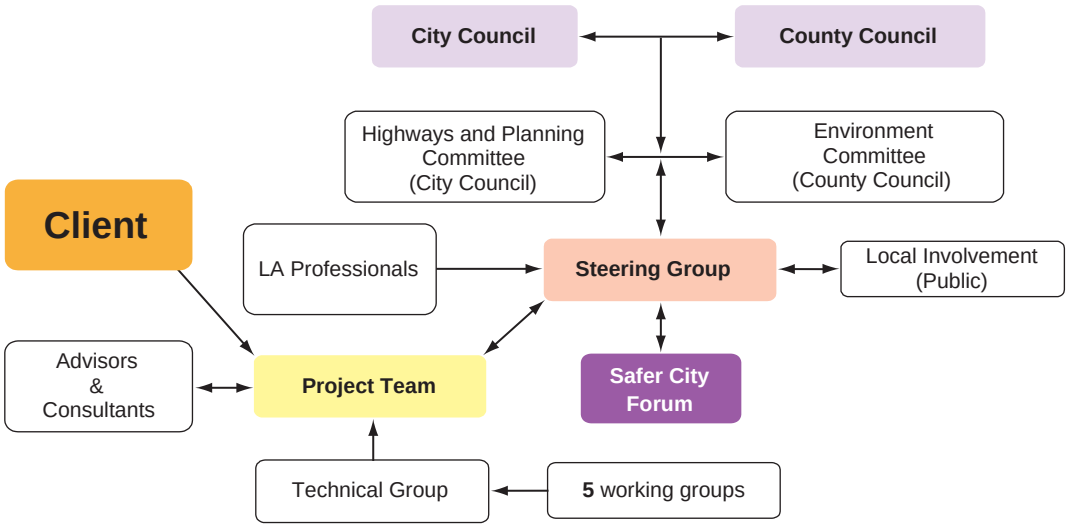


Figure 6. Management Structure used in Gloucester Safer City project

In many cases these groups may not normally work closely. But, to deliver a USM project, communication and co-ordination across professional boundaries is vital. Maintaining this co-ordination is key to achieving a strategic outcome and requires a strong management set-up to maintain the integrated approach.

As well as the politicians and the professionals, the process should directly involve stakeholders and opinion leaders, possibly as part of a 'forum', Community Plan or Local Strategic Partnership, which allows all other interested parties to include their views. These other parties might include:

- Local residents associations
- Disabled groups
- Minority group representatives
- Local businesses
- Local bus operators
- Freight Transport groups
- Taxi groups
- The press
- Parking suppliers
- Emergency services
- Magistrates / Legal representatives
- Health providers (hospitals etc)
- Action groups (including pedestrian, cycling and environmental groups).

This forum will have several roles. Once it 'buys in' to the vision and strategy it offers a valuable way of ensuring that positive messages are spread through the community. It also ensures that negative publicity can be balanced by positive messages. A forum can act as a channel of communication between the professionals and the wider urban community.

A forum can offer advice at the high strategy level and at the detailed, local implementation level. Its powers are unlikely to include decision making but its input to the understanding of issues as seen by this range of stakeholders can be important in ensuring that the local authority's decisions are based on the best available understanding of public reactions. It is also an opportunity to deal with conflicting views and to work towards a shared understanding of the reasons behind decisions.

Maintenance of the enthusiasm of the forum members will be a specific task for the USM professional team. The forum needs to believe that its contribution can affect the outcome. Therefore, it needs to meet on a regular basis with representatives of the USM team.

A possible structure is shown in Figure 7.

3.5 Applying the USM methodology

Having set up the management structure and defined the overall objectives, the USM team and sub-teams will need to carry forward USM principles through the analysis, strategy, planning, design, implementation and assessment phases as shown in Figure 5. The stages will overlap and there may be several iterations between stages but, for simplicity, they are considered separately here.

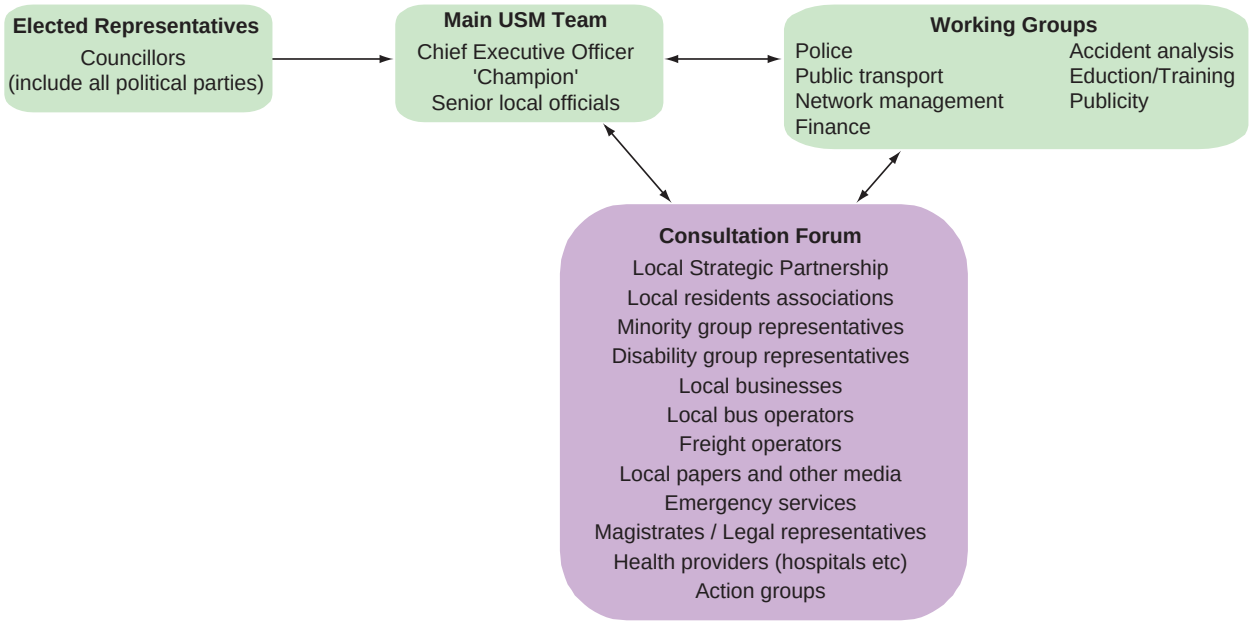


Figure 7. Possible model for management of the USM process

3.5.1 Analysis phase

Dividing the urban area into areas bounded by barriers such as railway lines, rivers etc , (but not main roads as they should be included in the USM process) may be useful at this stage. It may also be useful to consider where different parts of the urban area have very different housing types or land use.

The aim of the analysis phase is to assess how the road network is currently used, its suitability for the various functions required of it and what are the safety and mobility problems.

Collect data

The analysis of accident data for an urban area will provide a picture of the characteristics of the road safety problems. Associated road layout and traffic data should be collected in two phases:

Phase 1: a rapid survey of the whole area; and

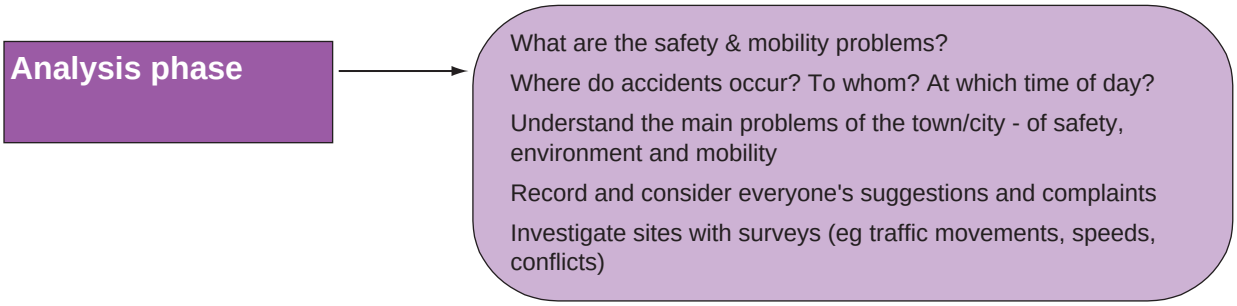
Phase 2: detailed surveys of specific places and routes where problems were identified from the accident analyses.

There is clearly a long list of potential data to be collected and should be done selectively, as there is a real danger of collecting too much data and being overwhelmed by it. USM is a broader, strategic approach and requires less detailed information than that normally associated with single site, route or mass action treatment.

Accident analysis

Accident data is analysed under various headings such as:

- by road user type
- by road type
- by accident type
- by time of day
- by vehicle type
- by road condition



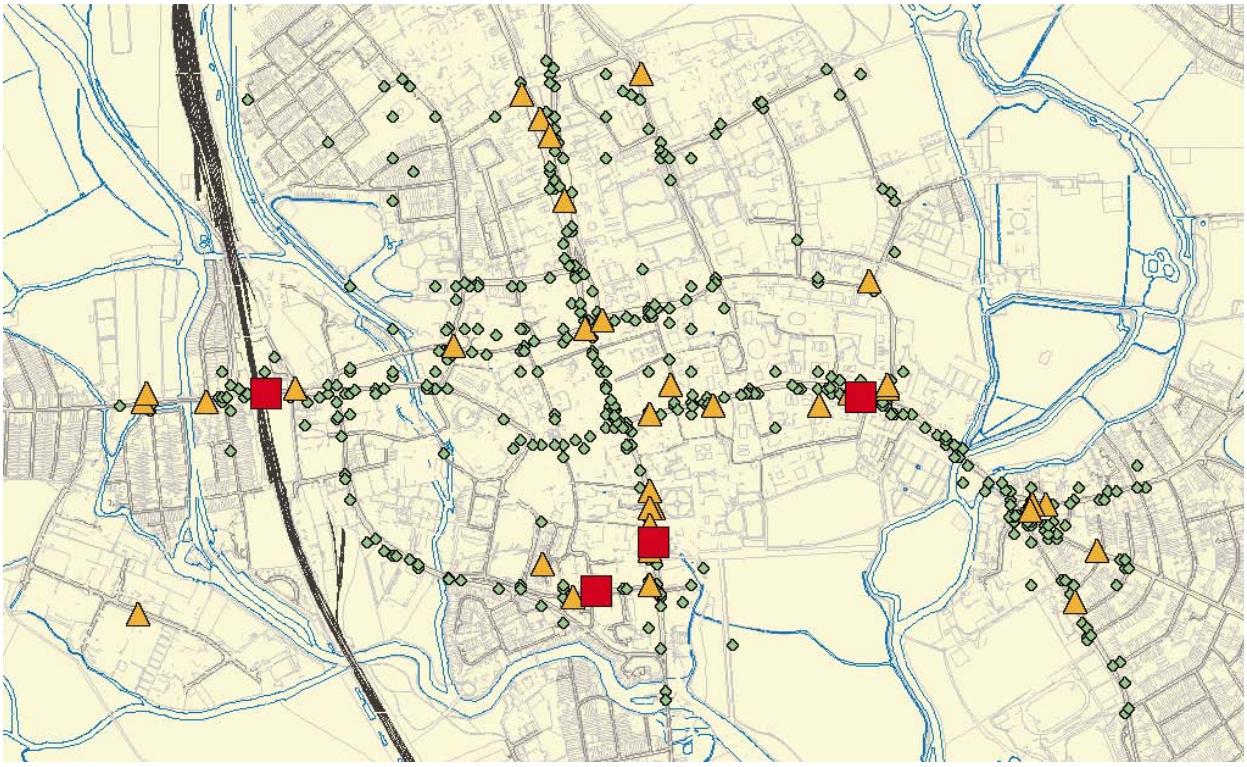


Figure 8. Typical urban accident plot

This allows for common types of accident to be identified, and measures designed to affect and reduce them. It is often useful to look at all motor vehicle casualties on the various road categories and consider pedestrian casualties and two-wheeler casualties separately.

The analysis should show which areas have the highest accident rates where measures might be considered first. It is very useful to produce accident maps for the road network so that an immediate visual impression of accident density can be gained, perhaps by type of accident. Ideally the map should also show vehicle and pedestrian flows. The data analysed should ideally cover a period of at least the past three years so that trends and variability can be studied, and any underlying pattern can become apparent.

Speed analysis

Data on speed is also important and will often need to be collected for both planning and monitoring purposes. It is important to collect data on a range of roads.

A review of existing speed limits is also recommended as the strategy is likely to include an objective of better speed management.

Strategy phase

- Considering National targets, how to fix local problems to achieve objective?
- Identify other strategies/programmes which will impact on safety
- Identify the appropriate road hierarchy
- Divide city/town into sub-areas and produce safety strategy for each
- Check strategies with all stakeholders and get commitment

3.5.2 *The strategy phase*

In the USM process the aim should be to integrate all activities affecting safety and produce a "strategy" or master plan. This should be a document available to all agencies who can contribute to or impinge on safety. The strategy will form a long-term framework for action. Out of the strategy will come the safety objectives which will be achieved by either safety schemes or other actions. A useful outcome of the strategy phase is a map of the area showing the land use (existing and proposed), proposed road hierarchy, location of accidents and resulting safety objectives. This map can later be overlaid with proposed safety measures and any potentially reinforcing or conflicting proposals initiated for other purposes.

Although engineering is a main focus of USM and is the way the road environment will be changed , it is of equal importance that the strategy co-ordinates with the other professionals listed above to identify how in particular education, training, publicity, enforcement and town planning will contribute to the strategy.

There are two main elements to applying the engineering element of USM to a road network. They are:

- managing traffic to achieve a safer distribution
- managing speed to achieve a safer circulation.

Establishing a hierarchy

To achieve a safer distribution, an essential part of the strategy is to identify a functional hierarchy of main roads, local distributors and residential access roads (as described in Section 2.1) and then attempt to encourage traffic to use this network appropriately. Ideally, through traffic should use only the main roads; the traffic on local distributor roads should require access to premises in the local distributor itself or in residential access roads leading off it; and in residential access roads traffic should need access to premises in the access road itself (see Figure 2).

However, many roads in urban areas are multi-functional (often called mixed priority routes) and it may not be possible to provide alternatives routes for the inappropriate traffic using them. In these cases special designs may be necessary to accommodate the conflicting functions safely. Research is currently underway by the Department for Transport (DfT) (Mixed Priority Routes Project) to provide advice on best ways to do this.

Comparison between the ideal and existing flows should identify roads which have inappropriate levels of flow. Reducing these flows is often a major part of the USM strategy. Safety can

normally be improved but often with some loss of convenience of access. In practice this is one of the most difficult aspects of USM for public acceptance to be gained particularly if radical measures such as road closures are planned. As such closures may be resisted by the public, Authorities may prefer to allow flows to be kept near existing levels, but devise measures to reduce casualties at the current flow levels and give more priority to pedestrians and cyclists.

Another issue which needs to be considered when establishing the new hierarchy is access by emergency vehicles. If the emergency services are involved in the definition of the hierarchy they can ensure that delays to their vehicles are minimised. It is possible that certain roads will have to be treated specifically to ensure access by emergency vehicles even if they are not otherwise designated to serve a through traffic function.

Speed management

Another important element of Urban Safety Management is to "manage speed to achieve a safer circulation". Such speed management can be tackled by both engineering measures and increased enforcement through additional police checks.

The use of speed management partnerships which allow authorities to invest money recovered from fines on increased camera enforcement on dangerous roads has proved to be effective in substantially reducing casualties by reducing speeds.

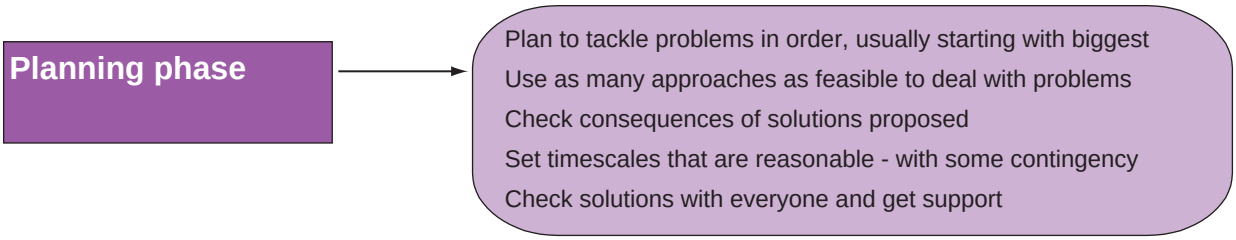
Authorities may also wish to consider non-traditional methods of speed reduction for example "community speed watch" where members of the public are equipped and trained by the police to carry out speed checks.

While many of the speed management issues relate to urban roads with 30mph limits there is a clear need to consider 20mph zones and Home Zones within the overall speed strategy.

Strategy for education training and publicity

Within the USM model education training and publicity (ETP) are used try to bring about a cultural change in attitudes and behaviour as well as directly informing and teaching people. The strategy needs to include a comprehensive programme of ETP for all road users including publicity and training on how to use the changed network as well as more traditional child focussed education.

Publicity materials can be ‘branded’ to identify them as part of the overall strategy. This keeps the idea of the USM process in the minds of the public. It means they see the various elements as part of an overall plan for their area.



3.5.3 The planning phase

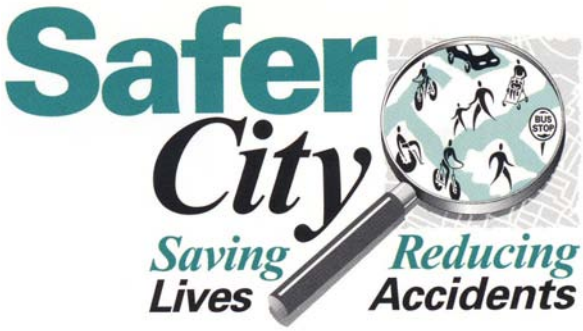
The planning phase is an opportunity for initial consideration of phasing and managing the overall USM process. Timing of the different phases of the design and implementation can be established. This is important in responding to public concerns about the implementation especially if some parts of the urban area are scheduled for treatment much later than others. At this point a schedule of reviews can be set out which will allow the USM team to report back to elected representatives.

Figure 5 shows that consultation is necessary throughout the USM process. Consultation on the initial vision and strategy is vital to ensure that at this strategic level there is agreement on how to create a safer urban area. Consultation is also needed before detailed plans are drawn up for a particular part of the urban area, again when plans become more specific, and finally after implementation. It is strongly recommended that the consultation process is recognised as providing a valuable input into the early formative stages of any proposals. This means that the 'before' consultation process should be done when the schemes are first being planned. At this stage it may be more a case of examining the feasibility of the safety objectives, the main issues that need to be considered and who should be consulted. When the proposals are more advanced and more detailed further (but still 'before'), consultations should also be undertaken.

Consultations conducted 'after' implementation can be viewed as part of the monitoring and evaluation process.

This consultation should always be as wide as possible. For a safety scheme to be successful it is important to have the support of the local people who will be using the roads and living with the safety changes made, as well as professionals whose work impinges on safety even though safety is not their prime interest. For the safety measures to be successfully integrated into the urban transport system, consultation with stakeholders should be seen as a necessary and valuable process. The need for a sense of 'ownership' must not be underestimated: this will give road users the feeling they have had an input into the implementation of the measures, and, as a consequence, value them more.

Branding or marketing the process, through publicity and information is also useful in encouraging a local feeling of commitment.



Whom to consult?

The USM approach is based upon bringing together a wide range of different issues. The consultation process may therefore need to consider a wide range of factors such as safety, enforcement, traffic management, public transport, transport planning, area-wide or local engineering treatments, road maintenance, and land use as well as things such as environmental, health and education issues.

The consultation should involve the public, key stakeholder organisations, as well as other interest groups. These various groups may have very different opinions. Even various members of the same group will have conflicting interests and views.

Among the groups which should be considered are those in the Consultation Forum described in section 3.3.2 but consultation may also need to include:

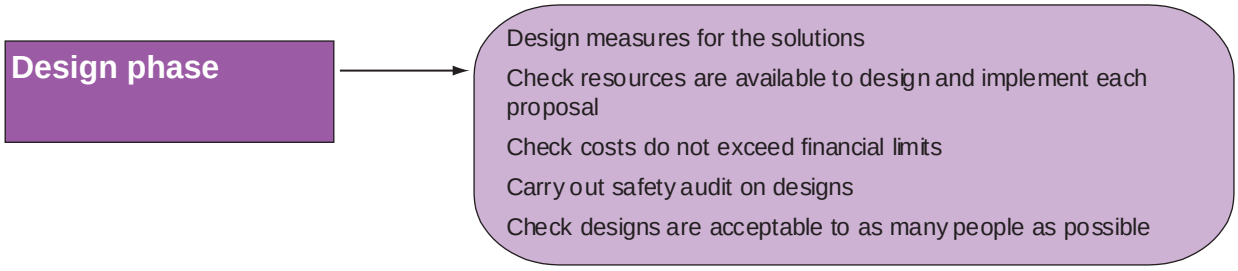
- Local Members of Parliament
- Freight operators
- National Trust
- English Heritage
- Conservation groups
- Youth groups
- 'Living Streets' - the Pedestrians' Association
- Cycling organisations
- Motoring organisations
- Tourist Board
- Local Chambers of Commerce/Bureau Association/Local Traders Groups

How to consult?

The consultation process can use a variety of different methods. It is important to tailor the methods to the needs of the local community, taking into account any language or cultural differences. The methods most normally used are:

- carrying out public surveys
- conducting interviews with representatives of stakeholder and interest groups
- holding focus group discussions
- organising meetings and exhibitions
- using participatory methods e.g. citizens' juries
- using websites to facilitate both information and feedback through email

One of the problems of extensive consultation is that peoples may come to expect that all their ideas will be implemented. It is important that false expectations are not raised. Information should be realistic and the reasons for choices made clear.



3.5.4 Design phase/Appropriate engineering solutions

The strategy will have identified a number of safety objectives for which measures to achieve these objectives need to be designed. Once cluster sites have been dealt with, most parts of the road network will not exhibit single dominant accident types which warrant treatment on their own. Rather the dangers that exist are more likely to result from a combination of conflicting turning movements, speed differentials between motor vehicles and other traffic, pedestrians needing to cross the road and arrangements for parking. Measures need to be designed to address all these aspects of the problem. This is likely to involve reassessing and redesignating the road space available for each use.

Part of the value of implementing measures in the form of a local area safety scheme lies in the ability to provide a continuity of visual effect. This can both clarify the functions of the different parts of the network and help road users to perceive more clearly the risks they encounter – the "self explaining roads" concept.

There are a variety of measures that can be used to reduce the number of road traffic accidents, and improve road safety. The four E's of Enforcement, Education, Engineering and Encouragement are very commonly cited as the basic ways of helping to reduce road accidents. Officers should consider as wide a range of measures as possible from which to choose remedies to the problems they are trying to solve within the USM general strategy adopted. Once agreed, the designs of possible countermeasures must be selected or developed to achieve the aims of the strategy.

Innovative redesign of public road space to give a better quality of urban environment should be considered as a long term aim but in the interim a number of low-cost engineering measures appropriate for area-wide schemes have been developed. These include road humps, mini-roundabouts, ghost islands, central hatching, gateways, chicanes, pinch points, cycle lanes, central refuges, road side build-outs, 20mph zones, home zones, mixed priority route treatment etc. The emphasis should be towards self-enforcing measures.

Where re-distribution of traffic is not seen to be appropriate efforts should be made to influence the way traffic uses existing routes by measures aimed at speed reduction or more generally at driver behaviour.

Speed reduction can be approached in three ways:

- measures aimed primarily at speed reduction in response to identified safety problems at specific sites
- the introduction of layouts which encourage speed reduction when developing measures aimed at other safety objectives
- the general introduction of speed reducing measures on some or all of the road categories, ie speed management

Safety audit should be an important part of the process in the design of all measures.

Computer programs are available to help to identify the potential safety impacts of changes to the road network.

Implemenation phase →

- Implement measures in stages (use a 'quick fix' to big problem - to get successful start)
- Ensure safe practices followed during works
- Safety Audit prior to opening

3.5.5 *Implementation phase*

Implementation of a USM strategy will often need to be phased over a long period of time, possibly many years. The strategy will define what needs to be done but the availability of funding will be a factor in deciding when action can be taken.

The local implementation of engineering works is a potentially disruptive period, particularly for businesses but also for residents. Good communication with the local community is important particularly if such disruption is likely. A speedy and tidy method of operation is desirable.

Implementation can also be a difficult period for public relations with those who are opposed to the measures as it is often at the implementation stage that the public fully realise what changes are being made. Authorities need to hold their nerve until the advantages of the changes are recognised. Early information and feedback on the effects and any side effects is vital so as to be able to counter opposition.

Procurement arrangements can make a significant difference to overall costs of USM. The establishment of a procurement strategy should result in more efficient and effective implementation of the engineering measures.

Safety audit is again relevant when the works are almost complete. The safety specialist needs to check on site that nothing has been left out or has crept in that could lead to unnecessary risk of accidents.

When the measures are finally implemented, they should convey a visual image that lets road users know how each part of the road system is intended to be used – thus making the roads in the area "self-explaining".

Assessment phase →

- Monitor sites and repeat 'before' studies (eg. speed, flow, conflicts)
- Carry out roadside/house interviews
- Measure accidents, casualties - check against objectives
- Are additional measures needed to meet objectives?
- Inform everyone about successes & failures - including press releases
- Report on achievement of objectives

3.5.6 *Assessment phase*

Assessment of the effects of the USM process before, during and after implementation is important for a number of reasons:

- to have factual information with which to reassure the public.
- to establish that safety benefits are being achieved
- to identify any new safety problems that may arise
- to learn by experience so that areas that are treated later can benefit from the experience of areas treated earlier
- to review the USM strategy and update it if necessary

Accident and casualty numbers are clearly the major indicators of the success or otherwise of USM in safety terms. But it is also important to measure the effect on other aspects of mobility such as accessibility, the speeds and flows of motor traffic, and the amount of walking and cycling to gain a better understanding of how the various measures work. It is also useful to measure environmental effects such as noise and air quality as these can be potential sources of concern to the public.

Any changes in public awareness and opinions are also important in being able to judge the acceptability of USM to the local citizens. These can be measured by interview surveys or focus groups but it is important to get a good cross section of public opinion. Relying only on letters of objection can give a misleading impression of the community's views.

Particularly at implementation but also at earlier stages, the cultivation of the local media, keeping them informed of what is intended and how it is being achieved, can greatly help in generating positive public opinion.

four The Way Forward

These guidelines show how it is possible to substantially reduce the level of death and injury on our urban streets. It is only by adopting the strategic USM approach that substantial progress can be made in reducing the large numbers of injury accidents which occur, not at high risk sites, but almost anywhere in the urban road network.

Local Authorities should consider the USM strategy as an essential part of the Local Transport Plan (LTP). Clearly safety is but one of the issues to be covered in the total plan but cannot be considered in isolation. Many initiatives that are designed to improve safety also help towards other aims of an LTP, and many aspects of town planning also impinge on safety.

For this reason it is also important that Local Plans take the safety strategy into account. In addition planners need to look more to enhance safety when urban areas are being re-designed. This is particularly so over the long term and further emphasises the need for a city-wide strategy for transport and land use development and safety agreed by all agencies. Conflicts can arise between the road network design and how urban spaces are handled which an agreed safety strategy can resolve. Safety audits can help but innovative approaches to street layout and design are also available such as pedestrian streets, home zones, 20mph zones and time sharing for different road functions. But, for these to come to fruition, a common approach between planners and traffic safety engineers, which includes acknowledgement of all the other professionals with an interest in the design of the urban area, is required.

USM can therefore encourage a more innovative and forward looking approach to the design of urban street space where the needs of all users are well catered for. The traditional palliative approach to road safety generally deals mainly with accident cluster sites and is based on the way the road network is currently used. It does not provide the safety and quality of life that urban citizens in a modern society require, even though these citizens and their representatives may need to be persuaded that there is another way – that other way is *Urban Safety Management.*

Acknowledgements

These guidelines were drawn up by Archie Mackie and Pat Wells of TRL Limited with help and guidance from Ian Drummond (DfT), Richard Allsop, Barbara Sabey and Jon Freer representing IHT, Maureen Theobald (Warrington Borough Council), Phil Moore (Institute of Road Safety Officers) and David Hughes (Cheshire County Council).

The photographs and other illustrations were provided by TRL Limited except the one on the top of page 7 which was provided by Warrington Borough Council and the one on page 22 which was provided by Gloucester City Council.

Appendix A

Measures used in Gloucester

A variety of measures were used for the following safety objectives.

For enforcement of speed limits:

- dedicated police team to increase enforcement activity
- laser speed gun
- in-car video equipment
- speed cameras (these were not operated under a "Speed Camera Partnership arrangement)

To encourage drivers to drive at a more appropriate speed:

- road-side posters to advertise the number of people prosecuted and the amount that they were fined
- traffic calming
- narrowing of space available for motor vehicles creating better channelisation of main road traffic through:
  - cycle lanes
  - central refuges
  - central hatching
  - build-outs
  - widening of footpaths
- speed activated warning signs
- gateway feature at all main road entrances to the city, highlighting the speed limit and its enforcement
- publicity in the local press

To improve pedestrian safety in the city centre:

- pedestrianisation

To assist pedestrians to cross roads more safely:

- new Pelican crossings
- new Zebra crossings
- central refuges
- area-wide traffic calming
- narrowing of carriageway
- safer routes for children on their way to and from school

To assist pedestrians and cyclists to cross roads:

- new Toucan crossings

To encourage safer cycling:

- cycle lanes on main roads
- redesign of roundabouts
- area-wide traffic calming

Other measures were used to encourage drivers to use the roads of the new hierarchy which were appropriate for the journeys they were making. These other measures were:

- Lengthening journey times on local distributor and residential access roads by reducing the speed of traffic, (mainly through traffic calming)
- Giving less time at traffic signals to traffic on local distributor and residential access roads
- Installing pedestrian phases at traffic signals and reducing the waiting time for pedestrians at Pelican, Puffin and Toucan crossings.
- Taking space for car traffic by installing central refuges and hatching, bus and cycle lanes and fitting bus-priority receivers to traffic signals, triggered by transponders on the buses

Speed Management

A key element of Urban Safety Management is to "manage speed to achieve a safer circulation". Such speed management can be tackled using both engineering measures and increased enforcement through additional police checks.

A partnership between the police and the Safer City Project was put in place to develop comprehensive enforcement of speed limits using mobile and fixed site detection, through speed cameras and other equipment funded by the Safer City Project.

Publicity about the increased enforcement, through roadside posters showing the number of people caught speeding, and as part of the general press information programme, was an important part of the speed management strategy.

Speed management by engineering measures took the form of road narrowing using gateways, cycle lanes, central refuges and warning signs on main roads and general traffic calming on residential roads.

General

Throughout the project opportunities were taken to reduce the time pedestrians had to wait at pedestrian crossings before the "green man" was displayed. On main roads these times were reduced from 40 to 20 seconds and on mixed use-roads from 25/30 seconds to as little as 5 seconds.

In addition to improving facilities for cyclists and pedestrians, detectors at traffic lights speeded up buses by triggering a green phase for them as they approached.