



Safe Mobility: the cornerstone of IRF's reflections on improvement in road safety

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Abstract

Road safety targets, such as the European Union's goal of reducing fatalities by 50% by 2010, require sustainable actions with long-term impacts. It is felt that these should effect a safe road transport system by providing all users with maximum protection against human error. True, positive support to the users (such as information, education and training) and negative support (such as penalties) can make a significant contribution to road safety. Such passive measures will, however, never be sufficient. Pro-active road safety measures are needed, supported by appropriate level of funding, and designed to improve the infrastructure and make it more forgiving of human error. Major changes must be made to the road infrastructure in addition to an improved level of road maintenance. Furthermore, installing and upgrading road equipment such as safety barriers and obstacle protection, markings, signs, signals and lighting make a vital contribution to a reduction in road accidents and the unacceptable burden they impose on society. To achieve this, appropriate road safety policy should be implemented. This should be built around the following key points: commitment, dedicated funding, sustainability, supportive measures, cross border standardization, partnerships and dissemination of know-how. This paper presents the IRF's view on road safety and it shows how these may be implemented using road management concepts.

Keywords: road safety, policy, management

1. Introduction

The International Road Federation (IRF) is the leading global industry support organization for advocating, financing, planning, designing, building, maintaining and operating safe, efficient highway and road systems by providing support for the development of roads and highways worldwide through technology transfer, networking opportunities and educational and management programmes. These coupled with timely advocacy, high-quality market data and effective communications aimed at delivering specialized services and programmes designed to meet public and individual membership needs ^[1].

In this context, IRF recognizes that the road network plays an indispensable role in the movement of goods and in enhancing mobility. Mobility generates economic, social, environmental and political impacts usually expressed in terms of costs and benefits. The benefits of roads largely outweigh their negative aspects. Nevertheless, their negative impact cannot be ignored, in particular the costs, in both social and economic terms, of road accidents. IRF deplores the high number of road accidents and urges authorities to analyse their causes and find adequate solutions. Keeping the road as safe as possible while maintaining its major quality - mobility - is the main challenge for road policy makers.

Accidents are rarely the result of a single factor. In the vast majority of cases, they result from a series of random incidents and events. It is for this reason that substantial improvements in road safety may be achieved only if all the components of the road transport system (RTS) are addressed. In other words a holistic approach to the interactive triangle of road user, vehicle and road infrastructure is needed. This approach should consider that infrastructure improvements, driver training and vehicle safety performance contribute to the pursuit of improved road safety ^[1, 3].

Most work to date has focused on the human element (road user) and vehicle, with decision makers, all too often, assigning responsibility to road users, telling them to reduce speed, wear a seat belt, avoid alcohol, and so on ^[2]. These certainly valid requirements cannot, however, be the only focus of effort.

For its part, IRF believes that substantial changes must be made to the road infrastructure itself. This document highlights how infrastructure improvements would be beneficial to the safety of all road users. Furthermore it gives a policy framework for road safety and a model for the implementation of policy.

2. Safe Mobility: The need for a new approach ^[1]

Road safety performance indicators, such as the European Union's goal of reducing fatalities by 50% by 2010, require long-term, sustainable solutions, with long-term impact. Such solutions cannot rely entirely on changing driver behaviour. A safe RTS should provide all users with maximum protection against human error. True, positive support to the user, such as information, education and training, and negative

support, such as penalties, can make a significant contribution. However such passive measures will never be sufficient.

Pro-active road safety measures are needed, supported by an appropriate level of funding, and designed to improve the infrastructure to mitigate against human error. Major changes must be made to the road network itself. These may concern the construction of motorways, bypasses and separated highways. Furthermore it is important that road authorities consider an improved level of road maintenance with associated operations aimed at reducing the number of road accidents.

In addition, installing and upgrading road equipment such as safety barriers and obstacle protection, markings, signs, signals and lighting make a vital contribution to a reduction in road accidents and the unacceptable burden they impose not only on the road users but on the entire society.

This is the thinking behind Safe Mobility. Today, it is the cornerstone of IRF's reflections on improvements in road safety.

3. Developing a Safe Road Transport System

An RTS is an entity composed of three interactive elements: the user, the vehicle and the infrastructure. Their relationship is regulated by a legislative framework. The interaction between the three parties creates a traffic situation. The user may be characterised as either 'protected' or 'unprotected'. The 'protected' road users include the occupants of cars and public transport vehicles. The 'unprotected' road users are the motorcyclists, cyclists and pedestrians. With regard to the road vehicles, these include both motorised and non-motorised vehicles. Finally the road infrastructure should consider the entire road network together with its furniture and immediate environment.

The key role of the RTS is to offer safe, efficient and environmentally friendly mobility, in particular to minimise time and resources in connecting human and organisational demand with existing supply of products and services in society. Two of the principal elements of the RTS developed independently of each other, with vehicle ownership based on market forces, and roads themselves built by national, regional and local authorities in response to social, political and economic needs. No system approach, founded on compatibility and interaction was applied. The third element - the road user - was hardly ever considered. A general result of the RTS development has been the assignment of responsibility for road safety to the user, the natural link between road and vehicle. This is reflected in current road and traffic legislation.

Yet research undertaken over many years confirms that, however well educated and trained, human beings are prone to make errors when at the controls of a vehicle. The errors are of two types: intentional and unintentional. An intentional error is, for example, violation of speed restrictions. An example of non-intentional error might be loss of control of a vehicle through distraction, hazardous highway surface

conditions, difficult weather conditions or a combination of such factors. Such errors may result in road accidents.

According to current estimates, the number of people dying annually in road accidents may rise to between 1 million and 1.3 million over the next ten to twenty years, with the increase occurring in developing countries and countries in economic transition. According to the World Health Organization (WHO), road traffic accidents will be the third leading cause of disease or injury and the sixth leading cause of death in the world in 2020 ^[1].

Road accidents generally cost between 1 and 3 % of a country's Gross National Product (GNP). Typically the figure is about 1.0 % of GNP in developing countries, 1.2 % in transition countries and 2.0 % in industrialized countries. Total global economic cost is estimated at about US\$ 500 billion per year world-wide ^[1]. The European Union estimates the cost of a single road death at EUR 1 million, based on a further life expectancy of 40 years, and associated contribution to society and the economy.

Road accidents have both direct and indirect costs. Direct costs may include police, ambulance, hospital, sick leave costs and are relatively easy to estimate. Indirect costs, covering loss of productivity and human suffering, are more difficult to assess.

The vast majority of road deaths occur to the young and those in the prime of life. Road accidents are also a leading cause of head injuries and acquired disability. Care for the disabled largely falls on families and friends. Household income often decreases from the loss of a victim's earnings. The sudden and unnatural death or disability of a loved one leaves families traumatised.

To this end it is felt imperative that the number of road accidents must be reduced by means of actions that are outlined below.

4. Principles and Recommendations ^[1]

To achieve safe mobility, IRF wishes to make the following recommendations:

4.1. Multidisciplinary approach

The RTS should be developed and maintained taking into account the interaction between user, vehicle and infrastructure. This requires cooperation: between the road builders and the vehicle manufacturers, and shared information on new developments in each industry, both taking due account of the limitations of the road user.

This level of cooperation proved crucial during the phase-in period of Intelligent Transport Systems. All three industries should now extend this cooperation to research on the protection of vehicle occupants and unprotected road users, such as pedestrians.

4.2. Focus on the road user

It is necessary that the focus of any action must be on the road user. Consequently the three governing principles of RTS design should be: improved mobility of people and goods; better quality of life; enhanced service to users.

However it is important to consider that road users, as road taxpayers, are customers and must be treated as such. The relationship between road authorities and users should be based on a supplier-customer business model. This relationship should also be reflected in road design, which should take into account the limitations of the road user who remains entirely responsible for respecting civic obligations and road traffic regulations. Authorities need to address road safety by introducing appropriate training from an early age. They must also continue to engage in road safety campaigns, nonetheless remaining aware that such campaigns have only short-term impacts on human behaviour.

4.3. The ‘forgiving’ road

Safe road design, the so-called ‘forgiving road’, minimises the consequences of road user errors and precludes those that might have disastrous consequences. The basic road design parameters should be tolerance and resistance of the human body to mechanical forces.

It is extremely important for road designers to take into account the low physical tolerance of the human body and integrate maximum protection for all road users. There should be no rigid structures, other dangerous elements, or unprotected zones directly adjacent to a road or highway. Where rigid structures exist, for example on bridges, safety features should be introduced to enhance road user protection. Features such as safety barriers should take into account the needs of all road users. The users of two-wheel vehicles such as bicycles or motorcycles are particularly vulnerable.

This implies that more responsibility for the structure and safe functioning of the RTS should be shifted to road designers with a view to improving the quality and expanding the capacity of road networks. IRF strongly encourages road authorities to involve experts in human behavioural sciences when designing new roads or modifying existing ones.

4.4. Highway design

The highway design adopted must be optimal for the case under consideration. Whilst IRF does not recommend that all trunk roads should be upgraded to motorway standard, it is nevertheless a fact that it is safer to drive on a motorway than on a two-lane or rural road.

4.5. High quality safety products

Installing and upgrading road safety features such as appropriate road surfacing, crash barriers, protection against road side obstacles, horizontal markings, vertical signs, delineators, signals and public lighting offer the road user the best possible protection, by using appropriate, high quality road equipment, accessories, materials and features. Equipment used should comply with regulations or, where none exist, to the highest industry standards.

It is the responsibility of both the legal authority and designer to ensure that equipment installed is selected according to its ability to protect the road user and not according to price level. All too often contracts are awarded solely on price. It is not the lowest but the best bid that should win. The buyer must have the flexibility to take into account technical advantages and lifecycle costs and an obligation to respect appropriate rather than minimum performance requirements.

To this end IRF believes that basic safety requirements in terms of vision and time response should correspond to those of a senior citizen.

4.6. Road funding

Road safety requires an appropriate level of road funding. Safety performance will not be improved if governments continue to allocate revenues from direct and indirect road taxes to the general treasuries. It is up to policy makers to ensure that adequate funds are dedicated to investment in roads and into road user mobility, education and training.

Funding should also be available for regular maintenance and upgrading to ensure the long-term performance of road safety features. Low-cost safety measures should be encouraged. These are low-cost improvements and low-cost treatments at accident black spots that can bring a major return on investment through a reduction of accidents. Adequate levels of maintenance funding should apply throughout the entire life-cycle of the infrastructure.

In addition to the above, a policy framework is needed to address the causes of accidents associated with all three principal elements of the RTS, i.e. the user, the vehicle and the infrastructure.

5. A Policy Framework

Policy may be considered as a mechanism for achieving a consistency of decision-making between the road owner and administrator. In the context of roads, policy provides a framework within which all decision-making in the sector is undertaken. At its simplest, policy may be considered as the *what* and the *why* relating to decisions in the roads sector ^[4]. Policy is primarily about outcomes and for roads is set at two main levels:

- Government level, where political aims are defined, and legislation and other instruments are adopted that force or encourage implementation of the policy.
- Organization (road administrator) level, where local policy is formulated to reflect national policy and to interpret this in the light of local circumstances; plans and procedures can then be put in place to implement this.

Policy is normally defined in terms of a ‘framework’ that may include:

- *Mission*, which defines the broad aims, through a summary definition of policy, and why the organization is aiming to achieve these.
- *Objectives*, which support the mission by setting specific goals to be achieved within defined time frames; normally objectives are required to be specific, measurable, achievable, relevant to the mission and time-based.
- *Standards*, which provide the detailed operational targets to be achieved by individual units in the organization, and are sometimes supported by legislation, regulations or decisions of the courts.

Although in practice policy frameworks are often defined much more loosely than this, Figure 1 shows a graphical representation of such a framework.

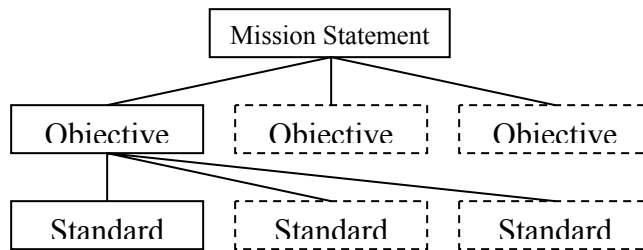


Figure 1 Structure of a policy framework (after ^[4])

The effectiveness of a policy may be assessed by means of performance indicators. They help to quantify the degree to which objectives have been achieved, and to identify any constraints that are impeding the achievement of objectives. Performance indicators differ from the normal operational statistics produced by a road administration as part of its everyday management activities. These relate to the impacts and perceptions by the ‘customers’ of the organization. As such, they are targeted externally. Indicators consist typically of a few selected operational statistics that characterize performance in a way that customers can relate to and understand. Normally, they relate to key objectives from the policy framework. One use of performance indicators is as targets in an agency or service-level agreement between the road administration and its parent ministry. Such performance indicators should be associated with, and concern, the road user, the organisations involved in road safety, the society, the political authorities and the environment ^[6].

With regard to a road safety policy framework IRF feels that the following checklist should be considered ^[1]:

1. *Commitment*
Governments should assign a high priority to prevention of road traffic death and injuries in their policy statements and mobilize resources and political commitment.
2. *Dedicated Funding*
Governments should develop sustainable funding for road safety through dedicated funds. Highway engineers must be ensured of funding for maintenance during the entire life cycle of the infrastructure.
3. *Sustainable solutions*
Priority should be given to long-term sustainable road safety measures carried out in accordance with strict environmental protection principles.
4. *Supportive measures*
Road safety and civic responsibility training should be carried out from an early age. Governments must also continue to encourage road safety campaigns, nonetheless remaining aware that such campaigns induce only short-term modifications of behaviour.
5. *Cross border cooperation*
Possible confusion in interpretation of road signing should be reduced to a minimum through cross border cooperation and standardization.
6. *Partnerships*
Partnerships must be formed at local, national and international levels to bring together transportation engineers, law enforcement bodies, industrialists and other interested parties such as paramedical emergency services.
7. *Dissemination of know-how*
Efficient road safety concepts should be disseminated amongst countries. Solutions must be carefully adapted to national and local conditions.

8. Implementation by means of the Management Cycle

To implement such a policy a high level plan or set of plans is needed. Such plans form a strategy. Strategy may be considered as the *how*, *who*, *where* and *when* relating to decisions in the roads sector. Thus, strategy is about 'process' and subsequently it may be facilitated by the *management cycle* (see Figure 2).

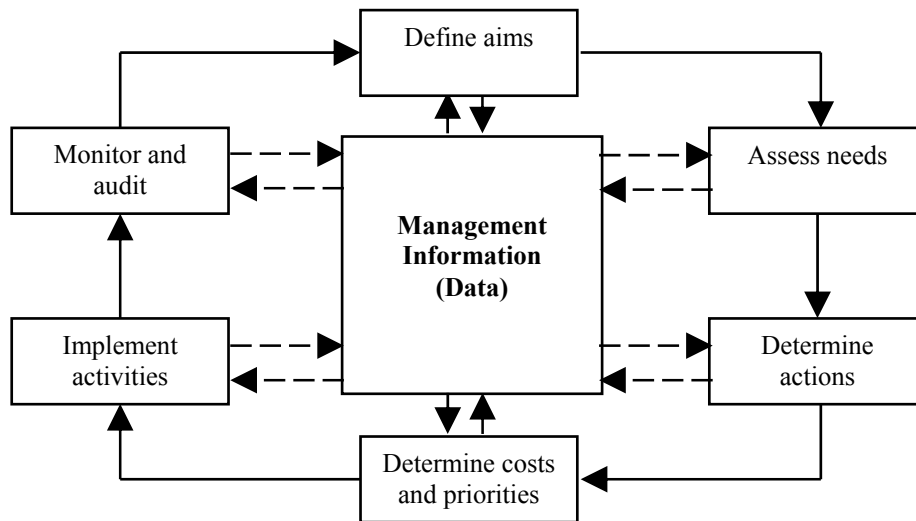


Figure 2 The management cycle (after ^[5])

The management cycle is a concept that specifies a series of well-defined steps of comprehensive decision-making activities by:

- Defining the goals being sought in connection with the policy framework considered.
- Assessing the current needs by means of data being collected to establish the gap between the present level of standards and that set out in the aim being sought.
- Determining actions to achieve the goals being sought.
- Determining costs and priorities of the alternative actions through a rational system.
- Implementing activities to predefined standards.
- Monitoring to learn from past experience and auditing to provide a physical check that the work has been carried out according to quality control procedures.

At the core of this process there exist data that enable rational decision-making.

Such a management cycle has more than one applications ^[5] but it would be advantageous if it were followed for the implementation of a road safety strategy. By using this management cycle all stakeholders involved in road safety could have a common reference framework to coordinate their roles and responsibilities both internally and externally (that is between them).

9. Concluding Summary

This paper has outlined the IRF's views on road safety. Furthermore it presented a reference framework for the implementation of road safety policy. The main conclusions may be summarized as follows. Road safety

- must focus on the road users and protect them from human errors
- must not overlook the importance of both the road infrastructure itself and its maintenance to the reduction of accidents
- should receive adequate funding
- should follow a policy that engages all stakeholders concerned in a coordinated set of actions
- should be based on a rational managerial approach.

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11. References

- [1] IRF. *Safe Mobility An IRF discussion paper*, International Road Federation, Geneva 2003
- [2] BERNHARD MICHAEL, '*Please! Stop blaming the driver!*', *World Highways*, October 2003, pp 43.
- [3]
http://www.irfnet.org/onlinecenter/include/service/7/data/80/safety_in_road_tunnels.htm, accessed on 21 September 2005.
- [4] ROBINSON R, *Restructuring Road Management*, Notes, Week 2, Senior Road Executives Programme 2005, University of Birmingham, UK.
- [5] ROBINSON R, U DANIELSON AND M SNAITH, *Road maintenance management: concepts and systems*. Basingstoke: Palgrave (formerly Macmillan Press), 1998
- [6] ROAD INFRASTRUCTURE MAINTENANCE EVALUATION STUDY (RIMES), *Final Progress Report*, for EC-DG-VII RTD Programme, Contract No. RO-97-SC 1085/1189, University of Birmingham, UK, 1999