ROAD SAFETY MANUAL

A MANUAL FOR PRACTITIONERS AND DECISION MAKERS ON IMPLEMENTING SAFE SYSTEM INFRASTRUCTURE

KEY MESSAGES FOR MANAGERS

This manual is designed to be a comprehensive, state-of-the-art international reference document that can assist all countries in fulfilling key objectives. The focus is on guiding the management of the safe planning, design, operation and use of the road network in low, middle and high-income countries. The manual highlights effective management and policy frameworks, technical references and provides overall guidance on the management of interventions to achieve results.

The Manual is organized into three parts with twelve chapters:

- Part 1: Strategic Global Perspective;
- Part 2: Road Safety Management;
- Part 3: Safe Planning, Design, Operation and Use of the Road Network.

Each chapter contains a list of key messages to senior managers and decision-makers. All these key messages are gathered together here in a single document.

1. Scope of the Road Safety Problem

Key messages

- Road traffic injury is a major global public health problem. Rapid motorisation in low and middle- income countries (LMICs) along with the poor safety quality of road traffic systems and the lack of institutional capacity to manage outcomes contribute to a growing crisis.
- Every year, around 1.19 million people are killed on road around the world and about 50 million are injured. These are mainly in LMICs, amongst vulnerable road users and involve the most socio- economically active citizens.
- Road traffic injury is the leading cause of death globally for children and young people aged 15–29. Without urgent action, it is forecast that road traffic injury will be the 7th leading cause of death for all by 2030.
- In socio-economic terms, countries around the world are paying a high price for motorised mobility. Road traffic deaths and injuries in low-and middle-income countries are estimated to cause economic losses of up to 5% of GDP compared to an estimated global average of 3% of GDP.
- Death and serious injury from road crashes are preventable if crash energies are managed so that they do not exceed human tolerances for serious and fatal injury, and this is accomplished with effective, results-focused and resourced road safety management.
- Safe System goals and strategies focus on providing a road traffic system free from death and serious injury.
- Safe System guides the planning, design, management, operation and use of the road traffic system to provide safety in spite of human fallibility. It places a shared accountability across all elements of the system.
- Preventing road trauma on public roads and in the course of work is a core responsibility for government, its agencies and employers and requires shared responsibility and leadership.
- The scale of the road safety challenge and the diversity of the effects of road traffic injury underline the importance of exploring synergies with other societal goals and priorities.
- A second UN Decade of Action for Road Safety 2021–2030 has been announced with an ambitious global target and plan to reduce road traffic deaths and serious injuries by at least 50% by 2030.

2. Key developments in road safety

Key messages

- Road safety is an urgent international development priority in view of the growing humanitarian crisis of road traffic injury in low- and middle-income countries.
- Road safety is being linked with the broader vision of sustainable development through the 2030 Agenda for Sustainable Development and Sustainable Development Goals.
- In support of the UN Decade of Action for Road Safety 2021–2030, a Global Plan has set a highly ambitious goal ‘to reduce road deaths and injuries by at least 50% by 2030. The Global Plan describes what is needed to achieve that target and calls on governments and partners to implement an integrated Safe System Approach.
- A set of 12 voluntary Global Road Safety Performance Targets has been developed to help guide and monitor the combined efforts of individual countries towards the global objectives.
- International development organisations concerned with transport and health are promoting the paradigm shift to the ethical Safe System goal and strategy, which involves zero tolerance of the traditional trade-off between mobility and serious and fatal road injury.
- Safe System is seen as particularly relevant for LMICs since it addresses the human vulnerabilities of all road users. It aligns with a range of international development goals and public policies for sustainable transport, occupational health and safety, child welfare, and social equity.
- International development agencies emphasise that long-term governmental ownership and leadership is required. Political interest needs to be translated into ambitious long-term goals, step- wise targets, and provision of appropriate human and financial resources.
- The safe planning, design, operation and use of the road network is recognised as a fundamental intervention strategy and the prime focus of this manual.

3. The Road Safety Management System

Key messages

- Preventing death and serious injury in road crashes requires a systematic, planned response, led by an appropriately resourced and accountable governmental leadership.
- Countries with the safest road networks have demonstrated political will by targeting better road safety outcomes, adopting and funding a systematic, evidence-based approach to intervention, and ensuring key organisational arrangements are in place.
- Addressing the Safe System goal means a shift in focus in road safety management from crash prevention to death and serious injury prevention since all humans make mistakes and crashes are inevitable.
- Intervention to improve speed management, the intrinsic safety of vehicles, the road environment, and the efficiency of the emergency medical system, all have a major role to play in addressing this new Safe System focus.
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- Interventions need to be evidence-based, noting that not all interventions offer the same benefits and while some may be highly effective there are some interventions that may not be effective at all, or in some cases actually increase risk.
- An effective road safety management system covers three linked elements: institutional management functions, interventions and results. Each element is periodically reviewed against successful international practice to address challenging and ambitious road safety goals.
- All countries should ensure that an effective road safety management system is in place. LMICs need to strengthen their road safety management systems to bring challenging levels of death and serious injuries under control, as do HICs when seeking more ambitious results.
- International ISO standard provides a potentially useful tool for organisations of all sizes in the development of road safety management systems and for engaging employers in work-related road safety.
- Critical issues are how to build capacity through institutional reforms; how to accelerate knowledge transfer and learn from previous experience; how to increase investment; and how to increase international cooperation and development aid support (for LMICs) sustainability.
- Essential road safety management tools are available to help jurisdictions and organisations as well as international aid agencies in building capacity. International professional networks play a key role in helping to build knowledge and assist implementation.
- A practical two-step process is outlined in national guidance for countries wishing to improve their results. This starts with a road safety management capacity review and the specification of an investment strategy leading to Safe System project design and implementation.
- To produce rapid results, road safety programmes and projects must initially target high concentrations of crash deaths and serious injuries on sections and areas of the road network where the biggest gains can be made.

4. The Safe System Approach

Key messages

- The Safe System approach is the most effective way of considering and responding to fatal and serious casualty crash risks on a network.
- This approach is based on an ethical position where it can never be acceptable that people are seriously injured or killed on the network. It provides a set of design and operating principles to guide action on the journey to the long-term elimination goal.
- The long-term Safe System goal is the elimination of death and serious injuries on a country's roads.
- The Safe System is being adopted by an increasing number of countries and forms the basis for the UN Decade of Action for Road Safety.
- The Safe System requires strong governmental leadership, as well as the engagement of a wide range of sectors.
- The prime responsibility of a road authority and other agencies is to support road users to reach the end of their trips safely.
- The Safe System approach compels system designers to provide a safe environment, and to consider the combined system as the major factor in crashes rather than the traditional approach that placed most responsibility for safety on the road user.
- A focus on key crash types occurring on a network helps to identify the role and intervention options for each Safe System element.
- System-wide intervention strategies are required to avoid fatal and serious injury crash outcomes, including emergency medical care for crash victims.
- There is a shared responsibility between system designers (who design and operate the roads) and road users, for safe travel outcomes on the road network.
- The Safe System approach compels system designers to provide an safe environment, and to consider the combined system as the major factor in crashes rather than the traditional approach that placed most responsibility for safety on the road user.
- The system design and operation must become forgiving of routine human (road user) error.
- The Safe System framework developed by ITF - World Bank provides a mechanism to help identify the current level of Safe System progress, which can be applied to a project, region, country, or organisation, as well as to interventions and activities.

5. Effective Management and Use of Safety Data

Key messages

- The establishment and ongoing support of road safety data systems is critical to the effective management of road safety in all countries.
- A lack of accurate data has a serious impact on the effective management and delivery of positive road safety outcomes. The issue of under-reporting in many countries needs to be addressed. Guidance is available on how to improve this accuracy.
- Safety data is used for identifying the size of the road safety problem, analysis of problems, development of strategy, identification of solutions, for advocacy, and monitoring, analysis and evaluation.
- Key safety data includes exposure data (e.g. traffic volume, population data), final outcome data (e.g. deaths and injuries), and intermediate outcome data (e.g. average speeds, protective equipment fitment and use, level of drinking and driving, network and vehicle safety quality).
- Countries that do not collect this data need to commence this process as a priority. In the meantime, crash injury and survey data should be collected on high-risk routes (e.g. high volume roads with a recognised fatal and serious injury problem).
- Detailed guidance is available on how to establish and improve crash data systems, including the assessment of existing data sources, development of a crash report form, engagement with key stakeholders, development of a crash data system, and ensuring the quality of this data.
- Other data is also important for assessing and addressing road risk. There is an increasing awareness of the importance of road asset data (information on safety related road and roadside design elements and features). Where high quality crash data does not exist, this information can be used to identify and treat high risk locations.
- Integration of different sources of safety data can lead to a more comprehensive understanding of the road safety problem, and a greater ability to put effective actions in place to address this problem.
- Accurate and comprehensive road safety data can be used by many stakeholders to help improve road safety.

6. Road Safety Targets, Investment Strategies, Plans and Projects

Key messages

- Adoption of a Safe System goal for the long-term, supported by short- and medium-term quantitative targets provides the focus for achieving better performance.
- To achieve good performance, a strong linkage between road safety agencies and elected members and Ministers in a country is essential.
- Competent data collection and analysis of risk using the collected data is a precondition for target-setting.
- An assessment of a country's road safety management system is appropriate to consider the achieved results, the scope and quality of applied interventions, and the efficiency of institutional management capacity.
- Intervention selection should be guided by evidence of its likely effectiveness, assessment of likely community and government support, and whether the country has the capacity to implement it.
- Implementation also requires identifying what changes to current operating practices within agencies will be required, what impacts of actions on other policy areas will need to be addressed, and the level of capacity needed to achieve successful implementation progress.
- Funding and implementation of a demonstration project to build capacity in LMICs is strongly recommended as a first step. This will enable later-stage target setting, strategy/action plan assembly and targeted outcome delivery to be achieved as successful demonstration project approaches are then rolled out across the country.
- The demonstration project should treat a high-risk corridor with a complete range of interventions across the road safety agencies, review selected policies, establish project management arrangements, and monitor outcomes to establish progress.
- The demonstration project will develop capacities within agencies in LMICs (i.e. strong bureaucratic and political linkages; improved advocacy; strengthened road safety management, leadership, and coordination; and extended technical knowledge).
- Strategies for the later growth and consolidation investment phases should be evidence-based, and actions should be data-driven.
- It is recommended that time-limited targets for these investment phases be ambitious, but realistic. Substantial legislative actions will be an important vehicle to support policy change as part of medium-term strategy.

7. Roles, Responsibilities, Policy Development and Programmes

Key messages

- The government through the road authority has responsibility for the provision of safe infrastructure and safe operation of the road network. In some countries, the road authority also carries out the lead agency function.
- Legislated safety-related roles and responsibilities should be clearly set and state the Safe System principles the authority seeks to operate under, as well as its strategic objective for implementing a Safe System approach.
- Implementation of a Safe System approach requires a fundamental change in the way the authority addresses safety risk on the network. To support this change management challenge there will be a requirement for structured training.
- Embedded in the Safe System approach are processes, procedures, policies, guidelines and tools that are applied to new works, maintenance, operations and retrofitting of the existing network.
- Formalise how the Safe System objectives are considered during project development for safety, traffic management and asset management purposes, as well as operational and cost efficiency.
- Formalise the manner in which a road authority applies its policies to its operations, to include measures of performance against those policies and expected outcomes. (e.g. a network safety management system).
- Acquire or refine legislative powers that provide road authorities, in consultation with the local authority and community, the ability to impose restrictions on access to/from new or existing developments, where these are deemed to be unsafe.

8. Design for Road user Characteristics and Compliance

Key messages

- ‘Human Factors’ is a well-established scientific term in use since the 1930s by the safety community of man-machine-interaction. Human Factors is defined as those psychological and physiological threshold limit values that are verified as contributing to operational mistakes in machine and vehicle handling.
- Unless roads are designed and managed to take account of Human Factors, it is unlikely that a Safe System can be achieved.
- Speed management is one key step towards creating a Safe System. Speeds are the result of road design and the resulting subconscious choices made by road users. Speed can be heavily influenced by the number of contrasts in the periphery of the field of view (e.g., by signs and markings), by the size of the visible road surface and the distance of the fixation point in the depth of the field of view.
- Two additional and until yet not systematically practiced key steps are the management of the field of view and the pre-programming of driver expectations. That's why road engineers have to be trained in psychological basics of activity regulation (perception, cognitive processing and motor response).
- A skilful combination of design elements can create ‘self-explaining’ roads where appropriate actions, including speed choice, are obvious to road users. Self-explaining roads lead road users to behave in a way that road planners and designers expect, thereby resulting in low crash rates.
- In addition to road design, a range of techniques for directly influencing road user behaviour are available, including education, publicity, in-vehicle technology and enforcement.
- Good practice in each of the above areas is now well-understood, and guides to good practice are available.

9. Infrastructure Safety Management: Policies, Standards, Guidelines and Tools

Key messages

- Improvements to infrastructure can contribute substantially to reductions in death and serious injury. Many high severity crash types can be eliminated with the effective use of infrastructure. This includes crashes that are thought to be caused by human error and non-compliance.
- Few infrastructure investments produce such high benefits as infrastructure measures targeted at making road safety improvement.
- Road infrastructure is often the single most significant factor that contributes to the severity outcome of a crash.
- Clear and defined policies relating to the delivery of Safe System infrastructure are required to drive road safety improvements.
- Good examples of infrastructure policy can be found. Benchmarking against good practice should be undertaken to identify required changes in policy. Care should be taken when borrowing policy from other countries to ensure that it is fit for local conditions. However, there are a number of universal approaches that are applicable.
- Standards, guidelines and tools are a mechanism to translate policy into action. Without linking to policy, such documents and tools can be reactive, and delivery of safe infrastructure can lack structure and direction.
- Guidelines to assist in the implementation of infrastructure policy exist. These can be used to assist in the delivery of Safe System infrastructure, although they will need to be adapted for local conditions. Such guidelines require constant review and update based on good practice.
- The occurrence of key crash types on high risk routes can be reduced through effective infrastructure treatments. For those just starting to address safety, corridor demonstration projects are a very effective way to improve safety.
- A number of tools are available to help implement safe infrastructure. An overview of tools is provided in this chapter, while details can be found in **Chapter 10. Assessing Potential Risks and Identifying Issues** and **Chapter 12. Monitoring, Analysis and Evaluation of Road Safety**.

10. Assessing Potential Risks and Identifying Issues

Key messages

- Assessment of risk should be undertaken for the entire road network for which the road agency is responsible. In many countries, a small percentage of roads account for a large percentage of deaths and serious injuries. At programme level, the task is to identify such routes and address these as a priority.
- There are established approaches for identifying high risk crash locations – but training of key staff is required.
- For existing road networks, where data is available, reactive approaches based on crash data assessment should be undertaken to identify high risk locations. To identify crash-based locations good crash data covering a period of at least 3 years is required.
- Proactive approaches should also be adopted – especially for major road corridors – including impact assessment, road safety audit, safety inspection, and road assessment programmes.
- Where crash data is not available, proactive approaches must be adopted while collection of crash data commences.
- Proactive approaches should be used in combination with reactive approaches when they are applicable. This combination of approaches provides a full assessment of road safety risk.

11. Intervention Selection and Prioritisation

Key messages

- Once high-risk locations have been identified, appropriate interventions must be assessed and selected to address this risk.
- Prioritisation of appropriate road safety interventions requires an economic assessment, such as the cost-benefit analysis.
- Effective road infrastructure interventions are available to help address road safety problems, regardless of the cause. These can reduce the likelihood and/or severity of a crash. Some interventions can almost eliminate death fatalities and serious injury injuries, while others provide more limited (or incremental) improvements.
- Interventions should be designed to address risk at a specific location, routes or across the whole road network.
- Detailed information is available on effective interventions and when these should be used implemented, including for those in useful for LMICs.
- Interventions can be selected based on the expected reduction in injury injuries and fatalities, but other factors should also be considered when selecting interventions.
- Once appropriate locations have been identified, there is a need to assess which combination of interventions and/or locations will produce the greatest reduction in fatal and serious injuries for the budget available.
- Economic assessment should be undertaken to identify the most cost-effective use of resources. The process for this is well established, including for LMICs, and tools are available to assist in this task, which can be implemented in the context of LMICs as well.

12. Monitoring and Evaluation of Road Safety Interventions

Key messages

- Monitoring, analysis and evaluation are often overlooked, but are essential for the effective management of road safety.
- Monitoring refers to the systematic collection of data regarding the performance of a road safety programme or intervention during or after its implementation. Analysis involves the study of data in order to interpret it and its parts, such as determining the contributing factors to crashes. Evaluation involves the analysis of this data to determine the effect of the treatment or program, or to compare locations.
- There is a requirement to constantly monitor progress against road safety targets (intermediate and outcome).
- There is also a need to monitor, analyse and evaluate the effectiveness of infrastructure interventions. There are currently many gaps in knowledge regarding the effectiveness of interventions, especially in LMICs.
- Techniques and tools are available to help in this important task.