Global Roadmap of Action Toward Sustainable Mobility

PAPER 5 | Safety

SUSTAINABLE mobility FOR ALL™

Internet: http://www.sum4all.org

Standard Disclaimer

This publication was produced by the Sustainable Mobility for All (SuM4All™) initiative. The findings, interpretations, and conclusions expressed in this paper do not necessarily reflect the views of the Boards of the SuM4All members or the governments they represent. SuM4All does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of SuM4All or its members concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Rights and Permissions

Translations

If you create a translation of this work, please add the following disclaimer along with the attribution: This translation was not created by Sustainable Mobility for All. SuM4All shall not be liable for any content or error in this translation.

Copyright Statement

ISBN: 978-1-7341533-5-4

GLOBAL ROADMAP OF ACTION

Toward Sustainable Mobility

SAFETY

TABLE OF CONTENTS

List of Figures

List of Boxes

List of Tables

LIST OF ACRONYMS

ADB	Asian Development Bank
ADREP	Accident/Incident Data Reporting
AFDB	African Development Bank
ANSV	National Road Safety Agency
APEX	Airport Council International Airport Excellence
ASIAP	Aviation Safety Implementation Assistance and Partnership
BIGRS	Bloomberg Initiative for Global Road Safety
BMZ	German Federal Ministry for Economic Cooperation and Development
CAA	Civil Aviation Authority
CAF	Development Bank of Latin America
CARE	Community Road Accident Database
CCTV	Closed-circuit television
COSCAPs	Corporations development for Operational Safety and Continuing Airworthiness Programs
DGT	Directorate-General for Traffic
EASA	European Aviation Safety Agency
EC	European Commission
EI	Effective Implementation
EIB	European Investment Bank
ELCF	European Level Crossing Forum
EMSA	European Maritime Safety Agency
ETSC	European Transport Safety Council
EU	European Union
FIA	Fédération Internationale De l'Automobile
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GDP	Gross Domestic Product
GISIS	Global Integrated Shipping Information System
GMR	Global Mobility for All
GRA	Global RoadMap of Action

GRSF	Global Road Safety Facility
GTKP	Global Transport Knowledge Partnership
GTR	Global Traffic Regulation
IATA	International Air Transport Associations
ICAO	International Civil Aviation Organization
ILCAD	International Level Crossing Awareness Day
IMO	International Maritime Organization
iRAP	International Road Safety Programme
IRF	International Road Federation
IRTAD	International Road Traffic and Accident Database
IRU	International Road Transport Union
IsDB	Islamic Development Bank
ISO	International Organization for Standardization
iSTARS	Integrated Safety Trend Analysis and Reporting System
ITF	International Transport Forum
LAC	Latin America And Caribbean
LEZ	Low Emission Zones
LMIC	Low- And Middle-Income Countries
MARPOL	Maritime Pollution
MCGM	Municipal Corporation of Greater Mumbai
MDBs	Multilateral Developments Banks
NACTO	National Association of City Transportation Officials
NCAP	New Car Assessment Programme
NCLB	No Country left Behind
NRSO	National Road Safety Observatory
OECD	Organization for Economic Co-operation and Development
PAHO	Pan American Health Organization
PANS	Procedures for Air Navigation Services
PIARC	World Road Association (Permanent International Association of Road Congresses)
PIRGs	Planning Implementation Regional Groups
PPPs	Public Private Partnership
RAMS	Reliability, Availability, Maintainability and Safety
RASG	Reginal Aviation Safety Group
RPAS	Remotely Piloted Aircraft System
RSCMR	Road Safety Management Capacity Review
RSOOs	Regional Safety Oversight Organizations

RSPR	Road Safety Performance Review
SAFA	Safe Assessment of Foreign Aircraft
SAFE	ICAO Safety Fund
SAFER-LC	SAFER Level Crossing
SARPS	Standards And Recommended Practices
SDGs	Sustainable Development Goals
SMART	Specific Measurable Action-Focused Realistic and Time-Bound
SMS	Safety Management
SOLAS	International Convention for Safety of Life at Sea
SSCs	Significant Safety Concern
SSP	State Safety Programme
STCW	The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
STRADA	Swedish road traffic crass and injury surveillance system
SuM4All	Sustainable Mobility for All
TA	Technical Support
TEN-T	Trans- European Transport Network
TNCs	Transport Networking Companies
TOD	Transit-Oriented Development
UIC	International Union of Railways
UN	United Nations
UNASEV	Unidad Nacional de Seguridad Via
UNECE	United Nations Economic Commission for Europe
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNESCAP	The United Nations Economic and Social Commission for Asia and the Pacific
UNRSC	United Nations Road Safety Collaborations
UNRSTF	United Nations Road Safety Trust Fund
USOAP	Universal Safety Oversight Audit Programme
WB	World Bank
WGI	Worldwide Governance Indicators
WHO	World Health Organization
WRI	World Resources Institute

FOREWORD

Sustainable Mobility for All (SuM4All) is an umbrella platform that brings together 55 public and private organizations and companies with a shared ambition to transform the future of mobility. Its unique value lies in bringing key influential actors to work together. It serves as the principal platform for international cooperation on sustainable mobility, a center of excellence, and a repository of policy, knowledge and resource on sustainable mobility. Its mission is to play a leading role in the ongoing transformation of the global mobility system, and support countries in their transition towards sustainable mobility.

Established in 2017, SuM4All's first task at hand was to find common ground on what countries wanted to achieve. We all agreed that transport was a key contributor to economic development and core to people's quality of life. We also agreed that the transport that we have is not the transport that we want—congestion in cities, segregation among rural and urban communities, carbon emissions, air and noise pollution, and traffic mishaps that are symptomatic of a systemic problem with mobility. We set our ambition high for the mobility of the future: we need an equitable, efficient, safe and green mobility.

The consensus on what sustainable mobility meant set us on our next task to establish the imperative for action. The Global Mobility Report 2017 benchmarked countries' performances on mobility relative to four policy goals. The findings of that report were alarming: not a single country in the world—developed or developing—has achieved sustainable mobility.

With evidence at hand, SuM4All embarked on a major drive in 2018 to develop a comprehensive policy framework to assist decision makers in cities and countries as well as practitioners at development banks to identify gaps, necessary steps, and appropriate instruments to attain the Sustainable Development Goals, and improve the sustainability of their transport sector.

We are pleased to share the outcomes of these efforts that embody the collective knowledge of all its members and more than 180 experts, and feedback from more than 50 public decision makers and 25 large private corporations. The Global Roadmap of Action builds on six policy papers, including this Safety paper, whose content is made accessible and usable to all in a web-based tool for decision making.

Sustainable Mobility for All Steering Committee
(On behalf of our 55 Member organizations)
July 2019, Washington, D.C.

ACKNOWLEDGMENT

This paper on one of the four policy goals of sustainable mobility, namely "Safety", was prepared by the working group led by Nhan Tran (WHO) and Walter Nissler (UNECE), with inputs from Raymond Soames Job (WB), Antonio Avenoso (ETSC), Claudia Adriazola-Steil (WRI), Dipan Bose (WB), Fred Wegman (Delft University), Hilda Gomez (CAF), Henry Gourdji (ICAO), James Bradford (iRAP), Julio Urzua (iRAP), Melecki Khayesi (WHO), Lukasz Wyrowski (UNECE), Maria-Teresa Sanz-Villegas (European Commission), Marisela Ponce de Leon (ADB), Maria Segui-Gomez (FIA Consultant), Marc Shotten (WB), Maria Marcela Silva (WB), Priti Gautam (UNECE), Per Mathiasen (EIB), Ricardo Sanchez (UNECLAC), Rob McInerney (iRAP), Eugenia Rodrigues (PAHO), Susanna Zammataro (IRF), Saul Billingsley (FIA Foundation), Victor Aragones (WB), Veronique Feypell (ITF), Yohan Senarath (WB), Thanattaporn Rasamit (UNESCAP), Arseno Domingu (IMO), Ana Maria Pinto (ADB), Ahmed Al Qabany (ISDB), Alejandro Furas (Latin NCAP), Haldane Dodd (ATAG), Fotini Ioannidou (European Commission), Gima Bezabeh (AFDB), Hun Ki Lee (ADB), Jorge Kogan (CAF), Marco Merens (ICAO), Mark Clintworth (EIB), Omar Davis (ISDB), Rodrigo Caudullo (UNASEV), Tom Bishop (AMEND), Thilly De Bodt (ICAO), Shaw Voon Wong (Universiti Putra Malaysia), Abdulgafoor M. Bachani (consultant) and Jeanne Breen (consultant)

Finally, the team would like to acknowledge the financial support of the World Bank and the German Federal Ministry for Economic Cooperation and Development (BMZ) for the production of this paper.

EXECUTIVE SUMMARY

Safe mobility is a fundamental principle of sustainable transport, and it is widely acknowledged that deaths and serious injuries resulting from transport crashes and incidents are largely preventable. While a safe mobility paradigm is needed across all modes, fundamental differences exist between road transport and other modes. Modes differ in their safety performance and with respect to the proactive, regulatory, and operational frameworks more evident in the non-road transport modes. The risks also vary widely between and within different transport modes.

Road transport is often described as an open system involving a larger number of responsible sectors as opposed to the opportunities for the more closely managed systems in air, rail, and maritime modes. Estimates indicate that road crashes contribute 97 percent of all global deaths resulting from transport crashes and incidents, with most road deaths occurring in low- and middle-income countries (LMICs). The sustainable development goals (SDGs) which directly relate to transport are concerned with road safety, thus highlighting safety as the priority transport concern.

While the Global Mobility Report (GMR 2017) announced a general objective to improve the safety of mobility by avoiding fatalities, injuries, and crashes across all modes of transport, no global overarching long-term goals exist for transport safety. The GMR 2017 did, however, propose a target to halve the number of global deaths and injuries from road traffic accidents by 2020 (SDG target 3.6), and to reduce by 5 percent the fatalities in rail, maritime and air transport. A long-term goal is important since it signals that the levels set for interim targets are not acceptable but are milestones on a path to the only acceptable, albeit long-term, outcome of zero death and serious injury.

The last 15 years has seen unprecedented agreement on road safety between international and national agencies and organizations about understanding the key road safety problems and the means of addressing them. However, a gap needs to be closed between what is known to be correct and effective, and what is actually practiced and accepted.

Air transport has seen a continuous reduction in the number of fatal crashes and incidents, and some regions have begun to experience zero fatalities. One of the biggest challenges in air transport is how to achieve or maintain an ultimately safe system knowing that traffic is continually increasing, and new actors such as remotely piloted aircraft systems (RPAS) are entering the aviation system.

The safety performance on railways has also improved in the last 20 years. The main challenges faced by rail transport are two-fold: i) collecting and analyzing worldwide information on rail transport, including the number of incidents, victims, and location of crashes; ii) improving safety measures for cars and at pedestrian crossings, anticipating urban expansion.

A detailed, integrated global safety path inclusive of all modes is challenging to outline, not only because of differences mentioned previously, but also on account of the lack of available key data to inform specific intervention and implementation needs to prevent and mitigate death and serious injuries for transport users.

Transport safety must be produced from a planned, systematic, results-focused response that considers the results to be achieved, the selection of interventions needed to achieve results, and the broad scope of institutional delivery and cooperation that provide the foundation for activity. Experience shows that approaches which fail to consider each of these elements and their linkages are likely to be unsuccessful. Key areas of action include: regulatory and institution-

al agreements; building leadership; building essential capacity to allow goals and targets for projects and programs to be addressed; accelerating knowledge transfer; scaling up investment for transport safety; and continuing international cooperation to improve safety in all modes of transport.

Countries need to work on and meet safety goals and targets. Further work and cooperation are required to establish firmly knowledge and pragmatic guidance, increase investments, reinforce work that is already delivering results, and address challenges and opportunities provided by further automation and other developments. Without strengthened institutions, better data, accelerated knowledge creation and transfer, plus scaled-up investment and increased international cooperation and development aid, ill-prepared LMICs are likely to be overwhelmed by the sheer scale and rapid spread of the crises of death and serious injury on the road.

1. POLICY GOAL DEFINITION

1.1. Background and context

Safe mobility is a fundamental principle of sustainable transport, and it is widely acknowledged that the loss of life and serious injury resulting from transport crashes and incidents are largely preventable[1]. Most of the burden of death and serious injury in transport crashes and incidents is borne by road transport; reliable estimates indicate that road crashes contribute 97 percent of all global deaths resulting from transport crashes and incidents, with most road deaths occurring in low and middle income countries (LMIC).[2]

The safe system approach comprises a long-term goal, interim targets, key safety performance objectives and intervention strategy aimed at the prevention and reduction of death and serious injury, and is the continuing theme and recommendation throughout this paper. The approach, outlined in later sections, provides a synthesis of current scientific knowledge and best practices, and addresses societal ambition and expectation for transport safety. The approach is recommended by a wide range of international organizations to all countries regardless of transport mode, regional and national safety performance or socio-economic status.

Road safety stands in need of a fundamental shift in approach away from personal responsibilities for crashes and their outcomes, and directed to the responsibility of those who plan, design and operate the road traffic system creating safe environments for use. Unlike other modes of transport (aviation, maritime, railway) considered in this paper, road transport implements a safe system approach much less effectively. Only when transport systems are designed to tolerate common human error and take better account of human tolerance to injury thresholds can a sustainable safe system be achieved for transport. The collection and reporting of better road safety data at global level are a work in progress, and important steps forward have been achieved by the World Health Organization (WHO) and its partners, the European Union (EU) and the International Transport Forum (ITF), through its international road traffic and accident database (IRTAD) group on international road traffic safety data.

The aviation sector has established an advanced data reporting system[3] on fatalities and injuries, and reports annually. The International Maritime Organization (IMO) uses the global integrated shipping information system (GISIS) to collect information on marine casualties and incidents. Reporting administrations submit marine safety investigation reports to the IMO on maritime safety. Less progress has been made in global mapping of rail deaths and serious injuries. At the regional level, the EU Agency for Railways established common safety targets based on safety indicators. These targets are specific and well described for each country as well as collectively for the EU.

One of the challenges for the future, notwithstanding the progress being made, is to ensure that every mode of transport measures safety with accurate, timely and high quality data on fatalities and serious injuries, and with sufficient information to identify the circumstances and key factors that influence the occurrence of transport crashes and incidents and their consequences on fatal and serious injuries.

1.2. Interim quantitative targets

The sustainable development goals (SDG) target 3.6 is "by 2020, halve the number of global deaths and injuries from road traffic". Given that the target period ends in just over a year and that it is unlikely to be met as the United Nations (UN) resolution notes, new interim targets to 2030 are proposed.

- Halve the number of global deaths arising from road traffic crashes, and provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons.
- Reduce by 10 percent the human fatalities in rail and maritime modes.
- Achieve zero deaths in commercial passenger aviation.

The serious risk is that, without a new fatality reduction target, the safety performance will be weakly measured and consequently, poorly managed. A new target will reinvigorate the transport safety ambition of the SDGs and will provide a framework for accountability and action.

1.3. Key safety performance fields and objectives

The sole use of "deaths and serious injuries" in performance frameworks is increasingly understood as being insufficient for several reasons. A change in the number of deaths and serious injuries in the short-term does not necessarily reflect a change in the long-term. The reporting of crashes and injuries in official statistics may be incomplete; totals of death and injury provide neither information about the processes that produce them nor the inherent dangers in traffic systems, where serious or fatal crashes may not have yet occurred. [4]

A promising start was made in the setting of 12 highly ambitious voluntary global targets for road safety which include institutional delivery elements as well as interventions (table 1.1).[5] [6]Critical success factors

Table 1.1: Voluntary Targets agreed by the UN Member States (2017)

Target 1:	By 2020, all countries establish a comprehensive multisectoral national road safety action plan with time-bound targets.
Target 2:	By 2030, all countries accede to one or more of the core road safety-related UN legal instruments.
Target 3:	By 2030, all new roads achieve technical standards for all road users that take into account road safety, meet a three-star rating, or better.
Target 4:	By 2030, more than 75% of travel on existing roads is on roads that meet technical standards for all road users that take into account road safety.
Target 5:	By 2030, 100% of new (defined as produced, sold or imported) and used vehicles meet high quality safety standards, such as the recommended priority UN Regulations, Global Technical Regulations, or equivalent recognized national performance requirements.
Target 6:	By 2030, halve the proportion of vehicles traveling over the posted speed limit and achieve a reduction in speed-related injuries and fatalities.
Target 7:	By 2030, increase the proportion of motorcycle riders correctly using standard helmets to close to 100%.
Target 8:	By 2030, increase the proportion of motor vehicle occupants using safety belts or standard child restraint systems to close to 100%.
Target 9:	By 2030, halve the number of road traffic injuries and fatalities related to drivers using alcohol, and/or achieve a reduction in those related to other psychoactive substances.
Target 10:	By 2030, all countries have national laws to restrict or prohibit the use of mobile phones while driving.
Target 11:	By 2030, all countries to enact regulation for driving time and rest periods for professional drivers, and/or accede to international/regional regulation in this area.
Target 12:	By 2030, all countries establish and achieve national targets in order to minimize the time interval between road traffic crash and the provision of first professional emergency care.

Source: Authors

underpinning their voluntary take-up by countries are addressed in later sections.

The International Civil Aviation Organization (ICAO) has created a list of key safety performance indicators in aviation safety. Its primary safety indicator is the accident rate based on scheduled commercial operations.

Table 1.2 shows the global aviation safety objectives and associated timelines and a catalogue of ICAO's recommended performance indicators.[7]

All modes of transport require encouragement and further work to set key safety performance objectives that are directly related to the prevention of deaths and serious injuries in transport crashes.

Table 1. 2: Safety Targets agreed by ICAO Member States

Target 1:	By 2017, all member states achieve a minimum of 60% effective implementation (EI) of a safety oversight system; Member states with greater than 60% EI implement a state safety programme (SSP).
Target 2:	By 2022, all member states establish an effective SSP
Target 3:	By 2022, all regional aviation safety groups to establish mature regional monitoring and safety management programs
Target 4:	By 2028, all member states to implement advanced safety oversight systems including predicative risk management
Target 5:	By 2028, zero fatalities in commercial scheduled passenger operations (less than 1 fatality per 10 billion passengers transported)

Source: Safety Targets. 2016. www.icao.int/safety/Documents/Doc%2010004.2017-2019%20edition%20EN.pdf

ENDNOTES

1 Although some modes refer to accidents and casualties as including vehicle loss and damage, this paper is primarily concerned with the prevention and reduction of serious health loss to people using transport systems.

2 Several international and national sources including WHO, UNECE, ICAO, EMSA. 2018.

3 ICAO Accidents/Incidents Data Report (ADREP) system

4 The Research Council of Norway (2018). Risk and safety in the transport sector: A state-of-the-art review of current knowledge.

5 UN General Assembly Resolution. Improving global road safety (April 2018), UN A/72/271.

6 www.icao.int/safety/Documents/Doc%2010004.2017-2019%20edition%20EN.pdf

7 www.icao.int/safety/Pages/Indicator-Catalogue.aspx

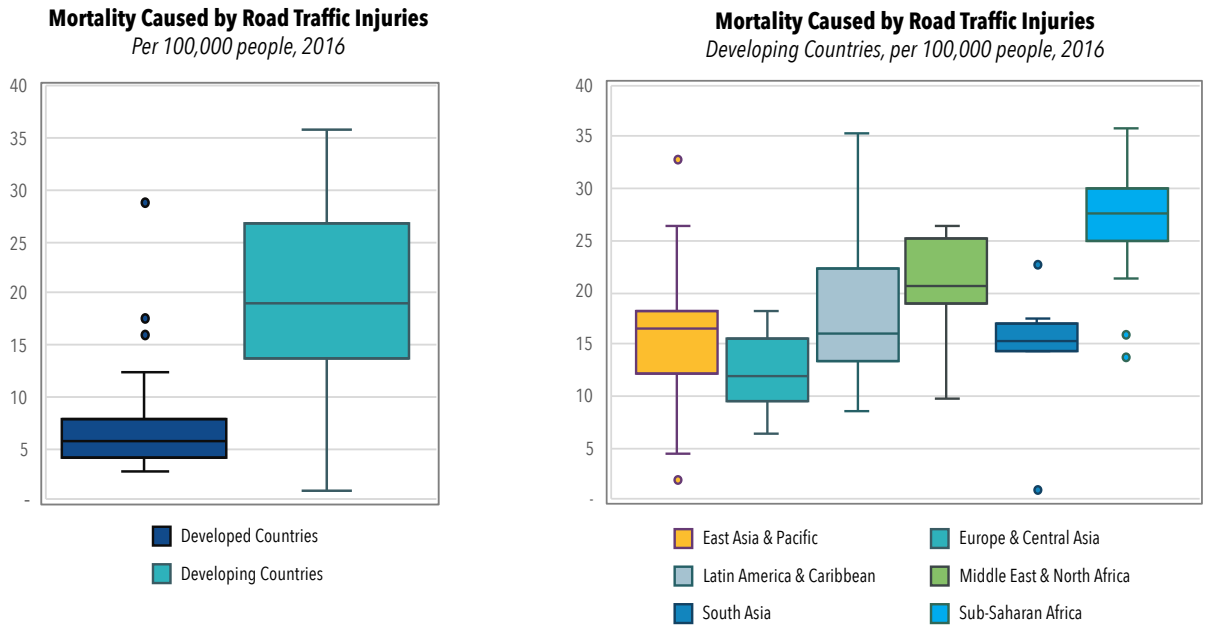
2. STATE OF PLAY

2.1. Road safety

Since 2004, unprecedented agreement has grown between international and national agencies and organizations concerned with road safety about understanding the key road safety problems and the means of addressing them. Important steps forward have been made in trying to assist LMICs, who bear the majority of the road traffic injury burden, in accommodating the urgent challenges of massive increases in levels of motorization for road safety. The following sections comprise the strategic lines of what has been achieved to date and outline the gap that needs to be closed between what is known to be correct and effective and what is actually practised and accepted.

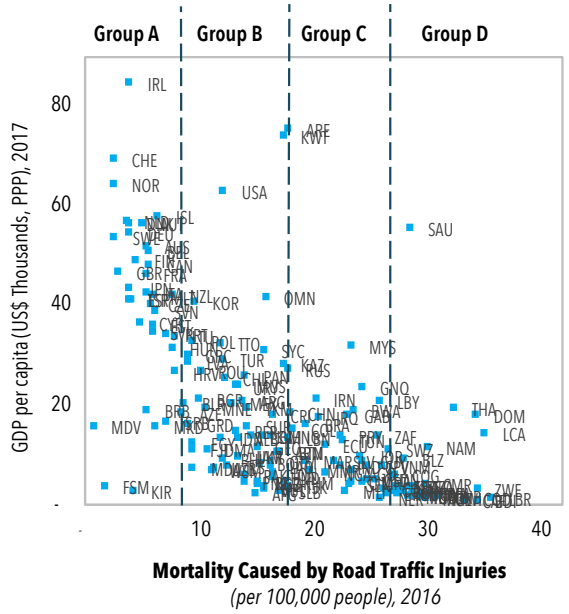
Figure 2.1 shows the distribution of Mortality caused by road traffic injuries in developed and developing countries, and in six regions of the world for developing countries only. The line in the box shows the median of the variable. The width of the box on either side of the median shows the "spread" of one quartile of the observations. The "Whiskers" show where the more spread out observations lie (two quartiles). Individual dots show observations which are outlying extreme values beyond the quartiles. For example, the

Figure 2.1: Distribution of Country-level Road Traffic Mortality Rate by Region



Source: WHO raw data analyzed by the World Bank

Figure 2.2: Scatterplot of Road Traffic Mortality Rate vis-à-vis GDP per capita by Country



Source: WHO raw data and World Bank analysis

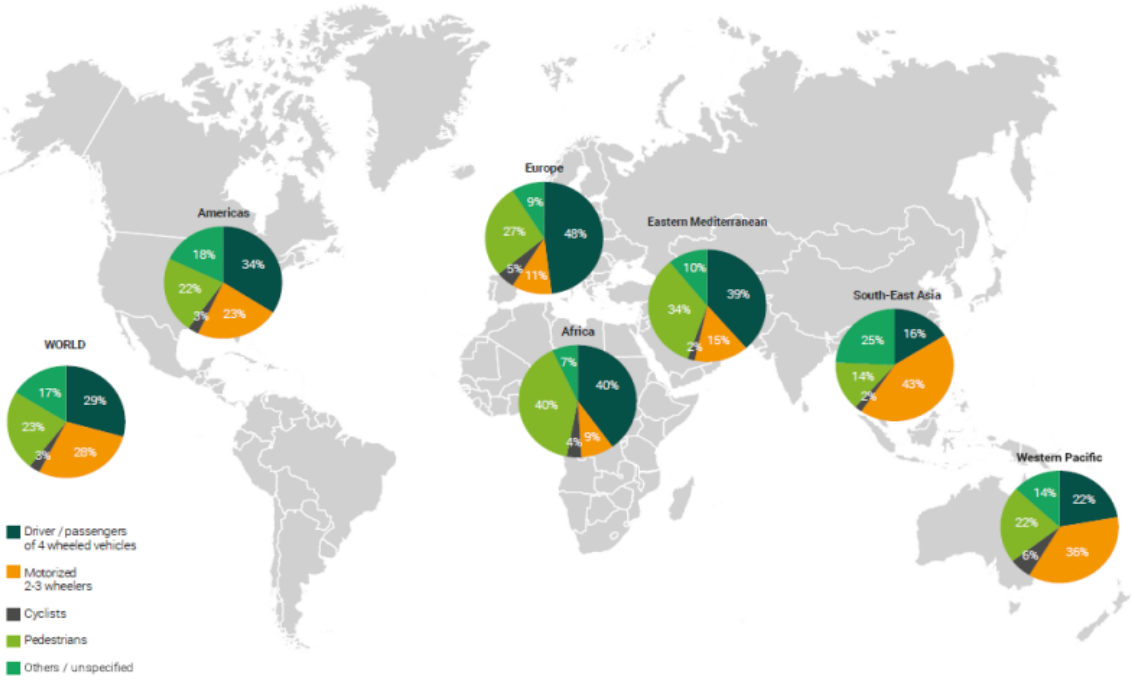
median for Latin America and Caribbean is about 16. The values within one quartile range from about 14 to 23 (the Box) and the broader values range from about 8 to 36 (the Whiskers).

While countries in the developed world enjoy the lowest road traffic mortality rates, developing countries suffer from the highest rates. There are clear differences in the median between regions and in the variability (spread) of the data among countries within a region. For example, countries in East Asia and Pacific have a large disparity in the rate within the region, that is, some countries in the region have the lowest rates while others have the highest rates.

Ranked by median, the regions, from lowest to highest, would be: Europe & Central Asia, South Asia, Latin America & Caribbean, East Asia & Pacific, Middle East & North Africa and Sub-Saharan Africa.

In Figure 2.2, data on road traffic mortality rate is plotted against Gross Domestic Product (GDP) per capita and used to compare countries on safety. Countries are divided into four groups (A to D) based on dis-

Map 2.1: Distribution of Deaths by Road User Type by WHO Region



Source: WHO global status report on road safety 2018

Table 2.1: Attributes by Country Groups Classified by Mortality Caused by Road Traffic Injury per 100,000 people[a]

	Group A (Mortality<10)	Group B (≥10 and <20)	Group C (≥20 and <30)	Group D (≥30)
Distance from target	Most Progress	More Progress	Less Progress	Least Progress
Attribute				
GDP per capita	High	Lower-middle to High	Low to Upper-middle	Low
Government effectiveness[b]	Middle to High	Middle	Low to Middle	Low to Middle
Motorization rate[c]	High	Low to Middle	Low to Middle	Low
Percent change in motorization rate per year[d]	Low to Middle	Middle to High	Low to High	Low to Middle

Note:

a. WHO. Global status report on road safety 2015. www.who.int/violence_injury_prevention/road_safety_status/2015/en/

b. The World Bank. GovData360. Government Effectiveness. https://govdata360.worldbank.org/indicators/h580f9aa5?indicator=388&viz=line_chart&years=1996,2017

c. International Organization of Motor Vehicle Manufacturers. World vehicles in use–all vehicles. Number of all vehicles per 1,000 inhabitants in 2015. www.oica.net/category/vehicles-in-use/

d. International Organization of Motor Vehicle Manufacturers. World vehicles in use–all vehicles. Percent change in the number of all vehicles per 1,000 inhabitants from 2014 to 2015.http://www.oica.net/category/vehicles-in-use/

tance to best performance (A). The figure displays a strong inverse association between road traffic mortality rate and gross domestic product (GDP) per capita by country. Countries with the highest mortality rates are mostly those with low GDP per capita, and the average mortality rate rapidly declines as GDP per capita increases.

Map 2.1 shows the distribution of deaths by road user type. Vulnerable road users including cyclists and pedestrians share over a quarter of all deaths, and indicate a large difference in the distribution across the regions.

Table 2.1 describes the level of country attributes in addition to GDP per capita by country group classified by the principal indicator of the safety objective: road traffic mortality per 100,000 people. GDP per capita, perceived government effectiveness, and motorization rate (the number of motor vehicles in use per unit population) were all inversely associated with road traffic mortality rate.

2.1.1. Steps forward

International agreement about problems and priorities.

- The humanitarian and social cost of road traffic injury is high and unacceptable.
- While LMICs bear major road traffic burdens, similar problems affect all countries, although they differ in scope and extent.
- Road safety is an urgent global priority and underpins successful sustainable development.
- Road death and serious injury are largely preventable with known critical success factors. Death and serious injury are not the inevitable price of mobility when the focus, intervention choice and institutional delivery are correct.
- Road safety improvements require a planned, systemic response for the interim and beyond led by government, and supported by civil society and the business sector.

- An ambitious, but realistic results-focused and evidence-based approach leads to best use of public resource;
- The safe system approach is recommended in all countries despite its challenges and regardless of road safety performance and socio-economic status.
- Increasing investment in road safety management capacity is urgently required to achieve better results through systemic intervention, supported by effective institutional delivery.

Governmental mandate for action at global, regional and national levels.

- Successive UN General Assembly resolutions (latest 2018) have received unanimous agreement establishing the decade of action 2011–2020. The road safety-related targets in the SDG Targets 3.6 and 11.2 aim to halve the number of global deaths and injuries from road traffic accidents; and aim to provide access to safe, affordable, accessible and sustainable transport systems as well as improve road safety for all. The WHO is established as the global coordinator for action leading to successive, periodic global road safety status reports[8] and the establishment of the UN road safety collaboration (UNRSC). The UNRSC released the global road safety plan (2011) setting out good practice interventions and related performance measures to 2020, underpinned by a first pillar requiring the building of road safety management capacity.
- Approval by consensus of the 12 voluntary global performance targets for road safety risk factors and service delivery mechanisms at the meeting of UN Member States (November 2017).
- Establishment of regional road safety goals and targets to 2020 e.g., by the EU, the African Union, transport ministers of the Asia-Pacific region[9] and others, encouraged by the UN regional economic commissions and other agencies.
- Agreement to prepare a forward-looking declaration leading up to 2030, in the third global high-level conference on road safety in 2020 to be hosted by Sweden.

New global funding mechanisms and partnerships established.

- Establishment of the global road safety facility (GRSF) by the World Bank (2006).
- Establishment of the FIA Foundation for the Automobile and Society, which plays a critical advocacy and funding role (2001).
- Start of coordination among the multi-lateral development banks on road safety;
- Bloomberg Philanthropies road safety funding.
- Establishment of the UN road safety trust fund (April 2018).

Development of key global guidance and tools.

- Following the joint publication of the "World Report on Road Traffic Injury Prevention" by the WHO and the World Bank (2004), the WB produced a range of global guidance and reports for example, guidance on road safety management capacity review and project design in 2009 and 2013 by the World Bank. UNRSC manuals cover a range of interventions; the World Road Association's revised road safety manual on implementing a safe system in road infrastructure (2016); WHO "Save Lives: A road safety technical package" (2017); and "Sustainable & Safe: A Vision and Guidance for Zero Road Deaths" by World Resources Institute (WRI) and Global Road Safety Facility (GRSF).
- Establishment and use of global new car assessment programme (NCAP) and new regional NCAPs.
- Establishment and use of international road assessment programme (iRAP) road infrastructure safety ratings, fatality estimations and investment planning tools.
- Publication of the ISO 39001 standard on road traffic safety management systems (2012).
- Adoption of the global framework plan of action for road safety[10] by the UN road safety trust fund (November 2018).

2.1.2. *Continuing challenges*

- The number of global road deaths and serious in-

juries remains high and the SDG target probably will not be met.

- At the beginning of the decade of action (2011–2020), forecasts indicated that more than 50 million deaths and 500 million serious injuries on the world's roads could be projected with some certainty over the first 50 years of the 21st century unless sustained new initiatives are taken. More than 20 million people have been killed and 200 million seriously injured in road collisions in the period from 2001 to 2015. The annual global road death toll has risen from 1.25 million (2011 baseline) to the current total of 1.35 million road deaths (2016) with the rapid increase of motorization. Achievement of the highly ambitious SDG to halve the number of deaths by 2020 is unlikely to be met.[11]

Road safety investment

- While some progress is evident in country management systems and results achieved in LMICs, the findings of the global status reports, road safety management capacity reviews and assessments indicate that insufficient progress is being made in establishing appropriate road safety management. In many LMICs, a clearly defined results focus is often missing, and governments are not held accountable for outcomes. Coordination arrangements are ineffective since they are either underfunded or sectors have not learned how to work together effectively. Supporting legislation is weak without implementation of recommended international protocol agreements and legislative sets. Road safety is still a small budget line in the transport budgets, and not mainstreamed across the sectors that have an impact on mobility. In addition, constrained road safety resources are often expended on ineffective road safety interventions, which are easy to apply but not soundly based on existing evidence. Little or no work has been done to give speed management the relevance it needs. Design standards do not include the many proven cost-effective features that improve safety for all road users. Furthermore, promotional efforts are poorly targeted, and monitoring and evaluation systems are ill developed. Research and development, and knowledge transfer, which underpin all successful activity are, at best, limited. Project and program interventions are fragmented, and often reflect neither good practice nor the evidence base. In many cases, little is known about the results achieved through lack of performance monitoring.[12]

Capacity weaknesses are not confined to countries

- Global and regional institutional capacity to address road safety priorities in line with existing guidance and tools also reveals weaknesses. Knowledge and skills within the international and regional development agencies and banks, particularly at country levels, need to be strengthened further. Limited investment in building road safety management capacity[13] had serious consequences. Global regional and national road safety aspirations typically remain paper plans, and make little or no positive impact on achieving goals and targets. Despite available guidance and concerted global planning and practice to date, the paradox of how to implement good intervention practices being advocated when insufficient country capacity is unable to manage the process, has not been sufficiently addressed.

Road safety investment is insufficient to address agreed goals and targets

- Beyond human suffering, road traffic deaths and injuries cause significant economic losses to individuals, communities and countries, keeping millions of people in poverty and creating an estimated $2.15 trillion burden on the global economy each year (2.9% of global GDP) with crash costs estimated between 4.2% and 5.8% of GDP in LMICs.[14]
- While the need to improve safety is gaining increasing recognition, targeted efforts have not been adequately funded at the local, national, regional or global levels.[15]
- The business case for safer roads (iRAP) in 2018 highlights a global return on investment of $8 for every $1 invested in safe roads globally, with returns in LMICs ranging from US$9 to $18 of benefits for every US$1 invested.[16]
- Governments have provided the mandate for ac-

tion, as stated in interventions during the World Health Assembly on April 2018, but not yet the resources to deliver it. Very substantial increases in funding are needed, commensurate with the scale of the problem.[17]

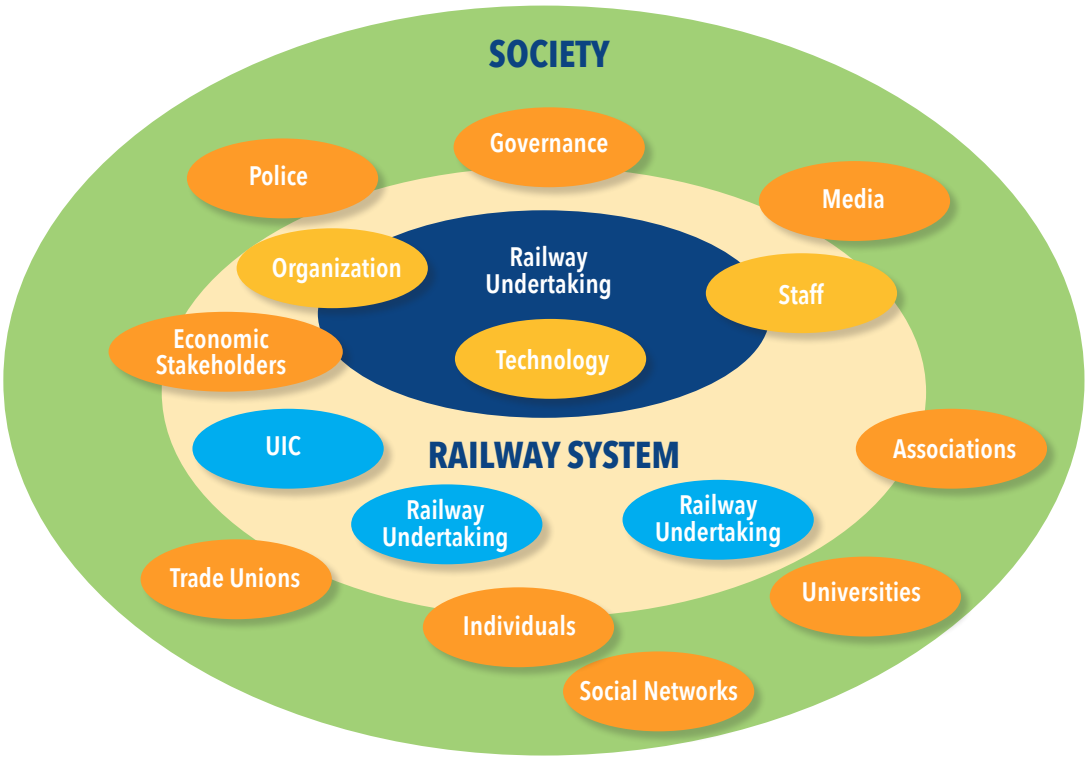
2.2. Air, rail and maritime safety

2.2.1. Steps forward and continuing challenges

Between 2012 and 2017, the annual number of fatal air crashes and incidents in commercial aviation decreased from 11 to 5 with 50 reported deaths occurring in 2017.[18] In 2018, 12 crashes killed more than 500 people. One of the biggest challenges in air transport is how to achieve or maintain an ultimately safe system knowing that traffic is continually increasing, and that new actors are entering the aviation system. These new actors include integration of regular commercial space transport operations into controlled airspace as well as remotely piloted aircraft systems (RPAS) which affect the way in which air operations are controlled. The ICAO's universal safety oversight audit programme (USOAP) audits have identified that governments' inability to oversee aviation operations effectively remains a global safety concern. This includes lack of a basic safety oversight system and lack of implementing a state safety program (SSP). The global aviation safety plan (GASP) provides a detailed strategy aimed at achieving improvements in safety management. A continuing challenge for this sector is to assist in developing in-country capacity for delivery.

Railways have also been successful during the last decades in reducing serious incidents such as train collisions and derailments through the application of a safe systems approach (discussed in later sections). Most incidents were caused by individuals trespassing on the tracks, inside and outside level crossings. It is important to note that the railway system is not an object in itself; it should be considered with its interconnections to other transport modes and areas where people live, move and think (figure 2.3). It is unrealistic to achieve optimal safety levels without pro-

Figure 2.3: Railway System (Source: International Union of Railways, UIC)



moting a safety culture within society as a whole. All stakeholders such as public authorities, educational institutions and media ought to be part of this holistic development. As part of this whole, a particular task for railways lies in further integrating human factors into safety issues. Safety ought to be operationalized through the acts of each player of the system, and more specifically the railway staff.

Data from the global integrated shipping information system (GISIS) contain information related to marine casualties and incidents are not corroborated by the full marine safety investigation reports submitted to the IMO by reporting administrations, and this loophole needs to be addressed. Effectively, no consolidated data exist on the number of casualties from maritime transport.

ENDNOTES

8 WHO. Global status report on road safety 2018.

9 Updated regional roads and targets adopted in the Ministerial Declaration on Sustainable Transport Connectivity in Asia and the Pacific at the Ministerial Conference on Transport held in Moscow in December 2016.

10 www.unece.org/fileadmin/DAM/Road_Safety_Trust_Fund/Documents/UNRSTF_Global_Framework_Plan_of_Action_21_Nov_2018.pdf

11 UN General Assembly Resolution. Improving global road safety (April 2018), UN A/72/271.

12 Bliss T and Breen J (2012). Meeting the management challenges of the Decade of Action for Road Safety, IATSS Research 35 (2012) 48–55

13 WHO (2018). Global status report on road safety 2018

14 iRAP (2018), Presentation to ITF Conference, Leipzig.

15 Dahdah, S and Bose, D (2013). *Road Traffic Injuries: A Public Health Crisis in the Middle East and North Africa*. Transport Notes TRN-45. October 2013. World Bank, Washington DC.

16 iRAP (2018), *Vaccines for Roads*, www.vaccinesforroads.org

17 FIA Foundation (2018). https://www.fiafoundation.org/connect/publications/fia-foundation-annual-report-2018

18 ICAO -2018 edition Safety Report, Montreal.

3. INTERNATIONAL AGREEMENTS AND COMMITMENTS

3.1. All modes

The provision of a legislative framework, which addresses the transport safety task satisfactorily, is a key function of effective institutional delivery. While safety regulations and standards vary significantly around the world, a legislative framework represents an opportunity to help create a harmonized regulatory system.

Binding international instruments provide a harmonized legal framework across countries that incorporate transport safety aims. Specialized UN entities, such as the ICAO, IMO and the UN Economic Commission for Europe (UNECE) administer these legal instruments. Regional economic integration organizations such as the EU establish legal binding instruments for their member states. These instruments provide a framework for establishing national legislation and technical standards that can be adapted to technical progress over time. In combination with a range of other tools, legal instruments play a key role in helping address transport and mobility challenges in a transforming world.

However, challenges related to the accession of these legal instruments and to their full implementation persist. First, these instruments may not have been acceded to by most countries—for example, a total of 78 countries around the world are contracting parties to the Convention on Road Traffic in 1968. Second, as underlined in later sections, many countries lack the capacity to implement regulations and standards because of limited finances or poor governance. Such challenges either prevent countries from acceding to instruments in the first place or lead to poor implementation when countries do accede.

3.2. Road vehicle safety

Motor vehicle occupant deaths comprise more than half of global deaths in road crashes, and cyclists and pedestrians comprise about a quarter. One important area in which legal instruments are especially relevant for LMICs as they rapidly motorize is road vehicle harmonization. This includes technical prescriptions, technical regulations, and technical inspections for improving road safety (box 3.1). Harmonization is also key to facilitate international trade and remov-

Box 3.1: UN Regulations and Agreements Relating to Road Safety

The first legal agreement addressing vehicle safety regulations on technical prescriptions for wheeled vehicles equipment and parts[a] was adopted as early as 1958. This agreement known as "UN Regulations" determines a common set of technical prescriptions and protocols for the approval of vehicles and their components, and is also the basis for reciprocal recognition of such approvals among 56 contracting parties, many of which are countries in Europe and high-income countries of other regions. It is administered by the UNECE. Key provisions include technical requirements for active safety (braking, steering, stability control, tyres, lighting headlamps, controls) and crashworthiness (front-, side-impact protection, safety belts child restraint systems, motorcycle helmets) among other provisions.

In 2018, 147 UN Regulations were annexed to this 1958 agreement. In turn, the agreement concerning the adoption of uniform conditions for periodical technical inspections[b] of 1997 provides the legal framework

for the technical inspections of vehicles based on two rules that aim at maintaining vehicle safety. Finally, the agreement concerning the establishing of global technical regulations[c] of 1998 provides the framework for the development of these regulations for vehicles, and a total of 20 global technical regulations have already been adopted. While many countries worldwide have not yet acceded to vehicle harmonization agreements and do not implement their prescriptions, instances exist of other countries that have not acceded to but mirror the UN regulations content in their own national requirements.

Two other UN legal instruments administered by UNECE for road safety are (i) the convention on road traffic and (ii) the convention on road signs and signals, both signed in 1968. These instruments seek to harmonize traffic rules and systems of road signs signals and symbols and road markings. Both conventions have been regularly updated. Overall, these conventions provide governments with the legal basis and the technical rules and regulation for national traffic codes. There are 78 and 63 contracting parties to these two conventions respectively.

Other legal instruments administered by UN regional commissions addressing road safety are (i) infrastructure agreements which include provisions about the right basis for construction and maintenance of road infrastructure to make it safe for travel; (ii) agreements on the transport of dangerous goods by road which enhances the safety of international transport; and (iii) agreements on the work of crews of vehicles engaged in international road transport.[d] The latter two agreements are administered by UNECE, and agreements on the transport of dangerous goods by road is globally applicable.

Note:

a. Agreement concerning the Adoption of Harmonized Technical UN Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these UN Regulations.
b. The Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections.
c. The Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles.
d. The Intergovernmental Agreement on the Asian Highway Network (UNESCAP), The European Agreement on Main International Traffic Arteries (AGR-UNECE), European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR-UNECE), and European Agreement concerning the Work of Crews of Vehicles Engaged in International Road Transport (AETR-UNECE).

al of trade barriers, with reciprocal recognition of vehicle and inspection approvals among countries. Regulations provide a minimum level of safety when accompanied by consumer information such as new car assessment programs. Such assessments rate the safety of new car models to assist fleet and car buyers using state of the art crash tests and protocols. As well, product liability legislation and manufacturing initiatives make a substantial contribution to road safety. Leadership provided by regional and national initiatives is an important contributor to better global standards. For example, the EU's work in relation to frontal and side impact protection in cars and pedestrian protection requirements, and the United States in its early work to regulate electronic stability control in cars.

Research over decades shows that the safety benefits of different vehicle regulations vary. In addition to key braking and lighting requirements, particularly important measures for the safety of light vehicles are shown in box 3.2.

The global new car assessment program (NCAP) has set out a two-stage roadmap to assist LMICs in implementing priority UNECE vehicle safety legislation as shown in Box 3.3.[19]

Box 3.2: Key UN Regulations for the Safety of Light Vehicles

- Reg. 12 Steering mechanism - frontal impact (partly covered by Reg.94)
- Reg. 13H brakes
- Reg. 14 Seat belt anchorages
- Reg. 16 Safety belts and restraint systems
- Reg. 17 Strength of seats, their anchorages and any head restraint
- Reg. 21 Interior fittings
- Reg. 22 Motorcycle helmets
- Reg. 26 External projections
- Reg. 30 or UN Global Traffic Regulations (GTR) 16 Tyres
- Reg. 43 or UN GTR 6 safety glazing
- Reg. 44 or Reg 129 Child restraint systems
- Reg. 48 light installation
- Reg. 94 or Reg. 137 Occupant protection in frontal collision
- Reg. 95 Occupant protection in lateral collision
- Reg. 135 or UN GTR 14 Pole side impact
- UN GTR. 7 Head restraints
- Reg. 140 or UN GTR 8 Electronic stability control
- Reg. 127 or UN GTR 9 Pedestrian protection

Box 3.3: The Global NCAP Road Map for Safer Cars 2020v

ROADMAP FOR SAFER CARS 2020	ALL NEW CAR MODELS PRODUCED OR IMPORTED	ALL CARS PRODUCED OR IMPORTED
STAGE 1 – UN REGULATIONS* FOR: Frontal Impact(No.94) Side Impact (No. 95) Seat Belt and Seat Belt Anchorages (No. 14 & 16)	2016	2018
STAGE 2 – UN REGULATIONS* FOR: ESC (No.13H or GTR. 8) Pedestrian Protection (No. 127 or GTR. 9)	2018	2020

**Or equivalent FMVSSs*

Second-hand vehicles also have room for improvement on regulations; Spain, for example, is the only country that prohibits the exportation of second-hand vehicles that do not meet the national standards.

Traditionally, as noted by the International Transport Forum (ITF), policy makers have taken a gradualist approach to regulation in the road transport sector, regulating or taking other action in response to a development that is perceived to necessitate it. But, as deployment of automated vehicles approaches, arguments favor a more proactive approach with a broader focus.[20] In the meantime, a wide range of demonstrably effective, semi-automated driver assistance technologies, such as intelligent speed assistance, are available to regulate. The EU recently reached a provisional agreement on making some safety features that leverage new technology mandatory in vehicles as of 2022.[21]

3.3. Aviation Safety

The civil aviation sector has also addressed transport safety through legal instruments by adopting the Convention on International Civil Aviation of 1944. The provisions of this ICAO convention address not only safety, but also efficiency, universal access, and green mobility. ICAO manages over 12,000 standards, recommended practices and procedures (SARPs) across the 19 annexes and five procedures for air navigation services (PANS) to the convention. On safety, ICAO regulates international standards and recommends practices in relation to aircraft, personnel, aerodromes and airways in all matters in civil aviation.

3.4. Maritime Safety

The IMO is the main global standard-setting authority for safety and environmental performance of international shipping. The main convention addressing safety is a revised version of the international convention for the safety of life at sea (SOLAS) in 1974, and it specifies minimum standards for the construction, equipment and operation of ships, compatible with their safety. The IMO has another 10 additional conventions relating to maritime safety and security, and the ship or port interface.

3.5. Rail safety

As yet, rail safety is not covered by any global convention. However, a body of regional regulation is emerging through the auspices of the EU. A mandatory EU requirement is for rail operators to have safety system management based on risk management.[22]

ENDNOTES

19 Global NCAP (2015), Democratizing Car Safety: Road Map for Safer Cars 2020, London.

20 ITF (2018) Cooperative mobility systems and automated driving. Summary and conclusions of an ITF Roundtable, Paris.

21 http://europa.eu/rapid/press-release_IP-19-1793_en.htm

22 Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety

4. CATALOGUE OF POLICY MEASURES

4.1. Safety Management systems and frameworks

Transport safety must be ensured and that requires a planned, systematic, results-focused response which considers the results to be achieved, the selection of interventions needed to achieve results, and the broad scope of institutional delivery and cooperation which provide the foundation for activity. Experience shows that approaches which fail to consider each of these elements and their linkages are likely to be unsuccessful.[23]

Safety management systems and frameworks developed at jurisdictional and organizational levels since the early 2000s provide for a holistic approach to addressing transport crash injury.[24] In aviation, maritime and rail modes, safety management systems of varying scope and ambition, including the cooperation necessary to implement them, are typically covered by legislation and codes of practice and are issued by global sectoral regulators and organizations. The focus in these modes, reflected in safety management regimes outlined in boxes 4.1–4.9, is typically to manage safety-related risk proactively and predictively to enhance safety in general for a range of outcomes. Outcomes include vehicle loss and damage under safe system principles, although a direct strategic focus on the prevention of death and serious injury and survivability is not always evident.

The roles and responsibilities of key players for road safety are less well defined, and involve many more actors than other modes. International guidance and an ISO road traffic safety management system standard are the main available safety management system tools.

Box 4.1: Global Aviation Safety Management

The ICAO has a strategic objective dedicated to enhancing global civil aviation safety and focused primarily on the member state's regulatory oversight capabilities. The objective is set in the context of growing passenger and cargo movements and the need to address efficiency and environmental changes. Annex 19 to the Convention on International Civil Aviation on Safety Management is a proactive strategy and built upon a foundation of compliance with prescriptive requirements. As part of the implementation of a state safety program (SSP), states shall require aviation service providers to implement safety management system (SMS) 4 components and the 12 elements. In line with the strategic objective on safety, the global aviation safety plan (GASP) (2017–19)[a] outlines key activities over three years. GASP objectives call for states to put in place robust and sustainable safety oversight systems and progressively to adapt them into more sophisticated means of managing safety. GASP promotes coordination and collaboration among international, regional and national initiatives aimed at delivering a harmonized, safe and efficient international civil aviation system.

Note:

a. ICAO (2016). Global Aviation Safety Plan 2017-2019, Doc 10004.

Box 4.2: Measures Taken to Prevent Incidents in Railway Stations

<table>
<tr>
<td rowspan="2">ANNOUNCEMENT IN STATION
Audible Warnings:
▪ Warning for departing train
▪ Warning for incoming train
▪ Warning for passing train
▪ Warning for hazardous conditions: ice, water
▪ Warning for general safety: platform edge, run
Visible warnings on electronic display platform
▪ Warning for departing train
▪ Warning for incoming train
▪ Warning for passing train
▪ Warning for hazardous conditions: ice, water
▪ Warning for general safety: platform edge, run
CCTV surveillance
▪ Followed by specific announcements</td>
<td rowspan="2">PLATFORM DESIGN
▪ Concave platform alignment (preventing wheeled object to roll off the platform and into the tracks.)
▪ Removing obstacles close to the edge of the platform.
▪ Enlarging platforms in busy stations.
▪ Signs: informative display e.g. narrow platform, end of platform/no trespassing
▪ Yellow line (or other color) distance from edge
▪ Sign for train driver to know where to stop along the platform
▪ Visual display designs, tactile pavement</td>
<td>STAFF PRESENCE
▪ On train (open door, look if passengers want to get out as the train is departing)
▪ On pedestrian crossings
▪ On platform</td>
</tr>
<tr>
<td>DISPATCHING PROCESS
▪ All doors closed
▪ One door open

COMMUNITY SUPPORT, SAFETY CAMPAIGNS
▪ Schools
▪ Internet
▪ Other</td>
</tr>
<tr>
<td>ANNOUNCEMENT IN TRAIN
▪ Side for disembarking
▪ “take care when alighting”, “mind the gap”</td>
<td>TRAIN DESIGN
▪ Interlocking doors
▪ One side opening only</td>
<td>PASSING TRAINS
▪ Horn warning
▪ Limited speed</td>
</tr>
</table>

Source: International Union of Railways

Box 4.3: Global Rail Safety Management

1. International Union of Railways (UIC) hosts a working group on level crossing safety called European Level Crossing Forum (ELCF):
   a. To raise awareness about the danger at level crossings
   b. To promote safe behaviour by all users at and around level crossings
   c. To find measures to increase safety and lower the number of accidents

This group brings together key stakeholders to exchange information and provide experiences and lessons for improving the management of the "at-grade road/rail interface". https://uic.org/level-crossings; http://www.ilcad.org/IMG/pdf/062018_lc_grr_issue3.pdf

2. International Level Crossing Awareness Day (ILCAD)

   The ILCAD is an awareness campaign on level crossing safety. the UIC spearheads the campaign with the support of the railway community around the world. A growing number of road sector organizations, international institutions (EC, UNECE, IRU) have also been involved in raising awareness of the risks at level crossings to change road users and pedestrians' behavior to "act safely at level crossings". http://www.ilcad.org/ILCAD-2019.html

3. Within the UNECE working party on road traffic (WP1) of which the UIC is a member, the UIC contributed to the creation of the safety group of experts on improving safety at level crossings in 2014. The group completed its work on 12.12.2016. Final report: www.unece.org/fileadmin/DAM/trans/doc/2017/wp1/ECE-TRANS-WP1-2017-4e.pdf
4. The UIC coordinates an EC project related to level crossing safety "SAFER-LC": www.safer-lc.eu

Source: International Union of Railways.

Box 4.4: Toward a Positive Railway Safety Culture

An "integrated" safety culture[a] is said to exist when a company has reached the highest level of maturity in terms of safety. Management takes the lead on safety while ensuring that operators are heavily involved in some management activities and in the rigorous application of safety measures. In other words, the shop-floor and bureaucratic cultures are both strong and are integrated with one another. Changes in the safety management system and changes in operators' behavior become integral part of its safe system and will together influence safety performance.

An integrated culture therefore refers to the highest level of cultural maturity that a company can have. Such an integrated safety culture, which is what we mean by a positive safety culture, is characterised by nine features:

- Engagement and involvement in safety of all stakeholders
- Leadership and leading by example
- Just culture
- Suitable rules
- Suitable resources
- A learning organisation
- Cooperation and trust
- Good communication
- Safe change management

There is a link between safety management system and safety culture. Safety management is a catalyst for improving safety culture. The UIC will publish a study in 2019 about this link based on a safety management system (SMS) approach adopted, grounded in the principles of ongoing improvement that are advocated by the European Railway Agency. This approach is enshrined in European regulatory and legislative frame-works through the introduction of human factors, a just culture, stakeholder engagement at all levels to avoid externalisation of risk, and the notion of safety leadership. These ingredients are the foundation of a positive safety culture.

Source:

a. François Daniellou, Ivan Boissières, Marcel Simard. Les facteurs humains et organisationnels de la sécurité industrielle: un état de l'art. FonCSI. FonCSI, pp.125, 2010, Les cahiers de la sécurité industrielle.

Box 4.5: Global Maritime Safety Management

At the global level safety lacks any waterborne transport initiative. Key conventions proposed by the IMO as standard:

- International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended
- International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto, and by the Protocol of 1997 (MARPOL)
- International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) as amended, including the 1995 and 2010 Manila Amendments.

4.2. Safe System Results, Intervention and Delivery Framework in Transport

4.2.1. The Safe System Approach in Road Transport

Two major and complementary developments since early 2000s have informed approaches for more effective management for better results by using holistic approaches.[25] The first was led by Sweden (Vision Zero) and the Netherlands (Sustainable Safety) more widely known as the safe system approach and is widely promoted and increasingly adopted around the world.

The World Bank, the International Transport Forum (ITF), and the International Standards Organization (ISO) have underlined that effective road safety management is a results-focused, systematic process at several levels. Road safety does not just occur but has to be produced. The safety performance produced by countries active in road safety was achieved following years of sustained investment in road safety management and through governmental leadership.

The road safety management system is the productive capacity to deliver key institutional management functions, which produce and enable effective, system-wide interventions that are designed to produce results, with the safe system goal and strategy representing the most ambitious approach, OECD in 2008; Global Road Safety Facility (GRSF) in 2009 and International Organization for Standardization (ISO) in 2012.

These approaches represent the summation of effective multi-disciplinary road safety knowledge and successful practice across the road traffic system, built up over decades. On this basis, a generic, global transport safety management framework (figure 4.1) applying to all modes can be accommodated setting out the relationship between results expressed as goals, targets and objectives and interventions and institu-

Box 4.6: The Safe System Goal and Approach

The long-term safe system goal is the elimination of death and serious injury in transport, supported in the interim by periodic, quantitative casualty reduction targets and key safety performance objectives of the International Transport Forum (ITF) and the Organisation for Economic Co-operation and Development (OECD), 2008 and 2016. The aim is to work toward the design of a system that eliminates death and serious injury, while accepting that crashes with minor outcomes will still occur. The safe system goal clearly defines what is meant by "safety" in road safety management—safe not safer.

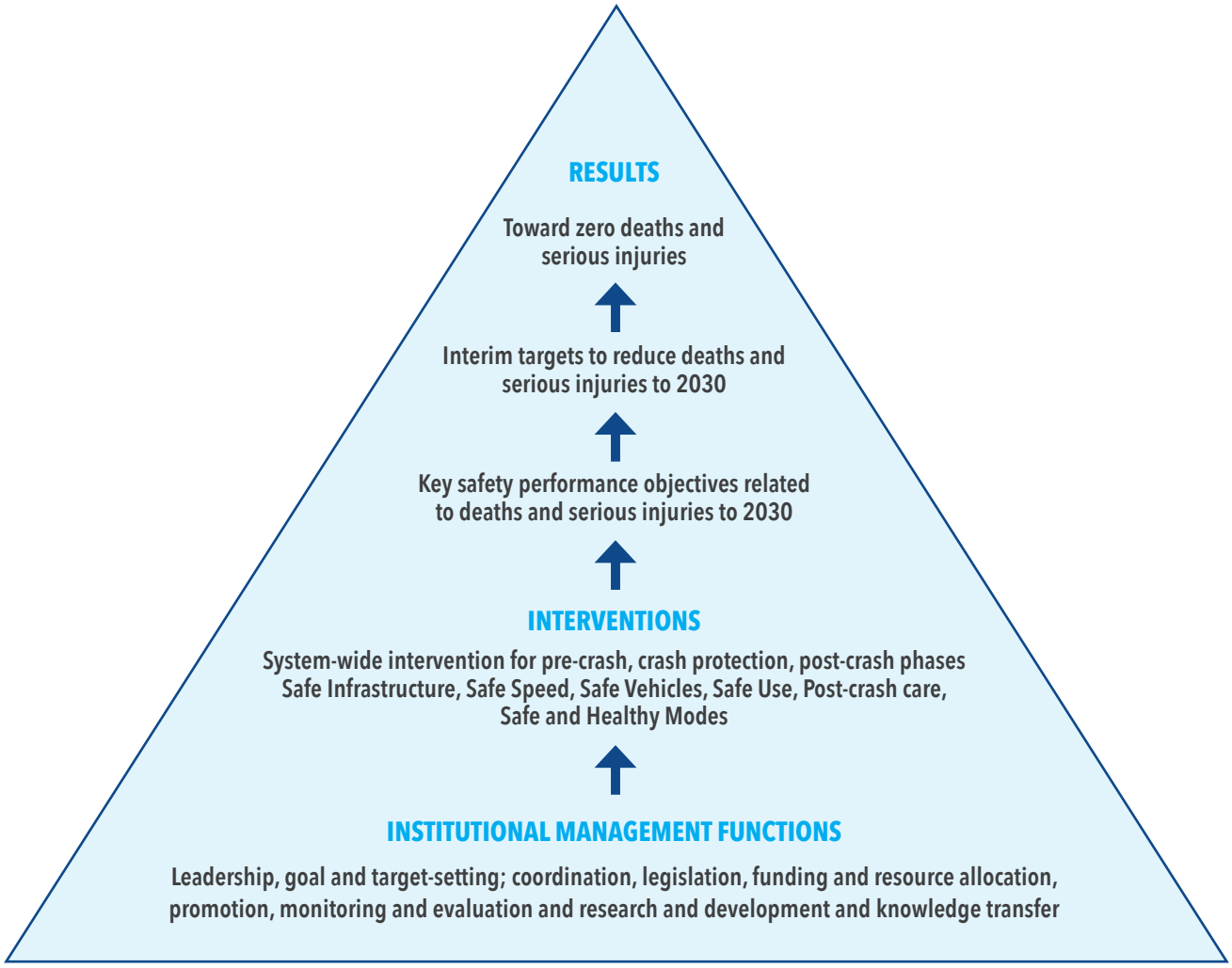
The safe system strategy places the emphasis of responsibility on system designers for safety outcomes rather than on the personal responsibility of users. It aims to ensure that in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury. The aim is to address known human characteristics by accommodating common, unintentional error, and to take better account of the vulnerability of the human body in the planning, design, operation and use of the road traffic system to benefit all users. Safe system intervention addresses all elements of the traffic system and their linkages—infrastructure, vehicles, speeds, the emergency medical system, and road users. The safe system approach is applicable in all countries irrespective of socio-economic status.

Source: Koornstra et al.,1992; Tingvall, 1995; Wegman & Aarts, 2006;[a] ITF/OECD, 2008, 2016; Welle et al., 2018.[b]

Note:

a. WOV Institute for Road Safety Research (2006). Advancing Sustainable Safety. National Road Safety Outlook for 2005-2020.
b. Welle, B. et al. (2018). Sustainable and Safe: A vision and guidance for zero road deaths. Washington, DC: World Resources Institute (WRI) and Global Road Safety Facility (GRSF).

Figure 4.1: Safe System Results, Intervention and Delivery Framework in Transport



Note: This safety management framework is based on World Bank Global Road Safety Facility (GRSF), Bliss and Breen (2009) building on the frameworks of Land Transport Authority (2000), Wegman, (2001), Koornstra et al. (2002), Bliss, (2004), and updated with reference to the World Road Association (2015); OECD/ITF (2016).

tional management.

4.3. Planned, Systemic Intervention in a Safe System Approach

The holistic safe system strategy involves intervention to reduce exposure to the risk of death and serious injury, prevent death and serious injury, reduce the severity of injury when a crash or incident occurs, and reduce the consequences of injury after the crash has occurred. It also involves the systemic planning, design, operation and use of interventions covering all elements of the traffic systems of different modes. A key challenge is for all countries to implement key in-

terventions with known effectiveness to reduce risks and to implement cost-efficient and cost-saving measures to make best use of public resources. The type of intervention differs from one mode to the next. Safe system intervention fields and examples of available tools and networks for roads are set out in table 4.1.

A safe system approach is particularly appropriate for an increased focus on vulnerable road users who comprise nearly half of the main injury burden in LMICs. The approach aims to provide safe environments for cycling and walking, the most sustainable modes, and for mass transit users to address death and serious injury among motorized two-wheelers who bear the highest risks. The Bloomberg initiative for global road safety (BIGRS) provides a good example of supporting efforts in cities in LMICs.[26] High-income countries also require new focus, where the focus of road traffic system design for too long has been around the movement of motorized transport accompanied by high external costs. Countries active in road safety look to embrace the advantages of non-polluting and otherwise healthy, equitable, and active travel modes, and to work on providing safe environments where planning, design, layout and operation are more tolerant of common human error and take better account

Table 4.1: Safe System Intervention Fields, Tools, Guidance and Networks: Roads

System element	Description	Global targets	Examples of tools, guidance, networks	Synergies with transport and other societal goals
Safe Roads and Roadsides	The planning, design and operation of Safe Roads and Roadsides sets the framework for safe road and vehicle use. Research has shown that road-related factors are very strongly linked to fatal and serious injury causation in road collisions. The aim is to support correct road use in the form of "self-explaining" roads and "forgiving roads and roadsides" such that if crashes occur, they do not lead to death and serious injury.	Targets 2,3,4,6	iRAP toolkit and safety ratingsa Vaccines for Roads and the Business Case for Safer Roadsb Austroads Safe System guidelinesc,d,e,f World Road Association Road Safety Manual (2015)g World Resources Institute (WRI) Cities Safer by Design (2015)h UNRSC PG2 work hosted on GTKP provides both ready reference to remedial treatment options for known crash problems as well as tools and methods for road safety infrastructure management.i	Urban access Rural access Efficiency Green mobility Gender Public health Active travel Occupational health Poverty reduction Tourism
Safe Speeds	Safe Speeds are at the core of safe system intervention strategy. The aim is to align speed limits with road function and the protective qualities of roads, roadsides and vehicle against the risk of death and serious injury in crashes. Publicity and compliance regimes and in-vehicle driver assistance technologies are also involved. If crashes occur, they should not lead to death and serious injury.	Targets 3,6	WHO Managing Speed (2017)b World Road Association Road Safety Manual (2015)j UN Road Safety Weekk iRAP toolkit and safety ratingsl Sustainable and Safe: A Vision and Guidance for Zero Road Deathsm	Urban access Rural access Efficiency Green mobility Gender Public health Active travel Occupational Health Poverty reduction Tourism

Safe Vehicles	Safe Vehicles concerns the planning, design, operation and use of vehicles through regulation, consumer information and industry initiatives to provide driver assistance to avoid crashes, crash protective designs to prevent and reduce against fatal and serious injuries as well as fast access to emergency medical help. The aim is to support correct in-vehicle use and to protect drivers and passengers as well as road users outside the vehicle such that if crashes occur, they do not lead to death and serious injury.	Targets 5,6,8, 9,10	UNECE Agreements, regulations and protocols (see Section 3). Global NCAP and regional NCAPs.n WHO–UNRSC Seat-belts and child restraints: a road safety manual for decision makers and practitioners (2009)	Urban access Rural access Efficiency Green mobility Gender Public health Active travel Occupational Health Poverty reduction Tourism
Post-Crash Care	Post-crash care deals with the rescue, treatment and rehabilitation of crash victims. The aim is for efficient emergency notification, fast transport of qualified medical personnel, correct diagnosis at the scene, stabilization of the patient, prompt transport to point of treatment, quality emergency room and trauma care, and extensive rehabilitation services. The aim is to reduce the severity of injury and its consequences should a crash injury occur.	Target 12	WHO pre-hospital care guidelineso Essential trauma care guidelinesp Post-crash response: supporting those affected by road traffic crashes (2016)	Urban access Rural access Efficiency Green mobility Gender Public health Active travel Occupational Health Poverty reduction Tourism
Safe Road Use	In addition to all other Safe System elements, Safe Road Use involves standards and compliance regimes for the licensing and disqualification of drivers and riders and key safety rules (compliance with speed limits, use of seat belts, child restraints, crash helmets; driving without alcohol or other drugs or fatigue; driving without distraction), education and compliance regimes designed to prevent and reduce fatal and serious injury risk. The aim is for road users to have the knowledge, capability, capacity, willingness and assistance to use roads and vehicles safely such that if crashes occur, they do not lead to death and serious injury.	Targets 6,7.8,9, 10,11	UNRSC and partner manuals: mobile phone use: a growing problem of driver distraction (2011) -powered two and three-wheeler safety (2016); -seat-belts and child restraints (2009); -speed (2008, 2017); -drinking and driving (2007); -helmet use (2006) See for all above.q	Urban access Rural access Efficiency Green mobility Gender Public health Active travel Occupational Health Poverty reduction Tourism

Safe and Healthy Modes	Safe and Healthy Modes covers the provision and promotion of access to safe public transport modes as well as the road safety needs associated with increasing use of higher risk (due to users' vulnerability), but otherwise healthy, road user modes such as walking and cycling.	Targets 3,4,5,6, 9,10,11	World Resources Institute (WRI) Cities Safer by Design (2015)r iRAP toolkit and safety ratingss World Road Association Road Safety Manualq WHO: Managing speed (2017)t WHO: Pedestrian safety: a road safety manual for decision-makers and practitioners (2013)t National Association of City Transportation Officials (NACTO): Global Street Design Guide (2016)u Saving Lives with Sustainable Transportv Sustainable and Safe: A Vision and Guidance for Zero Road Deathsw	Urban access Rural access Efficiency Green mobility Gender Public health Active travel Occupational Health Poverty reduction Tourism

Note:

a. www.irap.org/; https://toolkit.irap.org; https://vida.irap.org
b. www. vaccinesforroads.org/
c. Austroads (2016). Safe System Assessment Framework, Research Report. AP-R509-16, Sydney.
d. Austroads (2016). Safe System Roads for Local Government Research Report. AP-R518-16, Sydney.
e. Austroads (2013). Asset Management within a Safe System, Publication No. AP-R442-13, Sydney.
f. Austroads (2015) Safe System in the Planning Process, Research Report. AP-R488-15, Sydney.
g. World Road Association (2015). Road Safety Manual, Paris.
h. www.wri.org/sites/default/files/CitiesSaferByDesign_final.pdf
i. www.gtkp.com/themepage.php?themepgid=377
j. World Road Association (2015). Road Safety Manual, Paris.
k. www.unroadsafetyweek.org/en/solutions/safe-roads
l. www.irap.org/; https://toolkit.irap.org; https://vida.irap.org
m. www.wri.org/publication/sustainable-and-safe-vision-and-guidance-zero-road-deaths
n. www.globalncap.org/
o. Sasser S, Varghese M, Kellermann A, et al. Prehospital trauma care systems. Geneva, World Health Organization, 2005.
p. Mock, C., Quansah, R., Krishnan, R., Arreola-Risa, C., & Rivara, F. (2004). Strengthening the prevention and care of injuries worldwide. The Lancet, 363(9427), 2172-2179.
q. www.who.int/roadsafety/publications/en
r. www.wri.org/sites/default/files/CitiesSaferByDesign_final.pdf
s. http://toolkit.irap.org/
t. www.iso.org/standard/44958.html
u. https://nacto.org/; and https://globaldesigningcities.org/
v. www.wri.org/publication/saving-lives-sustainable-transport
w. www.wri.org/publication/sustainable-and-safe-vision-and-guidance-zero-road-deaths

of human tolerance thresholds.[27]

Safe system intervention provides the opportunities for choice in the selection of intervention, as long as the desired outcomes of preventing and reducing death and serious injury are addressed. Safe system allows transport planners and government agencies to adapt their intervention strategies based on the specific needs of their context in the knowledge that if some interventions are not feasible, there are other ways of compensating or reducing that risk. For example, while the use of motorcycle helmets is a known effective intervention and can reduce death and serious injury risk by at least 50 percent, in countries where a large Sikh population exists, exemptions will need to be made in regulatory approaches. The safe system approach allows system designers to consider other effective ways of reducing the risk of death and serious injuries to motorcyclists such as establishing a

Box 4.7: The Central Role of Speed in a Safe System Approach

Speed is a central design parameter in implementing the Safe System approach. Here, the emphasis is on determining allowable speeds by setting them according to road use, the protective quality of roads, roadsides and vehicles and ensuring the compliance of drivers and riders.

Small increases or decreases in mean vehicle speed can have a substantial effect on fatal and serious crash injury risk. An increase of 1 km/h in mean vehicle speed results in an increase of 4–5% of fatal crashes. A similar decrease in speed will have a similar decrease in fatal crashes. A 5% cut in average speed can result in a 30% reduction in the number of fatal road traffic crashes.

A study among OECD countries showed that typically 40¬50%, and up to 80%, of drivers were driving above the posted speed limits, while a similar proportion of vehicles travelling at excessive speed has been found in low- and middle-income countries.

Source: World Health Organisation (2017). Managing Speed, WHO, Geneva.

Box 4.8: Safe Speeds for Key Road Types and Their Potential Conflicts

Roads with possible conflicts between cars and unprotected users	**30km/h**
Intersections with possible side-on conflicts between cars	**50km/h**
Roads with possible frontal conflicts between cars	**70km/h**
Roads with no likelihood of frontal or side-on conflicts between road users	**≥100km/h**

Source: Tingvall and Haworth, 1999

These recommendations were mainly implemented in high-income countries. The safe speed of "≥ 100 km/h" is not intended to provide justification for no speed limit on motorways. A recent study investigated the critical impact speed for fatal and serious injury.[a]

Note:

a. Jurewicz C et al. (2016) Exploration of vehicle impact speed–injury severity relationships for application in safer road design. Transportation Research Procedia. 14:4247–56.

Box 4.9: Approaches to Managing Speed

i.	**Building or modifying roads to include features that calm traffic**
ii.	**Establishing speed limits appropriate to the function of each road**
iii.	**Enforcing speed limits**
iv.	**Installing in-vehicle technologies**
v.	**Raising awareness about the dangers of speeding**

Source: WHO 2017[a] Roads include sidewalks as appropriate.

Note:

a. World Health Organisation (2017. Managing Speed, WHO, Geneva.

separate motorcycle lane that is separated from other vehicles by a barrier. Where safe separation cannot be achieved in network planning, nor protective qualities enhanced, then speed management can bring speeds down to tolerable levels, such as 50 kilometers per hour, that do not result in serious or fatal crash injury outcomes. Improved speed management may also assist with other global agenda by reducing greenhouse gas emissions, noise pollution, and reducing fossil fuel use.[28]

Safe system intervention planning also requires new attention to the linkages between system elements. Consideration of linkages between different types of sectoral intervention are crucial for effective implementation. For example, occupant restraints and seat belts require fitment before they can be worn or used; setting posted limits for safe speeds must take account of the safety quality of roads, roadsides and vehicles to protect against death and serious injury outcomes; and in-vehicle lane keeping assistance will not function if road authorities do not maintain lane markings.

Adopting a safe system approach necessitates action across government and between levels of government at global, regional, national and local levels. It requires the involvement and close collaboration of many sectors including transport, health, police, industry and civil society.

Action to boost the wearing of seat belts provides a good illustration of the interdependence of different road safety measures and stakeholders to ensure effective protection (table 4.2).

A wide range of guidance and manuals has been produced since the publication of the "World Report on Road Traffic Injury Prevention" in 2004.[29] Interactive websites and regional road safety observatories (e.g., SafetyCube, European Road Safety Observatory, Vaccines for Roads) are available to explore a variety of appropriate interventions. WHO's production, "Save Lives" package[30] captures the priority and proven interventions for large-scale action globally.

The measures listed in table 4.2 can be categorized into two types. The policy objectives to which these measures contribute and their relevance by country group are listed in Annex I of the GRA report.

- Legal and regulatory tools
  - Safe vehicles
  - Post-crash care
  - Safe road use
- Technology and engineering tools
  - Safe roads and roadsides
  - Safe speeds
  - Safe and healthy modes

Table 4.2: Action Needed to Increase Seat Belt and Child Restraint Use

Global UN	– Setting targets to increase global seat belt and child restraint use – Performance standards for seat belt and child restraints and seat belt reminders in motor vehicles – Global guidance and information from key organizations e.g. WHO, NCAPS
Regional level e.g. EU	– Setting targets to increase regional seat belt and child restraint use – Rules on the mandatory fitting and use of seat belt and child restraints and seat belt reminders – Rules to improve checks and the application of penalties to car drivers – Performance standards for seat belts and restraints – Regional guidance and information from key organizations e.g. for EU, Euro New Car Assessment Programme (NCAP), European Transport Safety Council (ETSC) – Support for the launching of a regional/ EU programme to evaluate the restraint systems on the market – A framework and support for campaigns to promote seat belt use – Monitoring of the incorporation of regional legislation by the Member States into their national law
National level	– Setting targets to increase national seat belt and child restraint use – Implementation of global, regional e.g. EU regulations – Setting exemptions – Inspect vehicles for compliance with standards – Securing compliance through resources for police enforcement (including automated enforcement) and publicity – Targeted national information – Monitoring of seat belt use – Encouraging seat belt use policies in the public and private sectors – Support for child restraint loan schemes – Financial incentives for child restraints
Regional/ local level	– Police enforcement and publicity – Seat belt information in schools – Encouraging child restraint loan schemes in the local health sector – Seat belt use surveys – Seat belt use survivor clubs
Private sector	– Setting targets in organizations to increase seat belt use – Innovation and initiatives – Development and marketing of more efficient restraint systems, in response to evaluation campaigns – Installation of non-compulsory restraint devices – Reduced insurance premiums for users of equipped vehicles – Campaigns at company level for the workforce

Source: Based on Table 1, European Commission (2003).

Note: European Commission (2003) European Road Safety Action Programme, Halving the number of road accident victims in the EU by 2010: A shared responsibility, Brussels, 2.6.2003, COM (2003) 311 final

4.4. Institutional delivery

Global guidance indicates that successful institutional delivery comprises a range of functions. The overarching function is results focused, supported by coordination, legislation, funding and resource allocation, promotion, monitoring and evaluation, research and development, and knowledge transfer. Capacity for the delivery of each function is important at national, local and organizational levels to produce effective, system-wide intervention. The existence of an appropriately resourced lead agency is a prerequisite for effective management. ISO 39001 has closely aligned its management standard with this guidance and sets out a range of requirements encouraging effective action from the top management of organizations.

While Table 4.3 sets out the framework for roads, these functions are relevant and transferable to other modes.

The measures listed in table 4.3 can be categorized into four types of tools. The policy objectives to which these measures contribute and their relevance by country group are listed in Annex I of the GRA report.

- Legal/Regulatory tools
  - Results focus
  - Coordination
  - Legislation
- Technology/Engineering tools
  - Research and development and knowledge transfer
- Economics/Financing tools
  - Funding and resource allocation
  - Monitoring and evaluation
- Communications tool
  - Promotion

Table 4.3: Institutional Management Functions, Global Tools, Guidance and Networks: Roads

Management Function	Description	Examples of global tools, guidance and networks	Synergies with transport goals: Urban, rural access, efficiency, green, gender and other goals: Public health, occupational health and safety
Results Focus: **Leadership, Goal and Target setting**	Results focus is the overarching institutional management function with all other functions contributing to its achievement. It addresses leadership, goal and target setting and accountabilities for these, and defines the level of safety to be achieved in the long term and in the interim.	Global Road Safety Facility (GRSF) Road safety management guidance (2009, 2013)[a] ISO 39001 (2012) Road traffic safety management systems standard.[b, c] Sustainable and Safe: A Vision and Guidance for Zero Road Deaths[d] Political Economy of Road Safety[e]	All functions: Urban Rural access Efficiency Green Gender Public health
Coordination	Coordination to ensure meaningful, shared responsibility for results is addressed globally, regionally, nationally, locally; across and between sectors and levels of government; in delivery partnerships with government, non-government and business and via parliamentary relations.	Global Road Safety Facility (GRSF) road safety management guidance (2009, 2013) for all other functions. UNRSC[f]	Active travel Occupational Health Poverty reduction Tourism

Legislation	Legislation sets out government and agency roles, responsibilities and accountabilities and ensures that instruments are well matched to the road safety task. It involves capacity of specialist legislative and technical expertise within government to develop, consult and consolidate on standards and rules.	WHO (2014) Strengthening road safety legislation: a toolkit for road safety legislation workshops[g] Global Forum for road safety legislators[h]	Synergies with all policy goals
Funding and Resource Allocation	Funding and resource allocation concerns the financing of interventions on a sustainable basis using a rational evaluation and programming framework to allocate resources to achieve results.	UN Road Safety Trust Fund; GRSF; FIA Foundation; Multilateral development banks.	Synergies with all policy goals
Promotion	Promotion concerns the sustained communication of road safety as a core business for government and society and emphasizes the shared responsibility for the delivery of the interventions to achieve results.	GRSF Road safety management guidance (2009, 2013).[h] GRSP advocacy tools[i]	Synergies with all policy goals
Monitoring and Evaluation	Monitoring and evaluation concerns the systematic and ongoing measurement of road safety outputs and outcomes; evaluation of interventions and institutional delivery; and crash investigation to achieve results. This function also includes independent review of the safety management system including results, systematic intervention as set out in table 4.2 and institutional delivery. Critical gaps in the delivery and operation in the transport system can be effectively identified, highlighted and improved by thorough, independent, scientific investigation, analysis and reporting.	Global New Car Assessment Program (NCAP) and Regional NCAP guidelines, International Road Assessment Programme (iRAP) country reports and safety assessment guidelines, World Road Association (PIARC) Road Safety Inspection Guideline, PIARC Investigation and ISO investigation guidelines. WHO/UNRSC Data systems: a road safety manual for decision-makers and practitioners (2010) Regional Road Safety Observatories	Synergies with all policy goals
Research and Development and Knowledge Transfer	Research and development and knowledge transfer concerns the systematic and ongoing creation, codification, transfer and application of knowledge to achieve results. It involves sustainable capacity for research-based approaches and knowledge to road safety policy, programs and public debate.	GRSF Road safety management guidance (2009, 2013). World Road Association road safety manualj Global Transport Knowledge Partnership (GTKP) case studies[k] iRAP case studies[l]	Synergies with all policy goals

Note:

a. www.worldbank.org/en/topic/transport/publication/road-safety-management-capacity-review-guidelines

b. www.iso.org/standard/44958.html

c. www.iso.org/files/live/sites/isoorg/files/developing_standards/docs/en/ISO_39001_Startup_Guide_2017-06.pdf
d. www.wri.org/publication/sustainable-and-safe-vision-and-guidance-zero-road-deaths
e. www.odi.org/publications/10739-political-economy-road-safety-policy-oriented-literature-review
f. www.gtkp.com/themepage.php?themepgid=367
g. http://apps.who.int/iris/bitstream/handle/10665/148823/9789241508292_eng.pdf;jsessionid=650E8712D97969969D70982F64B-4D732?sequence=1
h. www.towardszerofoundation.org/the-global-forum-for-road-safety-legislators/
i. www.grsproadsafety.org/resources/advocacy-tools/
j. http://roadsafety.piarc.org/
k. www.gtkp.com/themepage.php&themepgid=88;
l. www.irap.org/media-centre/case-studies/

ENDNOTES

23 Note that the list of actions in the Annex table are provided for the purposes of comparison with other sections and comprise action fields rather than a long list of specific measures for these reasons.

24 ITF (2018), Safety Management Systems, ITF Round Table 172. www.itf-oecd.org/sites/default/files/docs/safety-management-systems.pdf

25 World Road Association (2015). Road Safety Manual, Paris.

26 www.bloomberg.org/program/public-health/road-safety/; https://thecityfix.com/blog/5-key-lessons-from-10-cities-at-transforming-transportation-2017-anna-bray-sharpin-subha-ranjan-banerjee-ben-welle-claudia-adriazola-steil/

27 World Resources Institute (2015). Cities safer by design Guidance and Examples to Promote Traffic Safety through Urban and Street Design Version 1.0.

28 Sakashita C. and Job RFS. (2016). Addressing key global agendas of road safety and climate change: synergies and conflicts. Journal of the Australasian College of Road Safety 27(3):62-68.

29 Peden M, Scurfield R, Sleet D, Mohan D, Hyder A, Jarawan E and Mathers C eds. (2004). World Report on Road Traffic Injury Prevention, WHO and World Bank, Geneva

30 www.who.int/violence_injury_prevention/publications/road_traffic/save-lives-package/en/

5. COUNTRY AND PRIVATE SECTOR EXAMPLES

5.1. Road safety performance

As in other sections, information focuses on road safety rather than the safety of other modes for reasons of priority status and availability of facts.

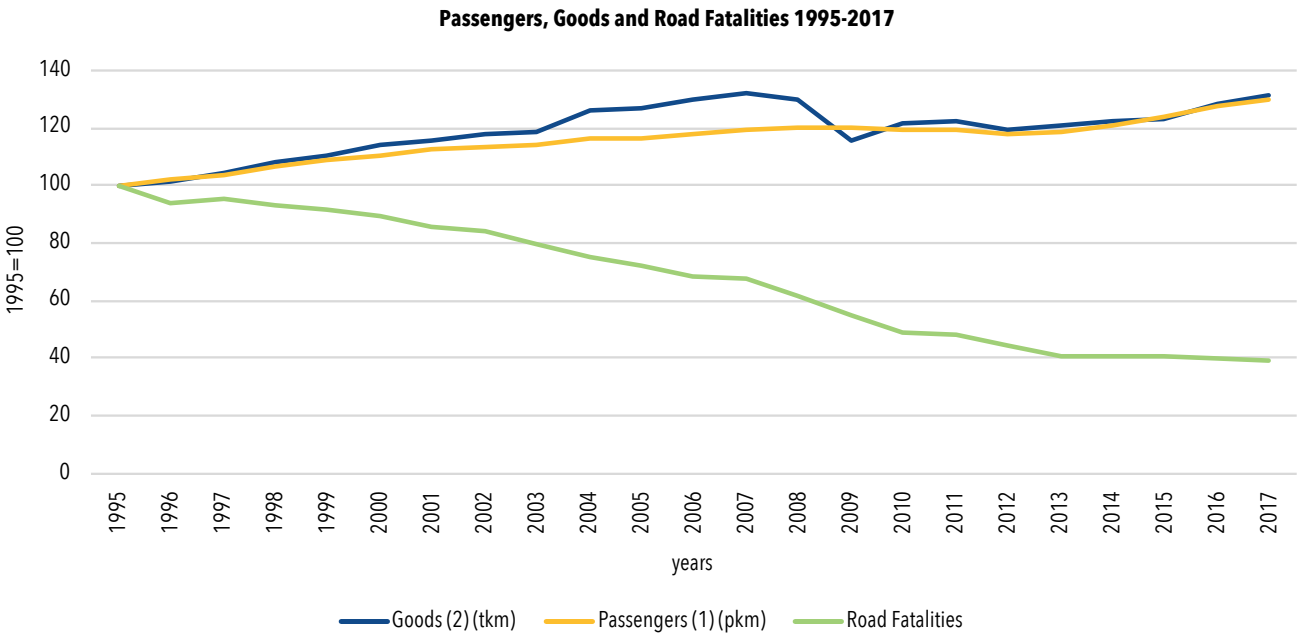
Questionnaire-derived information on the national road safety performance of countries is set out in the WHO global status reports on road safety (December 2018) and in the international road traffic and accident database (IRTAD) annual road safety report hosted by ITF–OECD for its member countries. Road safety management capacity reviews, though few, set out in-depth analyses of performance. The "Vaccines for Roads" resource provides a summary of infrastructure safety performance globally.

This section aims to give an overview of global road safety performance as well as regional and country examples.

5.2. Regional case study

The WHO European region is a leader in road safety performance and the EU is the regional global leader with an average of 4.9 deaths per 100,000 inhabitants

Figure 5.1: EU Passengers, Goods, GDP, Road Fatality Trend 1995-2015



Source: European Commission (2017). Statistical Pocketbook Transport in Figures, Chapter 2.1.https://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2017_en

in 2018. As shown in Figure 5.1, EU member states continue to make progress although recent progress has slowed. Average mortality over the last three years varies between 2.7 and 9.4 road deaths per 100,000 population.[31] Countries with the lowest mortality (per 100,000 in 2017) were Sweden (2.7), the UK (2.8), Denmark (3.1), and the Netherlands (3.1). Those with the weakest road safety records were Bulgaria (9.8), Romania (9.5), Latvia (9.5), Lithuania (8.3) and Croatia (8.2).

5.3. Global overview

The most recent estimates of the distribution of global road deaths by region is presented in table 5.1 with an almost threefold difference in fatality risk between worse and better performing regions.

5.4. National case study

Various countries' activity features in this section. Box 5.1 sets out one case study of a country's path to significant road safety progress in recent years resulting from regional, national and local action.

Table 5.1: Numbers and Rates of Road Deaths in Crashes: 2016

WHO Region	Number of deaths	Population (million)	Death Rate (per 100,000 population)
Africa	271,737	1,012	26.6
Americas	156,139	992	15.7
Eastern Mediterranean	120,709	669	18.0
Europe	85,683	916	9.4
South East Asia	402,919	1,948	20.7
Western Pacific	319,194	1,890	16.9
World	1,356,382	7,435	18.2

Source: Global Health Observatory data, World Health Organization.

Box 5.1: Road Safety in Spain

Results achieved: Spain has seen a dramatic improvement in road fatality trends since 1989 when road deaths peaked. Two million vehicles in 1960 rapidly rose to 33.6 million registered vehicles in 2016. Over the same period, population increased from 30.6 to 46.4 million, and with an increasingly huge volume of tourists visiting the country (75.3 million in 2016), whose crashes and deaths are reflected in the data. The lowest death rate ever happened in 2013 with 1680 fatalities recorded, which placed Spain among the top 5 world performers when rates per population are computed.

Decade of action 2011–2010: A national lead agency for road safety has existed since 1957. The current Road Safety Plan 2011–20 comprises specific targets and indicators, and its main objective is aligned with the European objective of reducing the number of people killed in road accidents in half by 2020. Spain adopted Vision Zero in 2012 as its road safety approach. Six of the thirteen 2020 targets had been reached by 2015. Details of progress can be found on the DGT website (www.dgt.es). This progress resulted in numerous awards, including the European Transport Safety Council (ETSC) PIN award in 2014.

Notable developments:

1. *Substantial shifts in transportation modes:* Since 2000, Spain has developed one of the largest

high-speed train networks, a popular mode amongst citizens and tourists. In addition, substantial improvements were made on the rail network in general, to the quality and regularity of trains, even for short distances. Public transportation in urban areas has also greatly improved.

2. *Substantial improvements in the road network:* Supported in part by EU funding, Spain has become one of European countries with an "excess" road capacity and a high-quality network as measured by all international standards. At least 3000 km were transformed from conventional 2 lane roads into segregated 2 lanes each-way roads.
3. *Being a member of the EU:* It became relatively simple to make otherwise difficult political decisions because they were mandates from the EU. EU membership helped Spain adapt and adopt to higher levels of traffic management, and it also gave politicians an easier escape route to avoid conflict. Furthermore, the (technical) experience from other countries was instrumental since the country could cut and paste from legislation to facilitate the setting up of traffic management centers very quickly.
4. *Substantial improvements in enforcement:*
   - There was a massive deployment of speed cameras along the 20,000 km of intercity major roads. In total, some 800 cameras were implemented in these roads that carry most of the travel in the road network. Most urban traffic managers followed the example and set up numerous speed cameras. A fully-automated ticketing center was created with capacity to issue 8 million speed tickets annually.
   - Substantial increases in penalties for selected behaviors (e.g., speed, drugs, and alcohol) were introduced. EU cross-border measures also helped as they allowed national authorities to issue and follow-up tickets.
   - Even though alcohol tests had been available for a while, some 8 million random tests were deployed as a baseline figure. Illegal drug saliva-based tests were introduced in 2012. Enforcement practices were augmented to ensure not only random-driver testing but also that offenders and crash-involved drivers were tested both for alcohol and drugs
   - Multiple-offence enforcement was developed. For example, speeding cars detected by cameras are also checked automatically for technical inspection certification and insurance status since 2014.
   - Introduction of the penalty points system.
5. *Economic recession.* The global financial crisis between 2007 and 2011 led to Spain undergoing one of its most severe economic crises. This led to a reduction in longer distance trips over this period, an ageing vehicle fleet, high youth unemployment levels and reduced applications for driver licenses at earlier ages (16 for motorcycles, 18 for cars). Notably the reduction in youth deaths in these years has been even more remarkable than that for the general population. Road safety budget cuts took place after 2012.
6. *Substantial media attention to the issue of crashes.*
7. *Increased attention by cities to road safety* in ways they had never done so (road safety had historically been perceived to be only a long travel, intercity road issue). Several models arose, many of them with good results.

Sources: Direccion General de Trafico, Ministerio del Interior, Gobierno de España.Principales Cifras de Siniestralidad, 2016

5.5. Air safety performance

Table 5.2 provides details on the state of aviation safety in different ICAO's regional aviation safety group (RASG) for 2018 in the context of global outcomes. The accident data for scheduled commercial air transport operations is categorized according to RASG regions by state of occurrence.

Table 5.2: Numbers and Rates of Fatal Air Accidents: 2018 (ICAO, 2019)

RASG Region	Estimated Departures (millions)	Number of Accidents	Accident Rate (per million departures)	Fatal Accidents	Fatalities
Africa Indian Ocean	1,440,702	4	2.8	2	21
Asia and Pacific	12,445,017	20	1.6	3	241
Europe	9,298,706	26	2.8	2	72
Middle East	1,326,656	3	2.3	1	66
Pan America	13,575,682	45	3.3	3	114
World	38,086,763	98	2.6	11	514

ENDNOTES

31 European Commission (2017). CaDaS, Brussels.

6. ROADMAP OF ACTION

The preceding sections scanned the global status of transport safety and the challenges for different modes. While the scale of the safety problems and the nature of solutions may vary between the modes, critical success factors for improving transport safety performance can be identified.

6.1. Building leadership

Safety leadership by government and the top management of organizations is critical to successful transport safety management. Planned, accountable, results-focused and appropriately resourced activity requires government orchestration globally, regionally, nationally, locally, and at city levels and in the top management of organizations.

Especially important, given the wider shared responsibility involved in road safety as opposed to other transport modes, is an active lead governmental agency for road safety at the national level with appropriate capacity, supported by technical and research sectors, efficient coordination and delivery partnerships. Widely acknowledged exemplars in this respect are the EU at regional level (box 6.1), and at national level, the Swedish Transport Administration, previously known as the Swedish Roads Administration (box 6.2).

Box 6.1 : The Road Safety Role of the EU

The EU adds value to member states' road safety efforts by:

- Establishing goals through 2050, and the setting of interim targets and objectives to 2030; focus on achieving ambitious road safety results across the EU supported by governmental leadership; an EU "Towards Zero" road safety strategy around core performance objectives, aligning at the same time with a broad range of related societal objectives.
- Coordinating actions across commission directorates at the EU level, with other EU institutions in a coordination body, with member states through the "High-Level Group on Road Safety" and CARE groups, and with the business sector and civil society to achieve desired results.
- Legislating to meet road safety tasks in areas of shared competence with due consideration to subsidiarity, proportionality, the evidence-base and the need to provide a high level of protection.
- Funding initiatives supporting EU goals, targets and action programs on the Trans-European Transport Network (TEN-T) and other roads, twinning and capacity building initiatives and projects, research and development, benchmarking review, data collection funds, best practice guidelines, and effective NGO activity.
- Promoting the societal shared responsibility for road safety at a high level, and creating new demand for road safety.

- Monitoring and evaluation of road traffic crashes, injuries and exposure to risk in transport and health sectors, EU action programs, objectives and interventions through CARE, other databases, surveys and projects, in-depth study and independent review.
- Research and development of road safety interventions and tools to implement Safe System; disseminating knowledge following EU projects such as Safety Cube; developing best practice guidance, and funding the European Road Safety Observatory.

Source: https://publications.europa.eu/en/publication-detail/-/publication/bd17c6de-6549-11e8-ab9c-01aa75ed71a1/language-en

Box 6.2: Example of Good Practice Institutional Delivery: Sweden

Results focus

- Parliamentary adoption of Vision Zero in 1997 and renewed commitment in 2016.a
- Managing by Objectives strategy and analytical work.
- Target setting for final and intermediate outcomes.

Coordination

- Group for national road safety cooperation.
- Annual results conferences of key stakeholders.
- Bi-lateral engagement with agencies e.g., Swedish Work Environment Authority
- Engagement with business sector to fast track measures.
- Strong interest and involvement of Parliamentary Transport Committee

Funding

- Secured doubled-road safety funding 1999-2009. An increased and earmarked allocation was made to allow resource for key network safety improvements, e.g., median guardrails, safe intersections, road shoulders.

Legislation:

- Enshrined Vision Zero in legislation as the national approach for long-term road and transport safety work.
- Specific safety requirements outlined in transport service procurement.
- Works for road safety legislation to meet the road safety task.

Promotion

- High-level promotion of Vision Zero by Ministers as the core of shared responsibility.
- Leading by example with in-house safe travel policies.

Monitoring and Evaluation

- National STRADA system of linked data between health and national police-reported data.
- Measuring intermediate outcomes directly linked to death and serious injury prevention and reduction.
- Transparent annual reporting and performance review.
- Road safety management capacity review.

Research and Development and Knowledge Transfer

- Sustained support for research sector and cross over in roles between research and policy personnel.
- Chaired the ISO 39001 (2012) development of road traffic safety management systems standard
- Created the Vision Zero Academy that runs Vision Zero courses and Vision Zero conferences.

Note:

a. www.government.se/4a800b/contentassets/b38a99b2571e4116b81d6a5eb2aea71e/trafiksakerhet_160927_webny.pdf

Some valuable perspectives from the World Resources Institute's research address leadership issues and challenges in three large middle-income cities, set out in box 6.3.[32] Policy leadership and action for Vision Zero and 5-Star Cities in urban areas worldwide provides a valuable and positive framework for transforming safety for all road users in cities.[33]

Box 6.3: Building the Case for Road Safety in Public and Political Thinking

Pair road safety with more prominent or popular issues

Identify stakeholders with an interest in road safety reform, even if for other motivations, and work together. This helps make the public case for reform and improve the political salience of the issue. For example, if making a street or public transport system safer will also reduce congestion issues, or help make businesses on the street more accessible, it matters little if road safety is not the primary objective of those business owners. This approach was inadvertently taken in Bogotá, where reform of the public transport system to improve travel options also significantly improved road safety. Where alignment of interests does not generate sufficient support for reform, advocates may find it useful to pair road safety objectives with other (potentially unrelated) content via policy processes rather than treating it as a stand-alone issue.

Reframe road safety in the public and political debate

Road safety is a public health issue, and also an economic, social, education, equality, law and justice issue. This allows reformers to link road safety to issues with local resonance, thereby garnering political salience. It can also change the way road safety is viewed by the public: shifting the full onus away from road users themselves. For instance, reformers in Bogotá linked traffic fatalities to homicides, emphasizing different benefits for different audiences. For example, in Bogotá, the Mockus administration successfully linked road safety challenges to the city's high homicide rate by focusing broadly on the issue of violent and avoidable deaths.

Seek opportunities and build alliances at all levels of government

Both support for and opposition to road safety can exist at all levels: national, regional and local. Despite the fragmentation challenges identified, there is not one form or extent of decentralization required for progress. For example, Colombia has empowered directly elected mayors, but in Mumbai, India, the Municipal Corporation of Greater Mumbai (MCGM) holds the power and decision-making autonomy. Nairobi's governor and county assembly have more power than the city council. Depending on the ideas they hold, the incentives they face, the autonomy they have and the ambitions they harbour, local actors may have the power to drive reform from within cities or block it. Those seeking to make progress on road safety must understand and respond to the political and institutional dynamics at play in their cities and countries.

Take advantage of wider institutional and governance reform

Many cities, including Mumbai and Nairobi, find it hard to improve road safety due to fragmented responsibility or a lack of ownership. As a result of national decentralization and other reforms, Bogotá established an elected mayor and improved institutional coordination and accountability. This boosted public faith in local institutions and created a willingness to follow local regulations. Specific reforms to the police, public transport, city finances and the transport department all increased the city's ability to influence, control and monitor people's mobility and safety.

Source: World Resources Institute (2015) Securing safe roads. The politics of change.

Governments are required to implement effective civil aviation systems[34] and safety oversight functions when building leadership in aviation. This is established by putting in place a civil aviation authority (CAA) or other relevant authorities or government agencies, headed by a chief executive officer, supported by the appropriate and adequate qualified technical and non-technical staff, provided with adequate financial resources. The state authority must have stated safety regulatory functions, objectives and safety polices. Widely acknowledged example in this respect is the European Aviation Safety Agency (EASA), the centrepiece of the European Union's strategy for aviation safety (box 6.4).

6.2. A global transport safety performance framework to 2030 and beyond

A range of actions is required in developing and adopting a global transport safety performance framework to 2030 and beyond.

6.2.1. All modes

- Adopting a long-term goal of safe system toward zero to align with good practice should be interwoven in a new global transport safety performance framework—supported by interim targets for reducing deaths—as well as key safety performance objectives to 2030.
- Adopting interim targets for road transport and air, maritime and rail transport to reduce deaths by 2030 (2020 baseline) as outlined in section 1.
- Setting key safety performance objectives to 2030. Further work is required on a set of measurable key safety performance objectives and targets that are directly related to the prevention and reduction of death and serious injury to underpin new 2030 targets and form the core of global transport safety strategy to 2030. Having measurable safety performance indicators would allow us to assess far earlier than 2030 if we are on track. These can also be followed through in

Box 6.4: Aviation Safety Role of the European Aviation Safety Authority – EASA

Its mission is to promote the highest common standards of safety and environmental protection in civil aviation. EASA develops common safety and environmental rules at the European level. It monitors the implementation of standards through inspections in the member states and provides the necessary technical expertise, training and research. EASA works hand in hand with the national authorities which continue to carry out many operational tasks, such as certification of individual aircraft or licensing of pilots.

The main tasks of the Agency currently include:

- Rulemaking: drafting aviation safety legislation and providing technical advice to the European Commission and to the Member States;
- Inspections, training and standardization programs to ensure uniform implementation of European aviation safety legislation in all member states;
- Safety and environmental type-certification of aircraft, engines and parts;
- Approval of aircraft design organizations world-wide as and of production and maintenance organizations outside the EU;
- Authorization of third-country (non EU) operators;
- Coordination of the European Community program SAFA (Safety Assessment of Foreign Aircraft) regarding the safety of foreign aircraft using Community airports;
- Data collection, analysis and research to improve aviation safety.

Source: www.easa.europa.eu/the-agency/faqs/agency

national projects and programs supported by international development finance and knowledge transfer.

6.2.2. Road transport safety performance objectives supporting long-term goals and 2030 targets

Key safety performance objectives directly relate to the prevention and reduction of death and serious injury, and involve use of validated tools and good practice measurement protocols. The main road safety performance fields in implementing a safe system approach are:

- Increasing the safety quality of roads and roadsides
- Improving compliance with safe speed limits
- Increasing the safety quality of new vehicles
- Increasing the efficiency and effectiveness of post-crash care
- Increasing levels of safe road use (use of seat belts, child restraints, crash helmets; driving without alcohol or other drugs or fatigue; driving without distraction)
- Prioritizing sustainable transportation: mass transit, walking and biking

It is particularly important for Sustainable Mobility for All (SuM4All) to include prioritizing sustainable transportation, mass transit, walking, and biking.

- The 12 global road safety performance targets (WHO, 2018) provide a framework for global and national action. The targets provide specific, measurable, action-focused, realistic and time-bound (SMART) measures for countries to adopt directly.
- Goal and target setting: Take account of external factors and emerging social and mobility trends such as increasing traffic volume, changes in mobility patterns, demographic changes and increasing automation, all of which influence road safety results. For example, it is forecast that by 2030, annual passenger traffic will exceed 80 trillion passenger–kilometers, a 50 percent increase compared with 2015. Global freight volumes will grow by 70 percent compared with 2015; and an additional 1.2 billion cars will be on the road, twice the existing total.
- Alignment with other SDGs and coordination with a range of sectors, in particular with sustainable mobility for all and climate change, is essential to extend the scope for road safety action and to address the key safety performance objectives. It entails work to identify co-benefits shared by different SDGs to improve business cases.
- Specific multi-sectoral interventions are identified in a broad multi-disciplinary knowledge base in a range of sectoral guidance and roadmaps. For example, in road safety these include reports from the World Road Association, the global NCAP, the iRAP, the UNRSC, the WHO, ITF, the World Bank, Austroads, the WRI and the EU. Also required are efforts to align the most promising measures addressing fatal and serious injury with chosen key safety performance targets. Costing interventions and review best use of existing tools, guidance and protocols should follow. These tools include road safety management capacity review, iRAP ratings and the business case for safe roads and safe speeds, NCAP ratings, surveys of speed, seat belt use, crash helmet use, in-car telephone use among others.

6.2.3. Air, maritime, and rail safety performance objectives supporting long-term goals and 2030 targets

The safety performance framework for maritime and rail sectors is more general, process-oriented and addresses all crash and incident outcomes. In all non-road modes, no key safety performance objectives can be identified that are closely related to the prevention and reduction of death and serious injury.

The safety performance framework for aviation is depicted in the ICAO global aviation safety roadmap in box 6.5.

Box 6.5: The ICAO Global Aviation Safety Roadmap

The ICAO aviation safety roadmap contains three distinct phases in line with the Global Aviation Safety Plan (GASP) objectives:

a) Phase I: Effective Safety Oversight by 2017

Phase I of the roadmap is divided into two sub-phases: Sub-phase I-A focuses on the establishment of an effective safety oversight framework, and sub-phase I-B focuses on the implementation of an effective safety oversight system. It is imperative that states complete sub-phases I-A and I-B to ensure effective safety oversight before focusing on State Safety Programme (SSP) implementation in Phase II.

b) Phase II: SSP Implementation by 2022

Safety initiatives under Phase II are aimed at a state lacking or in the process of implementing an SSP, whose effective implementation of the state's safety oversight system is above a score of 60 percent, and which is ready to progress into SSP implementation as demonstrated by the presence of effective safety oversight capabilities.

c) Phase III: Predictive Risk Management by 2028

Safety initiatives under Phase III are aimed at states that have effectively implemented SSPs.

Source: https://www.icao.int/safety/Pages/GASP.aspx

6.3. Building essential capacity to allow goals and targets for projects and programs to be addressed

6.3.1. Road safety

Capacity reviews and experience prior to and within the decade of action (2011–2020) reveal that existing management capacity cannot be necessarily assumed.

Achieving road safety results in general requires long-term governmental ownership, leadership and political will, manifested in the form of ambitious goals, step-wise targets and sufficient human and financial resources to achieve them.

The SDG targets (and additional ones set to 2030 for road safety) and key safety performance objectives based on the global 12 road safety voluntary targets have to be addressed. Embedding the safe system approach requires specific capacity building at the global, regional and country levels. Such measures enable to create resources and tools necessary to target initiatives on a scale capable of reducing road deaths and injuries significantly and sustainably, particularly in LMICs.

- Countries with poor road safety performance cannot expect to achieve the organizational structures and processes of good practice countries unless they receive attention and training to implement pragmatic global guidance. Such guidance addresses the central issue of how to accelerate the necessary process of shifting from weak to strong management capacity to achieve improved road safety results. Current guidance sets out a clear framework for action for international donors and financiers, and countries. The framework covers how institutional strengthening initiatives and related road safety investments can be properly sequenced and adjusted to the institutional realities encountered in the country concerned. It acknowledges that building effective road safety management is a long-term project requiring years of investment, and recommends a staged process to investment projects and programs. This entails a two-stage process; road safety management capacity review to define strengths and weaknesses and priority investment, and the defi-

nition and adoption of learning by doing projects and programs.

- Stand-alone learning-by-doing projects and programs involve funding core institutional capacity across the responsible sectors. They aim to bring targeted safety outcomes under control initially in high-volume, high-risk corridors and surrounding areas through coordinated multi-sectoral initiatives, using a range of available tools. Specific and simultaneous attention is paid to lead agency and related coordination arrangements and data needs. Policies are reviewed for example, on vehicle safety legislation; improving the safety of commercial transport; and speed management. This allows acceleration of capacity strengthening in intervention and institutional delivery. When scaling-up, lessons will be learned about dose response, and costs of interventions in various types of location and the best options for achieving desired outcomes. This involves consideration of opportunities for change, understanding benefits derived from a given intervention, and the ways an intervention package can be adjusted to achieve better results. A properly resourced global response is also necessary to facilitate projects at the country level (box 6.6).

Box 6.6: Argentina – Results from a Multi-sectoral Safe System Based Approach to Road safety

The Argentina Road Safety project is one of the World Bank's first stand-alone road safety projects, with a focus on strengthening and then sustaining road safety management capacity in the country by using the Lead Agency Model (an approach supported by the Bank), in this case the National Road Safety Agency (ANSV). It took account of recommendations to establish the initiatives necessary to help countries transition to a Safe System Approach that resulted in a holistic and innovative road safety 30 USD million project, delivered during a seven-year period from August 2010.

The Road Safety Project enabled the institutionalization of road safety management in Argentina, in the context of a federal country with strong autonomy of sub-national governments, through the empowerment of a truly multi-sectoral lead agency with sustained financing. The project built partnerships with local and regional governments by leading the Federal Council for Road Safety, as well as provided support to build capacity and funded cost-effective road safety interventions at the local level on a collaborative and consistent manner. It also furnished tools necessary for consistent and robust road safety data management, and for improvement of the design of policy implementation.

The project provided a menu of Safe-System based activities in support of ANSV's institutional strengthening to establish and sustain its leading national road safety role. It included the creation of a national driver licensing system, supported by a national traffic offence record system; road safety communication and education campaigns, trainings and workshops; protocols and guidelines for enhancement of response capacity in road traffic emergencies; and strengthening of traffic control and enforcement forces capacity. On the enforcement front, traffic enforcement authorities, jointly with the ANSV, carried out more than 180,000 inter-jurisdictional enforcement operations. The project provided enforcement equipment (for example, speed radars and breathalyzers) as well as training. The project also delivered numerous road safety education campaigns, training and workshops across the country. In addition, a road injury information system was developed in 50 hospitals.

The project generated commitment from the provinces and municipalities to the National Road Safety Strategy and enabled multi-jurisdictional collaboration through the creation of an incentive fund, and the implementation of safety demonstration corridors. The Incentive Fund was created to implement road safety policies and projects with the aim of working collaboratively and consistently with regional and lo-

cal jurisdictions to formulate road safety plans and reimburse the cost of implementing eligible road safety interventions, such as traffic calming, school zones, improved pedestrian crossings, and roundabouts. More than 147 jurisdictions in 19 of the 24 provinces received technical support and a reliable stream of resources from the Incentive Fund, thus ensuring on-the-ground implementation of national-level road safety policies. The first required intervention was the preparation of the Local Road Safety Strategic Plan, so that the implementation of subsequent activities conformed to planning under a Safe System Approach. The safety demonstration corridors had the objective of demonstrating the effects of ANSV's interventions, and above all, they serve to put in practice the leadership of the agency. In coordination with the private concessionaire managing the roads and upgrading the infrastructure, project interventions focused on raising awareness through education and mass-media campaigns that were coupled with enforcement efforts targeting driving under the influence of alcohol, speeding, helmet use, and seatbelt wearing. Traffic fatality rates fell on average by 23% while the number of serious injuries fell by 15% in the three demonstration corridors.

The project supported the investment needs for the set-up and strengthening of the National Road Safety Observatory (NRSO), responsible for maintaining and analyzing data to support setting national goals, monitor progress, and enabling effective advocacy from civil society. The NRSO has data from Argentina's 24 provinces, and disaggregated data from 12 of these. Nine provinces have also implemented an electronic crash data system. The NRSO also carries out regular observational studies to monitor risk factors such as seat belt usage, helmet usage, driving under the influence of alcohol and speeding, as well as sociocultural studies to understand people's perception of road safety risks. The monitoring and evaluation framework of the project relied heavily on the NRSO tracking risk factors, fatality rates and injuries in the demonstration corridors as well as fatalities at the national level.

Traffic fatalities in Argentina had been increasing steadily until 2011, when the number of fatalities stabilized between 5,000 and 5,500, with a mortality ratio per 100 thousand inhabitants of 12.7 in 2016, while the Latin America and Caribbean (LAC) regional ratio reached 13.5. Although the stabilization of traffic fatalities in Argentina cannot be attributed to a single project component, international experience shows that improving road safety management and implementing evidenced-based road safety measures in a coordinated manner under the responsibility of the lead agency have been successful in stabilizing and reducing road traffic fatalities and injuries in high-income countries. The project, which concluded in 2017, produced a sustained institutional reform that has provided the Safe System based framework to continue reducing road traffic fatalities and injuries in the following decades in Argentina.

Source: Global Road Safety Facility (GRSF), World Bank.

6.3.2. Aviation safety

- ICAO delivers technical assistance, training and implementation support tools to states to strengthen aviation safety oversight systems and operations necessary to develop and sustain a robust aviation safety and air navigation system. These activities align with the objectives of the ICAO's "no country left behind" (NCLB) initiative through the voluntary contributions of the Safety Funds (SAFE), which highlights ICAO's efforts to assist states in implementing ICAO standards, recommended practices and procedures (SARPs), and to help ensure that SARPs implementation is better harmonized globally. The purpose is that all states have same access to the significant socio-economic benefits of safe and reliable air transport. ICAO–NCLB activities have been supported by partner states, international organizations and industry. These partners have joined the ICAO collaborative platform, namely the aviation safety implementation assistance and partnership (ASIAP).

- Many states improved safety oversight systems through capacity building, supported by technical assistance (TA) projects implemented by ICAO. These include the resolution of significant safety concerns (SSCs) and a notable improvement of effective implementation (EI) in related technical domains. ICAO also supported the management of the rapid and coordinated responses to crises in several states and sub-regions, implementing contingencies and providing urgent assistance to states, and coordinating efforts among the stakeholders to achieve safety objectives.
- The GASP and Global Air Navigation Plan (GANP) have provided global frameworks for continuous safety improvements, and have harmonized global air navigation modernization. Their efforts were supported in the regions by the planning and implementation regional groups (PIRGs) and regional aviation safety groups (RASGs), regional safety oversight organizations (RSOOs) and the cooperative development of operational safety and continuing airworthiness programs (COSCAPs), and globally by the runway safety and safety management programs.
- In addition, the industry itself has a long history of collaborative action on safety, including the International Air Transport Association (IATA) operational safety audit—required of all members of this global airline association and also used by a number of other airlines—and the Airports Council International airport excellence (APEX) programs in safety initiative. Both organizations also ran capacity-building programs that provided training to their members from developing nations.

6.4. Measuring problems and establishing better data systems in all transport modes

The global mobility report (2017) highlighted key challenges facing all transport modes in measuring problems and establishing better data systems for effective safety management, and provided a stock of a wide variety of indicators for each mode. Historically, reliability, timeliness, costs, and volume of people and goods transported have taken priority over safety when planning transport. The absence at global level of comprehensive, universally agreed on data to measure and monitor transport incidents, their risk factors and their consequences as they happen around the world on an everyday basis are a clear barrier to progress. It is imperative to carry out a range of actions:

- All modes of transport have some data on fatalities and less data on injuries. There is a need to measure safety with good, timely, and quality data on fatalities and injuries in each mode of transport, and with sufficient information to identify the principal causes of fatal and serious injury crashes.
- Establish better data systems for road safety or make better use of existing tools to measure the operational conditions that influence death and serious injury for example, WHO Status Report; iRAP's Vaccines for Roads; global NCAP, IRF's world road statistics. Similarly, organizations urgently need to collect exposure data on the amount of travel by the development of regional road safety observatories, for example in Latin America and Africa, that are useful initiatives to enhance the quality of safety data progressively.
- The ICAO has established a full reporting and validating system in aviation safety for states to report safety-related information including safety data on fatalities and injuries. The ICAO publishes an annual safety report. The key components of the report include global accident statistics and global accident rate that provide an overall indicator of safety performance, and focus on trends in those accident categories that have historically accounted for a significant number of occurrences and fatalities. The ICAO has begun to develop a web-based reporting portal for states to report timely and accurately safety data.
- While some data regarding EU is made available by the EU Agency about railways, the International Union of Railways (UIC) remains the sole organization attempting to collect data at the largest geographical level available. It currently gathers detailed data on accidents in 25 countries, mostly in Europe, but also in Russia and the Middle East. The UIC safety database contains more than 25,000 events. The UIC issues a public annual report on safety, which includes a large range of indicators related to causes, circumstances and consequences of accidents, such as geo-tracking, track characteristics, type of accident, number

and category of victims, financial impact and impact on traffic. Time series since 2006 allow the railway sector to analyze trends and prepare for the future. The UIC global safety index is recognized worldwide as the best tool to assess safety levels.

- The IMO uses GISIS in maritime safety that contains information related to marine casualties and incidents, and the full marine safety investigation reports submitted to the IMO by reporting administrations. The organization collects information on ship casualties (including damage or loss of ship as well as injured persons) and identifies ship casualties at four levels: very serious casualties, serious casualties, less serious casualties, and marine incidents.

6.5. Accelerating knowledge transfer in all transport modes

Sustainable transport and safe mobility in all modes can be achieved through expediting knowledge transfer of research-based solutions to address the prevention and reduction of death and serious injury and by setting up increasingly ambitious goals and new developments. The need is particularly urgent in countries where current capacity is small and where the challenges are greatest in road safety.

6.5.1. Road safety

Road safety management guidance recommends that countries should adopt best practices to allow LMICs benefit from the costly lessons learned by high-income countries over decades in bringing their road safety outcomes under control. While capacity remains small, safe system demonstration projects (as opposed to overly demanding national plans) around a core safety performance framework are proving useful in a variety of contexts.

The safe system approach is acknowledged as best practice in managing for better road safety results, and it builds on good practice. A previous overemphasis on victim behavior and personal responsibility long relieved pressure on governments to take responsibility and act to protect their citizens. (GRSF, WRI, 2018). A specific focus on deaths and serious injuries—preventable and socially unacceptable—is required rather than on all crashes, which are not. Broader, accountable delivery would help achieve co-benefits. A key difference from traditional approaches is that greater attention is given to underlying operational conditions that influence death and serious injury occurrence and severity. This is achieved through targeting progress in: increasing road and roadside safety levels for new and existing roads; improving levels of safe speeds; increasing the safety quality of new vehicles, increasing efficient, effective post-crash care, and increasing levels of safe road use. While challenging for all professionals, a body of good practice safe system implementation is emerging for example, the global framework plan of action for road safety in 2018.

- Further knowledge transfer at regional and national levels will ensure current guidance on critical safety issues and available tools—road safety performance review (RSPR), road safety management capacity review (RSCMR), iRAP safety ratings, ISO 39001—filter into international assistance and national activity. One tool is to embed safe system approaches horizontally in road infrastructure management; address the central role of speed in managing risk; acknowledge the critical and efficient role of vehicle safety measures by adopting UN vehicle safety legislation and set up and supporting regional new car assessment programs (NCAP); manage exposure to risk through safe active travel policies that give equal consideration to safety, and the importance of efficient access to the emergency medical system and post-crash care.

The global framework plan of action, adopted by the UN road safety trust fund, provides for effective and efficient support to national efforts on road safety with practical application of the safe system approach. It uses the five pillars of road safety (decade of action) as essential blocks to create a national road safety system (Figure 6.1). It also incorporates any action that is necessary to attain the 12 road safety global voluntary performance targets.

The actions are detailed in four interconnected but separate areas of legislation, enforcement, education and technology for each of the four pillars. These areas are separate, since typically other national actors are in charge of action in these areas. At the same time,

Figure 6.1: Global Framework Plan of Action for Road Safety

Area / Pillar	Legislation	Enforcement	Education	Technology	International Regulatory Support
Road Safety Management					
Safe User	Traffic rules Drivers Cyclists Pedestrians	Lawful behavior ensured by police and inspectors	Awareness raising, training and examination	Supportive technology and equipment, rules reminders	UN RS legal instruments and resolutions, WP1, SC1, WP15
Safe Vehicle	Rules and standards for admission of vehicles to traffic	Certification and inspections by qualified inspectors	Awareness raising for users, training for inspectors	Supportive technology and equipment, compliance reminders	UN RS legal instruments and resolutions, WP1, WP29
Safe Road	Standard for design, construction, maintenance and signage	Audit, assessment and inspection by qualified teams	Raising awareness for road managers, users and for inspectors	Forgiving and self-explaining road design, intelligent road systems.	UN RS legal instruments and resolutions, WP1, SC1,
Effective post – crash response	Standards for data collection post-crash response and investigation	Oversight of rescue services, investigators investigating crashes	First aid and rescue service training, investigators training	Supportive technology and equipment	Consolidated resolution, int. standards, WP1, SC1

Source: United Nations Road Safety Trust Fund (2018) Global Framework Plan of Action for Road Safety.

they are interconnected, as action in one area can be impossible or will not lead to an expected result if no action follows in another area under the same pillar.

6.6. Scaling-up investment for transport safety

6.6.1. Road safety

Priority given to investments in the prevention and reduction of road traffic injury is small and insufficient when compared to spending in other key areas of transport policy and international development.

Potential savings from road safety investment are very large when they are appropriately targeted and research based. While it is understood that cost-benefit analysis may not always be the best tool for determining road safety priorities, many interventions demonstrate very high benefit to cost ratios, and some benefits can be sustained over long periods. For example, high-visibility safety policing combined with social marketing initiatives to reduce drinking and driving, and speeding, and increased use of seat belts can lead to substantial reduction of road trauma with benefits to cost within the range of 8:1–13:1. The benefits to cost ratio of investment in road safety engineering treatments and speed management are high. The iRAP business case for safer roads suggests $8

Figure 6.2: The Business Case for Safer Roads

UN TARGET 4 > 75% of travel on roads that meet technical standards for all road users by 2030 (equivalent to 3 stars or better)					
	Low Income	Lower middle income	Upper middle income	High income	ALL
Number of countries	31	45	51	50	177
CURRENT SITUATION					
Annual number of fatalities	195,569	423,148	472,563	116,331	1,207,611
Fatalities per 100,000 people	24.2	17.1	19.6	9.2	17.3
Annual Number of Fatalities and serious injuries	2,151,259	4,654,628	5,198,193	1,279,641	13,283,721
Annual cost of fatalities and serious injuries (% of GDP)	5.8%	4.2%	4.7%	2%	2.9%
WHAT CAN BE ACHIEVED with > 75% of travel on 3 stars or better roads for all road users by 2030*					
Annual Investment as a % of GDP	0.14%	0.18%	0.12%	0.14%	0.14%
Reduction in fatalities per year	86,342	169,259	174,106	37,332	467,039
Reduction in fatalities and serious injuries (FSI) over 20 years	18,995,159	37,237,024	38,303,352	8,213,036	102,748,571
Economic benefit (US$)	$273bn	$1,335bn	$5,063bn	$4,507bn	$11,180bn
Cost Benefit Ratio	18	9	16	5	8

*Full assumptions and national snapshots are available at **vaccinesforroads.org**

of benefits for every $1 invested at a global level and returns as high as 9:1–18:1 for network-wide investments in LMICs[35] Vehicle safety initiatives, where benefits across the national fleet may take a little longer to accrue, represent a particularly efficient and effective means of securing casualty reduction. Benefits to cost were identified for a wide range of active and passive safety measures (figure 6.2).

Levels of funding, new funding mechanisms and partnerships necessitate a range of appropriate actions.

- LMICs: Substantial new investments are required over time in governance and institutions, infrastructure, vehicle fleets and related investments in health and well-being of citizens to address death and serious and injury risk in inherently dangerous road traffic systems in the LMICs.
- At the same time, a reallocation of resource would require only a small percentage of existing infrastructure funding (1–3%) to contribute substantial but affordable savings in reducing deaths and injuries.
- International donors and financiers invest in road safety, and make use of large potential for sharing of scaled-up investment. The World Bank, the Asian Development Bank and the African Development Bank, as well as private philanthropies, such as Bloomberg Philanthropies and the FIA Foundation, have already made significant commitments. Road safety impact investment can also mobilize sufficient capital to implement the many high returns on investment solutions that exist.[36]
- The GRSF warrants further support. The GRSF is a global partnership program hosted by the World Bank. Since launching operations in 2006, the GRSF has worked in more than 60 countries with US $37 million disbursed, and has generated more than $850 million in direct road safety commitments. Some 40 percent of funds are allocated to program delivery organizations such as the

WHO, iRAP, the multi-lateral development banks (MDBs), the NGO Global Alliance on Road Safety, and other UNRSC partners. Its partnership with the World Bank has allowed GRSF to leverage the World Bank's convening power in countries, and use its grant funding to help reshape transport financing toward better road safety.

- Contributions to the new UN road safety trust fund, established in April 2018, are urgently required. Established at the request of the Secretary-General following the suggestion made by UN member states and the UN special envoy for road safety, the trust aims to mobilize resources from governments, intergovernmental or non-governmental organizations, the private sector, philanthropic organizations and individuals. UNECE estimates that every $1,500 contributed to the road safety trust fund could save one life, prevent ten serious injuries and leverage $51,000 in road safety investment. The FIA Foundation has made a $10 million pledge to the fund. UN-related agencies and officials propose that the UN road safety trust fund provide $7.7 billion of catalytic grant funding that could leverage an additional $262 billion in road safety investments (UNECE 2016).
- Further action on investment guidance, particularly by international donors, financiers and agencies holds much potential to address and assist countries with their ongoing road safety challenges.

6.6.2. Air safety

Paramount in the air transport sector are maintaining and improving safety, and those aspects require dedicated safety investments in civil aviation that are adequate, timely, predicable and long term. At the core of the ICAO's resource mobilization strategy is raising funds and enabling it, not only to identify effective and efficient funding, but also to broaden the donor base for safety priorities identified in its business plan.

- The ICAO safe fund was established to improve state civil aviation safety through provision of technical assistance and guidance. ICAO member states, international organizations and public and private entities associated with international civil aviation contribute to the safe fund. The ICAO developed the aviation safety implementation assistance and partnership (ASIAP) automated prioritization tool to help identify priority states requiring technical assistance using real-time data from the ICAO universal safety oversight audit programme (USOAP), integrated safety trend analysis and reporting system (iSTARS) safety margins, and the World Bank worldwide governance indicators (WGI).
- Master plans and national development plans were developed to ensure that civil aviation's priorities are reflected in the national development and budgetary plans guidance for states on clear links between their air navigation and safety plans, as well as their civil aviation.

6.7. Continuing international cooperation to improve safety in all transport modes

- Activity around the decade of action for road safety has seen greatly increased cooperation by a range of international organizations. However, the professional challenges of increasingly ambitious transport safety goals and the level of multi-sectoral collaboration needed for successful implementation are challenges that require urgent attention.
- Ever closer day-to-day cooperation between agencies working at global, regional and national levels in data gathering and sharing, investment programs, use of guidance material, efforts to improve the safety quality of road and transport networks (table 6.1).
- Close cooperation by funding agencies and financiers within countries to ensure that small country management capacity is not overstretched by unnecessary, duplicated activity or by conflicting priorities.
- Sectoral silo working is still evident and needs to be addressed at regional and national levels.
- The UN resolution (2018) acknowledges that national, regional and international collaboration needs to be intensified for future success.

Table 6.1: Roadmap of Action by Country Groups Classified by Mortality caused by Road Traffic Injury per 100,000 People

	Group A (Mortality<10)	Group B (≥10 and <20)	Group C (≥20 and <30)	Group D (≥30)
Distance from Target	Most Progress	More Progress	Less Progress	Least Progress
Legal and Regulatory	Post-crash care Safe road use Results focus Coordination Legislation	Safe vehicles Post-crash care Safe road use Results focus Coordination Legislation	Safe vehicles Post-crash care Safe road use Legislation	Safe road use Legislation
Technology and Engineering	Safe roads and roadsides Safe speeds Safe and healthy modes	Safe roads and roadsides Safe speeds Safe and healthy modes	Safe roads and roadsides Safe speeds Safe and healthy modes	Safe roads and roadsides Safe speeds
Economics and Finance	Funding and resource allocation Monitoring and evaluation	Funding & resource allocation Monitoring and evaluation		
Communications	Promotion	Promotion	Promotion	Promotion

Note: See tables 4.1 and 4.3 in this paper, and Annex I of the GRA report for descriptions of each action

ENDNOTES

32 World Resources Institute (2015) Securing safe roads. The politics of change.

33 www.irap.org/5-star-cities-case-study; https://visionzeronetwork.org/

34 The term "civil aviation system" is used in a generic sense to include all authorities with aviation safety oversight responsibility which may be established by each Country as separate entities, such as, Airport Authorities, Air Traffic Service Authorities, Accident Investigation Authority and Meteorological Authority.

35 iRAP (2018) www.vaccinesforroads.org/business-case-for-safer-roads/

36 www.fiafoundation.org/connect/publications/investing-to-save-lives

7. SCALE OF THE CHALLENGE

Given the multi-sectoral nature of transport systems, it is important to recognize that actions of different sectors have an impact on the safety of transport. Safety has to be embedded as a core value of work by every sector to achieve maximum gains, and efforts should be made to ensure that safety is an essential consideration for systems of transport and mobility.

It should also be noted that a mix of modalities can have safety benefits. For example, increasing public transport can decrease reliance on private vehicles that are less safe than public transport. Such shifts can also promote other interventions such as installing bike lanes, and address other objectives including equity, gender, and green mobility.

A global safety performance framework can be established based on current information. Further work can assist implementation. Setting safety goals and targets, however, is one thing, meeting them another.[37] Further work and cooperation are essential to establish firmly current knowledge and pragmatic guidance, increase investments, reinforce work that is already delivering results, and address the challenges and opportunities provided by further automation and other developments. Considerable management challenges lie ahead for all countries in meeting the expectations of the global goals, targets and plans. Without strengthened institutions, better data, accelerated knowledge creation and transfer, plus scaled-up investment and increased international cooperation and development aid, ill-prepared LMICs are likely to be overwhelmed by the sheer scale and rapid spread of the crisis of death and serious injury on the road that they face. For countries active in road safety for many years, the ever- increasing ambition as they move closer toward zero also presents challenges for strengthening safety management. Action is required and for it to be effective, the critical success factors outlined in the previous section must urgently be addressed, with staged investments sensitive to the learning and absorptive capacity of the countries concerned.

ENDNOTES

37 OECD (2008). Towards Zero: Achieving Ambitious Road Safety Targets through a Safe System Approach. OECD, Paris.

ANNEX I: LIST OF POLICY MEASURES

The list of policy measures identified in this paper to achieve safety in mobility has been consolidated and harmonized with the policy measures to achieve all other policy goals toward sustainable mobility. The Global Roadmap of Action toward Sustainable Mobility provides the consolidated list of measures.

The consolidated policy measures that have an impact on transport safety are shown in the tables below.

Table I.1: Policy Measures with Description (by toolbox and thematic area, with an impact on safety

Policy Measure	Policy Measure Description
Toolbox: Regulatory and Institutional	
Thematic Area: Plans and Strategies	
Develop an Integrated National Transport Plan	Develop and implement an integrated national transport plan to cover the four policy goals, all modes of transport, and passenger and freight traffic.
Set Targets across Policy Goals	Set clear targets to be achieved in the long term and in the interim for the four policy goals, aligned with an integrated sustainable mobility plan.
Develop Mobility Plans at the Sub-National Level	Develop a sustainable urban mobility plan and implement strategies at the sub-national level that are consistent with the integrated national sustainable transport plan.
Plan for a Multi-Tiered Rural Access Approach	Use a multi-tiered and multimodal approach to universal rural access in the integrated national transport plan, supporting both early attainment of universal rural access and further upgrading to higher-access tiers based on affordability and feasibility.
Adopt TOD Principles in Land Use Planning	Adopt integrated land use planning that supports transit-oriented development (TOD), mixed land use and compact city planning, reforming development policies and zoning codes, limiting urban expansion, and incorporating rail network development in urban planning.
Mainstream Gender Aspects in Transport Plans	Mainstream gender into national transport plans to establish and improve the decision-making process on gender-sensitive transport.
Embed the Safe System Approach into Transport Planning	Embed the safe system approach to road safety in all aspects of national and sub-national transport planning
Thematic Area: Institutional Design, Cooperation, and Coordination	

Policy Measure	Policy Measure Description
Coordinate Planning across Government Agencies	Coordinate across agencies to ensure integrated planning and shared responsibility for results across levels of government, jurisdictions, and agencies, including but not limited to the coordination of road safety responsibilities and the coordination of response to extreme weather events.
Define Roles and Accountabilities across Agencies	Define government roles, responsibilities and accountabilities in the transport sector across the four policy goals, modes of transport, national and sub-national government levels, and passenger and freight transport.
Establish a Metropolitan Transport Governance	Establish a governance structure and an institutional framework for transport at the metropolitan level.
Establish Joint Gender Programs Across Agencies	Establish joint programs with ministries and agencies responsible for gender to include transport in their work program.
Thematic Area: International agreements and regulations	
Accede to and Implement International Conventions	Accede to and implement relevant international agreements and conventions that address one or more policy goals, for example, the TIR Convention, the WTO Trade Facilitation Agreement, or core road safety-related UN legal instruments.
Thematic Area: Regulations for Transport Services	
Regulate Truck Size and Weight Limits	Adopt regulations of truck size and weight limits by transport corridor.
Establish Maximum Driving Times for Drivers	Establish maximum driving times and minimum rest periods for professional drivers and vehicle operators, for example, road haulage and passenger transport vehicles, or accede to international/regional regulation in this area.
Allow and Regulate Vehicle Sharing and TNCs	Reform regulations to allow and support vehicle sharing programs (cars, bicycles, scooters), transportation networking companies (TNCs), and demand-responsive transport solutions, with a focus on last mile connectivity to high capacity modes, and support vehicle-sharing community networks such as car-sharing fleets within companies and administrations.
Review transport regulations periodically	Promote the periodic review of the regulations to allow the fast moving mobility solutions to evolve towards a sustainable and inclusive transport system
Thematic Area: Regulations for Vehicles and Vehicle Use	
Ensure Legal Certainty Regarding Driver Permits	Adopt standards and compliance regimes for the provision and withholding of driver licenses and permits, including compliance regimes designed to prevent and reduce fatal and serious injury risk.
Define and Enforce Speed Limits	Define and enforce speed limits according to modal mix, road function, and protective qualities of roads.
Define Low Emission Zones in Cities	Define low emission zones (LEZ) in cities, i.e., areas where the most polluting vehicles are regulated through access restrictions, which could be based on vehicle emission standards or vehicle age, and enlarge them progressively.
Limit the Import of Second-Hand Vehicles	Limit the import of second-hand fossil fuel motor vehicles beyond a maximum age, including 2- and 3-wheelers.

Policy Measure	Policy Measure Description
Require Periodic Vehicle Inspection	Require periodic vehicle inspections to ensure vehicles conform to regulations governing emissions and safety.
Define Laws for Key Safety Rules	Define standards and compliance regimes for key safety rules, for example, the use of seat belts and crash helmets for drivers and passengers, child restraints, driving without alcohol or other drugs or fatigue, driving without distraction, restrict the use of mobile phones while driving, considering the needs of women and vulnerable groups.
Require New and Used Vehicles to Meet Safety Standards	Require new and used vehicles to meet high quality safety standards, such as the recommended priority UN regulations, global technical regulations, or equivalent recognized national performance requirements.
Require Crash Protective Designs in Vehicles	Require new and used vehicles to meet high quality safety standards, such as the recommended priority UN regulations, global technical regulations, or equivalent recognized national performance requirements.
Support Vehicle Connectivity and Smart Charging Regulations	Implement regulations supporting internationally harmonized vehicle-to-everything (V2X) technologies and smart charging solutions, both in terms of hardware and software, to facilitate the growth of e-mobility
Thematic Area: Regulations for Data Collection, Share and Use	
Require Service Providers to Report Standardized Data	Establish standardized data reporting requirements for all transport service providers, including transportation network companies (TNC), public transport operators, and bike- or car-share companies.
Develop Data Repositories and Data Collection Guidelines	Develop centralized data repositories and establish data collection guidelines at the national and metropolitan levels, and facilitate data access to different stakeholders (academics, private sector, etc.) while stablishing a legislative framework defining the context and purpose of its use.
Require Use of Data to Support Decision Making	Require using operational data to support decision making and regulatory oversight.
Thematic Area: Procurement and Contracts	
Prepare Public Procurement Rules and Procedures	Prepare procurement rules and procedures, standard contract documents for infrastructure construction and maintenance, supported by an e-procurement platform, and harmonize those at a regional or international level to foster economies of scale.
Procure Contractors on a Competitive Basis	Procure contractors on a competitive basis, using packaging of batches of projects to attract multiple capable contractors.
Use Public Procurement to Support the Circular Economy	Use circular economy principles in public procurement, by which public authorities purchase transport goods, services and works that contribute to closed energy and material loops, minimizing environmental impact and waste creation.
Establish a Pool of Technical and Financial Experts	Establish a pool of independent experts capable to undertake technical and financial audits of projects.
Thematic Area: Capacity Building and Human Resource Development	
Identify and Empower Sustainable Mobility Champions	Identify and Empower Country Champions to Help Move Forward the Sustainable Mobility Agenda, for example, ministers and mayors.

Policy Measure	Policy Measure Description
Build Capacity Across Levels of Government	Build national and local capacity across levels of government, jurisdictions, organization, and modes, including providing training and indormation resources.
Provide Training for Workforce in Leadership Positions	Provide training for the current and future transport workforce in leadership positions, enabling well-trained staff to drive change toward sustainable mobility.
Facilitate Capacity Building at the International Level	Facilitate sector specific capacity building at the international level.
Build Capacity for Local Path and Road Maintenance	Provide capacity building to assist stakeholders to perform their roles in the maintenance of local paths and roads.
Create Mentoring Programs and Professional Networks	Create programs to promote role models, mentoring and networks of transport professionals, including programs targeted to women.
Toolbox: Engineering and Technology	
Thematic Area: Technical Standards	
Harmonize Construction Standards along Corridors	Adopt construction standards so that assets are created using accepted, up-to-date, harmonized standards and regulations, across borders, within regions and along transport corridors.
Recruit Qualified Firms for Project Design and Feasibility	Recruit qualified consulting firms for preparing feasibility reports and engineering designs, and supervising civil works.
Ensure Safe Roads Design with Lower Design Speeds	Plan and design safe roads and roadsides for lower speeds, including features that calm traffic, and considering the increasing use of bicycles and pedestrian flows in urban areas.
Improve Intermodal Connections in Transport Hubs	Improve local access to transport hubs including bus and train stations, ports and airports.
Ensure Transport Project Design Includes Gender Aspects	Include considerations for women and for people with disabilities in transport infrastructure project design and planning.
Set and Implement Climate Change Adaptation Standards	Set climate change adaptation and resilience standards and practices, and integrate them into project design across transport infrastructure, including roads, airports, and seaports.
Set Low-Noise Engineering and Traffic Management Practices	Set traffic management practices to reduce noise pollution, for example, speed limitations, speed humps, traffic lights coordination and roundabouts, and low-noise road engineering and maintenance practices, for example low-noise pavement and noise barriers.
Modernize Air Traffic Management	Modernize air traffic management to improve aviation safety and efficiency as defined in the ICAO global air navigation plan (GANP) endorsed by the ICAO Assembly.
Establish a State Aviation Safety Oversight System	Establish and implement a States safety oversight system in line with the ICAO Global Aviation Safety Plan (GASP) Objectives and to progressively adapt them into more sophisticated means of managing safety
Coordinate New Transport and Telecom Infrastructure	Coordinate among the different civil works necessary for new mobility infrastructure, for instance, road and telecommunication infrastructure, in order to maximize synergies and limit costs

Policy Measure	Policy Measure Description
Thematic Area: Asset Construction	
Build Complete Multimodal Networks	Build complete multimodal networks ensuring optimal network operational availability.
Build Rail and Maritime Transport Infrastructure	Build infrastructure for energy- and space-efficient modes such as rail and waterborne transport, including high-speed rail for corridors with sufficient demand.
Expand Public Transport Infrastructure	Expand the public transport network adjusted to demand requirements, with an emphasis on equitable access and considering the most appropriate modes in each context, including bus, rail, demand-responsive service, cable-propelled transport and ferry transport.
Invest in Quality Aviation Infrastructure	Invest in the modernization and expansion of quality aviation infrastructure as defined in the ICAO GANP endorsed by the ICAO Assembly.
Improve First and Last Mile Access Infrastructure	Evaluate and improve first and last mile access to major transport services in urban and rural areas.
Expand the Network of Bicycle Lanes	Build quality and safe infrastructure for cycling, with a focus on protected bicycle lanes.
Repurpose Road Space to Allow Access for All Modes	Repurpose existing road space with complete street designs acommodating diverse users and uses, with access for all modes, particularly pedestrians and cyclists and their access to public transport stations.
Thematic Area: Design and Deployment of Transport Services	
Improve the Quality and Safety of Public Transport	Improve the quality and safety standards of public and private as well as formal and informal public transport operations, such as service frequency, reliability, cleanliness, and safe driving practices, and implement bus lanes and other bus priority measures.
Ensure Access to Transport Services in Underserved Areas	Ensure complete transport services by extending services to underserved areas and populations.
Prioritize Pedestrians and Cyclists in Traffic Management	Adopt traffic management strategies that prioritize pedestrians and cyclists.
Implement ITS Solutions for Providing Transport Information	Implement online platforms and other ITS solutions for providing information on traffic, routes, occupancy rate in train cars, public transport and transport mode options for both passengers and freight transport, to support more efficient use of time, more efficient choices of route, and more efficient responses to service interruptions.
Thematic Area: Design and Deployment of Programs	
Monitor Weather Events and Develop Warning Systems	Conduct real-time monitoring of extreme weather events, developing plans to take immediate actions to mitigate damage with early warnings.
Deploy Road Safety Cameras	Deploy road safety cameras to monitor the condition on the road and enforce traffic violations.
Promote Driver Assistance Technologies	Promote the adoption of driver assistance technologies to prevent road crashes.
Ensure Adequate Post-Crash Intervention	Ensure adequate post-crash intervention through efficient emergency notification, fast transport of qualified medical personnel, correct diagnosis at the scene, stabilization of the patient, prompt transport to point of treatment, quality emergency room and trauma care, and extensive rehabilitation services.

Policy Measure	Policy Measure Description
Support Data Sharing Programs and Platforms	Establish a framework and promote data sharing programs and platforms across different sectors to exchange data relevant for transport policy, such as data collaboratives models including the public and private sector.
Implement Telecommuting Policies	Implement policies that allow flexible work schedules and telecommuting, i.e., working from home schemes, to avoid non-essential trips.
Thematic Area: Asset Management	
Develop Asset Management Standards and Plans	Develop asset management standards and plans to preserve, maintain, and manage transport infrastructure and their systems over their life cycle.
Establish Approaches to Feeder Road Asset Management	Establish reliable approaches to asset management of feeder roads, with communities performing routine maintenance in rural paths and roads, where feasible, and contractors performing periodic maintenance, based on reliability, availability, maintainability, and safety (RAMS) approach
Audit the Usability and Safety of Public Transport for Women	Conduct systematic participatory audits to ensure that public transport infrastructure remain usable, safe and secure for women.
Toolbox: Economics and Finance	
Thematic Area: Project or Program Cycle	
Evaluate Long Run Transport Infrastructure Needs	Evaluate long-run infrastructure finance needs including the existing backlog of deferred maintenance (i.e., infrastructure gap).
Use a Robust Framework for Project Prioritization	Use a robust investment evaluation framework to prioritize the allocation of public infrastructure funding to infrastructure projects and associated services.
Establish Performance Monitoring and Evaluation Schemes	Establish performance and result monitoring and evaluation schemes to inform the regular adjustment for projects, policies and programs, for example, the evaluation of road safety interventions and their institutional delivery.
Conduct Impact Evaluation Studies	Conduct impact evaluation studies to improve the evidence base available to policymakers, considering the impact of transport infrastructure projects on economic growth and employment, and considering differentiated impacts on women.
Thematic Area: Allocation of Public Funds	
Allocate Funding for Transport Safety Interventions	Allocate funding and other resources for safety interventions on a sustainable basis, using a rational evaluation and programming framework.
Thematic Area: Fiscal and Financial Measures	
Set User Fees to Support Transport Infrastructure Funding	Adopt transport user fees to help fund transport infrastructure and allow for return on investment, for example, toll roads.
Mobilize Public and Private Capital for Transport Finance	Mobilize public and private capital for transport finance, using PPPs to improve sector efficiency when appropriate, and help bridge the transport infrastructure gap.
Thematic Area: Pricing for Efficiency and Inclusion	
Implement Fuel Taxes and Phase Out Fuel Subsidies	Implement and increase fuel taxes while phasing out fossil fuel subsidies to offset the social cost of greenhouse gas emissions and air pollution.

Policy Measure	Policy Measure Description
Make Public Transport Fares Affordable for the Poor	Make public transport fares affordable for the poor using means testes approaches to ensure cost-recovering mechanisms.
Ensure Integrated Fare Payment across All Modes	Develop integrated fare payment systems across all modes of public transport, parking and road charges.
Thematic Area: Innovation Policy and Enhancement	
Provide Education Programs for Innovation	Provide neutral trainings and educational programs to develop up-to-date skills, increase awarness of the latest innovations and support innovation in transport, relying on close cooperation with companies to develop curriculums.
Toolbox: Communication	
Thematic Area: Consultation and Public Engagement	
Use Participatory Planning Methods	Use participatory planning methods, including creation of a website, to help communities propose interventions.
Ensure Women's Participation in Consultation Processes	Ensure that voices of women are upheld during pre- and post-project consultation.
Promote Public Discussion on New Mobility Solutions	Promote public discussion with civil society about new mobility solutions to generate new ideas, innovations and tools.
Thematic Area: Promotion Campaigns and Public Awareness	
Implement Awareness and Behavior Change Strategies	Implement awareness and behavior change (ABC) strategies to help shift attitudes towards sustainable modes, for example, public transport, walking and cycling, complementing other engineering, legal or economic measures.
Raise Road Safety Awareness	Ensure sustained communication of road safety as a core business for government and society, emphasize the shared responsibility for the delivery of road safety interventions, and raise awareness about the dangers of speeding.
Make Information Publicly Available on Projects and Policies	Make information accessible to increase the public support to transport policies and projects.
Foster a Security Culture in Public Transport	Foster a security culture to improve efficiency and attractiveness of public transport, based on the psychological elements that make passengers feel secure while using buses, trains, and other modes of public transport.
Thematic Area: Knowledge Management and Dissemination of Best Practices	
Share Knowledge on Successes and Best Practices	Share successes and best practices with other agencies at the local, national and international level, based on a well-designed knowledge transfer framework.