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A Foundational Safety System concept to make roads safer in the Decade 2021-2030

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I. INTRODUCTION

While significant progress in improving road safety has been made in some countries in the last decade, the overall global results are far worse and changes are urgently needed to considerably reduce the number of global road fatalities and injuries. Road traffic injuries constitute the first cause of accidental death globally. Road traffic accidents are responsible for more than 1.3 million deaths each year, while estimates of non-fatal injuries range from 20 million to 50 million. The United Nations General Assembly, with particular reference to resolution A/RES/72/271 of 12 April 2018, expressed the concern that, at the current rate of progress by member States, the target 3.6[1] of Sustainable Development Goal 3 will not be met by 2020.

Enhanced national and international efforts are urgently needed to harness and improve the safety crisis on roads. A new way to address this overwhelming challenge is particularly needed to swiftly improve global road safety. Drawing from the past good practices and lessons, experience from other modes of transport, and special characteristics of mobility by road, this publication recommends an architecture of national road safety system to help effectively manage road safety.

Road safety systems do exist physically at national and international levels. At national level, some countries have comprehensive and effectively functioning systems, and some have only parts of the systems or less effectively functioning systems. At international level the United Nations Economic Commission for Europe (ECE) has developed a set of conventions on road safety, including licensing of drivers, traffic rules, road signs/signals and markings, performance requirements for vehicle construction, vehicle road worthiness and inspection, carriage of dangerous goods and driving/rest periods. The lack is often the recognition of the role of the systems and the use of the system principles to identify gaps or missing parts in national road safety systems as well as the continuous assessment of an effective coordination of all parts within the systems as the basis for a good guidance to improve road safety.

This publication presents the experiences from good performing countries in road safety and the relative success of maritime transport and civil aviation in their safety management in comparison with the global efforts for improving road safety. Based on them, this publication depicts a comprehensive picture of road safety systems, that can work effectively to prevent accidents, protect people in accidents, rescue people after accidents and learn from accidents. The systems include all necessary elements at national level and regulatory support at the international level.

The publication intends to draw the attention of the road safety community to the concept of the system and the use of the concept in the efforts for improving road safety in countries during the new decade. It can be used to identify gaps in the road safety system and to prioritize effective improvement measures in a coordinated and integrated manner. It can also be used as a reference book for verifying the contribution of efforts for road safety to the entire systems.

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[1] To halve, by 2020, the number of global deaths and injuries from road traffic accidents.

II. BACKGROUND

The United Nations General Assembly passed eight resolutions on "Improving Global Road Safety" since 2004 which all in their own ways gave momentum to awareness-raising, and initiated and directed activities around the world. In May 2010, the General Assembly proclaimed the period 2011–2020, a Decade of Action for Road Safety.

The United Nations General Assembly on 25 September 2015 adopted the Resolution: Transforming our world: the 2030 Agenda for Sustainable Development, the transformative plan of action based on 17 Sustainable Development Goals — to address the most important global challenges over the next 15 years. [2]

Thanks to the joint work of the road safety community and governments, improving road safety was included, for the first time, as a priority of the global development agenda:

- In Sustainable Development Goal 3.6, halve the number of global deaths and injuries from road traffic crashes by 2020, and

- In Sustainable Development Goal 11.2, 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 by 2030.

At this turning point of the Decade of Action, ECE joined countries and other organizations to start stocktaking of the achievements in the past decade and identifying more effective way to help countries address the alarming crisis of road safety in the world, in particular in developing countries.

As a lead organization for the establishment of the United Nations Road Safety Fund (UNRSF), ECE also had to provide a solution for the fund, how to make the fund as a unique tool to help developing countries more effectively address their challenges in road safety and how to use limited resources to leverage a tangible and immediate impact on reduction of road traffic deaths in countries.

With its experience in both developed and developing countries, its international regulatory role for road safety and its understanding from maritime and civil aviation sectors in managing safety, ECE proposed a solution, i.e., national road safety system with support of international conventions.

This scientific solution was filed in the master plan of UNRSF, namely, the Global Framework Plan of Action for Road Safety. This document was discussed by the Advisory Board and the Steering Committee of UNRSF in August 2018 and adopted by the two governing bodies in November 2018.

The Global Framework Plan is based on the concept of the national road safety system. It represents the picture which can be seen by UNRSF about road safety and the solution which is given by UNRSF to address the challenges in developing countries. The document together with the UNRSF Funding Criteria and Priorities guide the Fund's projects to support creating, improving and/or sustaining national road safety systems. It also serves as a cooperation framework to coordinate, among the United Nations organizations, different authorities in developing countries and their development partners, their efforts to avoid duplications and fragmentation of projects for road safety.

The Global Framework Plan was applied to the call for proposal of UNRSF in October 2019. It was used in the application form and guidelines for project proposals. The Fund's Advisory Board and the Steering Committee "decided to open the first formal call for proposals within the Fund's Global Framework Plan and Funding Criteria and Priorities, giving priority to individual country and multi-country projects having immediate and tangible impact".

Due to time and document size constraints, the full picture of the concept on national road safety system was not presented. In order to promote wider applications of this vitally important concept, ECE organized elaborations of the concept in its Working Parties in charge of road safety, such as the Global Forum for Road Traffic Safety (WP.1), the Working Party on Transport of Dangerous Goods (WP.15), the World Forum for Harmonization of Vehicle Regulations (WP.29) and the Working Party on Road Transport (SC.1).

Now ECE publishes all background information, the picture of the national road safety system and its possible applications to contribute to the new decade for road safety until 2030.

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[2] https://sustainabledevelopment.un.org/post2015/transformingourworld.

III. EXPERIENCE FROM THE DECADE OF ACTION FOR ROAD SAFETY 2011–2020

A. Overview of the Decade

In May 2010, the United Nations General Assembly proclaimed the period 2011–2020 the Decade of Action for Road Safety. The decade sought to save five million lives and prevent 50 million serious injuries.[3] During the Decade, the following major activities were strengthened:

- Global high-level conference: In 2009, the Government of the Russian Federation hosted the First Global Ministerial Conference on Road Safety. The Conference culminated with the adoption of the Moscow Declaration which invited the United Nations General Assembly to declare a Decade of Action for Road Safety 2011–2020. The second conference was held in Brasilia in 2015, and the third in Stockholm in February 2020.

- United Nations General Assembly resolutions: The first resolution on improving global road safety was adopted in 2004, followed by two others in 2005 and 2008. After the Decade of Action was proclaimed, the General Assembly adopted a resolution every two years.

- United Nations Road Safety Collaboration (UNRSC): In April 2004, resolution A/RES/58/289 on "Improving global road safety" invited WHO, in close cooperation with the United Nations regional commissions, to act as coordinator on road safety issues across the United Nations. UNRSC is an informal consultative mechanism and holds biannual meetings. The goal is to facilitate international cooperation and to strengthen global and regional coordination among United Nations agencies and other international partners towards implementation of United Nations General Assembly resolutions and the recommendations of the world report.

- Global Status Report on Road Safety: The first report was published in 2009 and was issued every two years during the Decade of Action.

- World Day of Remembrance for Road Traffic Victims: Initiated by RoadPeace in 1993, the day has been observed and promoted worldwide by several non-governmental organizations. In 2005, the United Nations endorsed a global day to be observed every third Sunday in November each year, making it a major advocacy day for road safety. It has been further promoted around the world as a day of commemoration.

- United Nations Global Road Safety Week: The first safety week was held in 2007 and then in 2013, 2015, 2017 and 2019. The events advocate the global need for more effective measures for road safety.

The Decade of Action generated new activities, such as:

- New accessions to the United Nations road safety conventions and agreements totalled 41 during the decade.

- Global Plan: In 2011, UNRSC developed a Global Plan for the Decade of Action for Road Safety 2011–2020 with input from many partners in an extensive consultation process. It provides an overall framework for activities as grouped in "pillars": road safety management, safe roads, safe vehicles, safe users, and effective post-crash response. Key activities under each pillar are defined. Countries are encouraged to accede to and/ or fully implement the major United Nations road safety legal instruments, designate a lead agency, develop

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[3] www.who.int/roadsafety/decade_of_action/launch/decade_launch/en/, accessed on 27 December 2019.

a national strategy and national decade plans, establish data systems, increase funding and 28 activities in the context of the other four pillars.

■ Voluntary global performance targets for road safety: At the Meeting of Member States to conclude the work on the development of voluntary global performance targets for road safety risk factors and service delivery mechanisms in Geneva in November 2017, 12 voluntary global performance targets for road safety risk factors and service delivery mechanisms were agreed by consensus. The targets can be seen as an abstract of the 34 activities of the Global Plan.

■ Road Safety Fund (RSF): Hosted by WHO, it was created in 2011 as support for the implementation of the Global Plan for the Decade of Action for Road Safety 2011–2020. Small grants from donors are directed to governments and non-governmental organizations to support road safety programmes in countries and communities.[4]

■ United Nations Secretary-General's Special Envoy for Road Safety: The Special Envoy was appointed in 2015. In this role, Mr. Jean Todt helps mobilize sustained political commitment towards making road safety a priority, advocating and raising awareness about the United Nations road safety legal instruments, sharing established road safety good practices, and advocating for adequate global funding for road safety. To date, the Special Envoy met with more than 100 Heads of States and Ministers in 67 Member States, and encouraged high-level political commitment to road safety, especially in the most affected areas. ECE hosts the secretariat (http://www.unece.org/united-nations-special-envoy-for-road-safety/roadsafetyenvoy.html).

■ United Nations Road Safety Fund (UNRSF): Hosted by ECE, the fund was launched in April 2018 to finance projects in low- and middle-income countries to catalyse concrete institutional actions to close key gaps in national road safety systems. Through the fund, national systems would be bolstered by international support to substantially improve road safety. To assist countries to create, improve and/or sustain national road safety systems, and to support UNRSF decision-making, a detailed action-oriented plan – the Global Framework Plan of Action for Road Safety and the concept of a safety system – was adopted. Using the plan, countries can benchmark current road safety systems and identify activities for establishing, improving and/ or sustaining efficient and functional national road safety system (http://www.unece.org/unrsf/home.html).

Intergovernmental and non-governmental organizations, multilateral development banks and the private sector have made tremendous efforts to help countries improve road safety. International assistance was mostly organized in:

■ Advocacy and public campaigns

■ Promotion of accession to the United Nations legal instruments

■ Capacity-building, e.g. training, workshops, tools, manuals and guidelines

■ Infrastructure investment

■ Road safety audits

■ Development of national strategies and action plans, designation of lead agencies

■ Research and studies

■ Data collection

■ Meetings on cooperation

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[4] www.who.int/roadsafety/funding/en/, accessed on 27 December 2019.

For example, a non-governmental organization "Bloomberg Philanthropies" advocates road safety, promotes and supports the adoption of evidence-based policies, builds the capability of key road safety stakeholders, and disseminates knowledge about good practice.

BOX 1

The Bloomberg Philanthropies Initiative for Global Road Safety

From 2007 to 2009, Bloomberg Philanthropies funded a pilot programme in Cambodia, Mexico, and Viet Nam to see if proven road safety interventions could be adapted and used on a global scale. The pilot was expanded in 2010 to support the implementation of these interventions to reduce road traffic fatalities and injuries in 10 low- and middle-income countries: Brazil, Cambodia, China, Egypt, India, Kenya, Mexico, Russian Federation, Turkey and Viet Nam.

In 2015, it launched a second phase which addressed road traffic safety in 10 cities (Accra, Addis Ababa, Bandung, Bangkok, Bogota, Fortaleza, Ho Chi Minh City, Mumbai, Sao Paulo, Shanghai), five countries (China, India, Philippines, Tanzania, Thailand), and four vehicle market regions (Africa, India, Latin America, South-East Asia). The primary goal was reducing road traffic fatalities and injuries.

Major interventions were:

- Behavioural interventions (helmets, safety belt, drink-driving, speed management)

- Infrastructure improvements (widening of shoulder, installation of a median barrier, control at crosswalk, marking and separation of lane, improved intersection, etc.)

- Sustainable urban transport (reducing car travel and designing secure mass transportation systems, walking infrastructure and bike routes)

- Vehicle standards

- Policy strengthening

Bloomberg Philanthropies dedicated 259 million dollars over 12 years to implement road safety in low- and middle-income countries.

Source: summarised from www.bloomberg.org/program/public-health/road-safety/#road-safety-fortaleza.

BOX 2

The World Bank's Global Road Safety Facility (GRSF)

The Global Road Safety Facility (GRSF) was established in 2006.

It provides funding, knowledge, and technical assistance designed to scale-up the efforts of low- and middle-income countries to build their scientific, technological and managerial capacities to implement their own road safety programmes. GRSF operates as a hybrid grant-making global programme.

FIGURE 1

Disbursements by activity since 2006 (44.6 million dollars)

Safe infrastructure **42%**
Enforcement **2%**
Workshops and Trainings **5%**
Facility Implementation Unit (FIU) **7%**
Research and Analysis **10%**
Advocacy **12%**
Capacity Building **22%**
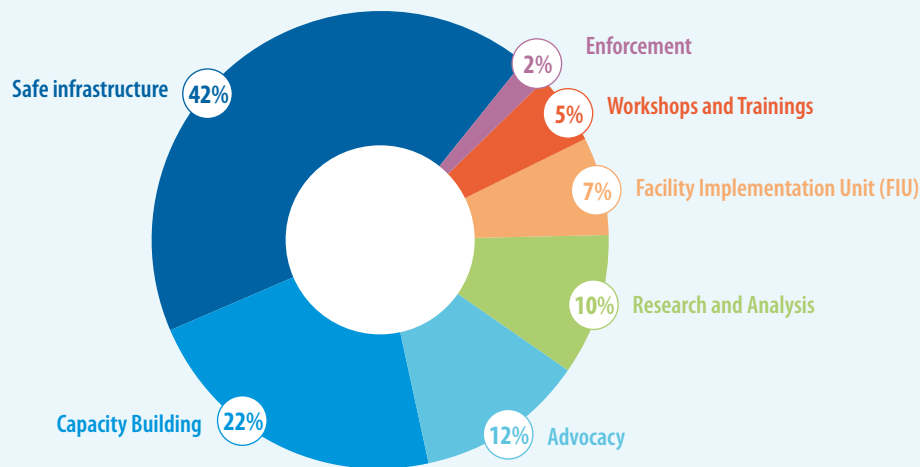
Source: World Bank Global Road Safety Facility, Annual Report 2018.

B. Progress in Global Improvement in Road Safety

According to WHO reports, road traffic fatalities slightly increased from 1.3 million in 2010[5] to 1.35 million in 2016[6]. Road traffic fatalities at the global level remain unacceptably high. If the data is extended back to 1990, a general growth trend can be seen, in figure 2.[7]

The fourth Global Status Report (2018) stated that the continuing growth in numbers of accidents could result from, e.g. rapid population growth, urbanization and motorization in many countries coupled with/or from incomplete data, inadequate enforcement, inferior safety standards for vehicles and roads, or poor road user behaviour (driving under the influence, speeding, and not wearing helmets or seat belts).

Nevertheless, variations in road fatality statistics were significant between regions and countries of the world. A strong association continued between the risk of road traffic death and the income level of a country. The risk of road traffic death in developing countries remains three times higher than in developed countries. The rates are highest in Africa (26.6 per 100,000 population) and lowest in the European Union (4.9 per 100,000 population).

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[5] www.who.int/healthinfo/global_burden_disease/GHE2016_Deaths_2010-country.xls?ua=1.

[6] WHO, Global Status Report on Road Safety, 2018.

[7] www.who.int/violence_injury_prevention/publications/road_traffic/world_report/summary_en_rev.pdf;   www.who.int/healthinfo/global_burden_disease/GHE2016_Deaths_2000-country.xls?ua=1.

FIGURE 2

Road traffic deaths in the world, 1990 to 2020 (in million death)
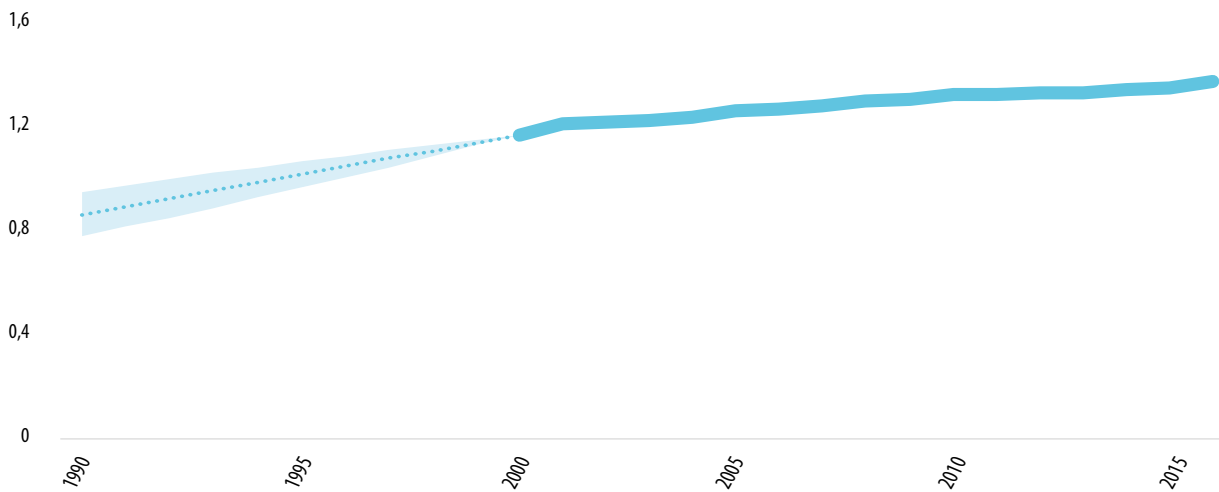
Source: WHO global status report on road safety, and ECE estimations

Between 2007 and 2017, the total number of fatalities in road traffic accidents decreased by almost 30 per cent in the ECE region, and particularly in the European Union and European Free Trade Association (EFTA)[8] subregion (see figure 3). The European Union and EFTA countries reported a decrease of 42 per cent in road traffic deaths between 2007 and 2017. The countries in Central Asia and Eastern Europe reported a decrease of 37 per cent, and North America a decrease of 11 per cent.

FIGURE 3

Road traffic deaths in the European Union and EFTA countries, 1993 to 2017
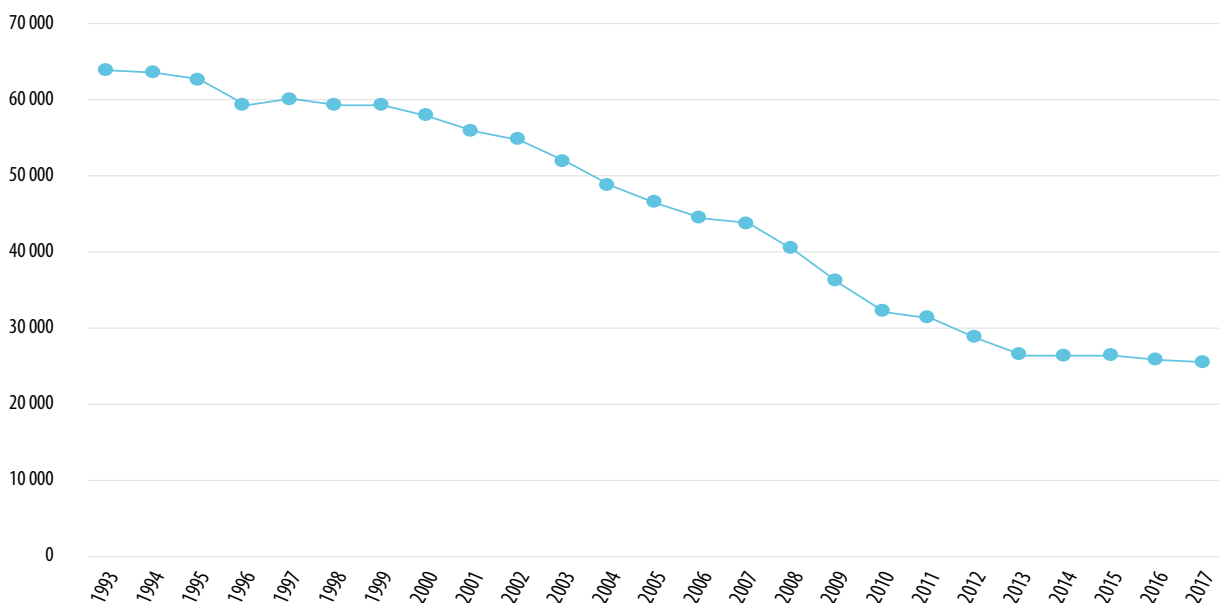
Source: ECE transport statistics database.

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[8]   Iceland, Liechtenstein, Norway and Switzerland.

During this time period, both the population and the number of passenger cars increased in the European Union and EFTA countries. The population grew from 511.9 million in 2007 to 526 million in 2017 (figure 4). The number of passenger cars increased from around 237 to 269 million in the same period (figure 5).

FIGURE 4

Population growth in the European Union and EFTA countries, 2007 to 2017
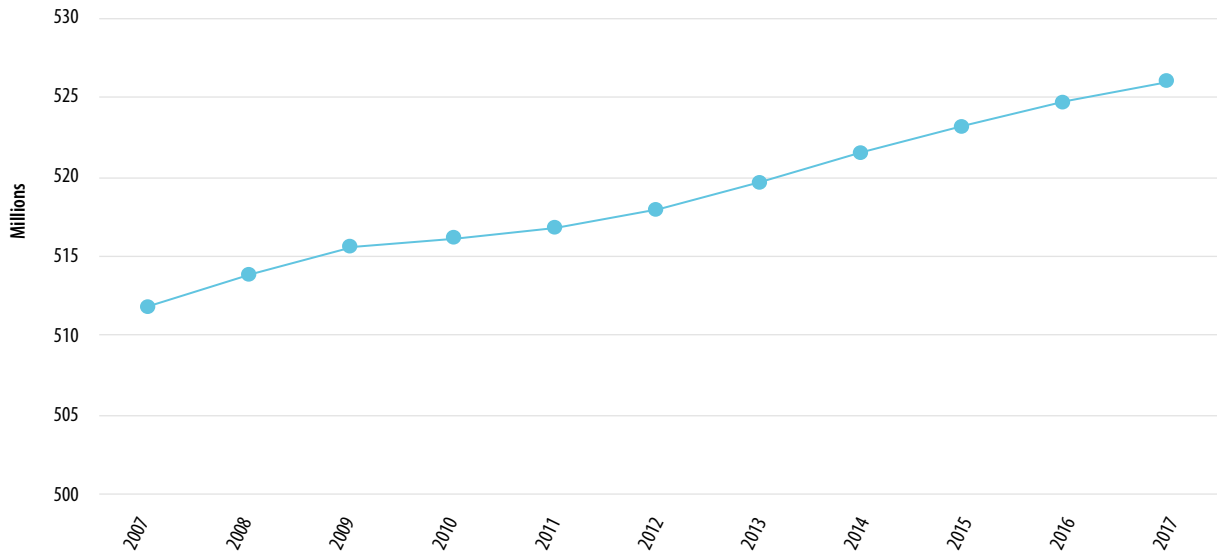
Source: ECE statistics database.

FIGURE 5

Growth of passenger cars in the European Union and EFTA countries, 2007 to 2017
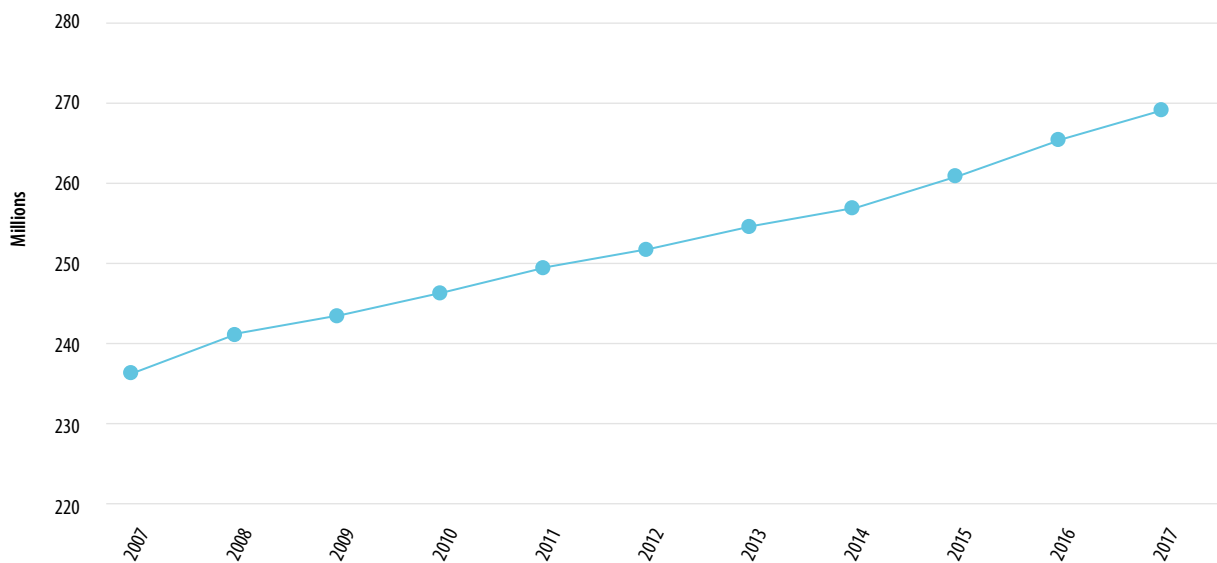
Source: ECE transport statistics database.

C.   Examples of Actions taken by Developing Countries

Some examples from Africa, Asia, Europe, and South America are briefly summarized in this section.

1.   Argentina[9]

In Argentina, the national road safety agency Agencia Nacional de Seguridad Vial (ANSV) was established in 2008 in the Ministry of the Interior, and in December 2015, moved to the Ministry of Transportation. One of its achievements was the creation of a national driver license registry system, accompanied with national traffic records and an infractions registry system – all are managed by ANSV. Over 1,800 different driving licenses were in use in the country in the past. The new system enhanced the effectiveness and efficiency of enforcing road safety legislation in Argentina. In 2008, ANSV began to launch road safety awareness campaigns. According to "Case study: The Argentina Road Safety Project: lessons learned for the decade of action for road safety, 2011–2020"[10], educational material on road safety was distributed to more than 55,000 public and private schools (primary and elementary) and by late 2011, reached more than 500,000 teachers and almost 9 million students. Between 2016 and 2019, three awareness campaigns were released to mass media and the nation. These included the promotion of wearing helmets and seat belts.

From January 2014, all vehicle models in Argentina were required to be equipped with airbags, an Anti-lock Braking System (ABS), head restraints on seats in outboard seating positions and a third stop lamp. In addition, new vehicle models were required to be equipped with a Safety Belt Reminder (SBR), daytime running lights, and had to undergo a frontal impact test according to the United Nations Vehicle Regulations administered by ECE. SBR for the driver and the frontal impact test according to the United Nations Vehicle Regulations became requirements for all vehicle models from January 2015 and January 2016 respectively.[11]

A rear impact test, according to the United Nations Vehicle Regulations, for all vehicle models (including new models) was introduced following the compulsory application in Europe.

In January 2016, a child restraint system (ISOFIX or LATCH) for new vehicle models and the installation of rear safety belt retractors for all vehicle models became mandatory.

In January 2018, a side impact test according to the United Nations Regulations became mandatory. Electronic Stability Control (ESC) was required for new models from January 2020 and, for all vehicle models from January 2022.

### 2.   Georgia[12]

The most important road safety reform in Georgia began in 2004. The first step was reforming the road traffic police to establish an efficient institution for the enforcement of road traffic rules. Traffic police became an autonomous unit inside the Ministry of Internal Affairs, and beyond the control of the local police administration or local government. In 2003, the general public's trust in the traffic police was about 10 per cent, and in 2011 after the reform leaped to 80 per cent.

The first Georgian Road Safety Strategy was approved in 2008, followed by the National Road Safety Action Plan (2010–2013) which specified a range of measures. The most impactful interventions were the introduction of compulsory safety belt use in 2010, small-scale road safety engineering improvements, road improvements with grade separation to eliminate dangerous mixed road use, small decreases in the age of a very old national vehicle fleet and access to newer, safer, imported vehicles as well as annual improvements in emergency medical response.

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[9]   www.worldbank.org/en/results/2019/04/12/promoting-road-safety-in-argentina.

[10]   https://journals.sagepub.com/doi/pdf/10.1177/1757975913502690.

[11]   ITF (2017), Road Safety Annual Report 2017, OECD Publishing, Paris, https://doi.org/10.1787/irtad-2017-en.

[12]   www.unece.org/fileadmin/DAM/trans/roadsafe/unda/GE_RSPR_WEB_e.pdf.

In 2015, the Ministry of Internal Affairs launched a new traffic safety programme aimed at making road safety legislation stricter by establishing a driving permit point system, contactless patrolling, a better speed management system and enforcing overtaking violations.

In December 2016, the new Road Safety Action Plan for 2017 was approved by the Government. The 2017 Action plan includes a comprehensive list of activities in different areas, such as roads, vehicles, enforcement, education and first aid. The specific activities, stakeholders and timeframes in the 2017 Action Plan make it more effective and is enabling the National Road Safety Inter-Agency Commission to make progress towards monitoring the implementation of action plans. As one of the four beneficiary countries of the ninth United Nations Development Account tranche project, "Strengthening road safety management systems and improving road safety records in beneficiary countries", a Road Safety Performance Review (RSPR) was undertaken for Georgia. It identified existing gaps and priority areas for intervention. National workshops and capacity-building events focusing on the issues that were identified in the Georgian RSPR were also organized over the project period (2016–2018).

The Georgian RSPR supported the reintroduction of periodic technical inspections for passenger vehicles and the adoption of amendments on road safety legislation. In 2016, Georgia acceded to the 1997 United Nations Agreement concerning the Adoption of Uniform Conditions for Periodic Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of such Inspections. Prior to 1 January 2018, most of the road vehicles in Georgia were in poor technical condition, since vehicle inspection was mandatory only for public transport vehicles, buses and trucks (these comprise approximately 20 per cent of the vehicle fleet).

The obligatory technical inspection of vehicles started on 1 January 2018 and is being gradually implemented.

3.   Nigeria

The experience of Nigeria in road safety is shown in figure 6.

Nigeria – Milestones in road safety
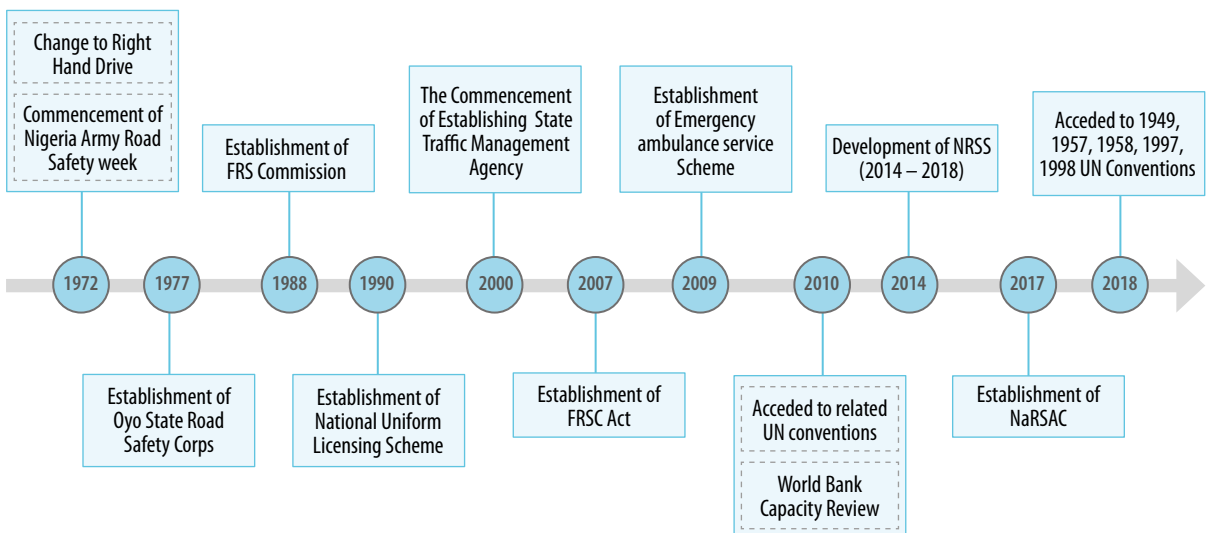
Source: Nigeria Road Safety Strategy II (draft), 2019.
Abbreviations: [a] FRS Commission – Federal Road Safety Commission, [b] FRSC Act - Federal Road Safety Commission Act, [c] NRSS – National Road Safety Strategy [d] NaRSAC – National Road Safety Advisory Council.

Nigeria developed its first National Road Safety Strategy (NRSS I, 2014 – 2018) on the basis of the five pillars of the Global Plan of the Decade of Action for Road Safety. NRSS I was a medium-term plan which aimed to reduce road accidents by 35 per cent. With 2012 as the base year, its objectives were a cohesive and efficient road safety administrative system, improved road infrastructure for all road users, general compliance with vehicle and other road machinery standards, a culture of personal responsibility for safe road use, and prompt and effective emergency response and care. The aim of a 35 per cent reduction in road accidents by 2023 (2018 base year), NRSS II would improve the achievements of NRSS I through new key activities that support NRSS I: strengthen its road safety management by introducing legislation to establish the National Road Safety Advisory Council at State levels, allocate 10 per cent of road safety intervention funds to improving road safety for "non-motorised traffic" (i.e. pedestrians and cyclists), design driver training and awareness campaigns with support from a lessons-learned system, deploy accident avoidance technology such as Anti-lock Braking Systems (ABS) in motor vehicles, and providing additional medical equipment and emergency rescue ambulances.

Nigeria became the first country outside the ECE region to accede to all seven United Nations road safety conventions; these are the 1949 and 1968 Conventions on Road Traffic, the 1968 Convention on Road Signs and Signals, the 1957 Agreement concerning the International Carriage of Dangerous Goods by Road, the 1958 and 1998 "Vehicle Regulations" Agreements, and the 1997 Agreement concerning Uniform Conditions for the Periodic Technical Inspection of Wheeled Vehicles. Nigeria reviewed its domestic laws in 2019–2020 to align them with the United Nations road safety conventions.

4.   Viet Nam

Viet Nam is one of four beneficiary countries in the ninth United Nations Development Account tranche project led by ECE, "Strengthening road safety management systems and improving road safety records in beneficiary countries" involving RSPR.[13]

In August 2014, Viet Nam acceded to the 1968 Conventions on Road Traffic, and on Road Signs and Signals. Viet Nam has been identifying gaps between its 2008 Road Traffic Law and the conventions to align its domestic legislation with the international conventions.

In 2012, Viet Nam launched its National Road Safety Strategy by 2020 and Vision to 2030. The overall objective was developing sustainable solutions and policies for road safety to meet the current and future requirements of the country – including an annual 5 to 10 per cent reduction in the number of deaths from road traffic accidents, and a strengthening of State management capacity to ensure traffic safety. Actions to included:

- Strengthening the capacity of the National Traffic Safety Committee and the Traffic Safety Boards of provinces to enhance their responsibility and authority to ensure the organization, coordination and professionalism of the agencies

- Establishing the national Centre of the Road Traffic Database

- Building a centre for research, development and the transfer of knowledge on traffic safety, and

- Training of traffic safety experts.

Drink-driving was one of the three leading causes which increased traffic accidents in Viet Nam. According to a 2014 WHO report, traffic accidents involving alcohol in Viet Nam were estimated at 36.2 per cent of total accidents caused by men and at 0.7 per cent of those caused by women. Although the 2001 Road Traffic Law specifically banned the use of alcohol over certain limits during the control of road traffic vehicles, many difficulties – e.g. traffic police not equipped with alcohol breath analysers – led to a lack of results. In 2011, district traffic police were equipped with alcohol breath analysers, and 48 out of 63 traffic police forces in the provinces and municipalities were trained to inspect and handle alcohol concentration violations in line with international standards. In general,

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there has been a significant decrease in the number of car drivers – especially commercial car drivers – violating alcohol regulations.

Speeding was the second most common cause of road traffic accidents in Viet Nam in 2016 at 9.59 per cent of accidents. To address this upward trend, the Government of Viet Nam issued stricter speed limit regulations and also installed modern traffic surveillance equipment. In 2009, the Government issued new regulations on detailed maximum speed requirements based on area density, for different types of vehicles and motorcycles.

In 2015, the Government further regulated the maximum permissible speeds of motor vehicles and special-use vehicles on the road and added different maximum speed regulations based on the type of roads, e.g. double track, one-way road with one motor lane, or one-way road with two or more motor lanes. In 2016, the Government imposed the strictest penalties and fines for speeding violations to date. In 2019, the Ministry of Public Security and the Ministry of Transport further enforced its speed management regulations by installing more surveillance cameras on national highways and expressways.

IV. GOOD PERFORMERS

A. Overall Performance of Selected European Countries

Figure 7 shows road fatalities in France, Germany, the Netherlands and Switzerland.

Total number of road traffic accident fatalities in selected countries
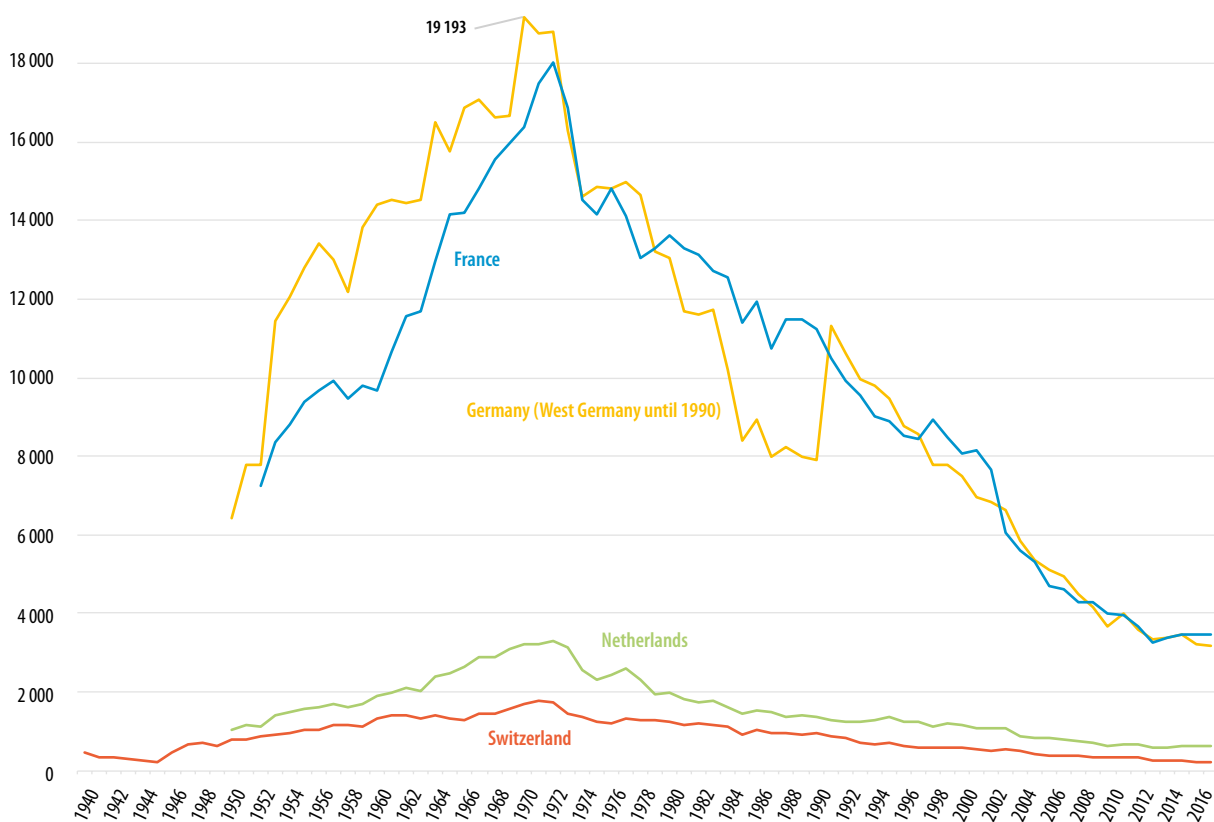
.Source: National Statistics Offices and Road Safety Agencies

After the second World War, Western European countries experienced rapid growth in motorization, and importantly, an increase in road traffic accidents, fatalities and injuries.

Around 1970, road traffic accident deaths peaked in many countries and began a steady decrease, though both the number of vehicles and the volume of motorized traffic continued to grow.

From about 2010, the four countries have maintained low numbers of road traffic fatalities.

Most developed countries follow a similar pattern or trend in road safety performance. The safest ECE member State in 2017 in terms of fatalities per million inhabitants is Norway.

B.   Road Safety Measures and Paradigm Shift in Europe

Most European countries were confronted with road safety problems much earlier, they comprehended the nature and seriousness of the problem sooner and started resolving it at a much earlier stage.

A number of countries in different times, developed similar road safety paradigms — distinct sets of concepts or thought patterns, including theories, research methods, postulates, measures and standards for resolving road safety problems. These stages in understanding and solving the road safety problems, are shown in Table 1.

TABLE 1

Road safety paradigms

Aspects	Paradigm I	Paradigm II	Paradigm III	Paradigm IV	Paradigm V
Timeline	1900 – 1940s	1950s – 1960s	1970s – 1980s	1980s – 1990s	from 2000 to present
Description	Control of motorized carriage	Mastering traffic situations	Managing traffic safety system	Managing transport safety system	Safe System Approach
Main disciplines involved	Repair and maintenance of vehicles	Car and road engineering, three "E"s solution, law enforcement	Traffic engineering, traffic system solutions	Advanced technology, system analysis, sociology, communications, multidisciplinary research	Integrated system to reduce risk of road user's mistake
Premise concerning unsafety	Transitional problem, passing stage of mal-adjustment	Individual problem, inadequate moral and skills	Defective traffic safety system	Risk exposure	Global problem, unavoidable human mistakes,
Effects	Gradual increase in traffic fatalities	Rapid increase of traffic fatalities with moderate increase of relative road safety indicators	Successive cycles of decrease of traffic fatalities and decrease of relative road safety indicators	Significant reduction of traffic fatalities and relative road safety indicators in most countries	Continuous reduction of stress, road accidents, suffering and socioeconomic costs
United Nations conventions (See annex I for brief introduction of the conventions)		Road Traffic (1949), Protocol Road Signs/ Signals (1949), Traffic Arteries (1950), Weight and Dimensions (1950), ADR (1957), Road Markings (1957), Vehicle Regulations (1958)	Road Traffic (1968), Road Signs/ Signals (1968), Work of Road Crews (1970), Suppl. Road Traffic (1971), Suppl. Road Signs/ Signals (1971), Road Markings (1973), E-Road (1975), Driving Permits (1975) in addition to the conventions adopted earlier	Protocol ADR (1993), Technical Inspections Vehicles (1997), Global Vehicle Regulations (1998) in addition to the conventions adopted earlier	amendments to the conventions, accession and implementation of the conventions by and transfer of knowledge and good practices to developing countries

Source: OECD Road Transport Research: outlook 2000 (1997), adapted by Professor Lipovac (2017) and by ECE (2019).

Paradigm I: Road Accidents were Rare

During Stage I (until 1940s), the level of motorization was under 25 motor vehicles per 1,000 population. It was believed that road safety problems were transitional and that they would disappear "per se". Road safety problems were considered personal problems of vehicle owners/users or individuals rather than systematic issues. During this period, the problem of road safety was not recognized and therefore there were no important measures by countries as it was considered an individual problem. Vehicle owners and/or drivers struggled with imperfect vehicles that were constantly broken on the road and efforts were made to build reliable vehicles that would function well over long journeys. In this stage, road safety problems were not particularly emphasized. The result of such an approach was a steady increase in the number of accidents and their consequences.

Paradigm II: Rapidly Increasing Numbers of Road Accidents

Stage II (1950s to 1960s) was characterized by the massive production and sudden growth in the number of motor vehicles (from 25 to 250 motor vehicles per 1,000 population). Another characteristic is the rapid development of all modes of transport, construction of faster cars (with speed over 100 km/h) and construction of highways and other high-quality roads. This led to a massive increase in the number of road accidents. Attention shifted from car driving to the issue of managing traffic situations (e.g. traffic rules at intersections).

In this stage, foundations were laid for the "three E" solution (Engineering – Education – Enforcement). It was accepted that traffic would be safe if the vehicles and roads were well designed (Engineering), if people were well trained (Education) and if the police forced all road users to comply with traffic rules (Enforcement). In that sense, attention was on vehicle and road design, driver's training and law enforcement. The European countries started to cooperate to develop the first generation of common standards and regulations under the auspices of ECE and to establish corresponding national road safety mechanisms. Increasingly, the problem of road safety was recognized as a significant transport problem, but the problem was still interpreted as drivers' mistake only (lack of skills or disrespect of traffic rules).

At this stage, the importance of transport for the development of society was increasingly emphasized, but the seriousness of the negative consequences of traffic was not understood completely. Road accidents were recognized as a significant issue. Nevertheless, the problem was not given enough consideration at the beginning, which resulted in increased numbers of road accidents, and casualties.

Paradigm III: Decreasing Number of Road Accidents

Stage III (from 1970s to 1980s) continued with the development of transport demand, growing number of motor vehicles (from 250 to 500 motor vehicles per 1,000 population). Apart from road designers, vehicle designers and psychologists, traffic issues were more and more resolved by traffic engineers, or experts from the multidisciplinary field of traffic management.

With the understanding of a big gap between human nature and technical characteristics of vehicles, roots and causes of road accidents were seen as imperfections of the "driver-vehicle-environment" system. Most European countries introduced protective road safety measures: speed limits, safety belt use, safety helmets, separation of motorized traffic from other road users, regulations in terms of passive safety, legal blood alcohol concentration limits, etc. Several countries established national institutes and scientific-educational institutions for transport/traffic studies and for monitoring and improving road safety. Most European countries recognized the importance of reliable and robust road safety standards and regulations. The United Nations legal instruments on road safety were developed further. The transposition of United Nations road safety related legal instruments into national legislation initiated the harmonization of traffic conditions, which became enhanced national road safety systems. Cost-benefit analysis was increasingly used in research studies, and the overall socioeconomic costs of road accidents were calculated.

At this stage, the importance of road safety system was recognized in European countries, and road safety became increasingly important. There was a continued reduction in both the absolute road safety indicators (number of road accidents, number of casualties, etc.), and relative indicators (number of road accidents per million vehicles,

number of casualties per 100 million vehicle kilometres, etc.). Still, countries were not fully aware of how to manage the road safety risks.

Paradigm IV: Significant Reduction in the Number of Road Accidents

Stage IV (from 1980s to 1990s) was characterized by the continued growth of motorization (over 500 motor vehicles per 1,000 population). Transport and traffic development became part of all strategic and policy documents. New expert profiles (applied technology, system analysis, sociology, communication theory, etc.) were engaged in road safety development. The ultimate strategic goal became defining the efficient transport system to deal with transport demand, and with better road safety and environmental protection.

Road safety management was imposed as a priority for countries and it was accepted that road accidents could be prevented. Countermeasures were undertaken in a holistic manner, throughout the system, taking into account the impediments and transport costs (time loss, problems in traffic flow, disturbances on the transport network, etc.).

The United Nations legal instruments and their application in countries were further developed in the ECE Working Parties which are responsible for the legal instruments. The agreement on periodical inspections completed the full spectrum of road safety.

In European countries, after experiencing good practices with highly effective measures, investing in road safety was seen as a good investment. A number of countries provided stable funding for road safety measures. Having realized that road safety related knowledge was expensive and scarce, special attention was on research and development of scientific knowledge in the field of road safety.

Absolute road safety indicators (number of road accidents and their consequences) were significantly reduced in most countries over a long period, despite continued development of traffic, constantly growing number of vehicles, increasing number of vehicle kilometres. Stage IV crystalized a new attitude that road safety could be managed, and showed in practice that it was possible to develop transport systems while reducing the number of road accidents, and all their negative effects and consequences. It was clearly stated for the first time that road safety was a manageable social externality of transport.

Paradigm V: Continued Reduction in the Number and Consequences of Road Accidents

Stage V (since 2000) saw another major road safety paradigm shift. Till that time road safety traditionally focused on promoting adherence to the traffic rules through education, training, regulation, and enforcement. Although such focuses were worthy, they left out a whole set of design, infrastructure, and systemic issues that affect the ability of people to conduct themselves safely on the road (WRI, 2018). To further improve road safety, several countries introduced a holistic approach based on the more profound understanding of system vulnerabilities and potential fields of action. This is a safe system approach, see box 3. A safe system encourages a forgiving strategy for road injury prevention, and accepts that while human error on the road is inevitable, other party error may not be, and that death and serious injuries as result of crash are not. It recognizes the shared responsibility of system designers and road users to ensure that crash energy always remain below levels that will cause fatal or serious injury, and promotes holistic, multisectoral approach which can reframe the way in which road safety is perceived and managed (ITF, 2018).

National road safety management systems have been well established in most European countries, and attained significant results. Once developed, more attention was given to the rest of the world, i.e. to developing countries which struggled with the rapidly increasing numbers of killed and serious injured. The United Nations legal instruments on road safety are embraced by the countries outside the ECE region as a powerful tool to improve road safety in developing countries and contribute to enhanced global road safety.

BOX 3

Road Safety Management in Finland

In Finland, the national Government is primarily responsible for coordinating road safety and implementing road safety measures. Local centres are minor in furthering road safety, however law enforcement is managed at the local level. Finland embraced a Vision Zero approach to road safety and has been relatively successful in achieving its road safety goals.

At the national level, the Ministry of Transport and Communications is responsible for drafting road safety legislation and national strategy. The Ministry, as a whole is led by a Permanent Secretary, while road safety measures, in particular, are led by the Minister of Transport. The national road safety programme is drafted and monitored by the Consultative Committee on Road Safety, which contains representatives from ministries and expert organizations.

In the Ministry of Transport and Communications, the key agencies on road safety are the Finnish Transport Infrastructure Agency (Väylävirasto), Traficom (Finnish Transport and Communication Agency) and Liikenneturva (Finnish Road Safety Council). The Finnish Transport Infrastructure Agency is responsible for road design, construction and maintenance, and for road signs. The responsibilities of the Traficom include vehicle registration, supervision of driving schools and driving licence operations, and organization of vehicle inspections. Liikenneturva campaigns for road and traffic safety, disseminates information, contributes to road safety education and training for various age groups, and provides further training for drivers.

According to Statistics Finland data on traffic crashes in Finland are collected through different channels: the police, the Finnish Transport Infrastructure Agency, Traficom and insurance companies.
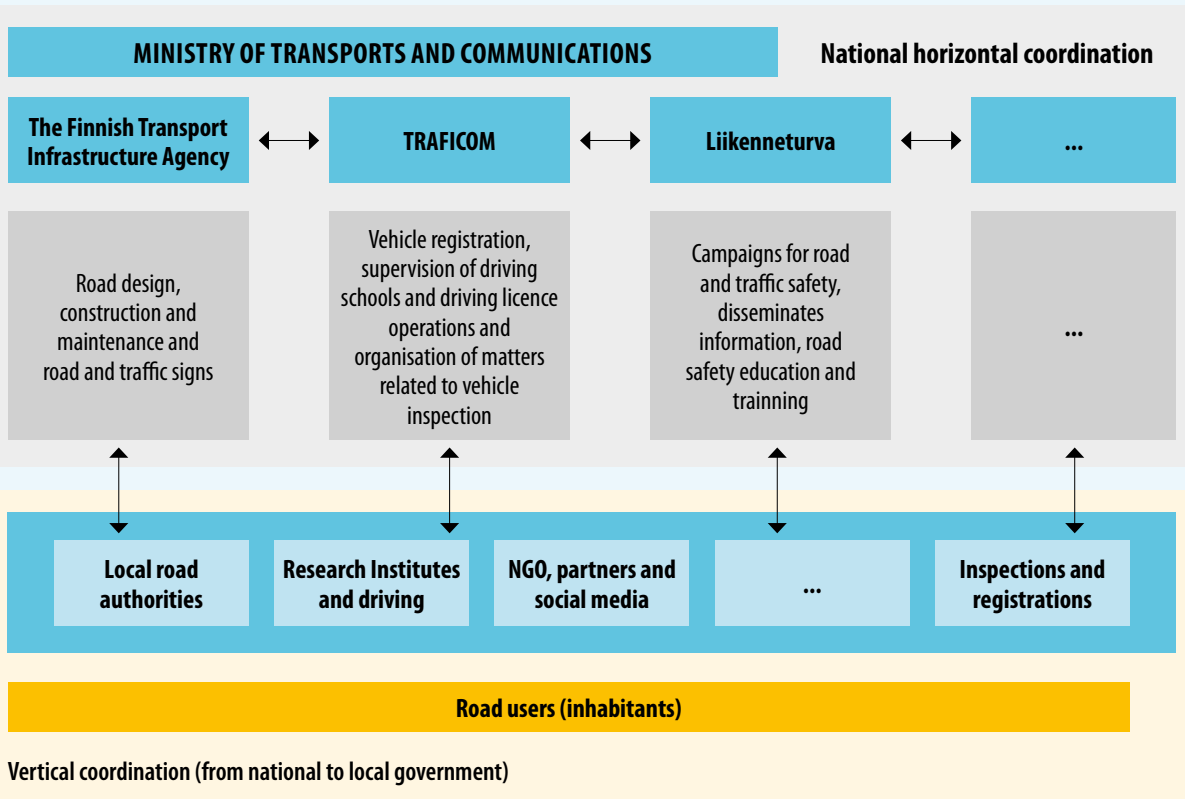
Source: ECE, Managing Road Safety in the ECE Region, unpublished.

C. The Role of the Economic Commission for Europe in European National Road Safety

Under the auspices of ECE, 59 United Nations legal instruments on inland transport were negotiated by governments and have become legally binding for countries which acceded. Worldwide, 148 United Nations member States, including 56 ECE member States, are contracting parties to at least one of the 59 legal instruments.

To support improvement of road safety in member States, the legal instruments relating to road safety were developed in the connection with the shifting paradigms (see the previous section):

Paradigm I

- 1949 Convention on Road Traffic

- 1949 Protocol on Road Signs and Signals

- 1950 European Agreement on the Application of Article 23 of the 1949 Convention on Road Traffic concerning the Dimensions and Weights of Vehicles Permitted to Travel on Certain Roads of the Contracting Parties

- 1950 European Agreement supplementing the 1949 Convention on Road Traffic and the 1949 Protocol on Road Signs and Signals

- 1950 Declaration on the Construction of Main International Traffic Arteries

- 1957 European Agreement on Road Markings

- 1957 Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)[14]

- 1958 Agreement concerning the Adoption of Harmonized Technical United Nations 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 United Nations Regulations

Paradigm II

- 1968 Convention on Road Traffic

- 1968 Convention on Road Signs and Signals

- 1970 European Agreement concerning the Work of Crews of Vehicles engaged in International Road Transport (AETR)

- 1971 European Agreement supplementing the 1968 Convention on Road Traffic

- 1971 European Agreement supplementing the Convention on Road Signs and Signals

- 1973 Protocol on Road Markings, Additional to the European Agreement supplementing the Convention on Road Signs and Signals

- 1975 Agreement on Minimum Requirements for the Issue and Validity of Driving Permits (APC)

- 1975 European Agreement on Main International Traffic Arteries (AGR)

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[14] The word "European Agreement" was replaced by "Agreement" in the latest amendment to this agreement.

Paradigm III

- 1993 Protocol amending article 1 (a), article 14 (1) and article 14 (3) (b) of the European Agreement of 30 September 1957 concerning the International Carriage of Dangerous Goods by Road (ADR)

- 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections

- 1998 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

Seven legal instruments can be considered as the foundation for national and international road safety: 1968 Convention on Road Traffic, 1968 Convention on Road Signs and Signals, 1958 Agreement on United Nations Regulations for vehicle type-approval, 1997 Agreement on periodic technical inspection, 1998 Agreement on United Nations Global Technical Regulations on vehicle construction, 1957 Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), and 1970 European Agreement Concerning the Work of Crews of Vehicles Engaged in International Road Transport (AETR). The seven legal instruments that are summarized in annex I address the main factors of road accidents (road user behaviour, vehicle and infrastructure) and are tangible contributors to improving road safety. Many countries across the world have become contracting parties to these legal instruments and benefit from their implementation. These contracting parties are also the key driving forces that keep the United Nations road safety conventions up-to-date through the ECE intergovernmental platforms.

The current ECE intergovernmental structure for the administration of legal instruments is shown in figure 8. Contracting parties to the legal instruments on road safety are supported by the ECE Inland Transport Committee and its subsidiary bodies, including WP.1, SC.1, WP.15 and WP.29.

The four Working Parties are platforms where the seven United Nations road safety legal instruments are elaborated. Participation is free. Governments, intergovernmental organizations, non-governmental organizations with consultative status and specialized agencies of the United Nations may attend. Secretariat support is provided by the ECE Sustainable Transport Division: servicing of sessions, preparation of documents/agendas/reports, collection and dissemination of information, facilitation of liaison between government and non-government participants.

ECE also developed two road safety tools: SafeFITS and the Road Safety Performance Review to assist member States to assess road safety and to decide on the most appropriate measures to improve road safety. ECE in cooperation with other organizations, assists developing countries across the globe to accede to and to implement the United Nations road safety conventions.

FIGURE 8
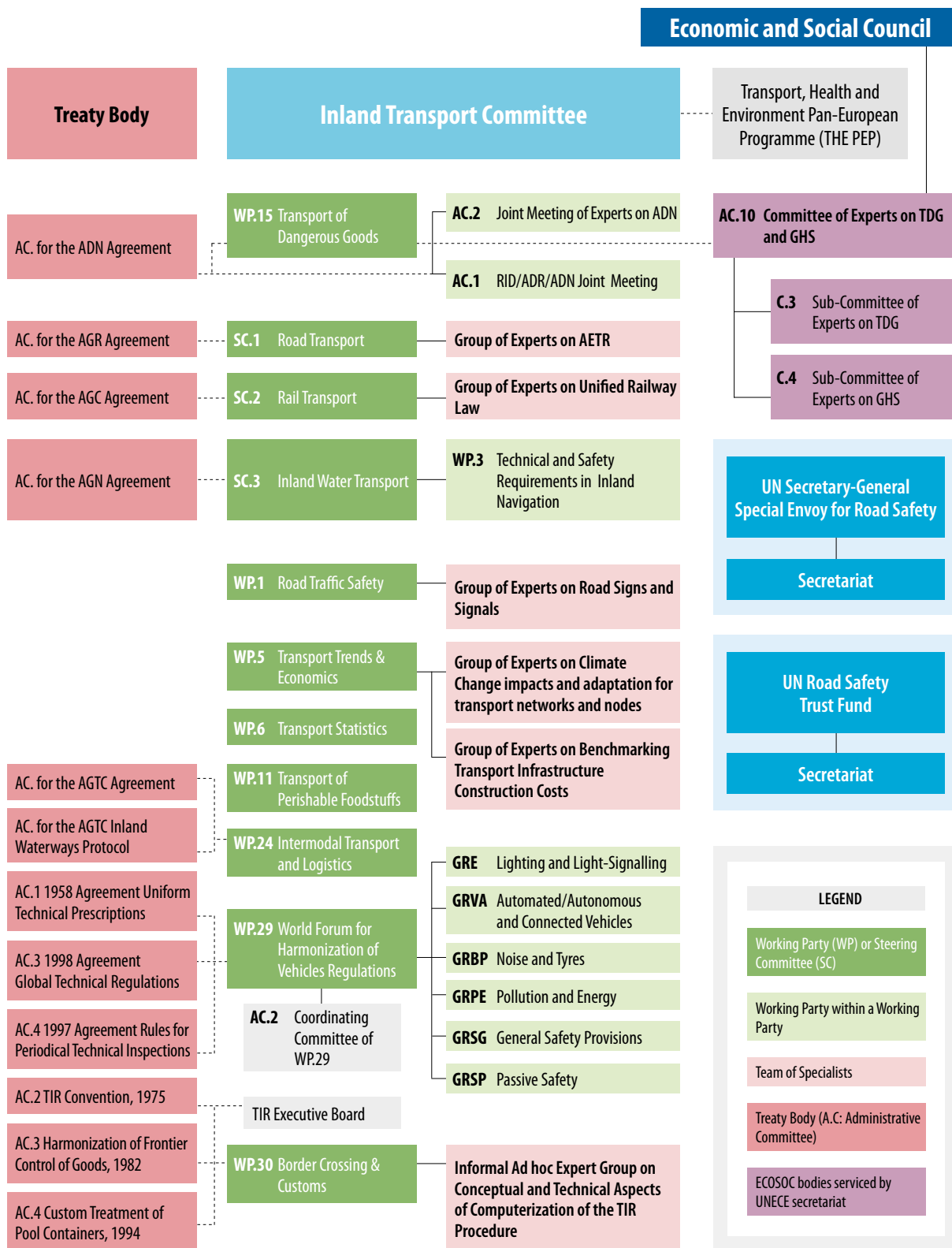
ECE Sustainable Transport Division

V. EXPERIENCE FROM MANAGEMENT OF MARITIME AND CIVIL AVIATION SAFETY

Maritime shipping, aviation, road, rail and inland waterway are the five main modes of transport, among which we find commonalities and differences. The infrastructure of each mode is developed, maintained and operated by transport sector. All modes service individual or combined movements of people and freight. Major users of maritime shipping, aviation, rail and inland waterway are professional transporters but that of road are mostly the general public and semi-professional transporters. Seaports, airports, railway lines and inland waterways operate in access-restricted areas, and roads, except enclosed highways, are open to everyone, including pedestrians, bicycles, motorcycles, tricycles, cars, buses and trucks.

In transport safety, a fundamental approach to management should be the same across the modes of transport due to their commonalities. However, each mode of transport is unique and uses, to some extent, its own ways to address particularities. In maritime and aviation transport, safety management both apply the safety system concept. They even learned from each other – see for example, their common terminology.

In the past, maritime and air accidents occurred frequently. Today, however, effective national safety systems and strong international regulatory support have led them to becoming the safest modes of transport. Key to both maritime and civil aviation safety is effective national safety systems with close links to the international conventions in place in the countries.

Given the long-standing road safety crisis, such experiences from other modes of transport would be extremely useful for the road sector to learn from and to harness.

A. Maritime Safety

1. International Regulations

The maritime sector, very early on, recognized that the best way of improving safety is to develop international regulations that are followed by all maritime nations. The regulations created a framework for the shipping industry that was fair and effective, universally adopted and universally implemented. The resulting "level playing-field" gave shipping lines a means to excel in safety, security and environmental performance.

As a specialized United Nations agency, the International Maritime Organization (IMO)[15] is the global standard-setting authority for the safety, security and environmental performance of international shipping. Formally established in 1949 in Geneva by the adoption of a convention, IMO[16] followed-up on the adoption of a number of treaties from the mid-nineteenth century. IMO currently has 172 member countries and three associate members.

In maritime safety, IMO developed and adopted:

■ international navigation rules

■ regulations to prevent collision

■ standards for seafarers

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[15] See www.imo.org/en.

[16] Originally the Inter-Governmental Maritime Consultative Organization (IMCO), it became IMO in 1982.

- international conventions and codes for search and rescue, load lines, the carriage of dangerous goods and tonnage measurement, including ship design, construction, equipment, manning, operation and disposal.

IMO administers over 50 international conventions and has adopted numerous protocols and amendments, resolutions and codes. The conventions on safety are:

- the International Convention for the Safety of Life at Sea (SOLAS), 1974[17]

- the Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972[18]

- the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1995[19]

- the International Convention on Maritime Search and Rescue (SAR), 1979

- the International Convention on Load Lines (LL), 1966

- the Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (SUA), 1988

- the International Convention for Safe Containers (CSC), 1972

- the Torremolinos International Convention for the Safety of Fishing Vessels (SFV), 1977

- the International Convention on Tonnage Measurement of Ships (TONNAGE), 1969

- the International Convention on Salvage (SALVAGE), 1989 and

- the Nairobi International Convention on the Removal of Wrecks, 2007.

IMO also regulates the carriage of dangerous goods:

- the International Maritime Solid Bulk Cargoes Code (IMSBC Code)

- the International Maritime Dangerous Goods (IMDG) Code

- the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code), and

- the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).

IMO brings member countries together to review the implementation of and to discuss further development of the conventions. It facilitates the work of member countries.

The Maritime Safety Committee (MSC) is the highest technical body on safety in IMO. All the member countries participate. MSC considers any concerns about aid to navigation, construction and equipment of ships, manning from a safety standpoint, rules for prevention of collisions, handling of dangerous cargoes, maritime safety procedures and requirements, hydrographic information, log-books and navigational records, marine casualty investigations, salvage and rescue and any other matters directly affecting maritime safety.

MSC is assisted in its work by subcommittees which are open to the participation of all member countries:

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[17] SOLAS is a United Nations specialized agency responsible for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships: construction, fire protection, life-saving appliances, radiocommunications, safety of navigation, the carriage of cargoes and safety measures for high speed craft.

[18] COLREGs set out, among other things, the "rules of the waterway" or navigation rules to be followed by ships and other ships at sea to prevent collisions between two or more ships.

[19] STCW sets minimum standards of qualification for shipmasters, officers and watch personnel on seagoing merchant ships and large yachts.

- the Sub-Committee on Human Element, Training and Watchkeeping (HTW) deals with the human side of shipping, including training and certification; the review, updating and revision of IMO model courses, and guidance addressing issues such as fatigue.

- the Sub-Committee on Implementation of IMO Instruments (III) brings together flag, port and coastal States to consider implementation issues, including the analysis of consolidated audit summary reports from the mandatory IMO member State Audit Scheme. The Sub-Committee has a key role in casualty analysis and issuing lessons learned from marine incidents. The Sub-Committee undertakes the analysis of Port State Control data and reviews the procedures for Port State Control. Guidelines for survey and certification including the survey guidelines under the Harmonized System of Survey and Certification (HSSC) are also under its scope.

- the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) deals with all matters related to navigation and communication, including the analysis and approval of ships routeing measures and ship reporting systems, carriage requirements and performance standards for navigational and communication equipment, the long-range identification and tracking system and the development of e-navigation. It also deals with search and rescue matters and the Global Maritime Distress and Safety System (GMDSS), e.g. recognition of service providers. Joint working groups that report to the NCSR Sub-Committee include the ICAO/IMO Joint Working Group on Harmonization of Aeronautical and Maritime Search and Rescue and the Joint IMO/ITU Experts Group on Maritime Radiocommunication Matters.

- the Sub-Committee on Ship Design and Construction (SDC) considers technical and operational matters related to ship design and construction, including subdivision and stability. The Sub-Committee also covers testing and approval of construction and materials, load lines, tonnage measurement, safety of fishing ships and the carriage of industrial personnel.

- the Sub-Committee on Ship Systems and Equipment (SSE) deals with technical and operational matters related to systems and equipment on all types of ships, ships, craft and mobile units covered by IMO legal instruments. This includes life-saving equipment, appliances and arrangements, and fire detection and fire extinguishing systems.

- the Sub-Committee on Carriage of Cargoes and Containers (CCC) deals with the carriage of packaged dangerous goods, solid bulk cargoes, bulk gas cargoes, and containers. The Subcommittee keeps updated the international codes. The Subcommittee closely collaborates with other United Nations bodies dealing with the multimodal transport of goods.

2. Maritime Safety in Countries

During the implementation phase of multilateral agreements, countries transpose conventions into domestic law, such as in primary or secondary legislation, and include mechanisms of enforcement for the standards in the conventions.

IMO distinguishes between two levels of implementation and enforcement of safety standards:

- the Flag State Control: acts as a registry of its own ships and enforcer of its own regulations based on the conventions.

- the Port State Control: acts as an enforcer of regulations for other ships of other countries.

The Flag State of a ship is the jurisdiction under which laws the ship is registered or licensed, and is deemed the nationality of the ship. A ship must be registered in one, and only in one, jurisdiction but may change the flag state to which it is registered. The flag state has the authority and responsibility to enforce regulations over ships registered under its flag, including those relating to inspection, certification, and issuance of safety and pollution prevention documents. As a ship operates under the laws of its flag state, these laws are applicable if the ship is involved in an admiralty case.

The Port State Control is a regime under which countries inspect foreign-registered ships in ports other the flag state and in which actions are taken against ships that do not comply. The inspectors are required to investigate compliance with the requirements of international conventions, such as SOLAS and STCW. Inspections can involve checking that the ship is manned and operated according to applicable conventions, and verifying the competency of a ship's master and officers, or the condition and equipment of the ship.

Measures that an inspector may impose on a deficient ship are:

- Rectification within 14 days for minor infractions

- Under specific conditions, rectification when the ship arrives at the next port

- Rectification before the ship can depart the port, and

- Detention of the ship.

Detention of a ship is the final action that an inspector would take upon finding deficiencies aboard the ship.

Flag state and port state controls are implemented by the maritime safety authority, the coastguard or a combination in some countries. The safety of domestic shipping is also under their authority.

In the United Kingdom of Great Britain and Northern Ireland, the authority is the Maritime and Coastguard Agency (MCA). As executive agency for the prevention of loss of life at sea, for implementing British and international conventions and safety policy, the agency is also responsible for land-based search and rescue helicopter operations.

MCA coordinates search and rescue on the coastline and at sea, ensures that ships meet the international and British safety standards, monitors and prevents coastal water pollution, and tests and issues Merchant Navy Certificates of Competency (licences) for ship's officers and crew to STCW requirements. MCA is responsible for the syllabus and national training standards issued by the Merchant Navy Training Board (based at the United Kingdom Chamber of Shipping).

MCA has three distinct "outward facing" elements – provision of search and rescue and prevention activity, port and flag state control of shipping through a network of Marine Offices and the development of international standards and policy for shipping through IMO.

3. Observations

The management of maritime safety operates under highly effective:

- International regulatory support system

- Flag state and port state control system.

International Regulatory Support

IMO developed a full set of regulations (conventions, resolutions and codes) covering all the necessary elements of a national maritime safety system, such as ship construction, crew competency, use of ship, response to emergency and reporting. Regulations are updated by protocols and amendments that are developed in the IMO subcommittees and committee. Accident investigation, analysis and reporting are systematically institutionalized. A two-pronged system (flag state and port state control) is applied to ensure implementation and enforcement.

The legal instruments together detail all elements required for a national maritime safety system to function in an integrated manner. They can be briefly grouped as:

- **Ship:** design, construction, materials, fire protection equipment, life-saving appliances, radiocommunication, lights, signal appliances, survey and inspection, registration, disposal

- **Crew:** minimum standards relating to training, certification and watchkeeping for seafarers, model courses, guidance on fatigue

- **Use of ship:** navigation rules, manning, stowage and securing of cargoes, rules for different types of cargoes including dangerous goods, management of safe operation, communication, assessment of port facilities, voyage and passage planning and assessment, potential dangers to navigation, weather forecasts, tidal predictions, clearance for departure and arrival, ship reporting system

- **Post-accident actions:** search and rescue, investigation, analysis, reporting, salvage, removal of wrecks, international review, circular of lessons learned

- **Implementation and enforcement:** Flag state and port state control systems, mandatory audit scheme, review and analysis of port state control data.

National maritime safety systems

Countries which are contracting parties to IMO transpose the conventions to domestic law through primary or secondary legislation; and establish the mechanisms to enforce the standards in the conventions. The main mechanisms are the maritime safety authority and coastguard or some combination that enforce national flag state and port state control. Support is provided by ship survey societies, search and rescue (included in the responsibilities of maritime safety authority in some countries), salvage entity, maritime college, institution for waterway maintenance and aids to navigation (included in the responsibilities of maritime safety authority in some countries), weather forecast, nautical information etc. All of them together constitute a national maritime safety system.

B.   Civil Aviation Safety

1.   International Regulations

In civil aviation, international regulations for safety began with commercial aviation. In 1944, 52 countries signed the Convention on International Civil Aviation in Chicago (Chicago Convention) and created the International Civil Aviation Organization (ICAO). As a specialized agency of the United Nations, ICAO administers the Chicago Convention.

The main body of the convention includes general principles and applications, requirements for flight over territory, nationality of aircraft, measures to facilitate air navigation, conditions to be fulfilled with respect to aircraft, scope and formulation of international standards and recommended practices, certificates of aircraft, license of personnel, settings of ICAO, and international air transport.

Standards And Recommended Practices (SARPs) in 19 annexes[20] support the Chicago Convention as well as six recommended Procedures for Air Navigation Services (PANS).[21] These are approved by the ICAO Council and recommended to countries for worldwide application. SARPs and PANS provide the foundation for standardized global aviation safety and efficiency in the air and on the ground, the worldwide standardization of functional and performance requirements of air navigation facilities and services, and the orderly development of air transport. Today, ICAO manages over 12,000 SARPs and continues amending many of them to be in line with the latest developments and innovations.

The 193 member countries of ICAO and industry groups reach consensus on SARPs, PANS and policies to maintain a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector. These SARPs, PANS and policies are implemented in ICAO member countries to ensure that local civil aviation operations and regulations conform to global standards and regulations.

In addition to developing and maintaining SARPs and PANS, ICAO also develops global strategies in the Global Aviation Safety Plan (GASP) and the Global Air Navigation Plan (GANP).

GASP from 1997 and GANP from 1993 support a prioritization and continuous improvement of aviation safety in countries by implementation of the global aviation safety road map, an effective safety oversight system, a State Safety Programme (SSP), predictive risk management and safety capabilities necessary for safety in aviation. GASP, as a common frame of reference for all stakeholders, is a high level, strategic, planning and implementation policy document that was developed in conjunction with GANP. Used together, both plans guide and harmonize the development of the regional and individual SSPs of ICAO, and promote coordination and cooperation among international, regional and national initiatives aimed at delivering a harmonized, safe and efficient international civil aviation system. They help coordinate and guide safety policies and initiatives worldwide to reduce the risk of accidents in commercial aviation.

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[20] Annex 1 – Personnel Licensing, Licensing of flight crews, air traffic controllers and aircraft maintenance personnel
Annex 2 – Rules of the Air
Annex 3 – Meteorological Service for International Air Navigation
Annex 4 – Aeronautical Charts
Annex 5 – Units of Measurement to be used in Air and Ground Operations
Annex 6 – Operation of Aircraft
Annex 7 – Aircraft Nationality and Registration Marks
Annex 8 – Airworthiness of Aircraft
Annex 9 – Facilitation
Annex 10 – Aeronautical Telecommunications
Annex 11 – Air Traffic Services – Air Traffic Control Service, Flight Information Service and Alerting Service
Annex 12 – Search and Rescue
Annex 13 – Aircraft Accident and Incident Investigation
Annex 14 –Aerodromes
Annex 15 – Aeronautical Information Services
Annex 16 – Environmental Protection
Annex 17 – Security: Safeguarding International Civil Aviation Against Acts of Unlawful Interference
Annex 18 – The Safe Transport of Dangerous Goods by Air
Annex 19 – Safety Management.
[21] PANS-ATM: Air Traffic Management
PANS-OPS: Aircraft OPerations
PANS-ABC: ABbreviations and Codes
PANS-ADR: AeroDRomes
PANS-TRG: TRaininG
PANS-AIM: Aeronautical Information Management.

FIGURE 9

The GASP framework

Safety performance enablers	Effective safety oversight	SSP implementation	Predictive risk management
Standardization			
Resources			
Collaboration			
Safety information exchange			
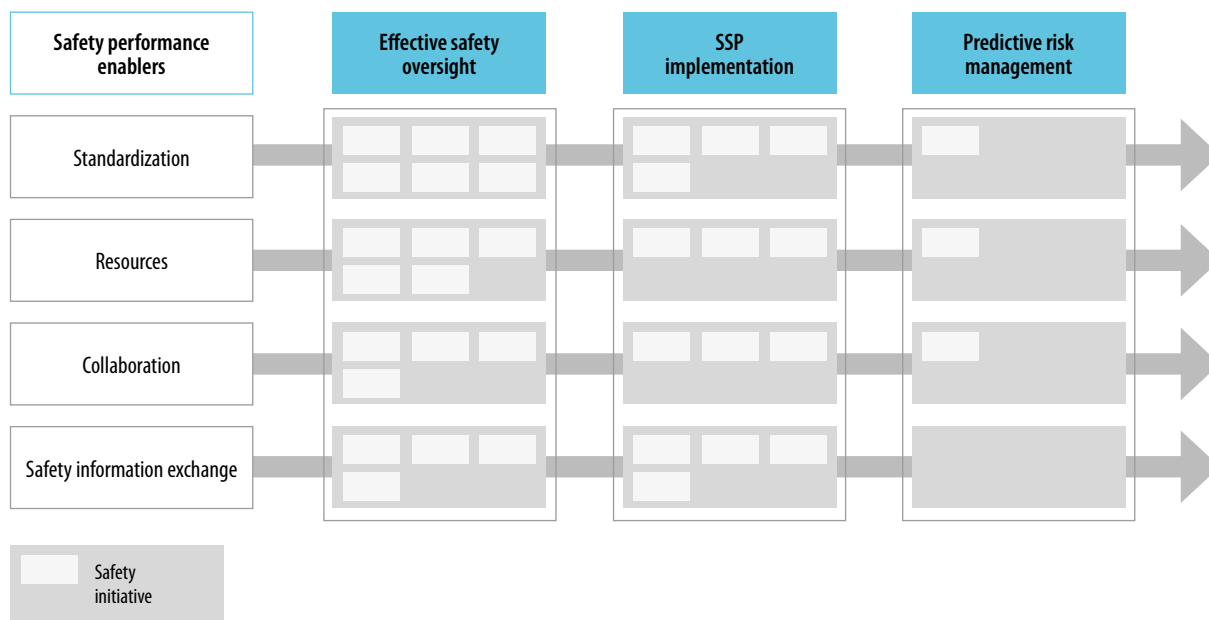
Safety initiative

A key component of GASP is the global aviation safety road map which provides a set of safety initiatives, prioritizes actions and associated timelines for each safety performance enabler found in the GASP framework (standardization, resources, collaboration and safety information exchange), see Figure 9. Each safety initiative is supported by a set of actions. The road map includes specific initiatives targeted to the different stakeholders (countries, regions and industry) at different levels of maturity. It provides a structured, common frame of reference for all relevant stakeholders. Its aim is to ensure that safety initiatives deliver the intended benefits associated with the objectives in a coordinated manner, thus reducing inconsistencies and duplication of effort.

GASP also sets out timelines for the global collective achievement of the short-, mid- and long-term objectives. These timelines are aligned with the established update process for GASP and GANP.

ICAO reviews GASP and GANP every three years, in an established process, in consultation with countries and industry. The progress and effectiveness of countries and regions in achieving the objectives and priorities set out in their aviation safety plans are measured on an ongoing basis. Monitoring and reporting of progress enables countries and regions to modify their activities based on their performance and to address emerging safety issues. To support countries and regions, ICAO publishes annual safety progress reports. The State Safety Performance Indicators are also developed to support the reviews.

The Air Navigation Commission (ANC) reviews GASP and GANP as part of its work programme, reporting to the Council one year in advance of each Assembly. After approval by the Council, amendments to GASP and GANP are submitted for endorsement by member countries at the following Assembly.

ICAO has the Assembly and Council as decision-making bodies and the Bureaux under the secretariat.

ANC considers and recommends SARPs and PANS for adoption or approval by the ICAO Council. ANC is also tasked by the Council to manage the technical work programme of ICAO.

2.   Civil Aviation Safety in Countries

According to the Chicago Convention, aviation safety oversight responsibilities rest directly with ICAO member countries. Because aviation transport is a highly standardized sector among countries, management of aviation safety is similar from country to country. Countries incorporate the international standards into domestic legislation and empower civil aviation authorities to perform safety oversight in a manner consistent with the obligations under the Chicago Convention, including the role and obligations of industry. Countries apply most SARPs and PANS which constitute country civil aviation safety systems, such as authorities' regulatory safety management system, air traffic service providers' safety management systems and accident response system.

More than 12,000 SARPs and six PANS of ICAO form the core elements of the safety system for countries, and cover a full range of safety responsibilities, such as training, testing and licensing of personnel, passenger education, certification, maintenance and clearance of aircraft, airspace management, air traffic control, airport management, fire-fighting, search and rescue, accident investigation and reporting. All the responsibilities are assigned to the authorities or agencies. The case of Australia as shown in figure 10.

FIGURE 10

Australia – Aviation safety management
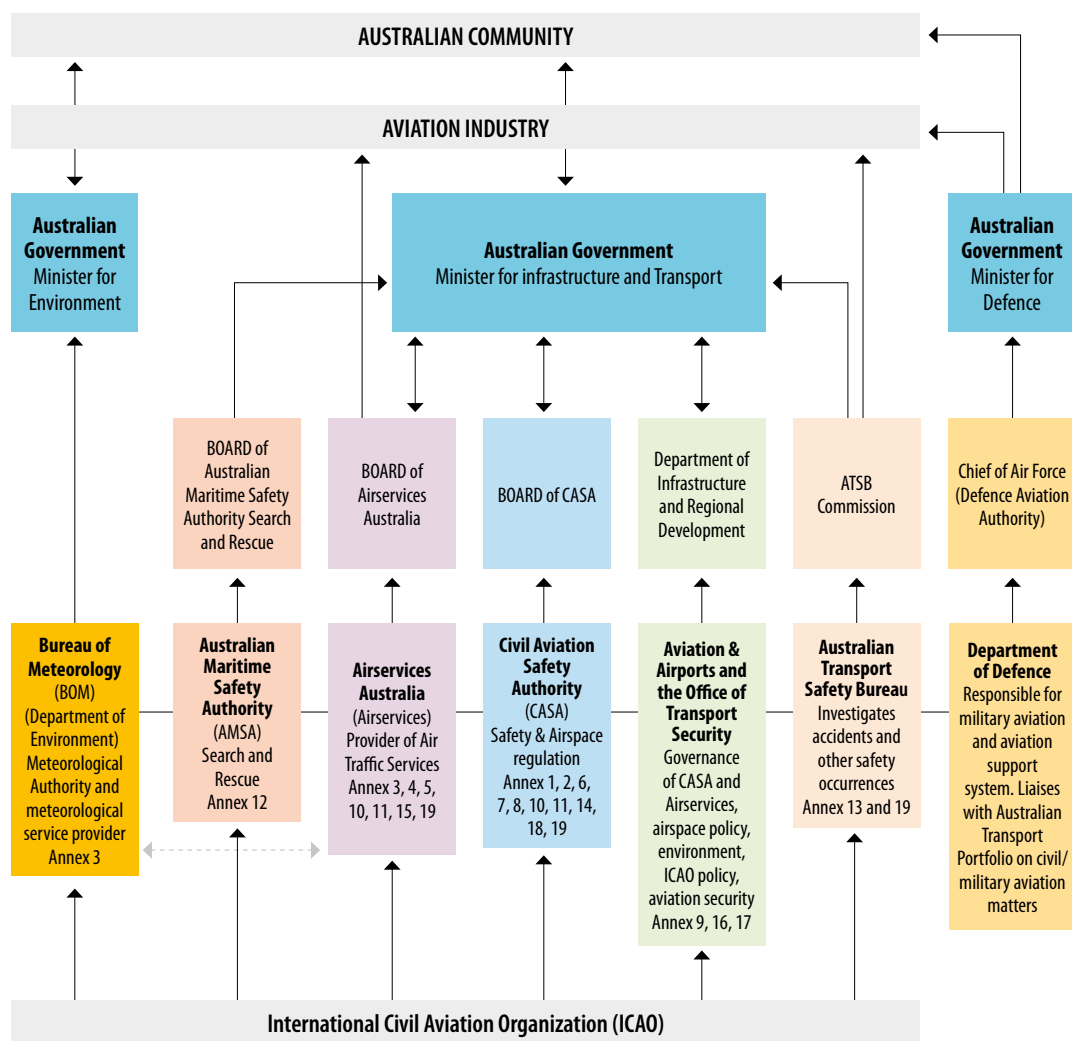
Source: The State Safety Programme of Australia, May 2016.

It can be noted that the annexes to the Chicago Convention are assigned to specific authorities. The Civil Aviation Safety Authority is responsible for the Annexes relating to safety oversight and airspace regulation, including Annexes 1 (Personnel licensing), 2 (Rules of the air), 6 (Operations of Aircraft), 7 (Aircraft nationality and registration marks), 8 (Airworthiness of aircraft), 10 (Aeronautical telecommunications), 11 (Air traffic services), 14 (Aerodromes), 18 (Transport of dangerous goods) and 19 (Safety management). The Air services Australia takes responsibilities relating to provision of air traffic services of the Annexes 3 (Meteorological service for international air navigation, shared responsibility with the Bureau of Meteorology), 4 (Aeronautical charts), 5 (Units of measurement to be used in air and ground operations), 10 (Aeronautical telecommunications), 11 (Air traffic services), 15 (aeronautical information services) and 19 (Safety management). The Australian Transport Safety Bureau takes charge of accident investigation in connection with the Annexes 13 (Aircraft accident investigation) and 19 (Safety management). The Department of Infrastructure, Transport, Cities and Regional Development is responsible for Annex 12 (Search and rescue), Annex 13 (Aircraft accident investigation) and Annex 17 (Aviation security).

Countries develop and improve the country aviation safety systems continuously through SSPs that consistent with the key policy principles outlined in GASP and GANP of ICAO. SSPs systematically addresses safety risks in agreement with the implementation of the safety management systems by the service providers. SSP is a key means of demonstrating how each ICAO member country plans to achieve an acceptable level of safety performance in civil aviation in its own country. SSP is in essence the safety management system framework for a country. The detailed requirements for SSPs are set out in Annex 19 to the Chicago Convention, which includes the safety management system framework as originally consolidated from the existing overarching safety management provisions in the Chicago Convention and its annexes.

Annex 19 of the Chicago Convention requires that SSP covers the safety management system framework applied by organizations responsible for the type design and manufacture of aircraft; safety policy and objectives, risk management, safety assurance and safety promotion in connection with the status of standards; state safety oversight system applicable to the oversight of all product and service providers; safety data collection, analysis and exchange including accident and incident reporting (mandatory reporting, voluntary reporting, publicly available aviation occurrence data, other safety related reporting and analysis, data analysis and reporting).

SSP also identifies the challenges and future short-, medium- and longer-term objectives and priorities to respond to these challenges and maintain the country's internationally recognized safety system.

Implementation of SSP is collectively monitored by the heads of relevant agencies. In coordination with ICAO GASP, SSP are normally reviewed and updated every three years with participation of relevant government agencies, industry and community stakeholders.

The capacity and implementation of international standards are different from country to country. ICAO assists countries which are challenged to resolve safety related deficiencies identified by the its continuous monitoring programme – with particular priority given to countries with significant safety concerns and low effective implementation. The assistance provides support to the countries to implement corrective action plans in a timely manner and enables them to meet obligations of the Chicago Convention and its Annexes.

3. Observations

The management of civil aviation maritime safety operates under:

- A strong international regulatory support system is in place

- Effective national civil aviation safety systems and international regulatory framework in countries, and

- Continuous improvement of safety through SSPs, GASP and GANP.

International regulatory support

ICAO developed a full set of standards and regulations in the Chicago Convention for all the elements needed for national safety systems, such as aircraft design and construction, crew competency and licensing, use of aircraft, air traffic control, response to emergency, accident investigation and reporting. The standards and regulations are updated through elaborations in the committee in the framework of ICAO. Accident investigation, analysis and reporting are systematically institutionalized. GASP and GANP were developed to assist countries to comply with the ICAO standards and regulations (SARPs and PANS).

SARPs and PANS detail all elements required for the national aviation safety systems to function in an integrated manner, including:

- Personnel licensing – licensing of flight crews, air traffic controllers and aircraft maintenance personnel

- Rules of the air traffic

- Meteorological service for international air navigation

- Aeronautical information management, information services, aeronautical charts

- Units of measurement to be used in air and ground operations

- Operation of aircraft

- Aircraft nationality and registration marks

- Airworthiness of aircraft

- Aeronautical telecommunications

- Air traffic services – air traffic control, flight information and alerts

- Search and rescue

- Aircraft accident and incident investigation

- Aerodromes

- Security – safeguarding international civil aviation against acts of unlawful interference

- Transport of dangerous goods

- Abbreviations and Codes

- Training.

National aviation safety systems

Countries which are contracting parties to the Chicago Convention transpose the convention to domestic legislation and have the mechanisms for enforcing the standards and regulations in the convention and its annexes. The mechanisms are mainly civil aviation safety authority, air traffic management and airport authorities in countries to enforce domestic legislation. SSP is widely used to systematically identify potential safety risks and challenges, and prioritize correction actions to mitigate the risks and address the challenges in an integrated manner. SSP is a key means of demonstrating how each ICAO member country plans to achieve an acceptable level of safety performance in civil aviation in its own country. SSP is in essence the safety management system framework for a country.

VI. THE CONCEPT OF A NATIONAL ROAD SAFETY SYSTEM

A. Introduction

Road safety is about a full spectrum of actions which need to be taken by governments to impact how users behave on the road, how vehicles and infrastructure are constructed and maintained to be safe and how post-crash response is organized. The impact can be exercised by creating rules and regulations, thus through a legislative action. The latter might however have only little impact if rules and regulations are not enforced, thus an enforcement and a compliance action is necessary. The impact may also be achieved or supported through actions in education and technology in addition or supportive to the enforcement action.

Road safety further requires from governments that they have institutions in place who have the necessary capacity and budget and are empowered to take actions.

The following Figure 11 shows the way of fragmented functioning of different elements of a spectrum of actions for road safety in many low- and middle-income countries.

FIGURE 11

Elements for actions in road safety

.Source: ECE, Sustainable Transport Division

With government institutions in place, which are empowered and equipped with regular and relevant budgets, governments need to consider how to implement road safety action in an effective and coordinated way, e.g. how to manage it in a sustainable way.

In this respect, the creation of national road safety systems appears to be an effective response to implementation challenge of the road safety action taking into account the experience from the good performers, the maritime and aviation sectors, as presented in sections IV and V, together with strong national or regional regulatory frameworks based on international conventions, and the lessons learned from countries where the availability of necessary road maps for safety helped to establish national safety systems and resulted in improvement of safety records (see figure 12).

The next section suggests what a national road safety system that offers an effective and coordinated framework to managing road safety may look like – in a role like the road maps in the aviation or maritime sectors, and how it may be constructed.

B.   National Road Safety System

A national road safety system needs to focus on a system matrix to combine road user, vehicle, infrastructure and post-crash response as core pillars and road safety management as overarching pillar with legislation, enforcement, education, technology and international regulatory support as core areas.

Distinction of four core pillars and five areas is important as there typically are or will be different national actors in charge of action in these pillars and areas. These actors focus on the:

(a)   creation of a clear legal basis for enhancing road safety as well as to designation of responsible agencies for enforcement, education and monitoring (legislation area),

(b)   assurance that rules, regulations and standards are observed and/or implemented (enforcement area),

(c)   assurance that rules and regulations are known by all road users and so can be applied (education area), and

(d)   complementation and strengthening system's effectiveness by technical solution (technology area).

At the same time, the pillars and areas are interconnected as action in one area and pillar may not lead to achieving an expected result/road safety target unless action in another area under the same and sometimes another pillar was implemented. For that reason, vertical and horizontal management is required and must be part of the national road safety system through an overarching pillar of road safety management.

The actions taken across pillars and areas need to lead to specific outcomes. It is sensible that the following outcomes are pursued:

(a)   legislative action:

– Traffic rules in place (user pillar)

– Rules and standards for admission of vehicles to traffic in place (vehicle pillar)

– Standards for design, construction, maintenance and signage in place (road pillar), and

– Procedures for post-crash response and accident investigation as well as associated data collection in place (effective post-crash response pillar).

(b)   enforcement action:

– Police and inspectors ensure lawful behaviour (user pillar)

– Inspectors certify and inspect vehicles (vehicle pillar)

– Qualified teams audit, assess and inspect roads (road pillar), and

FIGURE 12

Organization of Pillars and Areas into a road rafety system

INSTITUTIONS AND BUDGET

COMMITMENT

CAPACITY

LEGISLATION

ENFORCEMENT

EDUCATION

TECHNOLOGY
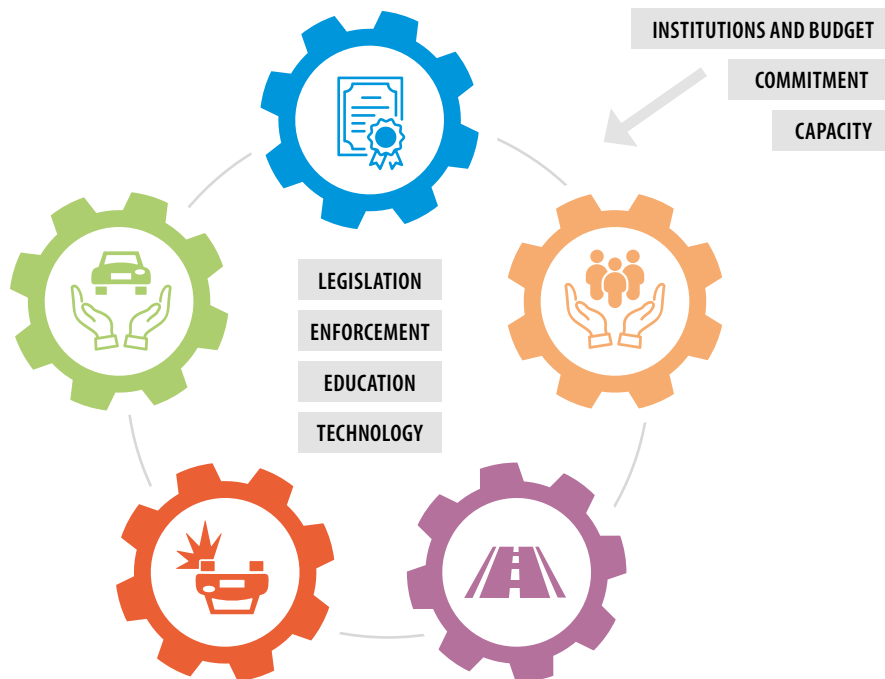
.Source: ECE, Sustainable Transport Division

- Rescue services are coordinated, investigators investigate road crashes, and data collected (effective post-crash response pillar).

(c) education action:

- Awareness-raising, training and examination for users provided and delivered (user pillar)

- Awareness-raising for users, training for inspectors provided and delivered (vehicle pillar)

- Awareness-raising for road managers, for users, for auditors and for inspectors provided and delivered (road pillar), and

- First aid rescue training for users and rescue services provided and delivered, investigators trained (effective post-crash response pillar).

(d) technology action:

- Supportive technology (e.g. rule reminders) developed, adopted and used (user pillar)

- Assistance technology (e.g. intelligent vehicle systems) developed, adopted and used (vehicle pillar)

- Forgiving and self-explaining road design, intelligent road system developed, adopted and used (road pillar), and

- Supportive emergency technology developed, adopted and used (effective post-crash response pillar).

Specific outcomes need to be pursued in the road safety management pillar. In addition to vertical and horizontal management of road safety action, the following outcomes should be pursued:

(i) Road safety targets are set

(ii) Progress towards these targets is monitored through achievement of outcomes and

(iii) Road safety is coordinated and managed across the pillars and areas.

Fulfilment of outcomes can be supported with internationally available tools, practices and mechanisms. International legal agreements (conventions) are available to support the legislative and enforcement action. International institutional platforms are established through which good practices are exchanged.

A system matrix is shown in Figure 13.

FIGURE 13

Matrix of a national road safety system

Area / Pillar	Legislation	Enforcement	Education	Technology	International Regulatory Support
Road safety management – vertical and horizontal coordination					
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, WP.1, SC.1, WP.15
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, WP.1, WP.29
Safe Road	Standards for design, construction, maintenance and signage	Audit, assessment and inspection by qualified teams	Awareness raising for road managers, users, and for inspectors	Forgiving and self-explaining road design, intelligent road systems	UN RS legal instruments and resolutions, int. standards WP.1, SC.1
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, WP.1, SC.1

Source: ECE, Sustainable Transport Division.

Actions to achieve the above-mentioned outcomes are numerous. The details are listed in annex I. Also, specific United Nations conventions and resolutions forming the international regulatory framework and the United Nations platforms are listed in annex I as reference tools and mechanisms.
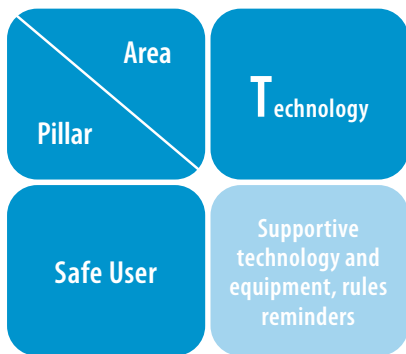
C.   Bundled Actions for Specific Targets

Actions lead to expected road safety targets, e.g. such as less fatalities, injuries or less accidents due to speeding, or no faulty vehicles on the road. For this to happen, the actions from across pillars and areas, and so the outcomes of the actions need to be bundled together as appropriate.

Using the examples of the mentioned road safety targets, Tables 2 and 3 list actions and their outcomes needed to meet these targets.

TABLE 2

Actions and outcomes to decrease the number of fatalities, injurious or accidents due to speeding

Pillar/Area	Road safety action	Action-related outcome
Area / Pillar — **L**egislation / Safe User — Traffic rules drivers pedestrians	Regulate reasonable speed and distance management	Speed regulations as part of traffic code
	Have in place penalties scheme for offenders	Penalties for speeding established
	Designate authorities responsible for implementation including those for enforcement of the rules	Police has the legal mandate for enforcing speed
Area / Pillar — **E**nforcement / Safe User — Lawful behavior ensured by police and inspectors	Carry out road side checks on compliance with speed regulation (police, use of enforcement technology enabled e.g. speed guns and cameras)	Police present on roads and applies penalties
	Have in place anti-corruption mechanism	
Area / Pillar — **E**ducation / Safe User — Awareness raising, training and examination	Train drivers	Driver speed awareness-raising
	Train enforcement authorities for road side checks	Effective speed enforcement

Area / Pillar		
Technology	Implement speed reminders/ intelligent speed limiters	Decreased driver distraction
Safe User — Supportive technology and equipment, rules reminders		
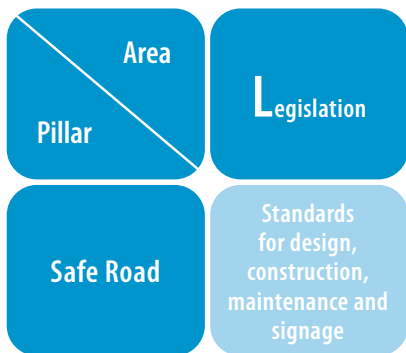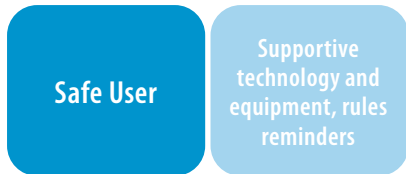
Area / Pillar		
Legislation	Regulate road equipment per classified road (calming equipment) Designate authorities for implementation	Legal base for road infrastructure which limits the possibilities of speeding
Safe Road — Standards for design, construction, maintenance and signage		

Area / Pillar		
Enforcement	License and accredit road assessment, inspection and audit organizations Carry out periodic safety inspection of roads	Oversight of road infrastructure which limits the possibilities of speeding
Safe Road — Audit, assessment and inspection by qualified teams		
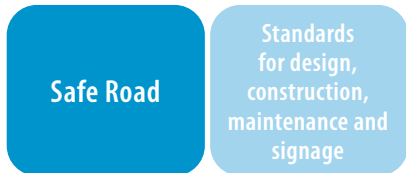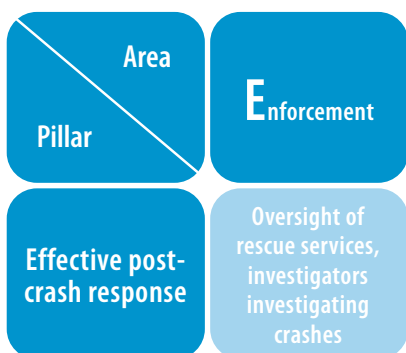
Area / Pillar		
Enforcement	Investigators investigating crashes	Clear understanding on the causes of the crash, annual data available on the number of crashes due to speeding
Effective post-crash response — Oversight of rescue services, investigators investigating crashes		

Overall outcome: speed is managed from all angles which is expected to result in less accidents/fatalities or injuries due to speeding. Effectiveness of actions and their outcomes needs to be monitored.

TABLE 3

Actions and outcomes to remove faulty vehicles from circulation

Pillar/Area	Road safety action	Action-related outcome
Area / **Pillar** — **Legislation** — **Safe Vehicle** / **Rules and standards for admission of vehicles to traffic**	Establish vehicle's minimum safety requirements for admission to traffic	Legal base for vehicle certification / approval / registration in place
	Put in place a regime for periodic technical inspection of vehicles in use	Legal base for vehicle inspection in place
	Have in place penalties scheme for offenders	Penalties for use of vehicle with expired certificates
	Designate authorities responsible for implementation including those for enforcement of the rules	Police has the legal mandate for enforcing use of safe vehicle
Area / **Pillar** — **Enforcement** — **Safe Vehicle** / **Certification and inspections by qualified inspectors**	Certify inspection centres and supervise and audit them	Rules for inspection centres, supervision authorities have mandate to assess inspection centres
	Carry out road side checks on compliance with vehicle inspection	Inspection supervision in place and effective supervising and auditing
	Have in place anti-corruption mechanism	Police present on roads and applies penalties
Area / **Pillar** — **Education** — **Safe Vehicle** / **Awareness raising for users, training for inspectors**	Conduct campaigns to raise general awareness of safety benefits from safety systems of vehicles	Public awareness-raising
	Train inspectors and inspection supervision	Effective vehicle inspection

Area / Pillar	Technology	Vehicle inspection reminders	Well informed vehicle owners
Safe Vehicle	Supportive technology and equipment, compliance reminders		

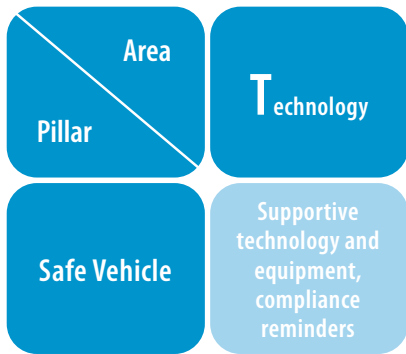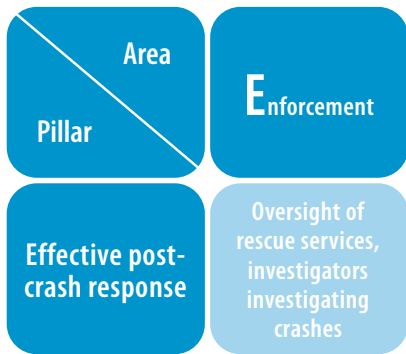| Area / Pillar	Enforcement	Investigators investigating crashes	Clear understanding on the causes of the crash, annual data available on the number of crashed due to faulty vehicles
Effective post-crash response	Oversight of rescue services, investigators investigating crashes		

Overall outcome: vehicles are inspected and controlled, and faulty vehicles are taken off the road.

VII. THE WAY FORWARD

It is obvious that Sustainable Goal 3.6 will not be met by 2020. However, there is some hope that the current number of road traffic deaths of 1.35 million people every year, with 93 per cent of these casualties occurring in low- and middle-income countries, can be stabilized in a first stage and then be further reduced. Thus, all stakeholders involved in global road safety need to consider a new approach to further strengthen their efforts to achieving global goals by 2030 during a new decade of action.

Achieving high level of road safety performance is not an easy undertaking. It requires actions on many areas. It requires that an action is tracked and bundled with other relevant actions. This in turn requires a system to be put in place and managed to keep track of what has been done, what needs to be done and what needs to be improved.

Creation and management of a national road safety system, which is focused on outcomes across crucial pillars and areas for road safety and which interconnects the pillars and areas so that specific road safety targets can be achieved, appears to be a sensible way forward to high-level of road safety for any country. The future should thus see a more enhanced effort by all countries in the world towards creation, improvement and/or sustainability of comprehensive and effective national road safety systems.

As the United Nations platform for inland transport in line with its 2030 Strategy, ITC provides a comprehensive regulatory framework for inland transport including road, rail, inland waterway and intermodal transport including road safety, comparable to the roles of ICAO and IMO.

The role of ITC is the United Nations platform for:

(a) Regional and global inland transport conventions

(b) Support of new technologies and innovations in inland transport

(c) Regional, interregional and global inland transport policy dialogues and

(d) Promotion of sustainable regional and interregional inland transport connectivity and mobility.

It is imperative for ITC, as an administrative body of the United Nations road safety legal instruments, to manage the recommendations on the national road safety systems based on the road safety legal instruments in the same way as ICAO and IMO.

The recommendations on national road safety systems can be used to serve as guideline or benchmark for developing a sound national road safety system. They will be reviewed and, if necessary, updated every three years to ensure they remain abreast of innovative developments in road safety.

The countries, which have primary responsibility for road safety, may identify missing or weak elements of their national road safety systems from the existing national action plans or national road safety performance reviews checked against the recommendations for improvement.

Should such a plan or review be not available, through an assessment of the existing national situation vis-à-vis the recommended national road system, a country interested to establish or complete a comprehensive and sound national road safety system should be in the position, if necessary, with international assistance, to identify shortcomings and required actions for funding support.

A country can prioritize actions for implementation by defining adequate implementation time frames and through it establish its national action. When doing so, the economic situation, urgency, other existing priorities and plans may be taken into account. Furthermore, successful implementation of such a national agenda necessitates the alignment of the national legal framework with the United Nations legal instruments.

This work should be coordinated at the government level and depending on a country's governmental structure may be led by (a) designated lead agency(ies). A government may furthermore clarify tasks and responsibilities of these authorities and institutions.

The implementation process can be carefully monitored either by authorities responsible for specific tasks or by the lead agency(ies). Relevant information should be collected, and performance indicators measured. The information and indicators should be closely linked to actions undertaken. A standard reporting format may be developed to enable monitoring and assessment of each action area for all countries, together with a better definition of guidelines to develop appropriate safety performance indicators as a road safety management tool. Assessment should be done on how the implemented actions impact the reduction of road traffic fatalities or serious injuries.

This should be founded on the international regulatory framework following the holistic approach of the safe system.

The fundamental of this concept is to keep the system in mind for all activities on road safety and aim at creating, improving and/or sustaining various elements of the system. One example for the use of the concept across a theme for speed management is shown in figures 14, 15, 16 and 17.

FIGURE 14

Safe User – Legislation/Enforcement for speed management

FIGURE 15

Safe User – Education/Technology for speed management

Safe user - Education

Area	**E**ducation
Pillar	
Safe User	Awareness raising, training and examination

Driver training	**Speed awareness in licensing driving permit**
Training of enforcement authority for road side checks	**Speed control incorporated in institutionalized training of police and mechanism for site mentoring created and maintained**
Information and reminders for existing/ foreign drivers	**Incorporated in web/ paper info and public notices**

Safe user - Technology

Area	**T**echnology
Pillar	
Safe User	Supportive technology and equipment, rules reminders

Speed reminders/intelligent speed limiters	**Vehicle speed limiters/ reminders (also safe vehicles) and road side reminders/ readers (also safe road) installed**
Use of enforcement technology enabled e.g. speed guns and cameras	**Speed guns and cameras used**

FIGURE 16

Safe Road – Legislation/Enforcement for speed management

Safe Road - Legislation

Area		
Pillar	**L**egislation	
Safe Road	Standards for design, construction, maintenance and signage	

→

Regulate speed limit and associated signs and signs
Regulate road equipment per classified road (calming equipment)
Designate authorities for implementation

→

Good speed limit signs and signals system established
Legal base for road infrastructure which limits speeding and empowers authorities

Safe Road - Enforcement

Area		
Pillar	**E**nforcement	
Safe Road	Audit, assessment and inspection by qualified teams	

→

Appropriate speed limit signs/ signals and facilities installed
License and accredit road assessment, inspection and audit organizations
Carry out periodic safety inspection of roads

→

Good speed limit signs/ signals and facilities installed in right places
Oversight of road infrastructure which limits speeding
Periodic audit mechanism established and maintained

FIGURE 17

Safe vehicle and post-crash response for speed management

Pillar / Area	**L**egislation	**E**nforcement	**E**ducation	**T**echnology	**I**nternational **R**egulatory **S**upport
Road safety management – vertical and horizontal coordination					
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, WP.1, SC.1, WP.15
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, WP.1, WP.29
Safe Road	Standards for design, construction, maintenance and signage	Audit, assessment and inspection by qualified teams	Awareness raising for road managers, users, and for inspectors	Forgiving and self-explaining road design, intelligent road systems	UN RS legal instruments and resolutions, int. standards WP.1, SC.1
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, WP.1, SC.1

Two examples of practical applications of the concept of national road safety system to some particular areas are provided in Boxes 4, 5 and 6.

In addition, the newly established United Nations Road Safety Fund (UNRSF) may support this coordinated effort, building on the safety system principles, especially in low- and middle-income countries as stipulated in the terms of reference of the fund.[22] The terms of reference further stated that UNRSF will apply a holistic and integrated approach by recognizing the safety systems principles and promote cost-efficient approaches.

UNRSF adopted its Global Framework Plan of Action for Road Safety in November 2018 as its master plan and funding direction. The focus of this document is the national road safety system and the use of the safety system principles. In this way, it should take lead to leverage funding support for creating, improving and/or sustaining the national road safety systems in low- and middle-income countries to make immediate and tangible impact. It should support technical assistance in making institutional adjustments to establish or improve national road safety systems. It should leverage and coordinate resources for institutional building and infrastructural developments of the national road safety systems.

The fund's Global Framework Plan of Action for Road Safety may be updated every three years in coordination with the recommendations of ITC on enhanced national road safety systems.

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[22] Page 4, Terms of Reference, United Nations Road Safety Trust Fund, 14 March 2018, available at: www.unece.org/unrsf/founding-documents.html.

BOX 4

Education on Road Safety in Schools

Instead of organizing ad hoc events in primary and high schools to raise awareness, national authorities on road safety and education can assist all schools to prepare adequate education materials and incorporate the knowledge and skills needed for safe use of road by different levels of students into the curricula and regular activities. This will become one long-term element of a national road safety system for education of all students generation by generation, who take buses or cars, ride bicycles or scooters, walk on streets and/or become drivers in the future.

BOX 6

School Area Road Safety Assessment and Improvement

International assistance may help governments to establish a system to assess or verify safety in school zones, as well as identify and implement specific measures that would improve road safety. Later, the system will monitor and maintain safety in school zones. Key persons of the system may be trained and their knowledge should be passed on.

BOX 5

Making Safety Training Compulsory when Issuing Driving Licenses

It is not uncommon for many developing countries to issue driving licenses on the basis of examination of knowledge of traffic rules and practical test on driving skills. In Switzerland which is one of the safest country in the world, before a person can take the theory examination the person should take a 10-hour first aid course. If the person passes the theory test he/she can start an eight-hour compulsory road awareness course and then apply for the practical driving test. The inclusion of such good practice into the element on issuance of driving licenses in a national system educates all drivers appropriately for road safety and capability to help the injured timely in the golden hours after accidents. While such a measure ensures new drivers trained adequately, the existing drivers can be also trained equally through renewals of driving licenses.

The concept of national road safety system combines the five pillars and voluntary targets for road safety as promoted in the Decade of Action for Road Safety 2011–2020. It is a practical instrument to attain the targets and build the pillars in countries. The full picture of the national road safety systems can help coordinate across international organizations, international financial institutions, national governments, the private sector and civil society to avoid fragmented and duplicated efforts.

Through the multi-level support and applications of the concept of national road safety system around the world, global road traffic fatalities and injuries will be significantly reduced in the new decade until 2030.

ANNEX I SEVEN UNITED NATIONS LEGAL INSTRUMENTS ON ROAD SAFETY

1. Road User Behaviour

ECE began road safety activities in the United Nations system with the establishment of an Ad Hoc Working Group on the prevention of road accidents in 1950. Today, the Ad Hoc Group's successor, WP.1, remains the only permanent body in the United Nations system on improving road traffic safety. Its primary function is to serve as guardian of the United Nations legal instruments aimed at harmonizing traffic rules.

The 1968 Convention on Road Traffic provides such rules on all aspects of road traffic and safety. The Convention aims at facilitating international traffic and increasing road safety through the adoption of uniform traffic rules. It describes all road user behaviour, such as what drivers and pedestrians must do at crossings and intersections. The convention also provides the formats for domestic and international driving permits, vehicle registration certificates, number plates, and distinguishing signs. For rules of the road and driver/vehicle documents the convention serves as a reference for national legislation. There are currently 79 contracting parties to this convention.

2. Road Signs, Signals, and Markings

The 1968 Convention on Road Signs and Signals provides over 250 commonly agreed road signs. It classifies them into three classes: danger warning, regulatory and informative; defines each class and describes their physical appearance to ensure visibility and legibility. The convention also contributes to safer mobility by prescribing common norms for traffic light signals and uniform conditions for road markings. There are currently 67 contracting parties to this convention.

The implementation of both the 1968 Convention on Road Traffic and the 1968 Convention on Road Signs and Signals is complemented by sets of recommendations or best practices, known as the Consolidated Resolution on Road Traffic (RE.1) and the Consolidated Resolution on Road Signs and Signals (RE.2). RE.1 and RE.2 represent the collective efforts of governments to create reference tools with a global scope that presents guidance for countries on the improvement of road safety.

3. 1958 Agreement on Vehicle Regulations

The 1958 Agreement[23] provides the legal and administrative framework for developing harmonized technical United Nations Regulations on uniform performance requirements, for procedures for granting type approvals, for the conformity of production, for the assessment of technical services and their designation and notification, for the circulation of United Nations type approval documentation, for resolving issues of interpretation, for general conditions in virtual test methods, for exemption approvals in new technologies and for the mutual recognition of the type approvals granted by contracting parties.

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[23] 1958 Agreement concerning the Adoption of Harmonized Technical United Nations 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 United Nations Regulations (Revision 3)

When acceding to the agreement, a contracting party can choose which, if any of the UN Regulations annexed to the Agreement it would like to apply. At the time of publication, the 1958 Agreement had 56 contracting parties and 152 annexed UN Regulations. The regulations are continuously adapted, when appropriate, to incorporate technical and policy guidance from the contracting parties, scientific advancement or technological innovations through WP.29.

4.   1998 Agreement on Global Vehicle Regulations

The 1998 Agreement[24] stipulates that contracting parties establish, by consensus vote, United Nations Global Technical Regulations (UN GTR) in a Global Registry on globally harmonized performance requirements and test procedures. Each UN GTR contains extensive notes on its purpose and development. The technical rationale, the research sources used, the cost and benefit considerations, and the references to data that were consulted are recorded. Contracting parties apply their national rulemaking procedures when transposing UN GTRs into national legislation. The 1998 Agreement currently has 38 contracting parties and 20 UN GTRs established in the Global Registry. These regulations enhance the safety of the newly constructed vehicles. It is administered through WP.29.

5.   Periodic Technical Inspection

The role of Periodic Technical Inspection (PTI) is to ensure that vehicles in operation are properly maintained and tested, so that their performance remains in line with their type-approval/certification throughout their lifetime. However, it is, alas, observed, that a large number of vehicles are circulating on public roads with technical defects, i.e. the performance of some of their safety or environment related parts is not any more in accordance with the requirements of the type approval/certification.

The 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections provides the legal framework and procedures for the adoption of uniform UN Rules for carrying out technical inspections of vehicles that are in use and for delivering international inspection certificates. The agreement has 23 signatories and 15 contracting parties. The UN Rules for vehicle inspection that are annexed to the agreement have been developed with the technical expertise of WP.29 participants and, in particular, of the International Motor Vehicle Inspection Committee (CITA). Initially designed for heavy duty vehicles, the scope of these rules has been extended to cover passenger cars and light duty vehicles. The related Consolidated Resolution R.E.6 provides guidelines for testing facilities and equipment, training and certification of inspectors as well as quality control for the supervision of authorized test centres. These UN Rules and R.E.6 may be useful for countries aiming to introduce or strengthen, in their national legislation, a periodic inspection system based on international expertise.

6.   Transport of Dangerous Goods

The transport of dangerous goods by road presents a risk of major accident. Road traffic crashes cause deaths and injuries and damage to property and the environment. The consequences may be even more serious when dangerous goods such as fuels, gases, chemicals and explosives are involved, with dangerous consequences resulting from spillage, explosion, fire or a toxic cloud.

Transports of dangerous goods are governed by international regulations, the 1957 Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), to ensure that these transports are carried out under the

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[24] 1998 Agreement concerning the Establishment of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles

highest possible safety conditions and to prevent such dramatic events. ADR is open to all United Nations Member States. Up to date, 52 contracting parties have joined the agreement. ADR applies to international transports, but most of the contracting parties also impose their national legislation based on the ADR provisions. Many countries are using ADR as national standards without accession.

ADR offers high quality standards to be respected for an optimal prevention of the impacts of possible accidents. Apart from some excessively dangerous ones, dangerous goods may be carried internationally in road vehicles, subject to compliance with the conditions laid down in the ADR annexes regarding goods (classification, packing, labelling, documentation, construction, testing and approval of packagings/tanks and carriage operations), crew (training, equipment) and vehicle (construction, equipment and operation conditions).

ADR vehicles may be subject to specific traffic restrictions defined locally in case of special risks at certain locations. This includes special speed limitations, additional provisions or restrictions for special road infrastructures like bridges, tunnels or areas with special local risks and restrictions for the transport of dangerous goods on certain weekdays. Harmonized hazard communication, appropriate signalisation of the vehicles and standardized instructions in accordance with ADR help to ensure rapid, effective and appropriate emergency response in case of an accident. ADR contains detailed provisions for training of personnel involved in transport of dangerous goods, according to their duties and obligations.

WP.15 administers and continuously updates the ADR. Any country, that is member of the United Nations, may participate in its activities and is invited to accede to ADR. Representatives of specialized agencies, intergovernmental organizations and non-governmental organizations also participate in WP.15 sessions.

7.   Driving Time and Rest Periods for Professional Drivers

Driver fatigue is known to increase the risk of serious road accidents. The 1970 European Agreement concerning the Work of Crews of Vehicles Engaged in International Road Transport (AETR) regulates the driving time and rest periods of professional drivers in commercial vehicles of more than 3.5 tons, or transporting more than nine people, engaged in international road transport. It defines the devices that are used to control those time periods, and sets technical requirements for their construction, testing, installation and inspection. Additionally, the agreement lays down requirements for checking driving hours by enforcement authorities. By regulating the driving times and rest periods of drivers of commercial vehicles engaged in international transport, the agreement helps to prevent traffic accidents caused by driving excessive hours and it creates a level playing field in the road haulage industry by promoting "fair competition". The agreement also introduces appropriate social rules by imposing "decent working conditions". As of 2019, 51 member States are contracting parties to the AETR Agreement and many of them apply its provisions also in domestic transport.

ANNEX II A NATIONAL ROAD SAFETY SYSTEM BY PILLAR AND AREA

A.   Pillar of user
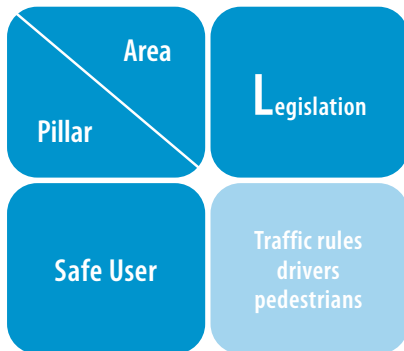
Actions such as those listed below should be considered in the area focused on the traffic rules, drivers of vehicles (including cyclists):

(1)   Put in place a comprehensive system of signs, signals and instructions to be observed on the road

(2)   Adopt strict rules for drivers and specific rules for professional drivers

(3)   Adopt adequate rules for pedestrians and cyclists and their interaction with drivers and behaviour of drives towards pedestrians and cyclists with appropriate liability for drivers

(4)   Put in place effective rules on position on carriageway, manoeuvring, overtaking, passing of traffic, change of directions, slowing down

(5)   Adopt rules for intersections, level-crossings and giving way

(6)   Regulate reasonable speed and distance management

(7)   Strictly regulate driving under fatigue and the influence of substances that negatively affect the driving capacity

(8)   Put in place rules on the compulsory use of safety equipment (safety belts, child restraint systems, helmets)

(9)   Regulate the use of lamps

(10)   Regulate strictly loading of vehicles and carriage of passengers and put in place specific regulations for cargo securing for road transport and for carriage of passengers by buses and coaches.

(11)   Put in place adequate rules on behaviour in case of accident

(12)   Adequately regulate distraction during driving and walking due to use of infotainment systems, portable electronic devices or mobile phones

(13)   Put in place regulations relating to public transport vehicles and rail-born vehicles

(14)   Regulate adequately standing and parking on road, opening of doors

(15)   Put in place special regulations for motorways and/or tunnels

(16)   Put in place special rules applicable to cyclists, moped and motorcycle drivers

(17) Designate authorities responsible for implementation including those for enforcement of the rules and regulations put in force as well as for their further development, as necessary

(18) Introduce effective penalties scheme for offending rules of road

(19) Adopt compulsory liability insurance system for driving motor vehicles

(20) Adopt specific rules for carrying dangerous goods by road and define such goods, their classification, labelling or packaging

(21) Assess effectiveness and completeness of legislation (completeness of regulatory framework benchmarked against international regulatory framework)

(22) Adopt specific rules for ensuring good vision/visibility of all road users.

Responsibility for implementation: Relevant national authorities for roads and road traffic such as Ministry of Transport and/or Ministry of the Interior.
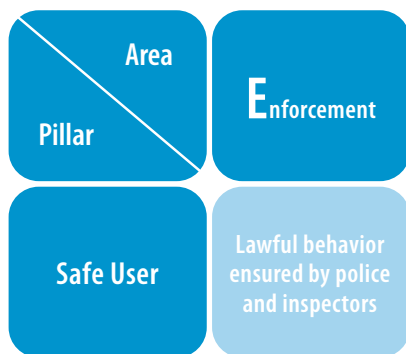
Actions such as those listed below should be considered for ensuring lawful behaviour on roads by police and inspectors:

(1) Carry out road side checks on compliance of traffic rules for drivers, pedestrians and cyclists as well as overloading of cargoes and passengers (police and other inspectors, use of enforcement technology, e.g. speed cameras, other monitoring high-resolution cameras for detecting offences, breath analysers)

(2) Cary out other checks (e.g. inspection at enterprises, – driving-rest times of professional drivers)

(3) Prevent public spaces – sidewalks and cycle lanes from being appropriated from vehicles or commercial activities

(4) License and inspect driver training organizations and supervise examinations

(5) Apply penalties effectively and use anti-corruption mechanism

(6) Enable multiple offence enforcement mechanism (e.g. speed – technical inspection – liability insurance) by interlinking and providing access of enforcement authorities to databases on vehicle technical inspection, vehicle registration, driver permit.

(7) Support development of and implement more sophisticated technology for identifying and monitoring offences by users

(8) Assess effectiveness of user enforcement activities by use of appropriate indicators

(9) Ensure sufficient budget for enforcement activities

Responsibility for implementation: Mainly traffic police, Ministry of the Interior and their bodies such as relevant inspection agencies.

Area / Pillar	**E**ducation
Safe User	Awareness raising, training and examination
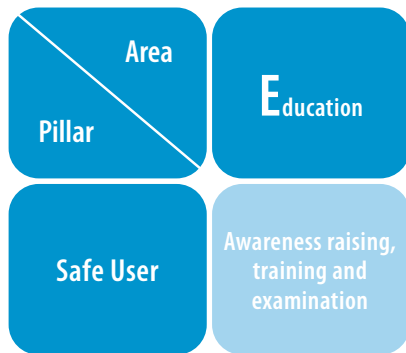
Actions such as those listed below should be considered for awareness-raising, training and examination for users on road safety:

(1)   Start road safety behaviour awareness-raising and teach minimum basic road safety rules already to children (as of 5-years old) with focus on safe street crossing and navigation on sidewalks

(2)   Train bicycle riders at earliest stage (children as of 10 to 12-years old)

(3)   Train drivers according to the categories applied for, and verify their driving skills, safety awareness, first-aid skills and behaviour through examination before issuing driving permit

(4)   Provide special training for professional drivers and test their (driving) skills, safety awareness, first-aid skills and behaviour before issuing a Certificate of Professional Competence in addition to a driving permit

(5)   Provide special training and certification for driving instructors

(6)   Provide periodic re-training for professional drivers, in particular drivers driving vehicles carrying dangerous goods

(7)   Introduce changes to training and examination following technology progress and changes to driving

(8)   Enhance awareness on rules of the road beyond drivers by road safety programmes at schools and by targeted awareness-raising campaigns

(9)   Train enforcement authorities – roadside check authorities – to educate on the rules of the road while enforcing them

(10) Assess effectiveness of education activities by use of appropriate indicators

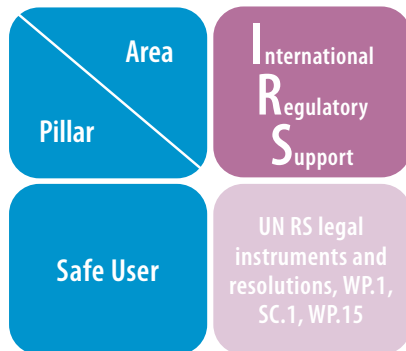(11) Ensure adequate budget for education and training

Responsibility for implementation: Relevant national ministries such as Ministry of Education, Ministry of the Interior, Ministry of Transport, Ministry of Information and relevant agencies.

Area / Pillar	**T**echnology
Safe User	Supportive technology and equipment, rules reminders
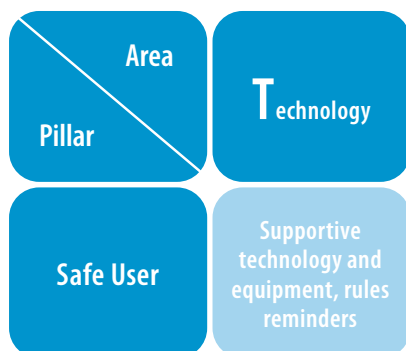
Actions such as those listed below should be considered for supportive technology and equipment and rules reminders:

(1)	Support developers to bring to market technologies that would keep road users attentive in following road traffic rules (alcohol ignition interlock, safety-belt reminders, speed reminder/intelligent speed limiters, approach to level-crossing reminder, safety reminder on mobile phone while driving or walking)

(2)	Support developers to bring to market equipment and technologies for vehicles and for infrastructure that would assist drivers and other road users in dangerous situations and in avoiding or mitigating road crashes (pedestrian/cyclist detection, emergency steering functions, automated emergency braking systems, protective clothing for motorcycle riders, intelligent traffic light management, e.g. pedestrian crossing, bicycle lanes, etc.)

Responsibility for implementation: Relevant national ministries such as Ministry of Transport, Ministry of the Interior, Ministry of Information and Communication, Ministry of Industry, Ministry of Economy and Trade, and relevant agencies, particularly in norms and standards.

Area / Pillar	International Regulatory Support
Safe User	UN RS legal instruments and resolutions, WP.1, SC.1, WP.15

The United Nations road safety conventions, especially those listed below, serve as the benchmark for developing national legislation for addressing safety of users:

–	1968 Convention on Road Traffic

  –	1968 Convention on Road Signs and Signals

  –	1957 Agreement concerning the International Carriage of Dangerous Goods by Road

–	1970 European Agreement concerning the Work of Crews of Vehicles engaged in International Road Transport and future amendment as a global agreement or further development as a global recommendation for all drivers of motor vehicles

The following resolutions can support national programmes for enhancing the safety of users:

–	Consolidated Resolution on Road Traffic

–	Consolidated Resolution on Road Signs and Signals

–	Resolution on the deployment of highly and fully automated vehicles in road traffic

The conventions and resolutions are administered by WP.1, SC.1 (work of crews) and WP.15.

More accessions to the legal instruments and participation in the activities of the intergovernmental platforms are needed to elaborate the best practices and new developments for incorporation into the national road safety systems to keep the systems updated.

Accession to the one of the conventions would allow countries to attain target 2 of the road safety global voluntary performance targets: by 2030, all countries accede to one or more of the core road safety related United Nations legal instruments.

B.   Pillar of vehicle

Area Pillar	Legislation
Safe Vehicle	Rules and standards for admission of vehicles to traffic
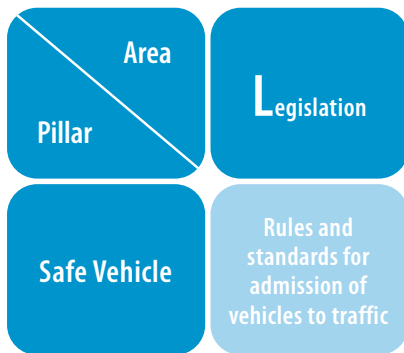
Actions such as those listed below should be considered on rules and standards for admission of vehicles to traffic:

(1)   Adopt rules for registration of vehicles that include strict vehicle inspection schemes.

(2)   Adopt rules on vehicle's identification marks.

(3)   Establish a vehicle's minimum safety requirements for admission to traffic, for both new and/or imported second-hand vehicles (braking, electronic stability control, steering, tyres, lighting and lighting devices, safety belts, child restraint anchorages (ISOfix), crash protection against front-, lateral- and pole side impact, pedestrian protection, child restraint systems and helmets, front and rear underrun protection, safety glazing).[25]

(4)   Put in place a regime for vehicle certification for both new and/or imported second hand vehicles with requirements for the certification processes, designation of technical services and/or inspectors, their facilities and knowledge, quality control and conformity of production and/or market surveillance.

(5)   Put in place a regime for periodic technical inspection of vehicles in use (registered) with requirements of scope, frequency of inspections, inspection items, test methods assessment of deficiencies, test equipment and facilities, skills and training of inspectors, and supervision of test centres.[26]

(6)   Designate authorities responsible for implementation including enforcement of the rules and regulations put in force as well as for their further development, as necessary.

(7)   Introduce effective penalties scheme for incompliance with vehicle requirements.

(8)   Introduce vehicle requirements and certification for carriage of dangerous goods.

(9)   Assess effectiveness and completeness of legislation (completeness of regulatory framework benchmarked against international regulatory framework).

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[25]   Minimum set of UN Vehicle Regulations to enhance road safety:
UN Regulation Nos. 13 and 13H on brakes and UN Regulation No. 78 or UN GTR No. 3 on motorcycle braking,
UN Regulation No. 140 or UN GTR No. 8 on electronic stability control
UN Regulation No. 79 on steering,
UN Regulations Nos. 30, 54 and 75 on tyres,
UN Regulations Nos. 48, 53 and 74 on lighting installation,
UN Regulation No. 16 on Safety-belts and UN Regulation No. 14 on Safety-belts anchorages,
UN Regulation No. 145 on ISOfix anchorages,
UN Regulations Nos. 94 and 95 front and side impact protection and UN Regulation No. 135 or UN GTR No. 14 on pole side impact,
UN Regulation No. 127 or UN GTR No. 9 on Pedestrian safety,
UN Regulations Nos. 44 or 129 on Child restraint systems and UN Regulation No. 22 on helmets,
UN Regulations Nos. 58 and 93 on rear- and front-underrun protection,
UN Regulation No. 43 or UN GTR No. 6 on safety glazing

[26]   UN Rule No. 1 on inspection of environmental related vehicle elements, UN Rule No. 2 on roadworthiness inspection, R.E.6 on test-equipment, skills and training of inspectors, supervision

Responsibility for implementation: Relevant national ministries such as Ministry of Industry, Ministry of Transport and/or Ministry of the Interior.

Area / Pillar	Enforcement
Safe Vehicle	Certification and inspections by qualified inspectors
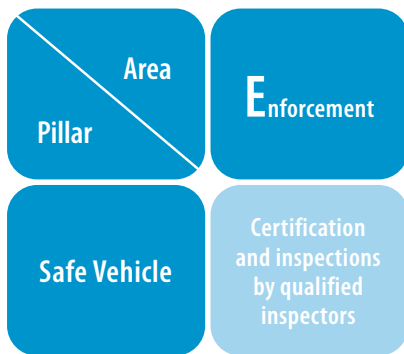
Actions such as those listed below should be considered on certification and inspections by qualified inspectors:

(1)   Authorize inspection centres, which may include privately operated workshops, for technical inspections and supervise and audit inspection centres

(2)   Carry out road side technical checks including load securing (police and technical inspectors, enforcement technology, e.g. mobile testing stations, portable inspection tools)

(3)   Establish and interlink databases for vehicle registration, periodic technical inspection and technical roadside inspections

(4)   Undertake import/export control on new and used vehicles

(5)   Apply effectively penalties for use of vehicles with expired certificates

(6)   Apply effectively penalties to inspection centres and use anti-corruption mechanism

(7)   Assess effectiveness of vehicle enforcement activities by use of appropriate indicators

(8)   Ensure sufficient budget for inspection, supervision and audit

Responsibility for implementation: Relevant national ministries such as Customs, Ministry of Transport, Ministry of the Interior and their bodies such as relevant inspection agencies and the police.

Area / Pillar	Education
Safe Vehicle	Awareness raising for users, training for inspectors
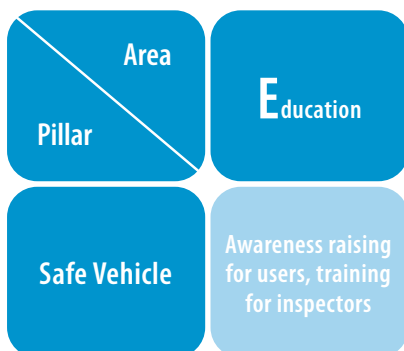
Actions such as those listed below should be considered on awareness-raising for users and training for inspectors:

(1)   Conduct campaigns to raise general awareness of safety benefits from safety systems of vehicles and proper equipment, importance of continuous vehicle maintenance and proper use of safety related systems and equipment.

(2)   Carry out targeted campaigns for specific groups of users (e.g. equipment for safe transport of children in vehicles, motorcycle helmets)

(3) Train, re-train and test inspectors to carry out high quality inspection and technical check

(4) Assess effectiveness of education activities by use of appropriate indicators

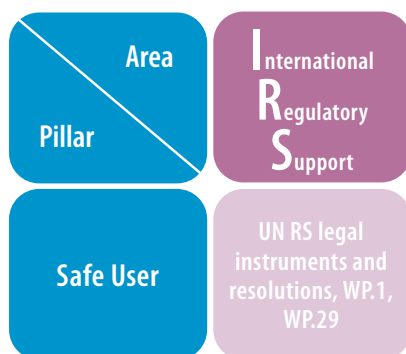(5) Ensure adequate budget for education and training

Responsibility for implementation: Relevant national ministries such as Ministry of Industry, Ministry of Transport and/or Ministry of the Interior and relevant agencies.

Area / Pillar	**T**echnology
Safe Vehicle	Supportive technology and equipment, compliance reminders
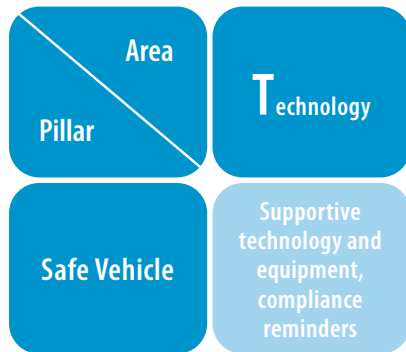
Actions such as those listed below should be considered on supportive technology and equipment and compliance reminders:

(1) Support developers to bring to market automated technologies reminding vehicle owners to renew technical inspection or registration

(2) Support developers to bring to market technologies making vehicles safer and provide higher protection for other road users especial vulnerable ones (blind spot monitoring and detection, rear crossing detection, active bonnets (outside airbags), night vision systems, door opening monitoring, intelligent cruise control, pedestrian/cyclist detection, emergency steering functions, automated emergency braking systems, etc.) as well as automated solutions.

Responsibility for implementation: Relevant national ministries such as Ministry of Industry, Ministry of Information and Communication, Ministry of Transport, Ministry of the Interior, Ministry of Economy and Trade and relevant agencies.

Area / Pillar	**I**nternational **R**egulatory **S**upport
Safe User	UN RS legal instruments and resolutions, WP.1, WP.29

The United Nations transport conventions, especially those listed below may serve as a benchmark for developing national legislation to ensure safe vehicle:

– 1968 Convention on Road Traffic – provisions regarding vehicle admission to traffic

– 1958 Agreement concerning the Adoption of Harmonized Technical United Nations 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 United Nations Regulations (Revision 3)

– 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections

– 1998 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

The following resolutions, standards or programmes may support national governments to ensure safe vehicle:
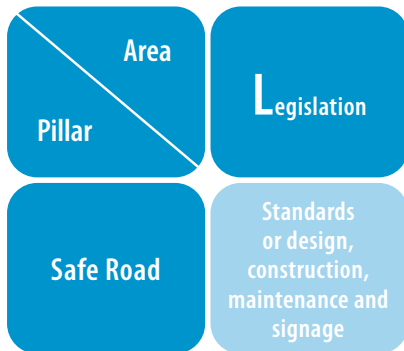
– Consolidated Resolutions on the Construction of Vehicles,

– Consolidated Resolution on the Common Specification of Light Source Categories,

– Consolidated Resolution on Test equipment, Skills and Training of Inspectors, Supervision, and

– Consolidated Resolution on Road Traffic

– Mutual Resolution No. 1 of the 1958 and the 1998 Agreements concerning the Description and Performance of Test Tools and Devices necessary for the Assessment of Compliance of Wheeled Vehicles, Equipment and Parts according to the Technical Prescriptions specified in UN Regulations and UN Global Technical Regulations

– Mutual Resolution No. 2 of the 1958 and the 1998 Agreements – Containing Vehicle Propulsion System Definition

– Special Resolution No. 1 of the 1998 Agreement concerning the Common Definitions of Vehicle Categories, Masses and Dimensions

– Global New Car Assessment Programme

The conventions and resolutions are administered by WP.1, WP.29 and its Working Groups on Passive Safety, General Safety Provisions, Emissions and Energy Efficiency, Lighting and Light-Signalling, Noise and Tyres, and Vehicle Automation.

Increased accession to the legal instruments and participation in the activities of the intergovernmental platforms are needed to elaborate best practices and new developments which would be incorporated into the national road safety systems to keep the systems updated.

Accession to the one of the conventions would allow countries to attain Target 2 of the road safety global voluntary performance targets: by 2030, all countries accede to one or more of the core road safety related United Nations legal instruments.

C. Pillar on road

Area / Pillar	**L**egislation
Safe Road	Standards or design, construction, maintenance and signage

Actions such as those listed below should be considered on standards for road design, construction, maintenance and signage:

(1) Put in place road classification including for urban streets that meet the safety needs of all road users

(2) Put in place adequate standards for geometric and design characteristics per classified road (No. of lanes, separation of lanes, width of lanes, curve radii, horizontal and vertical alignment, cross-sections, overhead clearance, intersections, tunnels, level-crossings, roundabouts, roadsides, etc.)

(3) Adopt general prescriptions and related standards for infrastructure for non-motorized traffic, crossings and separation with motorized traffic of bicycle lanes and pedestrian paths and sidewalks

(4) Adopt internationally harmonized signs and signals

(5) Establish national standards on safety facilities (including sufficient numbers of rest areas and adequate emergency lanes) and devices (such as traffic separation device and fence)

(6) Adopt standards to remove level crossings in areas of high traffic flows and do not place bus stops in proximities of level crossings

(7) Regulate shared traffic zones and non-motorized traffic zones as well as special school zones

(8) Regulate road equipment per classified road (markings, signage, calming equipment)

(9) Put in places regulations to ensure that infrastructure plans and land use planning prioritize safety

(10) Introduce standards for road maintenance

(11) Introduce standards for road work zones

(12) Designate authorities responsible for implementation including inspection/auditing and enforcement of the existing standards as well as for their further development, as necessary

(13) Assess effectiveness and completeness of standards (completeness of standards benchmarked against international regulatory framework)

Responsibility for implementation: relevant national ministries such as Ministry of Transport, Ministry of the Interior and ministries dealing with infrastructure and/or spatial planning.

Area / Pillar	**E**nforcement
Safe Road	Audit and inspection by qualified inspectors
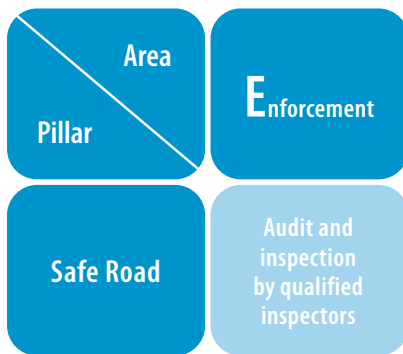
Actions such as those listed below should be considered on audit, assessment and inspection by qualified teams:

(1) License and accredit road assessment, inspection and audit organizations

(2) Conduct traffic safety audits of new infrastructure plans

(3) Conduct new road safety design assessment and audit before construction work starts

(4) Conduct new road safety audit before opening it to traffic

(5) Carry out periodic safety inspection of roads in operation, including risk mapping

(6) Introduce safety measures if safety conditions of a road deteriorate (e.g. decrease travel speed, close road as an extreme case)

(7) Assess effectiveness of road enforcement activities by use of appropriate indicators

(8) Ensure sufficient budget for road assessment, inspection and audit

Responsibility for implementation: relevant national ministries such as Ministry of Transport, Ministry of the Interior, ministries dealing with infrastructure and/or spatial planning and relevant inspection/licensing agencies.
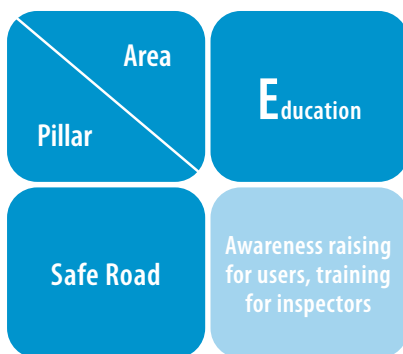
Area / Pillar	**E**ducation
Safe Road	Awareness raising for users, training for inspectors

Actions such as those listed below should be considered on awareness-raising for road managers, users and for inspectors:

(1) Carry out campaigns to build public support to construction and maintenance of safe roads as well as their proper usage

(2) Provide engaging public outreach experiences through temporary street and intersection redesigns and develop community awareness of the benefits of road safety interventions

(3) Train road designers, construction engineers, inspection and audit organizations to perform high-quality work, when possible by developing local road safety assessment, inspection or audit programmes

(4)   Assess effectiveness of education activities by use of appropriate indicators

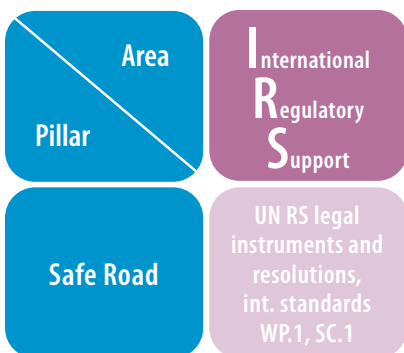(5)   Ensure adequate budget for awareness-raising and training

Responsibility for implementation: Relevant national ministries such as Ministry of Transport and/or Ministries dealing with infrastructure and/or spatial planning, and relevant agencies.

Area / Pillar	**T**echnology
Safe Road	**Forgiving road design, intelligent road systems**
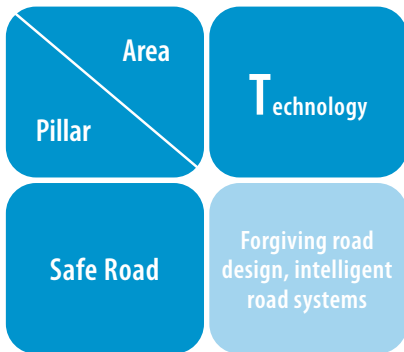
Actions such as those listed below should be considered on forgiving and self-explaining road design and intelligent road and traffic management systems:

(1)   Use equipment, materials and technologies for design and construction of forgiving, self-explaining roads including elements such as lane separation devices, emergency lanes, positioning, school zones, design and protection of traffic sign stayers

(2)   Use equipment, materials and technologies for design and construction of urban streets including elements such as separation of pedestrian areas, speed humps, traffic calming equipment, cycling lanes, parking areas, school zones, lanes for individual transport and lanes for public transport, information systems for road users (waiting times, delays in traffic, alternative routing)

(3)   Use equipment and technologies to measure, benchmark and report on safety performance of roads

(4)   Use equipment and technology and support development of new technology to measure objectively the safe performance of road design

(5)   Support development of intelligent cost-effective road system (VMS, systems to increase user attention, infrastructure to vehicle communication systems)

(6)   Introduce intelligent traffic management system based on sensor data and traffic forecasts with intelligent speed managements, re-routing, etc.

Responsibility for implementation: Relevant national ministries such as Ministry of Transport and/or Ministries dealing with infrastructure, spatial planning, digitalization and its relevant agencies.

Area / Pillar	**I**nternational **R**egulatory **S**upport
Safe Road	**UN RS legal instruments and resolutions, int. standards WP.1, SC.1**

The United Nations transport conventions and international standards, especially those listed below, serve as the benchmark for developing national legislation for developing road standards:

– 1968 Convention on Road Signs and Signals

– 1975 European Agreement on Main International Traffic Arteries

– 2001 Agreement on International Roads in the Arab Mashreq

– 2004 Intergovernmental Agreement on the Asian Highway Network

– Intergovernmental Agreement on the Trans-Africa Highways Network

– The following resolutions, recommendations and standards are helpful to support national action for safe roads:

– Consolidated Resolutions on Road Traffic

– Consolidated Resolutions on Road Signs and Signals

– International Road Assessment Programme, with standards for road assessment and standards for risk mapping

– Technical recommendations from global organizations, e.g. PIARC

– ISO road construction standards

The legal instruments and resolutions on road signs, signals and markings are administered by WP.1. The regional agreements on roads are administered by SC.1. WP.1 and SC.2 are serviced by ECE – the Committee on Transport and Logistics by ESCWA, the Working Group on Asian Highway by ESCAP.

Increased accession to the legal instruments and participation in the activities of the intergovernmental platforms are needed to elaborate best practices and new developments which would be incorporated into the national road safety systems to keep the systems updated.

Accession to the Conventions on Road Signs and Signals would allow countries to attain Target 2 of the road safety global voluntary performance targets: by 2030, all countries accede to one or more of the core road safety related United Nations legal instruments.
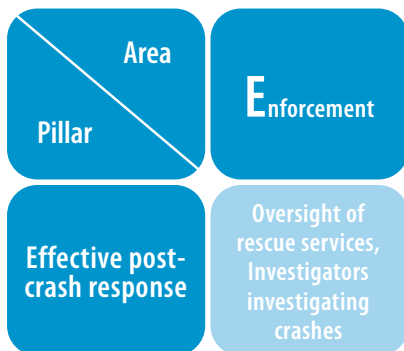
D.   Pillar of effective post-crash response

Area Pillar	**L**egislation
Effective post-crash response	**Standards for post-crash response and for crash investigation**
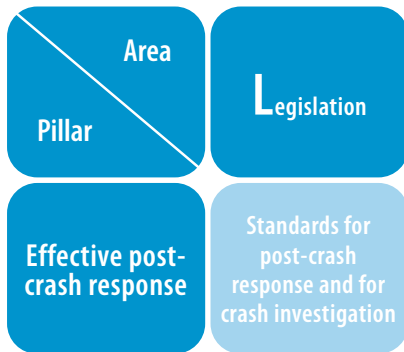
Actions such as those listed below should be considered on standards for data collection, post-crash response and investigation:

(1)   Introduce legal requirement for anyone to perform first-aid activities within their capacity

(2)   Introduce standards for post-crash professional emergency response

(3)   Introduce framework for rehabilitation programmes

(4)   Establish a link between liability insurance and financing of care for crash victims and rehabilitation programmes

(5)   Enable multidisciplinary crash rescue operation and investigation

(6)   Introduce a clear framework for crash investigation and data collection

(7)   Designate authorities responsible for implementation including enforcement of the existing standards as well as for their further development, as necessary

(8)   Assess effectiveness and completeness of standards (completeness of standards benchmarked against international regulatory framework)

Responsibility for implementation: Relevant national ministries such as Ministry of Health, Ministry of Transport and Ministry of the Interior.
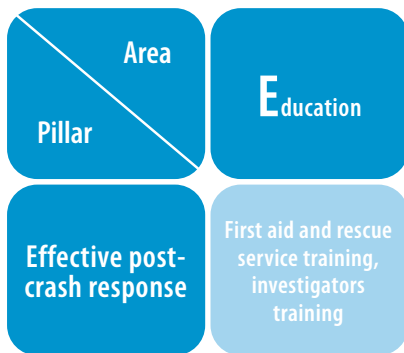
Area Pillar	**E**nforcement
Effective post-crash response	**Oversight of rescue services, Investigators investigating crashes**

Actions such as those listed below should be considered an oversight of resource services and investigation of crashes:

(1)   License (if private run) or review application of standards for emergency response (if state run) to improve the response, maintain compliance and avoid complacency.

(2)   Oversee rehabilitation programmes and trauma centres.

(3)   Ensure sufficient budget for emergency response.

(4)   Carry out multidisciplinary crash rescue and investigations.

(5)   Produce, analyse and publish data and indicators on accidents and their consequences:

– Number of road traffic fatalities and serious injuries and their number per type of users (drivers, vehicle occupants, children occupants, powered two-wheeler users, pedestrians)

– Number of road traffic fatalities and serious injuries attributable to or combination of factors such as:

■ speed, distraction, driving under influence, non-use of safety-belt, of child restraint, of helmet

■ vehicle defects

■ infrastructure defect

– Effectiveness of response.

(6)   Assess through Multi-Disciplinary Crash Investigations (MDCIs) gaps in national road safety system and make recommendations for improvements, especially in areas of legislation and enforcement.

(7)   Assess effectiveness of post-crash enforcement activities by use of appropriate indicators.

Responsibility for implementation: Relevant national ministries such as Ministry of Health, Transport and/or Ministry of the Interior and relevant agencies.

Area / Pillar	Education
Effective post-crash response	First aid and rescue service training, investigators training

Actions such as those listed below should be considered on first aid training for users, training for rescue forces and training for investigators:

(1)   Carry out campaigns to build public understanding to call professional emergency services to the crash scene and to provide first aid by everyone within their capacity

(2)   Provide general training for users to be capable to provide first aid and take care of victims until professional emergency services arrive

(3)   Provide regular training and certification for professional emergency services

(4)   Provide training and certification for rehabilitation organizations and trauma centres

(5)   Provide training and certification for investigators in MDCIs

(6)   Assess effectiveness of education activities by use of appropriate indicators

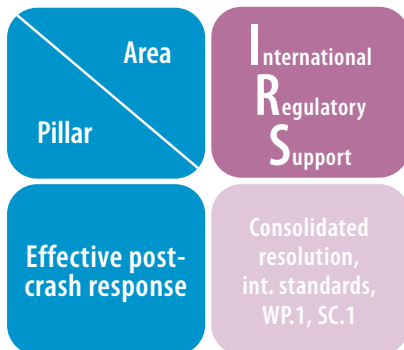Ensure adequate budget for awareness-raising and training

Responsibility for implementation: Relevant national ministries such as Ministry of Health, Transport and/or Ministry of the Interior and relevant agencies.

Area / Pillar	**T**echnology
Effective post-crash response	Support technology and equipment
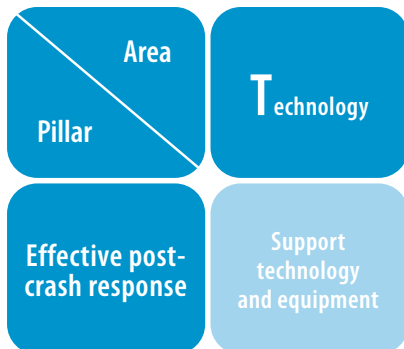
Actions such as those listed below should be considered on supportive technology and equipment:

(1) Support development of intelligent systems supporting the work of emergency response centres, rehabilitation centres and facilitating victims support

(2) Support development of technology facilitating MDCIs (crash investigation specific geoinformation systems, crash simulation software, vehicle crash performance databases)

Responsibility for implementation: relevant national ministries such as Ministries of Health, Transport and/or the Interior and relevant agencies.

Area / Pillar	**I**nternational **R**egulatory **S**upport
Effective post-crash response	Consolidated resolution, int. standards, WP.1, SC.1

The following international resolution is helpful to support national action for enhancing effective post-crash response:

– The Consolidated Resolution on Road Traffic, with good practices on effective post-crash response, on assessing MDCIs and on setting up a liability regime.

The resolution is managed by WP.1. The resolution needs further development in the WP.1 framework.

More participation in the activities of WP.1 is needed to develop best practices and new initiatives for incorporation into the national road safety systems to keep the systems updated.

A Foundational Safety System concept to make roads safer in the Decade 2021-2030

Road traffic crashes are responsible for more than 1.3 million deaths each year, while estimates of non-fatal injuries range from 20 million to 50 million. In 2018, the United Nations General Assembly expressed the concern that, at the current rate of progress by member States, the target 3.6 of Sustainable Development Goal 3 to halve, by 2020, the number of global deaths and injuries from road traffic accidents, will not be met. Enhanced international and national efforts are urgently needed to harness and improve the safety situation on roads.

The publication provides a new solution concept at the beginning of the new decade of action for road safety. It provides detailed guidelines for establishing, improving, completing and sustaining such national road safety systems aimed to reduce deaths and injuries from road crashes and, thus, to reduce economic losses resulting from these crashes.

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