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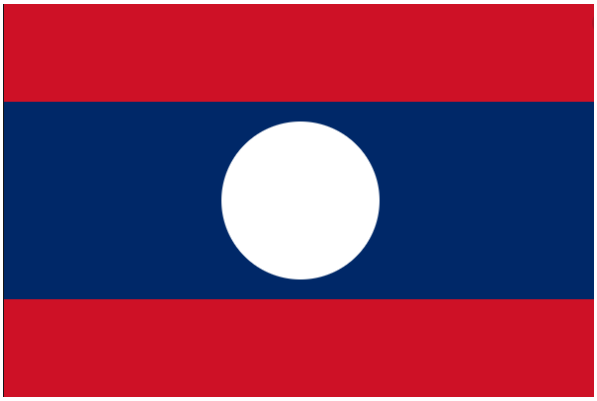

ROAD SAFETY MANAGEMENT CAPACITY REVIEW FOR LAO PEOPLE'S DEMOCRATIC REPUBLIC

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Executive Summary

The Government of Lao PDR is committed to address the issue of road safety: its vision in the draft National Road Safety Strategy is to eliminate fatalities and serious injuries on Lao roads. A 2030 target has been set for 50% reduction in fatalities and serious injuries.

To support this goal, the Ministry of Public Works and Transport (MPWT) together with the World Bank, are undertaking a systematic road safety management capacity review, focusing on strengthening the management systems and institutional capacity. The methodology and approach draw on international best practice (GRSF 2013). This review is made possible with financial support from Global Road Safety Facility (GRSF) and UK AID.

1.1. Road Safety in Lao PDR

The mortality rate from road crashes in Laos is concerning. Government data for 2019 records 1,020 road traffic crash deaths in Lao PDR (police records). The rate of fatalities per 100,000 population according was 16.6 in 2018 (WHO records). This is high when compared to, for instance, Indonesia (12.2) or Philippines (12.3), but lower than Thailand with 32.7 fatalities per 100,000. While the recorded number of crashes decreased by 22% between 2017 and 2018, fatalities increased by 29%.

Road crashes are a leading cause of death for school-age children and young adults. It is the number one cause of death for 5-14-year-olds, the number two cause of death for 15-49-year-olds, and the number one cause of disability for the entire population. 75% of road crash fatalities and injuries involve economically productive people between 15 and 64 years old.

Men are more vulnerable than women. The ratio of fatalities is 3:1 male to female, with males 15 to 49 years old being the most vulnerable.

Rapid expansion of motor-vehicle ownership coupled with poor driver discipline are the main reasons for the high death tolls on the roads. The number of registered vehicles increased from around 80,000 in 1990 to almost 1.8 million in 2018, an annualized increase of 13% per year (ERIA 2018).

Traffic crashes represent a substantial economic cost to the country. A conservative estimate indicates annual economic losses of over LAK 5,098 Billion (US$565m) from road crashes in 2017 alone, equivalent to 3.3% of GDP.

Recovery and rehabilitation services in Lao PDR are underdeveloped. Emergency response units operated by volunteers serve Vientiane Capital and major cities. State medical services are poorly equipped to deal with post-crash rehabilitation of victims.

1.2. Key Findings

1.2.1. Coordination

The National Road Safety Committee (NRSC) is an inter-ministerial organization responsible for leading road safety efforts. While NRSC is the lead agency responsible for road safety, implementation rests with a secretariat and the member institutions. NRSC meetings are infrequent, and communication and coordination between institutions involved in road safety is weak. Limited funding and staffing contribute to confusion regarding responsibilities for road safety, which curtails practical and timely action.

1.2.2. Legislation & Enforcement

The regulatory and institutional framework for road safety in Lao PDR is undergoing development. Several important policy documents have been recently prepared and are pending government approval including a Road Safety Strategy to 2030, a Road Safety Action Plan to 2025, and a Road Safety Audit Manual.

Regulations addressing road safety and enforcement matters are in place. However, enforcement of the rule of law is weak. Drunk, speeding and unlicensed drivers continue to drive on the roads and are rarely penalized. Attempts to impose fines at roadside checkpoints frequently end in a negotiated settlement which is convenient for individuals concerned but detrimental to national road safety goals and society at large.

1.2.3. Funding and Resource Allocation

A long-term vision for Road Safety in Laos now exists, but funding is inadequate and any improvement uncertain. The draft National Road Safety Strategy and accompanying Action Plan foresees a substantial increase in expenditure, but sources of funding are not identified. In recent years annual road safety funding has averaged US$2m, drawn from the national Road Fund. This level of funding is not enough to address the growing road safety challenges.

1.2.4. Promotion

Public awareness campaigns are run by various organizations, but they tend to be sporadic and uncoordinated. There is no coordination mechanism to ensure that a unified road safety message is conveyed to Laos's citizens, and that campaigns target locations where the largest number of crashes occur. There is no monitoring data to confirm if awareness campaigns are leading to improvements in terms of lives saved. Campaign on their own will not lead to measurable reductions in death and serious injuries.

1.2.5. Monitoring and Evaluation

There is a lack of institutional arrangements to coordinate the collection of crash data. Data is collected by police, ambulance teams, volunteer first responders, vehicle insurance agents and hospitals. No single agency has a complete data set; hence traffic crash statistics are likely to under-report the number of injuries and fatalities. It is currently not possible to know the percentage of road crash deaths at the scene, deaths on the way to treatment facilities or deaths after admission to hospital. Records held by different stakeholders are generally paper based or use simple spreadsheets, so it is challenging to synthesize the available data from different sources. As a consequence of data limitations, decisions about road sections and blackspots requiring engineering safety improvements using the Road Fund is not evidence based. DRIVER will alco be used to monitor and evaluate efficiency of the road safety interventions. Moreover, the result in terms of lives saved cannot be assessed.

1.2.6. Research and Development, and Knowledge Transfer

While progress has been made in road safety capacity building with support from development partners and international consultants, in the long-term this is unsustainable.

1.3. Conclusion and Recommendations

The recommendations of this capacity review are intended to close capacity gaps and strengthen institutional arrangements in order to achieve the vision and goals of the Lao PDR

National Road Safety Strategy 2030 and attain the final outcome of reduced fatalities and serious injuries.

Priority actions and initiatives are summarized below. These include visible leadership on road safety at the highest levels, a re-energized NRSC and effective coordination among stakeholders, improved public awareness and education, enforcement of the law focusing on risky driving behaviour, engineering solutions to ensure roads are as safe as possible, data collection and research to support evidence-based, and capacity building to support long-term sustainability. This is achieved through DOT being the lead agency supporting the NRSC. The NRSC role is to make decisions, approve programs and policies based on recommendations from Technical Executive Group (TEG).

TEG and Technical Working Group (TWG) will provide recommendation to NRSC and implement the decision that are approved by NRSC. Any major policy or program action should be advised through the TWG to TEG to NRSC framework. The TWG and TEG will provide essential base work and consensus between all departments before NRSC consideration. DOT as the lead agency will provide support to these three groups (NRSC, TEG and TWG). Details on the proposed updated institutional set-up is provided in 6.6.3.

A substantial increase in allocation of funds and human resources are needed, and urgently so to meet 2030 road safety targets

1.3.1. Coordination

- NRSC needs to become visible, meet at least every 6 months, and promote the strategic objectives outlined in the Lao Road Safety Strategy. It must model and lead a fresh culture of positive, constructive practices and decision making. To allow for this a review on who are members in the NRSC may be considered. The recommendation within the report provides a decision-making backbone for the NRSC through formalising existing ad-hoc meeting via TEG and TWG. All NRSC members must champion and promote the Safe System approach and Safe System thinking within their organizations. This means providing a high level of support and education to the road safety program and promoting a culture change towards saving lives within each organization's mandate.
  MPWT must mandate DOT as the lead agency and the National Road Safety Secretariat (NRSS), the legal authority and power to make decisions and coordinate the road safety governmental vision and assign at least four full-time staff and a lead to support the NRSC and manage the work of the NRSS.

1.3.2. Legislation & Enforcement

- MPWT to approve the draft Road Safety Strategy 2030, draft Road Safety Action Plan to 2025 and draft Road Safety Audit Manual and enforce road safety audits as required in Article 32 of the Lao Traffic Law.
  MPWT to mandate DOT as the responsible authority for accrediting road safety auditors. DOT, DOR and DPWTs will ensure they have trained personnel qualified in undertaking Road Safety Audits, based on the approved Road Safety Audit Manual and Lao Traffic Law.
  Police must increase its presence along the road network and undertake regular controls of speed limits, helmet wearing, valid driving license and alcohol limit activities on key routes.

1.3.3. Funding and Resource Allocation

- The current investment program funded under the RMF with about USD2 million per year is inadequate to deliver the Road Safety Action Plan. Allocation of funds for projects funded

must therefore be based on achieving the highest return on investment in terms of lives saved.
Most crashes are a result of violation of traffic rules such as speeding, drunk driving, unlicensed drivers, vehicle standard etc. Addressing these violations through regular frequent campaigns and sustained enforcement will provide immediate results in reduced number of road trauma.
Provide additional funding from RMF to support NRSC and NRSS as the lead road safety agencies to implement the National Road Safety Strategy and Action Plan.

- Improve road safety of the existing network and new road improvements / construction in the next 3 to 10 years, by mainstreaming road safety in contracts and bills of quantities based on mandatory road safety audits.

1.3.4. Promotion

- Accountabilities need to be clear for every agency and group working to achieve the agreed action implementation to meet the goal of saving lives and reducing the impact of road trauma, in accordance with adopted targets. The community has a right to hold the responsible to account and the responsible should hold the community to account when everyone is clear about their responsibilities, expectations, rules and consequences.
NRSC to develop a National Road Safety awareness strategy and promote Vision Zero to the public by frequent regular and sustained, school road safety education, TV, radio, and social media events. TEG to submit these plans to NRSC for approval or agreement.

  Winning hearts and minds of citizens including young adults is critical. Creating a consistent message from the LYU, LWU and LTU in road safety awareness campaigns will assist this. Focus should be on informing about the law, cost of road trauma, ways forward and expectations on citizen support.

1.3.5. Monitoring and Evaluation

- NRSS to develop and NRSC to confirm interim targets (for say 2025 and 2028) from Road Safety Strategy and Action Plan using a backcasting methodology for achieving the 2030 targets.
TEG to report twice yearly to the NRSC on progress of road safety.
Police to report on infringements from regular law enforcement checks on key routes in the reporting to TWG, TEG and NRSC.
As part of this assignment and ongoing projects The World Bank will support, and Traffic Police and DOT lead rolling out of DRIVER nationally and integrating ambulance and hospital data
Use DRIVER to support advocacy for road safety. It will improve ownership of the road crash problem by holding government relevant agencies accountable but also supporting their roles in addressing the problem.

1.3.6. Research and Development, and Knowledge Transfer

- DOT and DOR to pilot the Safe System Assessment Framework platform on Vientiane Expressway & Vangvieng Expressways with World Bank support.
DOT to deliver training of road safety awareness in provinces and communities ensuring different groups representative of diversity (gender, age, people living disability, ethnicity) are targeted

1.4. Report Structure

The structure of the report follows the GRSF road safety management capacity review manual.

Chapter 1 and 2 are providing an introduction, background and objectives of the work undertaken outlining some of the road safety best practice road safety management tools, such as the Safe System approach and Safety performance indicators. These are discussed in greater detail in the Appendices.

Chapter 3 is describing the current road safety situation in Lao PDR including crash recording and institutional arrangements at all governmental levels. Its aim is to provide the reader with sufficient information that lead to some of the recommendations in this report.

Chapter 4, Institutional Management Functions, is describing the findings of the road safety capacity review of Lao PDR by depicting every institutional management function as recommended in the GRSF Guidelines for Road Safety Management Reviews and Safe System Projects[1] (2013); (see **Error! Reference source not found.**).

Chapter 5, Interventions, is tailored around the UN road safety pillars with a view of identifying gaps and recommending opportunities for improvement.

Identified recommendations and opportunities for improvement in Chapter 4 and 5 are partitioned in: final outcome, intermediate outcome and organisational output (see Appendix A). All recommendations are assessed based on the potential to save lives and assessed capability to deliver each recommendation. It assigns an accountable agency to each recommendation and describes the methodology of implementing the recommendations.

Chapter 6 details within its five subchapters some of the most important recommendations to achieve Laos' road safety objectives. These are the recommendations that NRSC, TEG, TWG, MPWT and MOPS should immediately deal with.

Figure 1: Road Safety Management System[2]

[1] Bliss T, B. J. (2013). Road Safety Management Capacity Reviews and Safe System Projects; Global Road Safety Facility. Washington DC: The World Bank

[2] Adopted from Bliss and Breen, building on the frameworks of Land Transport Safety Authority, 2000; Wegman, 2001; Koornstra et al, 2002; Bliss, 2004

1.5. Recommendations

There are 82 recommendations identified as part of this review (See Appendix A):

- High Priority: 22 recommendations to be adopted as soon as possible (given in summary below)
- Medium priority (41 recommendations):
  - Category M1 implementable within 6 months) 15 recommendations
  - Category M2 implementable within 12 months) 21 recommendations
  - Category M3 implementable within 24 months) 5 recommendations
- Long term (19 recommendations)
  - Category L1 implementable by 2023) 9 recommendations
  - Category L2 implementable by 2026) 9 recommendations
  - Category L3 implementable by 2030) 1 recommendation

The 22 immediate high priority recommendations are:

1. DOT to support NRSC to become more visible
2. National aggregated data on road traffic crashes published annually by NRSC
3. Mandate DOT as the Lead Agency and provide it with the legal authority and power to make decisions
4. The NRSC to meet every 6 months
5. NRSC with support from DOT ensure the strengthened governance arrangements for operation of the TEG and the TWG in providing recommendations and advice to the NRSC are put in place
6. DOT to assign at least four (4) full time staff and a lead to support the NRSC, TEG and TWG
7. TEG to review a report on progress with the NRSS from the TWG and provide advice on necessary changes in priorities
8. MPWT to mandate DOT as responsible for accreditation of the road safety auditors
9. Sign MOU (between MPWT and MPS) on institutional arrangements on data collection, quality assurance, analysis for DRIVER implementation
10. All road safety partners consent through NRSC and the Lead Agency (DOT) on quantitative medium - and short-term targets
11. NRSC with DOT support undertake mass media campaigns linked to licencing, speed and speeding and establish enforcement linked to drink driving campaigns
12. Guided by an MOU, DRIVER should be identified as the national road crash database systems by MPWT and MOPS
13. The Technical Working Group (TWG) drawing upon all NRSC member organisations to create a new and fully funded Road Safety Action Plan in line with the National Road Safety Strategy
14. DOT review the new Road Safety Action Plan to prioritise business case development for high return projects
15. Each NRSC member organisation to provide the Lead Agency (DOT) with the nominated officer accountable to follow up on the actions of NRSC
16. Lead agency (DOT) to promote ownership and accountabilities among senior management staff within each relevant department to assist development of high priority road safety awareness
17. The World Bank to continue to provide technical assistance and support (including training and facilitation) under ongoing projects for the first two years on implementationagreed priority recommendations

18. DOT as Lead Agency group to develop with TWG and TEG for NRSC confirmation, interim targets (for 2025 and 2028) from implementation of the Road Safety Strategy recommendations for achieving the 2030 targets
19. Strong and frequent enforcement of traffic law and regulations by Traffic Police
20. DOT and DOR to pilot a Safe System Assessment Framework on Vientiane and Vangvieng Expressways to demonstrate compliance with Safe System principles for new road improvements
21. MPWT to consider a mandatory requirement for daytime running lights
22. DOR to implement proposed 56 blackspot treatments identified under LRSP2 and undertake evaluation of the outcome.

Abbreviations

Austroads	The peak organisation of Australasian road transport and traffic agencies
BCR	Benefit Cost Ratio
BAC	Blood Alcohol Concentration
DRIVER	Data for Road Incident Visualization, Evaluation, and Reporting
DPWT	Department of Public Works and Transport
DOT	Department of Transport
DOR	Department of Roads
EFT	Effective Full Time Employees
JICA	Japan International Cooperation Agency
GDP	Gross Domestic Product
LMIC	Low- and Middle-Income Countries
LTU	Lao Trade Union
LYU	Lao Youth Union
LWU	Lao Women's Union
MICT	Ministry of Information, Culture and Tourism
MOE	Ministry of Education and Sport
MOH	Ministry of Health
MOPS	Ministry of Public Security
MPWT	Ministry of Public Works and Transport
MPI	Ministry of Planning and Investment
NRSC	National Road Safety Committee
NRSS	National Road Safety Secretariat
NUOL	National University of Laos

PTW	Power Two Wheelers
PTTI	Public Works and Transport Training Institute
RMMS	Road Maintenance Management System
RSC	Road Safety Committees
SPI	Safety Performance Indicators
TEG	Technical Executive Group
TWG	Technical Working Group
TPD	Traffic Police Department
WHO	World Health Organisation

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2. Introduction

2.1. Road Safety Global Context

Improving road safety is critical to the World Bank's twin goals of eradicating extreme poverty and increasing shared prosperity. Low and middle-income countries (LMICs) suffer 90% of the 1.35 million road crash deaths and up to 50 million injuries occurring annually.[3] These deaths and injuries drive families into economic hardship, and in many cases poverty, when the family's primary income earner is killed or suffers disability. In addition, crash deaths and injuries drain human capital and create costs which have been shown to significantly limit the economic growth of LMICs. Road transport generates 97% of deaths from all modes of transport.[4] Investments in road safety often are not capital intensive. They often amount to 1-5% of the capital costs for a project and yield positive benefit cost ratios.

2.2. Road Safety Context in Lao PDR

Road transport is the dominant transport mode and will continue to be given Lao PDR low density population and affordable cost for road transport. Road crashes incur significant human, social and financial costs.

According to the World Health Organisation (WHO) data published in 2016, the population of Laos was 6,758, 353[3]. In 2019, the reported road traffic crash deaths in Laos were 1,020, or approximately 2.4% of total deaths. The Global Status Report on Road Safety[3] (WHO 2018) reports 1120 road crash deaths, which was 16.6 fatalities per 100,000 persons in Lao PDR and rising. This is high when compared to, for instance, Indonesia (12.2) or Philippines (12.3) (See Figure 2). Road crashes in Lao PDR are the number one cause of death for 5-14-year-olds, number two cause of death for 15-49-year-olds, and number one cause of disability for the entire population. It is noted that the country reported deaths and WHO estimated deaths are quite similar in number.

[3] *WHO. (2018). Global status report on road safety 2018. Geneva, Switzerland: World Health Organization*
[4] *SuM4All. (2017). Sustainable Mobility for all. Retrieved September 22, 2020, from http://www.sum4all.org/: http://www.sum4all.org/publications/global-mobility-report-2017*

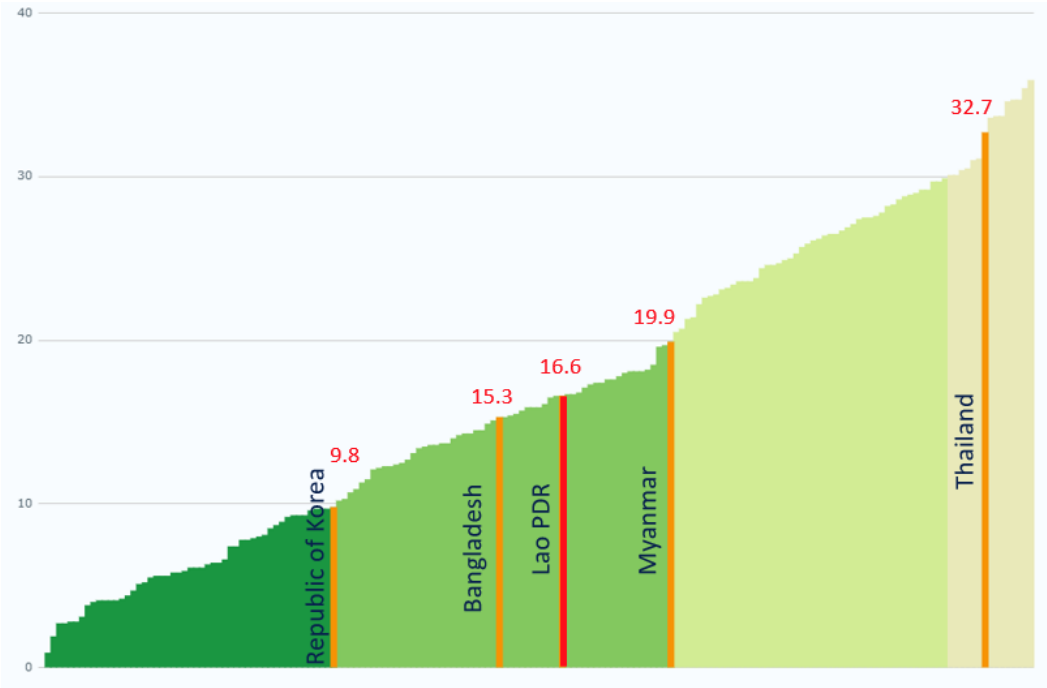

Figure 2: Deaths due to road traffic injuries per 100,000 population[5]

75% of road crash fatalities and injuries involve economically productive groups between 15 to 64-year-old. The ratio of fatalities is 3:1 male to female with the 15 to 49 years old being the most vulnerable. Approximately half of all road traffic fatalities are drivers and passengers of 2 and 4 wheeled vehicles, while pedestrians account for the remaining half.[6]

The Lao GDP was U.S.$16.853 billion in 2017.[7] A conservative estimate in economic losses from road crashes in 2017 alone is more than LAK5,098 billion (US$565m), based on a rapid estimate methodology used widely in low- and middle-income countries.[8] The cost of road trauma in Laos is estimated at 3.3% of the GDP.

Road safety is a major issue in Laos, affecting many lives. The number of fatalities and serious injuries are continuing to increase. Road trauma is a major public health issue which needs to be addressed as a similar priority being given to the eradication of malaria in Laos. That requires leadership, commitment, time, and sustained effort.

Through the Lao PDR National Road Safety Strategy 2030, the Government of Lao PDR is expressing a commitment to address the road safety issues, and its vision is to eliminate fatalities and serious injuries on Lao roads. A 2030 target of a 50% reduction in fatalities and serious injuries has been set.

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[5] WHO. (2016). World Health Organisation. Retrieved September 20, 2020, from https://apps.who.int/gho/data/node.sdg.3-6-map?lang=en

[6] *The Global Road Safety Facility (GRSF). (n.d.). Guide for road safety opportunities and challenges: Low- and middle-income country profiles. In W. W. Wambulwa, J. Soames, & B. Turner. Washington, DC 20433: The World Bank. Retrieved September 28, 2020, from http://documents1.worldbank.org/curated/en/447031581489115544/pdf/Guide-for-Road-Safety-Opportunities-and-Challenges-Low-and-Middle-Income-Country-Profiles.pdf*

[7] The World Bank. (2020, September 28). Retrieved from The World Bank Data: https://data.worldbank.org/country/lao-pdr

[8] *Department of Transport. (2019). Draft Strategy LDPR. Vientiane: MPWT*

In order to achieve this goal, the Ministry of Public Works and Transport (MPWT) together with the World Bank team, are undertaking a systematic road capacity review, focusing on strengthening the road safety management systems. This review is made possible with financial support from Global Road Safety Facility (GRSF) with financial support from UK AID.

2.3. Purpose and objectives

The main objective of this capacity review is to improve overall road safety in Lao PDR, by (1) assessing current policies and the management capacity of responsible stakeholders both at the central and local level, (2) implementing a unified crash database - DRIVER, (3) piloting a research and development activity in Lao' capital, Vientiane, and selected rural areas, where detailed analyses on the current crash situation (starting from location of crashes, types of crashes, etc.) will be undertaken, together with an analysis on infrastructure deficiencies based on crash type, through road safety inspections.

For a co-ordinated response to inform improvement to road safety measures, this GRSF intervention will seek to enhance collaboration between different stakeholders –member departments of the NRSC membership, provincial level authorities, public and private health care providers, police and ambulance services, groups representing road users; youth, trade and women unions, civil society groups and development partners working on road safety.

The analysis will enable a strong correlation with the topic "human factors in road safety", with a specific focus on vulnerable road users. The Bank team will train engineering units and educators on how to effectively collect and use information, including crash data, to inform design and implement road safety interventions (road improvement, messaging, behaviour change communication) considering different needs of stakeholders. As a result, these activities will support sustained, long term capacity building for designing and implementing more effective and efficient road crash prevention infrastructure, further expanding the pool of potential beneficiaries.

The Lao PDR National Road Safety Strategy 2030 identifies gaps in the regulatory and legislative system. The Bank team's gap analysis is based on the vision stated in the Strategy, "Zero road fatalities and serious injuries in Lao People's Democratic Republic".

This purpose of the road safety capacity review is to assist in strengthening road safety management systems to deliver the Lao PDR National Road Safety Strategy 2030. It is a critical step in improving road safety capacity to address its challenges and circumstances to incrementally achieve the ambitious 'Vision Zero'. 'Vision Zero' is the starting point for a commitment to improve road safety performance.

The Bank team is committed to undertake this qualitative research and identify practical recommendations, which will strengthen the road safety effort on a national and regional basis. The Bank Team engaged with the main Government agencies and stakeholders who can deliver and contribute to delivering results. The recommendations of this capacity review are intended to close these gaps to achieve the vision and goals of the Lao PDR National Road Safety Strategy 2030 and achieving the final outcome to reduce number of fatalities, rate of fatalities per 100,000 population, number of serious injuries and number of motorcycle fatalities by 50% by 2030.

2.4. Method and approach

This report is analysing the current internal structure and road safety management of Lao PDR. As part of this report the work included extensive interviews, research and consultation with key public, private, academical sectors and other relevant stakeholders.

The status of road safety management in the country has been assessed and measures are recommended to address existing institutional capacity barriers that are impeding implementation of road safety improvements in Lao PDR.

A broad range of available information, reports and data relating to road safety in Lao PDR were reviewed as part of this assessment (see References).

Detailed World Bank guidance sets out the methodology for the conduct of a road safety management capacity review[9] (See Figure 3). The approach of this review is following these guidelines. The assessment framework used a series of checklist and tailored questions that are based on identified good practice road safety management. A series of interviews were held with 22 stakeholder organisations to assess the current road safety performance in Lao PDR. A list of organisations interviewed is provided in Appendix B.

Information that was collected during the interviews, enabled the team to determine the gaps, and required enhancements to Laos' road safety capacity, and to reach informed conclusions and recommendations.

A workshop was held on 6 March 2020 at the MPWT, Lao PDR (MPWT) to present the initial report findings. The workshop was attended by representatives from MPWT (the Minister for MPWT is chair of the NRSC); the Director General of the Department of Transport, MPWT/ Head of the National Road Safety Secretariat; representatives from the Department of Roads, MPWT; police; National University of Laos; Lao Youth Union, Lao Women Union, Lao Trade Union; Ministry of Finance; Ministry of Health and Ministry of Information, Culture and Tourism. The workshop was part of the wrap-up meeting for the World Bank Lao Road Safety Implementation Support Mission under the Lao Road Sector Project 2 (LRSP2). The feedback from the workshop was positive and clearly aligned with the key themes of this review. In particular, the working group report to the plenary sessions of the workshop acknowledged the need for adopting the Safe System thinking and strengthening the institutional cooperation in relation to road safety management across all institutions.

Road safety discussions need to focus on both 'what needs to be implemented' and critical management functions. These management functions need to be appropriately resourced, focussed and directed to achieve progress. Key elements of the management systems represented in assessed as part of this review are institutional management functions, interventions and results. The team assessed all elements of the road safety system and the linkages between them to recommend improvements to current performance levels.

[9] *Global Road Safety Facility. (2009). Country Guidelines for the Conduct of Road Safety Management Capacity Reviews . In B. J. Bliss T.*

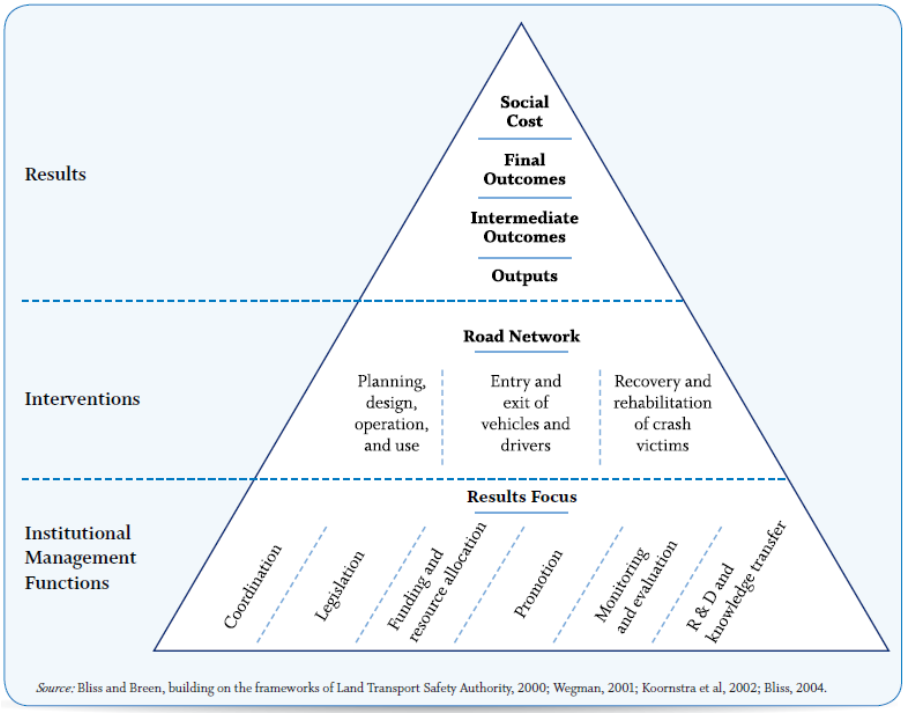

Figure 3: Road safety management system

3. Road Safety Management Systems

Road safety management is the first and fundamental pillar of the Global Plan for the Decade of Action for Road Safety 2011-2020 (UNRSC, 2011). It emphasises the safety management issues and highlights that improving road safety performance requires a systematic and planned approach.

There are several factors contributing to the global growth of the road safety problem and increase in road trauma[10]:

- High rates of motor vehicle ownership, in particular low-cost motorcycles.
- Increase in speeds with more vehicles entering the market on upgraded roads leads to increased travel speeds.
- Poor road safety behaviour and disregard of the rule of law.
- Disconnect between agencies allows formation of system loopholes.

Adopting a systemic approach and having strong institutional arrangements is the key characteristic of countries with the safest road networks. In the management of road traffic safety, a critical success factor is the development of evidence-based countermeasures that are formalised in strategies (investment plans), in combination with ambitious targets and institutional accountabilities.

The *leadership* component of any road safety management plan is vital to achieve improvement and eliminate road trauma. No significant improvements can be achieved by solely adopting reactive and targeted interventions. Significant and sustainable improvements are demonstrated and achieved when leaders make considered decisions that are effectively implemented and monitored, based on a solid appreciation of the relevant crash risk types to be addressed and the most cost effective measures to reduce these risks through a range of carefully targeted programs. It is a multi-sectoral task that needs specific targeted management.

3.1. The Safe System Approach

The Safe System Approach (also known as Vision Zero, Towards Zero or Sustainable Safety) aims for a future free of death or serious injuries on our roads. It is based on acknowledging; (a) tolerance limits of the human body to crash forces, (b) current traffic system is inherently dangerous and people make mistakes, (c) speed thresholds for managing crash impact energies to survivable levels, and (d) the ability for vehicles and infrastructure to reduce the impact of crashes on humans.

The Safe System approach encourages a better understanding of the interaction between the fundamental components of the road system such as:

- **Safer roads and roadsides** are predictable and forgiving of human error – their design should encourage appropriate road user behaviour and speeds.
- **Safer speeds** require speed limits which suit the function and level of safety of the road and the road user understands and complies with those speed limits and drives to the conditions.
- **Safer vehicles** help prevent crashes and protect road users from crash forces that cause death and serious injury.

[10] World Health Organization. (n.d.). WHO. Retrieved September 28, 2020, from https://www.who.int/gho/mortality_burden_disease/causes_death/top_10/en/
(Road injury is no 1 cause of death in South East Asian Region, 2016, both sexes, 15 to 29 year old)

- **Safer people** ensure road users are competent, alert and unimpaired, and people comply with road rules and choose safer vehicles.
- **Post-crash response**

As represented in Figure 4, there are several inputs into achieving a Safe System:

1. Good management and coordination
2. Using data research and evaluation into understanding crash causality and risk
3. Development and management of road rules and enforcement to ensure compliance with those rules
4. Managing access to the road through licensing drivers and riders and registering vehicles
5. Providing education and information to communities
6. Seeking continuous improvement and innovation
7. Development of standards for roads, vehicles and equipment.

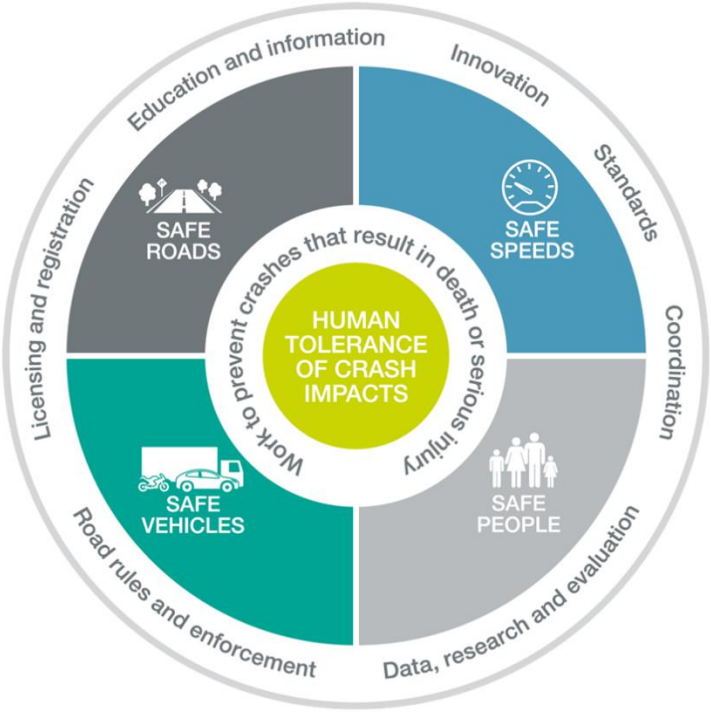

Figure 4: The Safe System

3.2. Safety Performance Indicators

Safety Performance Indicators (SPI) are used in addition to the crash records to measure operational changes in road traffic condition by detecting emerging issues before they become crashes. They are often expressed in the proportion of the traffic volume that fulfils the condition. One example could be 'the proportion of alcohol impaired drivers' or 'the proportion of injuries and fatalities resulting from crashes involving at least one alcohol impaired active road user 'or 'the proportion of car occupants using seat belts. The results can be used to design and ensure that, different countermeasures achieve the desired road safety outcome.

Figure 5 is representing the connecting activities contributing to a safe traffic system.

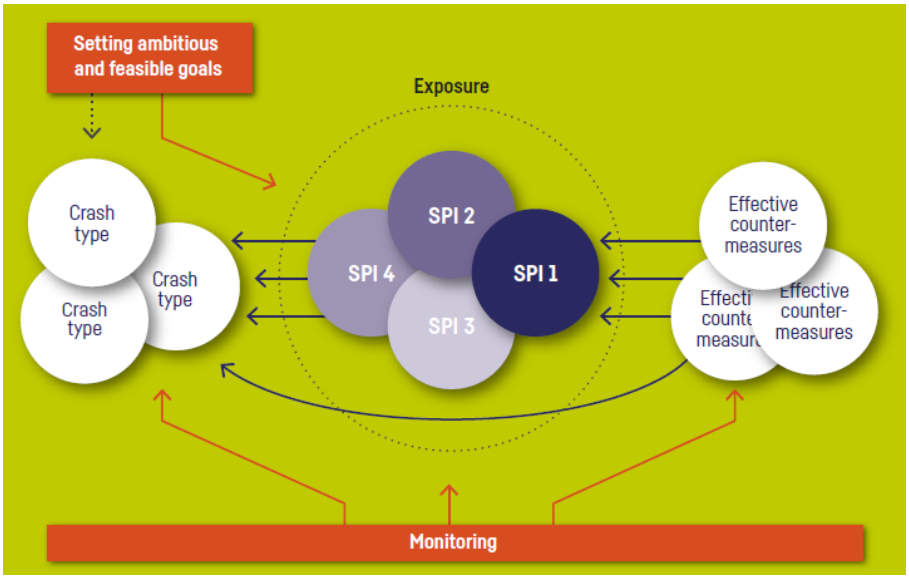

Figure 5[11]: Correlation between crashes, risk factors (SPIs) and countermeasures

[11] *SWOV. (2018). Sustainable Safety Principles 3rd edition. Den Haag, the Netherlands: SWOV.*

4. Road safety in Lao PDR

4.1. Existing road safety situation

According to the World Health Organisation (WHO) data published in 2016, the population of Laos was 6,758, 353[12]. Road Traffic Crashes Deaths in Laos reached 1,020 or approximately 2.4% of total deaths. The age adjusted Death Rate is 16.6 per 100,000 of population. Road traffic deaths rank number 12 in the top causes of death in Laos. Laos currently ranks 99th out of 183 countries for road fatality rates.

The trend in road crash fatalities (from 2007 to 2016) is shown[13] in Figure 6 below.

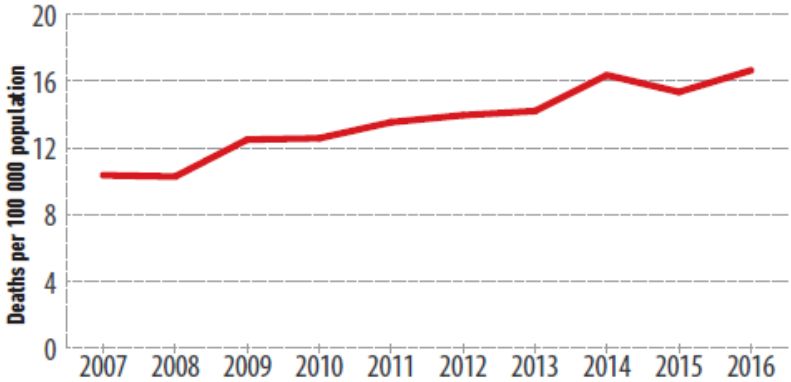

Figure 6: Road crash fatalities in Laos 2007 to 2016 (WHO GSRRS, 2018)

This trend in the rate of fatalities per population is most concerning with a greater than 50% increase being experienced from 2007 to 2016. What has been in place in Lao PDR for the management of road safety is resulting in these outcomes being delivered. More of the same will not deliver the necessary improvement. Substantially changed management and leadership by senior executives and by the government is essential if improved outcomes are to be meaningfully sought and achieved.

Turning around road safety performance is a tough challenge for any government requiring persistent and informed policies and programs to be funded and put in place. Evidence based interventions to address the known major road safety risks are known. What is required is the commitment by government to put in place the focus on results and commitment to improvement to stabilise and then reverse the trend in road crash fatalities and serious injuries in the next few years. This would most importantly support the necessary difficult funding and legislative and effective enforcement arrangements being put in place. Only then will a proposed 50% targeted reduction in fatalities by 2030 by Lao PDR become a seriously entertained option for the country. To ignore these fundamental and substantial challenges in assessing road safety in Lao PDR and not doing what is needed urgently to turn around performance is to accept highly likely failure to achieve improved performance over the next decade.

75% of road crash fatalities and injuries involve economically productive groups between 15 to 64-year-old. The ratio of fatalities is 3:1 male to female with the 15 to 49 years old being the most vulnerable.

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[12] *Global Status Report on Road Safety*; World Health Organization: WHO (2018 and 2015)
[13] WHO GSRRS (2018)

Approximately 47% of all road traffic fatalities are pedestrians while drivers and passengers of 2 wheeled vehicles make up 22% of fatalities and drivers and passengers of 4 wheeled vehicles are the remaining 20% or so (see Figure 7 and Figure 8).

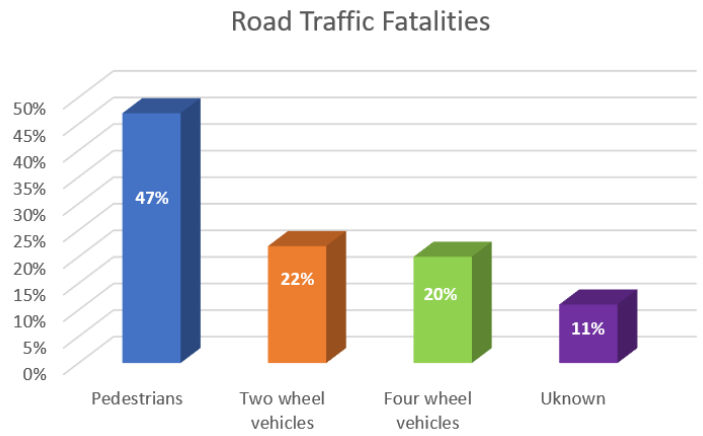

Figure 7: Distribution of road traffic fatalities

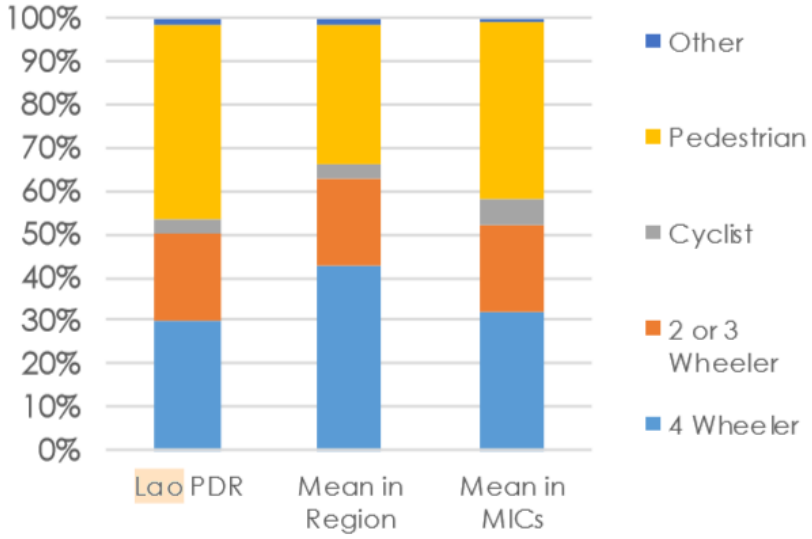

Figure 8[14]: Fatalities by user comparison

In Vientiane, a map of crashes is available and is shown in Figure 9.

[14]*The Global Road Safety Facility (GRSF). (n.d.). Guide for road safety opportunities and challenges: Low- and middle-income country profiles. In W. W. Wambulwa, J. Soames, & B. Turner. Washington, DC 20433: The World Bank. Retrieved September 28, 2020, from http://documents1.worldbank.org/curated/en/447031581489115544/pdf/Guide-for-Road-Safety-Opportunities-and-Challenges-Low-and-Middle-Income-Country-Profiles.pdf*

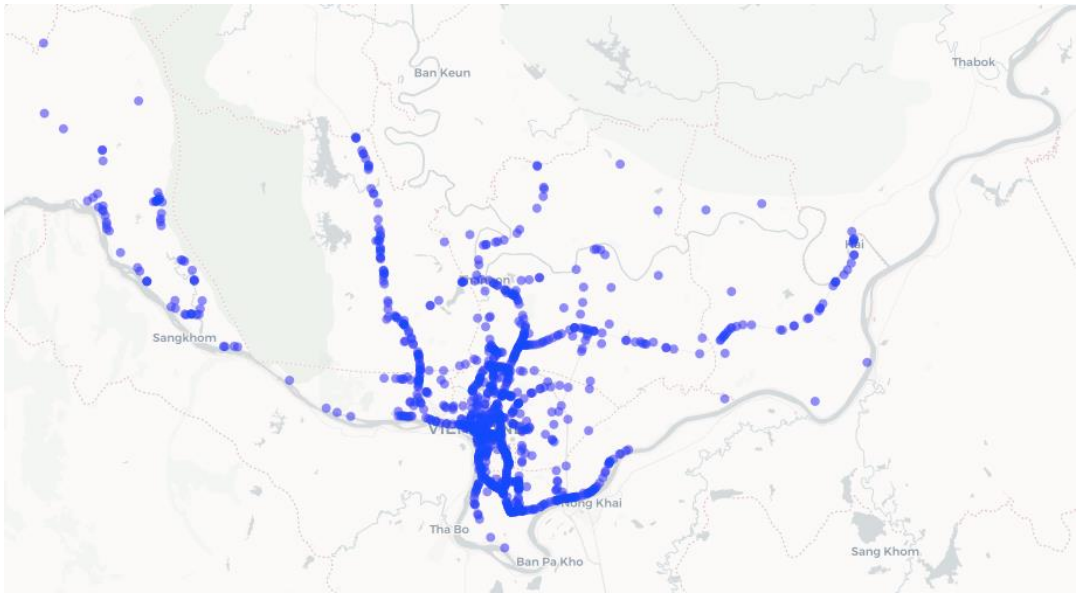

Figure 9[15]: Map of Crashes in Vientiane

This map represents 1,404 crashes in Vientiane from 2017 to 2018. A breakdown of these crashes is shown in Table 1.

Table 1: Number of Serious Injuries, Fatalities, and Crashes in Vientiane, 2017-2018[16]

	2017	2018	% Change
Serious Injury	41	40	-3%
Fatality	37	52	29%
Total Recorded Crashes	678	556	-22%

The above table shows that recorded number of crashes have decreased by 22% in 2017 to 2018 and fatalities have increased by 29%. While these data are believed to be widely underreported, this does not diminish the reality that fatalities represent a huge percentage of total crashes in Vientiane and it is increasing.

In addition to this, another alarming metric is the number of drink-driving cases that have resulted in fatalities. In Vientiane, 41% of fatalities and 45% of serious injuries in 2019 are alcohol related.[16]

[15] *DRIVER. (n.d.). https://laos.roadsafety.io.*
[16] *Ibid.*

4.2. Impact of road trauma on GDP

The Lao GDP was U.S.$16.853 billion in 2017.[17] A conservative estimate of over LAK 5,098 Billion (US$565m) in economic losses from road crashes, was experienced in 2017, based on a rapid estimate methodology used widely in low- and middle-income countries.[18] The cost of road trauma in Laos is estimated at 3.3% of the GDP.

Table 2: Socio-economic cost of road trauma in Laos (2017)

Estimated cost of fatalities	LAK 1,487 Billion	US$165m
Estimated cost of serious injuries	LAK 3,611 Billion	US$400m
Estimated total cost of road trauma *(cost of fatalities + serious injuries in 2017)*	LAK 5,098 Billion	US$565m

Overwhelmingly all agencies met during the March 2020 mission agreed that **speed and drink driving are the major risk factors for road crashes in Lao PDR**. A 5 % cut in average speed can result in a 30 % reduction in the number of fatal road crashes[19]. Effective speed management measures such as establishing and enforcing speed limits, traffic calming through roadway design and other measures, and vehicle technology need to be widely implemented.[20] The proven method to reduce alcohol related deaths on the road is to consistently enforce alcohol limits on drivers, adopting a carefully devised general deterrence approach.

4.3. Existing strategies and tools

Existing strategies and tools relevant to road safety in Lao PDR include:

- Lao Peoples' Democratic Republic Road Safety Strategy 2030
- Lao Peoples' Democratic Republic Road Safety Action Plan to 2025
- Road Safety Strategy and Action in Laos – Concept Note
- Road Safety Audit (RSA) Manual 2019/2020

Road Safety Strategy 2030

The Lao PDR Road Safety Strategy 2030 adopts an ambitious goal of a 50% reduction in fatal and serious injuries by 2030 and includes eight (8) intermediate safety targets to support achievement of this 50% reduction, and sets the final safety outcomes.

Table 3: Intermediate and Final Safety Outcome Targets

Intermediate Safety Outcome	2030 Target
Vehicles exceeding the posted speed limit	Less than 25%

[17] The World Bank. (2020, September 28). Retrieved from The World Bank Data: https://data.worldbank.org/country/lao-pdr
[18] *Department of Transport. (2019). Draft Strategy LDPR. Vientiane: MPWT.*
19 World Health Organisation. (2017). Managing Speed. Geneva: World Health Organization.
[20] SWOV. (2018). Sustainable Safety Principles 3rd edition. Den Haag, the Netherlands: SWOV.

Adult motor vehicle occupants correctly using seatbelts	At least 95%
Motorcycle riders correctly using helmets	At least 95%
Drivers testing above the legal alcohol limit	Less than 0.1%
iRAP safety star rating for Asian Highway network	At least 3 stars
Travel on main urban roads that meet 3-star safety ratings or better	> 75%
New motor vehicles meet at least 7 of the 8 priority UN vehicle safety standards	87,5 %
Time between crash and first professional emergency care	5-10 Minutes

Final Safety Outcome	2015-18 Baseline	2030 Target
Number of fatalities	1040	< 520
Rate of fatalities per 100,000 population	15.4	7.7
Number of serious injuries	to be confirmed	50% reduction
Number of motorcycle fatalities	to be confirmed	50% reduction

The Strategy outlines eight (8) strategic directions to be pursued throughout the life of the road safety strategy by 2030:

1. Promote the safe system approach
2. Strengthen road safety governance & leadership
3. Upgrade data, monitoring & evaluation systems
4. Tackle motorcycle safety
5. Sustained rider/driver enforcement & campaigns
6. Regulate vehicle safety technology
7. Demonstrate and rollout safe road environments
8. Invest in post-crash response

The governance for the National Road Safety structure is described in Table 4. NRSC plays a significant role in coordinating the outcome of the Road Safety Strategy and individual Districts and Province have the responsibility for development, delivery and monitoring of own component of the strategy under the monitoring of NRSS.

Road Safety Action Plan to 2025

The draft Road Safety Action Plan sets out 32 Key Actions (Appendix G) to start implementing the Road Safety Strategy 2030. These actions are largely not financed, and the draft Road Safety Action Plan therefore remains not implementable. The review team therefore direct the

attention to the priority actions that are implementable under the current budget and would support the Road Safety Strategy.

The Road Safety Audit Manual of Laos

A Road Safety Audit Manual has been completed and is expected to be approved by Minister of MPWT mid- 2020.

Article 32 of the Lao Traffic Law requires that a road safety audit be undertaken for all active and future major road projects. In spite of this, outside World Bank-funded projects, there is little evidence that road safety audits are undertaken. Having the road safety audit manual approved and incorporating road safety audits into the business process of road planning, design and implementation is crucial to implement article 32 of the Lao Traffic Law.

The Road Safety Audit Manual is following international best practice methodologies. Given that the Government of Lao PDR adopted the Safe System approach, the manual needs to include additional requirements that the Road Safety Audit recommendation must show alignment to and incorporate the Safe System principles.

4.4. Road Safety Budget

The budget allocation of the road safety fund equates to approximately US $2million per annum, which is shared for the most part among the 18 provinces (a considerable proportion of this is allocated to Vientiane Capital) to undertake road safety improvements. In addition, support is available from development partners including the World Bank.

These road safety projects, funded by the road safety fund, are nominated by the provinces, and sent to DOT for endorsement. MPWT sends the endorsed projects for approval to the Ministry of Planning and Investment (MPI).

Investment in road safety is also suggested in the Action Plan, however there is no firm budget commitment to any of these investments. It was proposed that US $5.6M be invested between 2019 to 2020, but this investment was not forthcoming, **road safety investment remained static and immediate priorities outlined in the Draft Road Safety Action Plan, were not and cannot be met**. Given the challenges in securing funds thus far, it is advised to prioritize actions with greatest impact first and fast track these investments for immediate release. The priority recommendations in this report give advice on this.

4.5. Institutional arrangements

In 2006, the National Road Safety Committee (NRSC) was established.

4.5.1. National Road Safety Committee

The NRSC is chaired by the Minister of MPWT and the vice chair is the Vice Minister of MOPS. MOPS is responsible for Traffic Police. The NRSC is made up of representatives from concerned agencies[21]. NRSC has been established with a three-tiered structure (see Table 4**Error! Reference source not found.**): National, Provincial and District levels. The NRSC secretariat, which is headed by the Director General of DOT, has been established to deal with day-to-day activities and the preparation of annual work plans based on input from provinces and agencies concerned. It is understood that it is required by law that the NRSC meet once a year. While the last meeting took place on 10 October 2019, prior to this, there was no

[21] Lao Service Portal. (n.d.). Retrieved September 28, 2020, from http://www.laoservicesportal.gov.la/index.php?r=site%2Fdisplaylegal&id=211.

meeting for at least four years. These meetings were normally focused on the budget allocation of the road safety fund, with revenue from 2.5% of the Road Fund income.

It has been proposed through the Road Safety Strategy that the NRSC will meet once a year and the National Road Safety Secretariat will be convened at least six times a year. The institutional arrangements are currently being drafted by DOT. After review of the draft, it is intended that it will be sent to Ministry of Justice and Ministry of Interior for review before final approval by the Prime Minister.

Table 4: Road Safety Institutions in Lao PDR

National Level (x 3)	National Road Safety Committee (NRSC)	Policy/National
	NRSC Secretariat	Coordinate/Implement
	NRSC Secretariat Office	Support/Implement
Provincial Level (x 2)	Provincial Road Safety Committee (PRSC)	Policy/Provincial
	PRSC Office	Support/Implement
District Level (x 1)	District Road Safety Committee (DRSC)	Implement
Sustainability: Road Safety Fund		

Ref. Traffic Law (2012)

- **NRSC Structure:**

  1. **Department of Transport, Ministry of Public Works and Transport (NRSC Secretariat)**
  2. **Director General of Department of Transport (Head of NRSC Secretariat)**

- **NRSC's Members:**

1. Minister of Ministry of Public Works and Transport	Chairman;
2. Vice Minister of Ministry of Public and Security	Vice Chairman;
3. Vice Minister of Ministry of Education and Sports	Member;
4. Vice Minister of Ministry of Health	Member;
5. Vice Minister of Ministry of Media, Culture and Tourism	Member;
6. Vice Minister of Ministry of Finance	Member;
7. Head of Red Cross of Lao PDR	Member;
8. Vice President of Trade Union	Member;
9. Vice President of Women	Member;
10. Vice President of Youth	Member;
11. Representatives of Association for Rescue Systems	Member;
12. Representatives of Foundation related on Land Traffic	Member.

Ref. Traffic Law (2012)

- **Provincial Road Safety Committee (PRSC) Members:**

1. Director General of Department of Public Works and Transport	Chairman;
2. Deputy Director of Department of Public and Security	Vice Chairman;
3. Deputy Director of Department of Education and Sports	Member;
4. Deputy Director of Department of Health	Member;
5. Deputy Director of Department of Media, Culture and Tourism	Member;
6. Deputy Director of Department of Finance	Member;
7. Head of Red Cross Office	Member;
8. Vice President of Trade Union	Member;
9. Vice President of Women	Member;
10. Vice President of Youth	Member;
11. Representatives of Association for Rescue Systems	Member;
12. Representatives of Foundation related on Land Traffic	Member.

Ref. Traffic Law (2012)

- **District Road Safety Committee (DRSC) Members:**

1. Head of Public Works and Transport Office	Chairman;
2. Deputy Director of Public and Security Office	Vice Chairman;
3. Deputy Director of Education and Sports Office	Member;
4. Deputy Director of Health Office	Member;
5. Deputy Director of Media, Culture and Tourism Office	Member;
6. Deputy Director of Finance Office	Member;
7. Head of Red Cross Office	Member;
8. Vice President of Trade Union	Member;
9. Vice President of Women	Member;
10. Vice President of Youth	Member;
11. Representatives of Association for Rescue Systems	Member;
12. Representatives of Foundation related on Land Traffic	Member.

4.5.2. Ministry of Public Works and Transport

National government activities in the transport sector are led by the MPWT and implemented through:

- Department of Civil Aviation,
- Department of Inland Waterways,
- Department of Roads (DOR),
- Department of Transport (DOT),
- Railway Authority,
- Provincial and district authorities.

4.5.2.1. Department of Transport

DOT as a Secretariat for NRSC is envisaged to undertake the full leadership of actions decided by the NRSC. Currently it does not have all the required capacity to perform the leading role for the NRSC. It successfully developed the Road Safety Audit manual, the Road Safety Action Plan and the Lao PDR Road Safety Strategy 2030. In this view, DOT is providing a road safety leadership function within the MPWT.

The DOT is accountable for planning and setting directions for the road transport sector. They maintain accountability across government department agencies such as transport, public security, finance, health, youth, academia etc. DOT is responsible for all aspects of road safety management and oversees driving licensing, vehicle registration, and public transport and recommendations to the NRSC chaired by the Minister of Public Works and Transport.

4.5.2.2. Department of Roads

The DOR is responsible for planning, construction, asset maintenance and road safety. The road network consists of more than 60,000 km of road network of which 7,300 km are national roads. A technical unit under the DOR is responsible for preparation of regulation, specifications, standards and is providing technical assistance to update selected manuals and guidelines, including the Road Safety Audit Manual.

DOR is responsible for the safety of all road users on national highways and major urban roads, including technical standards throughout all provinces.

Planning for the road maintenance within DOR is prioritised using the Road Maintenance Management System (RMMS) for national roads and the DPWTs are using the Provincial Road Maintenance Management System (PROMMS) for local roads. The annual and long-term maintenance plans are prioritised using these tools based on undertaken road condition surveys. DOR has a maintenance program for approximately 5,000 km maintenance of national roads including a few provincial roads.

The road maintenance fund is allocated by the MOF. Of the total road maintenance fund, 10 % is allocated for administration (of which 2.5% is the road safety fund), of the remaining 90 %, 80% is for national roads and 20% is allocated to local roads. However, the actual allocation of the 80% is reduced currently to approx. 45% for settling debts of previous contracts.

It is concluded that the available road maintenance fund is well under budget to meet the network requirements and this likely has a negative impact on road safety. This fund allocation can generally satisfy only 20 % to 30% of total needs, with most of the available budget spent on vital transport infrastructure, periodic maintenance, and rehabilitation of National Road no. 13 south and north. The maintenance fund allocation is inclusive of routine maintenance and bridge maintenance. In addition, any emerging issues such as addressing blackspot sites and emergency repair after landslides, etc. are also using the same road maintenance fund.

Funding for road maintenance and rehabilitation is also provided through externally funded development projects. However, this is not a consistent or reliable budget to plan from.

4.5.3. Ministry of Planning and Investment

The Ministry of Planning and Investment (MPI) allocates funding to the national and local level budgets. Overall planning is done in the 5-year National Socio-Economic Development Plan (current is the 8th for 2016-2020)[22], and budgets for ministries and provinces are planned and requested annually with a midyear revision.

4.5.4. Ministry of Finance

The Ministry of Finance (MOF) plays a major role in financing transport sector activities through the national budget. This includes both own revenues funded and externally funded activities. Further, the road maintenance fund allocation is approved by the MOF.

MOF is responsible for identifying the funding and resource allocation to meet the annual budget needs.

The MOF is also overseeing the Department of State-Owned Enterprises and is acting as insurance liquidator for Lao PDR. Private insurance regulatory work started in 2015 and the

[22] *National Socio-Economic Development Plan. (2016-2020). United Nation. Retrieved September 24, 2020, from http://www.la.one.un.org/images/publications/8th_NSEDP_2016-2020.pdf*

private (motor) insurance industry is booming. There are 22 licenced insurance operators out of a total of 24 across Lao PDR.

The insurance companies do not record the number of crashes or provide cover for drink driving or if the road rules are disobeyed.

A challenge remains to better regulate the insurance companies to provide consumers with information that allows consumers to understand the exclusions from the cover rather than inclusions. MOF play an arbitration role between consumers and the insurance companies.

4.5.5. Ministry of Public Security

Traffic enforcement is undertaken by the Traffic Police Department (TPD) in the Ministry of Public Security (MoPS). TPD is responsible for all aspects of enforcing key laws regarding helmet wearing, seatbelt wearing, speeding and blood alcohol limits when driving. TPD also record on daily basis all crashes reported to them from the local level and provide regular reports.

4.5.6. Ministry of Education and Sports

Ministry of Education and Sport is responsible for the safety of children arriving at and leaving from public schools, and for developing an understanding of modern road safety requirements amongst children.

4.5.7. Ministry of Public Health

Ministry of Public Health is responsible for promoting safe road environments as part of its public health programs for noncommunicable disease, and for coordinating emergency medical response and treatment for crash victims.

4.5.8. Ministry of Information, Culture and Tourism

Ministry of Information, Culture and Tourism is responsible for promoting amongst the Laos people a commitment to the elimination of serious road trauma, and the measures necessary to achieve this.

4.5.9. Lao Women's Union, Lao Federation of Trade Union, Lao People's Revolutionary Youth Union

These three unions play a key role as mass organizations. They have representation at all levels of public administration and are members of the NRSC and road safety committees at provincial and district levels. They have and can play a key role in public road safety campaigns.

4.5.10. Provincial and District Level Organisation

4.5.10.1. Provincial and District Road Safety Committee

The provincial and district level Road Safety Committees (RSC) mirror the NRSC. The establishment is based on the Traffic Law. The chair of the provincial RSC is the Director of the provincial DPWT. The vice chair is the Deputy Director of Public Security. Members include all sectors including the three unions in a similar way to the NRSC.

The chair of the district RSC is the Head of the Public Works and Transport Office and the vice chair is the Deputy Head of Public Security. Members include all sectors including the three unions in a similar way to the NRSC.

The level of activity at local level reflects the level of available funding, but the necessary administrative and executive structure is in place for scaling up. Both planning for and

execution of agreed contracts funded from the budget allocation of the road safety fund rests with the provincial authorities.

4.5.10.2. Provincial Department of Public Works and Transport

At local level, the provincial Departments of Public Works and Transport (DPWT), (one in each province and in Vientiane Capital), implement the national policies and physical work including road safety works. Only national road works are implemented from DOR under MPWT. The provincial level DPWT has a similar structure as the MPWT but is headed by a Director reporting to the Provincial Governor. Planning for the road maintenance is prioritised using the Provincial Road Maintenance Management System (PROMMS) for local roads.

4.5.10.3. Provincial Traffic Police

Just like the MPWT, the MoPS and TPD have a provincial organisation structured as the MoPS but reporting to the Provincial Governor. Traffic enforcement is undertaken by the Traffic Police including helmet wearing, seatbelt wearing, speeding and alcohol limits while driving. The provincial traffic police also record daily all crashes providing regular reports to the TPD in Vientiane.

4.5.10.4. Provincial Public Health Department

The provincial Public Health Department is responsible for promoting safe road environments as part of its public health programs for noncommunicable disease, and for coordinating emergency medical response and treatment for crash victims at provincial hospitals.

4.5.10.5. Provincial Education and Sports Department

The provincial Education and Sports Department is responsible for the safety of children arriving to and leaving from public schools, and for developing an understanding of modern road safety requirements amongst children.

4.5.10.6. District Office of Public Works and Transport

At district level, the District Office of Public Works and Transport (OPWT) implement the national policies and physical work including road safety works. The OPWT has a similar structure as the provincial DPWT but is headed by a Director reporting to the Provincial Director of DPWT.

4.5.10.7. District Traffic Police

Traffic enforcement is undertaken by the Traffic Police including helmet wearing, seatbelt wearing, speeding and alcohol limits while driving. The district traffic police also record daily all crashes providing regular reports to the provincial traffic police.

4.5.10.8. District Public Health Office

The District Public Health Office is responsible for promoting safe road environments as part of its public health programs for non-communicable disease, and for coordinating emergency medical response and treatment for crash victims at district hospitals.

4.5.10.9. District Education and Sports Office

The District Education and Sports Office is responsible for the safety of children arriving to and leaving from public schools, and for developing an understanding of modern road safety requirements amongst children.

5. Institutional Management Functions

The institutional management functions are delivered primarily by the government agencies with core road safety responsibilities. They can also deliver in partnerships with civil society and business in alignment with country and organizational goals and targets. The seven functions below have been identified and defined on the basis of successful country performance and road safety management capacity review in low, middle and high-income countries.[23]

1. Result focus,
2. Coordination,
3. Legislation,
4. Funding and resource allocation,
5. Promotion,
6. Monitoring and evaluation and
7. Research & development, and knowledge transfer

The rationale for each function was based on data and results rather than observation. The data was sourced from references to management systems and leadership arrangements in countries which have achieved substantial reductions in death and serious injury from traffic crashes over time.

5.1. Result focus

A country's 'results focus' is the expression of its ambition to improve road safety and the means agreed to achieve this ambition. It addresses the issue of leadership, strategy, goal and target-setting, ownership, resource allocation and accountability for better managing road safety results.

When institutional management functions are not adequately robust, development and delivery of effective safety initiatives will be severely compromised. Mechanisms for agency accountability and leadership are required to encourage improved performance. Road Safety agencies within a country are required to have an understanding that road safety is a multi-sectoral task. Several activities under different organizations contribute to specific desired outputs and these outputs are jointly contributing to the overall Road Safety vision. This requires strong commitment and coordination.

5.1.1. Main findings

A long-term vision for Road Safety in Laos exists now through the draft Road Safety Strategy 2030 but needs to be supported by an updated Road Safety Action Plan with funded actions. Both documents remained in draft format without an assertive commitment**. Strategies and action plans depend upon several elements for implementation but certainly upon adequate funding if they are to be implemented.**

[23] Bliss T, B. J. (2013). Road Safety Management Capacity Reviews and Safe System Projects; Global Road Safety Facility. Washington DC: The World Bank

Together these documents provide clear actions for implementation. The questions raised under Result Focus are:

1. Who is responsible? The answer is NRSC, but it is a shared responsibility among the involved agencies.

2. Who is accountable for results? The NRSC is accountable for the goal set out in the national strategy but to achieve this each agency must do its share and be held accountable for that. Essentially it appears that the road safety is left for committees and secretariats to manage. In general, when this is the situation, accountabilities and responsibilities are with groups of people. On an individual level, nobody is accountable or responsible. It is therefore often extremely difficult to achieve timely results. This requires improved accountability arrangements.

Is the Road Safety Strategy ambitious enough? Without doubt, the answer is clearly yes. The NRSC will need to address two major issues to start the delivery of this ambitious strategy: capacity and resources. It is proposed that the NRSC will continue to meet twice a year. History tells us that this is ineffective, and something needs to change. The NRSS is therefore proposed to meet six (6) times a year to ensure progress of the Road Safety Strategy and to guide implementation of agreed actions. It appears from interviews that DOT plays an important role in coordinating road safety policy, monitoring agreed actions and reporting to NRSC. They hold institutions accountable and take a road safety advisory role. DOT coordinated and drafted the Road Safety Audit manual, Road Safety Strategy, and the Road Safety Action Plan. Gap analysis.

Achieving results requires commitment, change and resources. Continuing with the business as usual approach will likely result in **no net** reduction in casualties, and indeed no plateauing of the increasing fatalities trend experienced in the past decade.

5.1.1.1. Lead Agency

The Lead Agency, to date, has been considered to be the NRSC but this points the accountability and responsibility to a committee rather than an authority. DOT, being the Secretariat to the NRSC, took the lead in developing the National Road Safety Strategy, which is a function of a Lead Agency. For a Lead Agency to appropriately function it is required to be appropriately funded and resourced. DOT is not funded, resourced or sufficiently skilled to effectively manage the full range of lead agency tasks including the Secretariat role. The NRSS will have to be resourced adequately to carry out its functions and lead effectively.

The NRSC and supported governance arrangements are not considered to be appropriately structured to provide effective road safety decision making.

5.1.1.2. Capacity to implement injury prevention measures

Effective injury prevention measures are based on good data, in relation to crashes, treatment effectiveness, post trauma response etc. The gaps related to these matters are discussed below in Chapter 6.5.

5.1.1.3. Road safety strategy and action plan

Both these documents are prepared. Linkages to the private sector or media are not discussed. These stakeholders form an integral part of achieving results. Investment is proposed to scale up in 2021/2022 from the existing US$2m to approximately US$24m without identifying the source of funding. It is highly unlikely that Laos is ready for such a scaled-up delivery and capacity in the current climate. The action plan needs to be realistic and achievable with enough resources. The National Road Safety Secretariat is supposed to oversee the delivery of the Action Plan and report to NRSC. In the absence of funding there is

not much progress to report on. Therefore, at this stage the Action Plan remains at a theoretical level and the Road Safety Strategy 2030 is set to fail. As part of this Road Safety Management Capacity Review an analysis of current strength and weaknesses was undertaken for the Ministers and Director Generals to determine a realistic way forward.

This report provides priority recommendations realistic under the funding constraints that could be part of a final Road Safety Action Plan.

5.1.1.4. Financial and human resources

Delivering the National Road Safety Strategy and Action Plan is inevitably linked to financial and human resources. Without the two operating in sync, the targets set within the Strategy are set to fail. There is no evidence to date that there is any commitment to fund road safety according to the Action Plan. In fact, nothing changed since its first draft last year, and the Action Plan remains largely unfunded. **At this stage the 2030 target is at least one year behind, and a revision of the Action Plan is urgently required unless there is a substantial increase in both capacity and funding made available through external partners, this report provide priority recommendations for such a revised action plan**.

Dedicated Safe System teams are required to be formed within the DOT, DOR and provincial DPWT. Their role is to develop, deliver and monitor own component of the Road Safety Strategy and influence all other external stakeholders.

5.1.2. Recommendations and opportunities for improvement

- Appoint DOT as the Lead Agency and provide it with the legal authority and power to make decisions and coordinate the road safety governmental vision.

- Review the Road Safety Strategy and Action Plan to prioritise business case development for high return projects to support proposed road crash reduction investment programs.

- Assign at least four (4) full time staff to manage the work of the NRSS and support the Lead Agency. Additionally, appoint a position to lead the leading agency.

Funding for implementing the Road Safety Action Plan is proposed to be collected from following sources:

1. Government budgets – ongoing staffing and operational costs
    - these are existing operational budgets which does not appear to change year by year to accommodate the investments outlined in the Road Safety Action Plan
2. Road Fund – safety development projects and provincial seed funding
    - The road safety fund is part of the roads fund which is a good platform for investment in road safety. However, an increase of the road safety funding is required, and road safety audits provide the argument to achieve this by mainstream road safety in improvement, construction and maintenance contracts
3. Transport ODA – major capital-intensive safety investments
    - when receiving ODA, business cases must be developed to determine the return on investment. Approvals generally takes time and may not be in line with the Strategy short-term timing but remain still important
4. Third party grants – leveraging better safety results through partnerships.
    - It is difficult to rely on grants to deliver an ambitious road safety strategy.

5. Traffic offences revenue to be centralised in an Infrastructure Road Safety Investment Plan

5.2. Coordination

This refers to horizontal coordination across central government and regionally; vertical coordination between central and local governments; specific delivery partnerships between government, non-government and business at the central, regional and local levels; and assembly relations at central and local levels.

The key in delivering road safety results, as demonstrated in best performing countries, is an effective horizontal (across central government) and vertical (across province and district governments) coordination as well as accountable decision-making process at senior government level.

5.2.1. Main findings

Theoretically the road safety horizontal and vertical coordination in Lao PDR is occurring through the NRSC. In practice the committee is meeting infrequently and is generally focusing on the budget allocation of the road safety fund.

Currently the DOT is the secretariat office for NRSC. There are 11 staff in the Land Traffic and Driving Licence Management Division in total, of which four or five assists with NRSC tasks. Several agencies that were consulted and are members of the NRSC indicated that they have no representation in the NRSC meetings. It was evident that the level of communication and coordination between agencies is weak.

The main government agencies with road safety infrastructure and enforcement responsibilities are DOR, DOT and Police. It was noticed that the relationship between these three main stakeholders are particularly good with the common goal to reduce road trauma. These parties are informally meeting outside the NRSC often at executive Director General level.

The lack of funding and staff resources are inevitably leading to several grey areas in terms of road safety actions between DOT and DOR and consequently this is often a reason for inaction. Contributing to this is the absence of an approved road safety audit manual and an updated decree on who is doing what in terms of road safety and road safety audits.

Data collected by hospitals following a road crash is not shared to Police or DOT to inform of the outcome i.e. death or serious injury. For example, in 2019 one hospital in Vientiane Capital (Mittaphab Hospital) reported 13,236 road crash patients (approx. 40 people/day) and about 230 deaths. The same hospital, in 2018, reported 12,818 road crash patients, 140 deaths and about 90 patients taken home to die.

One ambulance service (Vientiane Rescue 1623) in Vientiane Capital reported 3,817 callouts in 2019, with the majority involving vehicle crashes. Traffic Police reported a total of 6,616 crashes nationally, with 10,644 people injured and 1,134 deaths in 2019.

Based on the aforementioned, the mission in March 2020 affirmed the need for a unified road crash database system to ensure accurate and reconciled reporting.

Several stakeholders expressed the need for greater coordination and involvement among agencies and unions in order to effectively spread the road safety message. That is envisaged to be done through reporting on progress achieved on the delivery of the road safety milestones (results). In fact, all stakeholders see the coordination among all agencies highly desirable.

During the March 2020 mission, it was established that different institutions are undertaking separate road safety public awareness campaigns mostly using funds from the 2.5% National Road Fund. Perhaps the most significant campaign is the National Road Safety week which occurs annually in April before the Lao New Year. There does not appear to be a coordinated approach to these campaigns.

5.2.2. Gap analysis

It was not evident if a network wide analysis of crash causality is regularly undertaken to identify black spots. Such analysis should be undertaken by DOT together with the provincial DPWT and provincial traffic police with results distributed to stakeholders in particular DOR and Police. For example, crash causality analysis is today not linked with police intervention measures i.e. targeted drink driving or speeding enforcement.

The decision to create NRSC is sound, but the actions and accountabilities arising are vague or non-existent. A recommendation to address these issues is made in chapter 7.1. It is proposed to formalise existing ad hoc meetings into a decision-making structure with clear accountabilities and decision-making delegation. The NRSC should be the body bringing together all agencies on a horizontal and vertical level and provide direction, create accountabilities and responsibilities. The National Road Safety Committee, by law requires to meet once a year. It was noted however that the NRSC meetings are infrequent. A NRSC meeting was held on 10 October 2019 and before that in 2015. This emphasises requirement of the central government leadership. Information on the frequency of provincial and district road safety committees' meetings was at time of report not available.

Several agencies reported either to have no resources allocated for the NRSC tasks or not to be invited to the meetings (this may be because the meeting did not occur).

Despite the NRSC structure at central, provincial and district level there appears to be a disconnect between the three parties and no common agenda. The role of the central Government (here represented by DOT) is to bring all parties together, setting direction for achieving common goals. That means the provinces and districts are required to set local road safety targets that are within the National Road Safety Strategy.

The industry related private sector appears to have limited involvement in achieving the national road safety outcome. Essentially the private sector is a delivery arm for DOT and DOR and their education in the Safe System thinking is important. Equally important is coordination with universities and training providers who need to be equipped with the latest information regarding Safe System thinking and approaches. Now all these entities are expecting DOT to assist and provide information.

DOT has 11 staff in the Land Traffic and Driving Licence Management Division but only four or five assists with NRSC tasks. The work that is required to set up the logistical coordination and implementation of Safe System is a daunting task.

The Road Safety Action Plan sets out 32 unfunded recommendations divided into immediate, short- and medium-term actions. Both, final and intermediate safety actions have a 2030 target (Appendix G**Error! Reference source not found.Error! Reference source not found.**). To deliver such an ambitious task, it is required to have interim targets e.g. 2025 and 2028[24].

Achieving Lao PDR road safety vision requires commitment and leadership from all agencies. Other than the MPWT, the team identified that individual agencies do not have road safety targets or outcome. That may lead to lack of resource allocation and commitment.

[24] Department of Transport. (2019). Lao Peoples' Democratic Republic Road Safety Action Plan 2025. Vientiane: MPWT.

5.2.3. Recommendations and opportunities for improvement

Chapter 7.1 is recommending a formalised approach to existing ad-hoc meetings. The recommendations and opportunities for improvement below should be read together with Chapter 7.1:

- Identify additional funding for DOT as the Lead Agency and NRSS supporting NRSC to coordinate implementation of the National Road Safety Strategy and the updated Action Plan.

- Review and discuss who should be members of the NRSC to allow for twice a year formal meeting.

- Formalize current ad-hoc meetings at executive Director General level to a Technical Executive Group (TEG) and at technical Director/Deputy Director of division level to a Technical Working Group (TWG) and require quarterly and monthly meetings, respectively.

- Each NRSC member to assume accountability to NRSC for the delivery of each agreed action by own organisation

- DOT, as the NRSS, to develop and NRSC confirm interim targets (for 2025 and 2028) from Road Safety Action Plan recommendations using a *Backcasting Methodology* for achieving the 2030 targets (Appendix C). TEG and TWG should provide the essential base work and consensus between departments before NRSC consideration

- All NRSC member organisations to create a Road Safety Action Plan (RSAP) that is in line with the National Road Safety Strategy. Milestones and Achievements to be reported to the Lead Agency.

- Road safety is a Key Performance Indicator (KPI) on which agencies are measured when delivering results, in particular DOT, DOR, provincial DPWT. This must be stressed in the reporting to the Chair of NRSC.

- DOT to report quarterly to the chairperson of NRSC, the Minister of Public Works and Transport, on the progress made in road safety across all agencies including the progress from the Road Safety Action Plan using agreed KPIs

- Traffic Police establish Safety Performance Indicators (SPI) with benchmark and targets that are directly linked with prevention of fatalities and serious injuries, and report progress quarterly to the NRSC Secretariat:
  - Increased compliance to speed limit
  - Increases level of helmet use
  - Reduce of average speed
  - Reduce driving impaired by alcohols

- Police to develop annual plans to conduct increased and regular speed and alcohol enforcement on key routes and include results in the reporting on SPIs.

- DOT to ensure that provincial and district road safety committees are adopting the Safe System approach by:
  - Promoting capacity building and providing training
  - Setting direction and targets for blackspot development
  - Encouraging each district to create an individual Road Safety Action Plan on the basis of the National Road Safety Action Plan

- DOT to establish a process for project screening, selection and prioritisation of projects that are submitted from provinces as part of the road safety fund e.g. including a benefit cost analysis for selection of road safety projects and use to confirm selection of projects for funding.

- DOR to mainstream road safety in improvement, construction and maintenance contracts based on road safety audits and not handle road safety as an add-on or separate task.

- Introduce and adopt a modern crash filing system (DRIVER) under TPD of MOPS and in all provinces, and train all in use of this platform

- Traffic Police to release quarterly crash causality and crash reporting reports, and when fully introduced do so using DRIVER

- Unified and reconciled crash database – ambulance / hospitals to report quarterly to the Traffic Police on the road crashes that resulted in death or serious injuries (hospital care for more than 48 hours) for inclusion in DRIVER

- DOT to fund a national road safety public awareness campaign

- DOT and DOR to provide mandatory orientation to private industry on the Safe System philosophy as part of bidding for services or works.

5.3. Legislation, Regulation and Standards

The GRSF Guidelines for Road Safety Management Reviews and Safe System Projects[25] (2013) define *Legislation* as "the legal instruments necessary for governance purposes to specify the legitimate bounds of institutions, in terms of their responsibilities, accountabilities, interventions and related institutional management functions to achieve the desired focus on results". *Regulations* refer to the set of laws and rules that need to be followed while performing a road safety task and *standards* refers to the principles behind a work and values associated with it.

Accordingly, the government should ensure clear responsibilities and accountabilities of its agencies by:

- Providing a robust legislation that clearly addresses the roles and duties of agencies and sets long-term goals as well as interim targets. It should address such topics as land use, post-crash medical care, road, vehicle, and user safety standards along with the rules and compliance to these standards;
- Aligning road safety legislation and road safety tasks;

[25] *Bliss T, B. J. (2013). Road Safety Management Capacity Reviews and Safe System Projects; Global Road Safety Facility. Washington DC: The World Bank.*

- Ensuring that regulation is mandated by a government body and requires that—by law—those in the industry comply;
- Ensuring that both regulations and standards are dominated in work contracts;
- Providing a mixture of specialist legislative and technical expertise within government to develop and consult on enforceable standards with due consideration to cost, effectiveness, practicality, and public acceptability (one can have a robust legislation but if not regulated or enforced, it is meaningless).

5.3.1. Main findings

Lao PDR has a robust legislative framework that addresses road safety and enforcement matters. However, enforcement of the rule of law is not effective nor is it implemented.

Several examples are provided to support the legislative, regulatory and standards findings:

- Traffic Law requires Road Safety Audits (Article 32) be undertaken – a draft road safety audit manual has just been produced and awaits approval mid-2020;
- Drunk, speeding or unlicensed drivers continue to use the road system often without being penalised. There is a strong sense of 'mateship' between communities and the police force. This is resulting in road traffic offenders not being penalised. This type of behaviour is certainly seen as acceptable without the realisation that it is hurting the communities, eroding police authority and rule of law, and is exacerbating an existing social problem. This makes it difficult to implement the Road Safety Strategy Vision;
- The rule of law is not strictly enforced;
- Running red lights and disobeying the zebra crossing rules is rarely punished;
- There are no standards in relation to the installation of traffic signals. There are standalone traffic signals for which replacement parts are difficult to be found. Most, if not all, signalised intersections are based on fixed timing meaning that there is no coordination between consecutive traffic signalised intersections;
- The NRCS now meet irregularly and consequently institutional roles, responsibilities, and accountabilities for implementing the long-term Safe System approach are not established;
- Legislation currently does not permit motor vehicles to have headlights on during the day.

5.3.2. Gap analysis

The roles, responsibilities, and accountabilities of key agencies in relation to road safety requires further review. Analysis of the available legislation, regulations and standards identified the following gaps:

- The Technical Division within DOR is responsible for preparation of regulation, standards, specification in relation to road construction and maintenance. An update of the standards including the Safe System approach will be necessary and that should include building the DOR's Technical Division capability.
- Stakeholders expressed concerns that is often confusing to determine roles and responsibilities within agencies;
- All existing traffic signalised intersections will need to be replaced with a standardised solution to replace the current inconsistent standards. An adaptive traffic control system can be introduced to maximise the use of the road network
- Additional funding sources need to be identified in an environment where the MOF most likely, has other priorities e.g. health, education, COVID-19, etc. International

examples showed that governments identified these additional funding sources for road safety from insurance and / or traffic offence revenues;

- The Safe System approach also needs to be considered at the provincial level. Local roads are the responsibility of the provinces;
- Considering that the NRSC do not meet regularly, is creating a leadership void where the strong logistical platform for promoting road safety and the Safe System approach is absent.

5.3.3. Recommendations and opportunities for improvement

- DOT to introduce a driver licensing point penalty system to enforce all drivers to hold a current and relevant driver's license.
- Put measures in place that will detract officers and traffic offenders from reaching outcomes based on 'negotiations' such as use of online payments for fines (e.g. BCEL ONE)
- DOT to introduce helmet standards and progressively phase out existing unsafe helmets country wide.
- DOT, DOR, Provinces and Vientiane Capital DPWTs to undertake road safety audits in accordance with Article 32 for all infrastructure projects, including maintenance activities
- The Ministry of Finance (MOF) and the MPWT to review funding legislation which allows additional road safety funding sources to be obtained for the Road Safety Program. For example, traffic offence revenues or a percentage of the vehicle insurance fee could be directed towards road safety programs for infrastructure, enforcement, education and policy / standards.
- Police to enforce a mandatory third-party insurance for vehicles and DOT to make it a requirement for registration or for updating the vehicle "yellow book".
- DOT to implement policy on certification of road safety auditors.
- Ensure MPWT take accountability for Road Safety projects and programs to align with the Safe System approach by employing auditors who are qualified to do this role.
- Pilot a Safe System Assessment Framework to demonstrate compliance with Safe System principles for all new road improvements starting with Vientiane and Vangvieng Expressways.
- Develop a standard for installation of Traffic Signals including the hardware and software with the view of having a fully adaptive urban traffic control system in the future.
- Introduce legislation, standards and enforcement for restraint of children (up to 12 years old) in cars.

- Consider making it mandatory to use daytime running lights on all motorcycles and cars. This standard requirement could also be extended to other road vehicles.

5.4. Funding and Resource Allocation

These functions aim to ensure that road safety funding mechanisms are sufficient and sustainable. A rational framework for resource allocation allows for the creation of strong business cases for road safety investments based on cost-effectiveness and cost-benefit analyses. To achieve ambitious targets countries may need to establish new funding sources and mechanisms.

Significant private sector support for proven road safety engineering treatments can also be forthcoming from sectors such as the insurance industry when road safety business cases are strong. International development funding and the mainstreaming of road safety into infrastructure projects is of prime importance for LMICs.

5.4.1. Main findings

The Land Transport and Driving Licence Management Division under DOT has 11 staff in total. 4 or 5 of the staff assist with NRSC tasks. This Division also controls driving rules, driver licencing and the national road safety program.

The road network maintained by DOR and the Provinces has over 60,000 km. 12% of this is National road network (7,300 kms). There is a robust road management system in place. DOR use the Road Maintenance Management System (RMMS) for National Roads and the Provinces use the Provincial Maintenance Management System (PROMMS) for local roads. The prioritisation of the road development and road maintenance fund is supported by these two systems. The responsibility of DOR is to ensure that the road maintenance fund is used to support the Government objectives and community needs.

The road safety funding is 2.5% of the road maintenance fund equating to approximately US $2m per year. The total road network maintained by DPWT in Vientiane capital is 2,740 km. In 2019 the road fund provided 3 billion LAK (US$ 400,000). The funds were used to improve (widen junctions), roundabouts, traffic lights and road signage.

Engineering solutions need not be costly. Stakeholder interviews revealed that improvements to an intersection that include installation of traffic signals, roundabout and widening for instance can on average cost around US $40,000.

DOT, working along with 6 provincial authorities and police identified 56 blackspots on national roads. The crash data revealed that, at these locations, between 50 and 60 people lost their lives (the period is unclear). The team working on this project, identified simple and low-cost solutions including signs and line marking that have the potential of reducing road trauma. DOR agreed to implement the recommendations during 2020.

5.4.2. Gap analysis

The existing level of road safety funding is U.S.$2m per annuum. It is a good start to have a dedicated fund, however, funding is not enough to address the growing road safety problem in Lao PDR.

The proposed investment under the Lao PDR Road Safety Action Plan requires US $107,675,000 by 2025. Based on the existing U.S.$2m per year allocation, it is certain that this shortfall will not be allocated in the near future and a more realistic action plan can be prepared based on recommendations in this report.

Road Safety is not yet a mainstream activity and rather an add-on activity as part of the general road infrastructure program. When there is a larger road infrastructure investment, this will be an opportunity to bring in Safe System outcome-based solutions to prevent avoidable road crashes.

In addition, Government and Non-Government agencies are reporting a lack of resource allocation to general activities. This implies that the road safety task is suffering from absence of skilled and focussed support in implementation of tasks and consequently the Safe System approach.

Table 5: Road Safety Action Plan proposed investment[26]

Phase	Immediate Priority	Short Term Priority	Medium Term Priority
Years	2019-2020	2020 – 2022	2023 – 2025
Focus	Quick Start	Capacity Building	Investment
Required Funding	$5,600,000	$24,075,000	$78,000,000

5.4.3. Recommendations and opportunities for improvement

- Update the draft Road Safety Action Plan considering recommendations in this report and realistic estimates of funding for the period covered.
- Increase revenue for road safety fund and capture additional support under externally funded projects e.g. ADB, World Bank, AIIB etc.
- Create a Benefit Cost Ratio/ business case mechanism for road safety fund allocation
- Strengthen capacity for Road Safety within DOT and DOR and create Safe System dedicated staff
- Ensure DOT, DOR and DPWT have trained personnel who are qualified in undertaking Road Safety Audits
- Create a DOT accredited National Road Safety Auditors database under the management of DOT
- Include road safety as part of the road maintenance program and for all new construction of roads
- Allocate funds for the 56 blackspots identified in 2019 by the Climate resilience road asset management consultant under LRSP2 and undertake evaluation of the

[26] Department of Transport. (2019). Lao Peoples' Democratic Republic Road Safety Action Plan 2025. Vientiane: MPWT.

outcome. Should the outcome be positive, implement a "*Simple Measures Save Lives*" road safety program as part of the maintenance program.

5.5. Promotion

Promoting Road Safety in any country is much more than just road safety advertising to support certain interventions. It also addresses the overall level of ambition set by government and society for road safety performance. In addition, it refers to "managing up" or promotion of road safety matters to and by senior bureaucratic management.

5.5.1. Main findings

5.5.1.1. Internal Government Leadership and Awareness

Following stakeholders interviews it appears that most if not all stakeholders have a particular interest in advertising road safety to the general public. The Government established a road safety week that takes place every year before Lao New Year (in mid-April). However, there is still an increase in the number of drink driving crashes during Lao New Year.

Not all ministries are actively participating in this Road Safety event which proves there is not a united message nor a united approach to Road Safety. Strong leadership is required. For example, the Ministry of Health has a key role in outlining the need of injury prevention as a public health issue.

While new, the Safe System approach is rarely mentioned by senior government leaders. This does not mean the approach is not supported, at present time not well understood how to implement the Safe System approach.

5.5.1.2. Public Awareness and Advocacy

Lao Youth Union (LYU) appears to be active in promoting the road safety message, and has representation in provinces, districts and village administration. One of the nine LYU departments is focusing on road safety. It has had budgetary support from the road safety fund through DOT. LYU undertook a campaign pilot activity in 2015-16 in Vientiane Capital. It then scaled up adding four other provinces in 2017-18. It used the road safety budget of 106m LAK (US$11,800) plus 30m LAK (US$3,350) supplemented from the LYU central budget.

The LYU involved traffic police and DPWT in the awareness campaigns playing drama road shows at the village level focusing on the impact of drink driving.

The Lao Women's Union (LWU) is focusing on an awareness campaign for women within families. It received budget from the DOT road safety fund in 2018-19 which enabled the LWU to undertake road safety awareness campaigns in three districts in Vientiane Capital. They targeted LWU members at the village level. This campaign also included half-day sessions of presentations and speeches by senior LWU leadership, a talk by the Traffic Police on road safety, a short video clip and Q&A with prizes (helmets and high-vis vest).

The Lao Trade Union (LTU) is comprised of seven Departments including a Department of Worker Protection, and a Division for Worker Safety. In 2018 LTU partnered with Vientiane Capital Traffic Police to raise awareness on worker transport safety. Short sessions were organised in factories/workplaces (max 2 hours, sometimes over lunch) to minimize disruption to production. The Police outlined the importance of driving licenses, use of helmets and traffic rules.

5.5.2. Gap analysis

Road traffic injury is a leading cause of death for school-age children [27] [28]and young adults. Its prevention and mitigation are promoted by road safety organisations, however, it does not seem to be strongly promoted in schools and in particular to young adults who are about to obtain their driver licence or who drive without a license. More than half of crashes occur in the Provinces so this should be a focus area for them.

The three Unions have a great influence, access and communications among the population; however, it appears that the shortage of funding restricts a continuous and persistent awareness and educational campaigns getting to those who need it the most.

There is no apparent coordinated approach among the three Unions to ensure that a unified road safety message is conveyed to Laos's citizens nor do they target the Provinces where a large number of crashes occur.

5.5.3. Recommendations and opportunities for improvement

- Conduct formal Safe System training for all Directors General in MPWT
- Create a National Road Safety awareness strategy and promote Vision Zero to the general public using TV, radio, Social media and other social media
- DOT need to work with Police to conduct a regular public campaign to encourage a stigma for drink driving and speeding etc. This can be achieved by using TV, radio, their website and social media such as Social media, Instagram etc.
    - Strong and frequent enforcement of traffic law and regulation targeting drink driving; speeding; vehicle road worthy certification, helmet wearing; seat belt use and a valid driving license. The initial campaign would begin with warnings only and over a given time this would then be enforced with fines or other relevant deterrents.
- Promote ownership and accountabilities among senior management staff
- Citizens engagement - winning hearts and minds of citizens including young adults. Create a consistent message among the LYU, LWU and LTU when road safety awareness campaigns are rolled out to maximize and enhance the messages conveyed and the value for money achieved. For best results, citizens engagement should be backed up by enforcement campaigns.

5.6. Monitoring and evaluation

Periodic monitoring and evaluation of road safety targets and programs is essential to assess performance and to allow adjustments to be made. The establishment and sustainable Government funding of transport registries for drivers and vehicles, crash injury databases and periodic survey work will assist with the creation of accurate performance and exposure data. In order for the monitoring, data and evaluations to be accurate, it is the responsibility of the transport agencies, the police and health dept. to work together and share their findings regularly and consistently. The organization of independent inspection, audit and

[27] *Department of Transport. (2019). Draft Strategy LDPR. Vientiane: MPWT.*
[28] World Health Organization. (n.d.). WHO. Retrieved September 28, 2020, from https://www.who.int/gho/mortality_burden_disease/causes_death/top_10/en/

review are also part of this function. Required data collection includes: intermediate outcome measures, mean speed, number of regular breath testings, number of offences per test, vehicles monitored per week for speed, number of detected offences per monitored vehicle, trend in mean speeds, offences expiated per infringement issued, etc. These findings need to be logged into one source database which is the point of truth for any external organisation who are looking for information. In other words, all Government agencies should be singing from the same song book when it comes to monitoring and evaluating road safety. The only way this can happen is to put funding towards the technology required to enable this functionality.

5.6.1. Main findings

Some basic crash data collection and reporting is available however it is generally in paper format, fragmented, inconsistent and hard to consolidate as is located in different offices at district levels. The crash data is collected by the district level traffic police using crash record form[29] , after is being collected the data will be summarized in a statistic sheet format on a monthly, quarterly and annual basis and submitted to the provincial traffic police office to collate as provincial level aggregated statistics[30] and submitted to central level – Department of Traffic Police/Crash investigation Division to be compiled as national statistics[31] levels. Any agency wishes to use the data/statistics, for instance, the Department of Transport (DOT) will have to formally request for it. For instance, the Department of Transport (DOT) regularly (monthly, quarterly and annually) request and obtain data from the Department of Traffic Police and transfer the data into an excel worksheet to enable them to make necessary analysis (e.g., total fatalities and any traffic offense/violation) and regularly report to the Minister and relevant stakeholders as per requested.

In 2017, the World Bank has introduced the Data for Road Incident Visualization, Evaluation, and Reporting (DRIVER) System to Department of Transport/MPWT and Vientiane Capital and Department of Traffic Police/MPS, and all parties agreed to pilot and trial the system in Vientiane capital. DRIVER is a free web-based and open-source crash data collection system, that allows geo-spatial recording and analysis of road crash data using Open Street Map, developed by the World Bank.

The DRIVER platform has been translated and updated into Language, which follow traffic police's crash record form. The platform is hosted in https://laos.roadsafety.io/#!/login. The DRIVER Platform in Lao PDR is ready, piloted and deployed in Vientiane Capital from 2017 to 2019, with support and training provided by the World Bank (through grant funding from the Government of Japan under the Quality Infrastructure Investment Partnership, and from UK AID through the Global Road Safety Facility). In 2018, two trainings were conducted for five districts in Vientiane capital, with an aim to complete one-year data entry. However, due to police's illiteracy in English and computer skills, only 250 crash records out of about 1000 records reported for 2018 were entered by police into DRIVER, and participating police requested continuation of the program. In November 2019, more intensive 5 days training with basic computer training and DRIVER data entry and analysis was provided. After the training, a total of 25 participants of which all of them lack adequate basic computer skills and google platforms (email, map, and street view) to start with, were able to enter 728 crash records for 2018 and half of 2019. To ensure continuation of the crash record encoding, a voluntary encoding of records is agreed and a WhatsApp Hotline "DRIVER Lao PDR" is set-up,

[29] See Appendix H for sample crash record form
[30] See Appendix I for sample provincial/Vientiane capital crash data statistic report
[31] See Appendix J for sample national level crash data statistic report

with DRIVER related technical support from WB team. To date (July 2020), the Lao DRIVER platform has a total of 1300 (+) records.

Despite, a regular and systematic data collection and reporting as outlined above, the traffic police only attend the crashes that involve fatalities and those crashes where the parties involved cannot reach an agreement. That includes crashes that may result in serious injury and require hospitalisation. Additionally, the hospitals have no obligation to report the crashes to police, hence a large part of data is potentially not recorded. Some patients' families prefer to take the victims to die at home rather than hospital, in which case the death is not recorded as a traffic death. During the March 2019 mission, it was confirmed that in 2019 one hospital in Vientiane Capital (Mittaphab Hospital) reported 13,236 road crash patients (approx. 40 people/day) and ~230 deaths. One Ambulance service (Vientiane Rescue 1623) in Vientiane Capital reported 3,817 callouts in 2019, with the majority involving car crashes. Traffic Police reported a total of 6,616 crashes nationally, with 10,644 people injured and 1,134 deaths in 2019. The mission affirmed the need for a unified road crash database system, like DRIVER, to be put in place urgently.

The linkage between crash occurrence and infrastructure conditions are not discussed between Traffic Police and DOR.

5.6.2. Gap analysis

Based on the findings, there are main gaps that have to be addressed regarding data: lack of institutional arrangements that facilitate coordination, sharing, and integration of data, lack of well-defined, standardized, and formalized data collection and data quality assurance processes, and lack of supporting technology that improves data collection and analysis.

Regarding institutional arrangement, DOT, being the lead agency for road safety currently lacks the resources and capability to collate, organize, manage, and maintain a crash database system. The lead agency must be responsible for determining data collection procedures, maintaining the database, training, facilitating database linkages, among others.

In addition, while crash data is primarily collected by police, this data should be combined with or linked to other important road safety data from other sources, such as injury data from the health sector and road, vehicle and user data from the transport sector. These linkages are crucial since not all pertinent data are captured by the police. For example, accurate and detailed assessment of injuries can be done by medical professionals. Non-crash data such as data on infrastructure, vehicles, road user behaviour, road assessments, and contextual data such as population, the number of vehicle kilometres driven by type of road users are data that can be provided by DOT. Without a robust institutional arrangement that enables these ministries to work together and share data, it will be difficult to develop meaningful programs in road safety. However, current funding and resources do not allow for this and as a first effort crash data collection by the police needs to be improved by introducing DRIVER.

Another issue is how certain crash data elements are defined and are collected. Currently, there is no standard definition for fatality which should be defined as a fatal injury occurring within 30 days of a crash. Injury severities are also based on subjective assessments of the police. A more objective definition can be duration of stay in the hospital.

Clear guidelines should also be set for all aspects of data collection, reporting and analysis including timelines for various tasks to be completed, and interactive manuals and hotlines to support queries and troubleshooting. Currently, these are not in place.

A robust institutional arrangement should also be supported by easy-to-use, integrated, and electronic data systems. Crash data are still largely manually recorded in paper forms which is prone to error: handwriting can be incomprehensible, forms can be damaged or lost, among others. Systems such as DRIVER should be leveraged to streamline and help validate every part of the data collection process (such as collecting data at the crash scene using mobile phones, consolidating and sharing data among stakeholders, automating the completion of select fields). These systems can also provide analytical tools such as tables and graphs for summary reporting and geographic information systems to facilitate identification of blackspots and high-risk areas. Supporting technology can also aid data linkages which will increase the accuracy of data and provide more detail for evidence-based safety measures.

5.6.3. Recommendations and opportunities for improvement

- DRIVER should be identified as the national road crash database systems and should be rolled-out .

- The office that will ultimately house the national crash database should be capable both in terms of technology and staffing. The office should not just be able to conduct regular road safety analysis but also perform data quality assurance, set access policies, and should be capable to transform these analyses to programs and engage and hold discussions with multiple stakeholders.

- Supporting equipment should also be procured such as GPS equipment, mobile phones, and computers and internet in police stations.

- Institutional arrangement on data collection, quality assurance, analysis should be clarified. The DRIVER pilot implementation institutional arrangement is enumerated in Appendix L. The scale-up arrangement should be finalized with stakeholders.

- Crash data form are being reviewed and simplified as part of the GRSF support. In a future phase, definitions of crash data elements should be standardized among ministries.

- Data sharing agreements between the government ministries must be drafted and executed.

- MOH to establish their own health database system which should be integrated with DRIVER. MOH to also strengthen post-crash care rehabilitation and evaluate the results.

- Aside from crash data, data on road safety performance such as mean speeds, speeding offence levels and trends, motorcycle helmet use and drink driving detection rates per 100 Regular Breath Testings should be collected and reported to the TWG and TEG.

5.7. Road safety research & development, and knowledge transfer

This vital institutional management function has guided the design and implementation of national strategies that have sustained reductions in road deaths and injuries, in the face of growing mobility and exposure to risk. It aims to contribute research-based approaches and knowledge to road safety policy, programs and public debate.

Both, research development and knowledge transfers ensure a continuous improvement process and knowledge development as well as its application to achieve results.

5.7.1. Main findings

5.7.1.1. Research and development

The team was not able to identify any agency that is involved in road safety research other than NUOL (The National University of Laos). Road safety measure recommendations should be based on observations, discussions with local community and police and reviews of crash records. There is no documentation or register in relation to such findings. The absence of an evidence-based approach to road safety creates difficulties for jurisdictions to produce strong business cases for investment.

As part of this study, a component is allocated to research and development activities. Field research for the socio-economic research component is envisaged in two locations: in Vientiane Capital and Vientiane Province (Road 13 north).

Support measures that have been already implemented include:

- The road safety strategy, action plan and implementation plan. The strategy and action plans include a list of road safety interventions covering both physical and non-physical measures. These should be prioritized by DOT for implementation as follows:
- Road Safety Audit Manual and road safety audits
- Participation in the Asia-Pacific Road Safety Observatory events
- DRIVER training
- Road Safety Engineering training undertaken in May 2019

5.7.1.2. Knowledge transfer and capacity building

Some road safety seminars and workshops took place in Vientiane and included participants mainly from Vientiane and surrounding areas. The provinces have not benefited to the same degree of capacity building as its peers in the capital cities. The crash data is shared among agencies with DOT and police being the main contact point.

A new department at the National University of Laos has been formed; The Department of Transport and Logistic under the Faculty of Engineering. In the past it was under the MPWT. Students from the Engineering University have the opportunity to benefit from a 1.5-month internship with Vientiane DPWT. While this internship timeframe is very short, to add substantial value to both students and DPWT. It is a great platform that can eventually be expanded.

A Training Institute has been set up in 2015 and includes four divisions and four training centres. It is the training centre for all of the MPWT and consultancies within the sector. The Institute is maintaining all the records of staff who attended training.

The Department of General Education under Ministry of Education and Sports is in the process of training road safety to teachers who will teach the primary school students. There are several road safety committees within the Department, however they were not involved for a long time in any road safety aspects. The curriculum for schools is prepared by the Research Institute and provided to the Ministry of Education and Sport (MOE).

Good practice demonstration projects offer the mechanism for knowledge transfer. As part of this assignment the World Bank team is supporting DOT in coordinating and overseeing implementation of road safety activities under LRSP2, NR13 and others.

5.7.2. Gap analysis

In some departments of MOE, road safety is a new subject which is just starting to be acknowledged. It is essential that road safety education is part of the education system throughout the school years starting in early childhood to high school.

There are several sources of guidance available to assist jurisdiction with the implementation of Safe Systems. Some free online manuals are:

1. Integrating Safe System with Movement and Place for Vulnerable Road Users; AP-R611-20, Sydney
2. Safe System Assessment Framework, Research Report. AP-R509-16, Sydney.
3. Safe System Roads for Local Government Research Report. AP-R518-16, Sydney.
4. Asset Management within a Safe System, Publication No. AP-R442-13, Sydney.
5. Safe System in the Planning Process, Research Report. AP-R488-15, Sydney.
6. https://www.worldbank.org/en/programs/global-road-safety-facility
7. Effectiveness of Drink Driving Countermeasures: National Policy Framework. AP-R613-20; 2020 Sydney

Practitioners accessing the information in these manuals will require practical training adapted to the local context and translated to Lao language. Road safety training and capacity building is already being covered in Lao PDR mainly by international consultants. In the long term however, this is not sustainable for international consultants to deliver the training. There could be training of trainers program for instance which saves on budget and brings the responsibility back to the owner. Capability needs to be built within the existing national structure e.g. training institutes. The recent drafting of the Road Safety Audit manual represents a great opportunity in Lao PDR to widely dissipate the manual and train staff of all provinces and districts. Under DOT guidance and supervision this is a role that could be played by the Training Institute.

5.7.3. Recommendations and opportunities for improvement

- Using existing available facilities at PTTI and NUOL, expand the knowledge skills to cover area of evaluation of the road safety treatments
- DOT and DOR piloting the Safe System Assessment Framework platform on Vientiane Expressway & Vangvieng Expressways
- DOT to deliver training of road safety awareness in provinces and communities ensuring different groups representative of diversity (gender, age, people living disability, ethnicity) are targeted (deliver road safety awareness in 18 Provinces)
- Strengthen road safety and Safe System capability at provincial and district levels through DOT. i.e. Provincial and District Road Safety Committees.
- DOT to enable and support the Institute of Training (PTTI) to develop curriculum for undertaking Road Safety capacity building training across Lao PDR. One solution is to link the capacity building into funded projects.
- Introduce road safety as part of the curriculum within the National University of Laos under Department of Road Transport and Transport, Faculty of Engineering
- Include traffic safety awareness into the curriculum at all grades from primary to last year of high school and involve police in promoting safety for pedestrians and motorbike driver

- Offer engineering students internships of 6 months divided into 3 rotation in 3 areas. The internship to be shared among provincial and Vientiane DPWTs, DOT and DOR. Graduates will have the opportunity to experience different working areas and determine the areas they are most interested in to continue their career

- Assign an institution that will be responsible for the accreditation of the road safety auditors

6. Interventions

The Third Global Ministerial Conference on Road Safety took place in Stockholm, Sweden, on 19 and 20 February 2020. The event is also known as the "Stockholm Declaration". At this conference, a commitment was made by all representatives, to make the coming decade one of action and delivery by maintaining the integrity of the 2030 Agenda, "including by ensuring ambitious and continuous action on the targets of the Sustainable Development Goals with a 2020 timeline"[32]. That includes SDG target 3.6 of reducing road traffic fatalities by 50% by 2030.

Great concerns were raised in relation to the global road safety problem where:

- Road traffic crashes kill more than 1.35 people every year;
- Over 90% of road traffic deaths occur in low to middle income countries;
- these collisions are the leading cause of death for children and young adults aged 5–29 years
- Road traffic fatalities are the tenth leading cause of death of young people aged 15-29 years;
- In addition to the grief and suffering they cause, road traffic crashes result in considerable economic losses to victims, their families, and nations as a whole, costing most countries 1-5 per cent of their gross national product;
- If no action is taken to address the current crisis, global road traffic fatalities are forecast to rise to up to 500 million road traffic deaths and injuries worldwide;
- There is evidence about what works to prevent road traffic deaths and injuries. However, many countries have not implemented or do not enforce seatbelt use, speed limits, drink driving restrictions, helmet wearing or child restraint use.

6.1. Road Safety Management (Pillar 1)

6.1.1. Main findings

The Lao PDR Road Safety Strategy demonstrated adherence to the ambitious UN target for reducing the number of road-related crashes by 50% in the next decade.

The Lao PDR Government through MPWT committed to a multisectoral partnership by:

- Establishing the NRSC and its sub committees;
- Approving a Road Safety Strategy and Action Plan;
- Allocating funding to road safety;
- Adopting a crash information system i.e. DRIVER;

[32] United Nation. (n.d.). Retrieved 28 2020 September, from https://undocs.org/en/A/HLPF/2019/l.1

- Provide sustained program of capacity building to embed the Safe System thinking.

6.1.2. Gap analysis

NRSC and its subcommittees are in desperate need to start communication and meet on a regular basis. These forums need to be attended by senior leadership team within MPWT and promote 'down' the ongoing commitment to multisectoral partnership and the Safe System approach. At least twice a year the Minister of MPWT should attend the NRSC committee meeting. The Provincial and District level committees should promote "up" the need of resource allocation and funding to meet the 2030 goal.

Since the Road Safety Strategy and Action Plan were drafted there is little evidence of planning to implement the recommendations outlined in these documents. This needs to take priority. All road safety partners should reach a mutual consent for achieving quantitative targets in short and medium term.

6.1.3. Recommendations and opportunities for improvement

- Under DOT leadership, all road safety partners consent on quantitative targets on medium and short term (6 to 12 months)

- Studies to date reveal mostly positive findings about the effectiveness of car and motorcycle daytime running lights. The effectiveness ranged between an 8% to 29% reduction in crashes[33]. This will require an update to Legislation given that it is currently not permitted for motor vehicles to have headlights on during the day

6.2. Safer road and mobility (Pillar 2)

6.2.1. Main findings

Investment in road maintenance is occurring through the road maintenance fund with the Ministry of Finance playing a major role in funding maintenance through a fuel levy. That includes investment at high risk locations as part of the road safety fund described above. The DOR, along with international consultants, are planning to implement low cost treatments at 56 intersections. The construction of new roads is largely funded through external financing,

JICA is working on an urban transport master plan in Vientiane Capital with a target year of 2030. The project aims to enhance the capacity of urban development management so that urban development in the Capital will be managed in line with the 2011 established Master Plan. This has been endorsed by the Lao Government in 2012 and agencies such as PPTI and DPWT of Vientiane Capital will be the main benefactors.

The Vientiane Sustainable Urban Transport Project (VSUTP) is financed by ADB, EIB, EU, OFID, the private sector and Lao government. They are aiming to build a 'bus rapid transit system' along with other transport solutions in order to ease traffic congestions in Vientiane Capital. The project is financing over 12.9 kilometres of dedicated bus lanes, 28 enclosed stations and climate-friendly battery electric buses. It will also fund new signal lights at key intersections, a new on-street parking system and a central traffic control centre. It will also establish an urban transport management section within Vientiane Capital DPWT.

A Road Safety Audit manual has been completed and is now awaiting approval from the MPWT. It is expected that once approved, the DOT, DOR and DPWT will begin Road Safety

[33] European Transport Safety Council. (2001). Priorities for EU motor vehicle safety design. In Priorities for EU motor vehicle safety design. Brussels: ETSC.

Inspections (RSIs) and Road Safety Audits (RSAs) in line with the process described in the manual.

6.2.2. Gap analysis

Crash risk rate mapping of the Lao road network would be beneficial as it will enable investments in the highest risk locations. Programs such as iRAP would be recommended for this task. This type of mapping assesses the risk of death and serious injury based on historical data and / or road features.

For example, Austroads developed an Infrastructure Risk Rating manual for Australian roads[34]. It is a road safety risk assessment methodology that is calculated by coding the following road and roadside features:

- Land use
- Road stereotype
- Lane and shoulder width
- Horizontal alignment
- Roadside hazards
- Intersection density
- Access density
- Traffic volume – rural roads only
- Speed limit – rural roads only.

Safe System is not well understood at district or provincial levels. There is not much physical evidence of road safety prioritization on road sections and/or blackspots. When road safety improvements are undertaken as part of the road safety fund, the results in terms of lives saved is not known. A benefit on investment is either not calculated or was not apparent during the interviews.

The current road safety fund (approximately US $2m) offers the platform for investment in road safety however it is not enough to reach the 2030 targets. A progressive increase in capacity, capability and road safety funds would be required. This will initially ensure investment in blackspots, black length and mass action treatments.

6.2.3. Recommendations and opportunities for improvement

- DOT to work closely with JICA on the ambulance (dispatch) centre and DRIVER to link the two databases i.e. DRIVER and JICA's dispatch centre database

- DOT to implement a Benefit Cost Ratio investment methodology approval for road safety projects

- DOT to earmark part of available funds for high risk projects and create opportunities for all provinces to access the funds

- DOT and DOR to undertake road safety audits for major infrastructure projects

- MPWT to demonstrate a requirement and financial return to MOF for scaling up of the road safety fund by agreeing to a gradual increase from the 2.5% share of the Road Maintenance Fund revenue to at least match the an updated Road

[34] Austroads. (2019). AP-R587A-19. In Austroads, Infrastructure Risk Rating Manual for Australian Roads. Sydney, Australia: Austroads.

Safety Action Plan values

- DOR to set performance requirements for road markings and road signs
- Develop a network wide design process that embeds the Safe System philosophies.

6.3. Safer vehicle (Pillar 3)

6.3.1. Main findings

There were 1,850,020 vehicles registered in Laos in 2016 of which 1,422,869 are 2 or 3 wheelers.

DOT is responsible for transport planning matters including vehicle registration and licencing. This is regulated under the Traffic Law which is dealing with the vehicle and their use including loading. The Road Transport Law provides a regulatory framework for vehicle operation, repair, insurance. Traffic Police is enforcing both Traffic and Road Transport Laws.

6.3.2. Gap analysis

The regulation and restrictions that apply for import of used vehicles in Lao PDR requires strengthening to ensure the local market is not flooded with cheap and not crash worthy vehicles.

There were 52,443 heavy vehicles and 4,665 buses in Lao PDR in 2018. Vehicle and truck loads are regulated however not strictly enforced. That often creates road safety issues across Laos' road network with overloaded vehicle breakdowns. It is also a major concern from a road maintenance perspective with an accelerated rate of pavement deterioration.

In Vientiane Capital there is a reasonable percentage of fleet vehicles such as tuk-tuk's and motorcycles without headlights or taillights in working order. This issue may be of higher proportions in rural areas.

Technical vehicle inspections are not well enforced as it is currently possible to "pass" the inspection without showing the car.

When a crash occurs, a car occupant will continue to move at the same speed at which the vehicle was travelling before the collision. That will result in the driver being catapulted into the steering wheel and the passenger into the wind screen. The back-seat passengers will likely end up hitting the back seats or side windows. The use of seat belts and child restraints is one of the most important actions that can be taken to prevent injury in a motor vehicle crash.

6.3.3. Recommendations and opportunities for improvement

- Undertake / enforce periodic vehicle inspection safety compliance (road worthiness)
- Introduce safety regulation for imported vehicles i.e. motorcycle with antilock braking system, electronic stability control, back seat belts
- Enforce compulsory wearing of seat belts front and rear

6.4. Safer road users (Pillar 4)

The Safe System approach requires that human error be considered when designing roads. It is important not only to recognise that people make mistakes but also that serious injury

consequences are eliminated from potential crashes on a length of road. There is an assumption in the Safe System approach however that road users are expected to comply with the rules and regulations. This is the principle of *shared responsibility*

6.4.1. Main findings

Road traffic crashes are the leading cause of death in young people between 5 and 14-years-old in Laos. Key causes identified are alcohol and speeding.[35]

The Department of Media, under the Ministry of Information, Culture and Tourism (MICT) created a small unit of three (3) staff under the mass media department. This unit manages and coordinates the road safety campaigns with DOT. They attended the 10 October 2019 NRSC meeting.

In addition to organising the road safety week and having its own Social media page, the Department of Media, in collaboration with DOT, is developing TV and radio advertising campaigns. There have been more than five road safety videos created in the last two years. Future plans include the creation of more advertising and videos to raise awareness related to licencing issues and traffic enforcement.

In the four years prior to 2018, 56% of fines issued by Police after a crash in Laos were for the drivers or riders being unlicensed[36].

Lao Youth Union (LYU) in collaboration with Traffic Police and DPWT are organising activities and campaigns to raise awareness of drink driving at village level. LYU is coordinating these activities with other ministries and/or agencies who have undertaken similar campaigns.

Lao Women's Union (LWU) is focussing on raising awareness and education among women within families nationwide, children and youth. Adult males are the responsibility of Lao Trade Union (LTU).

6.4.2. Gap analysis

Literature reviews reveal that human contributing factors are present in most crashes as shown in Treat et al (1979). More recently in Cuerden and McCarthy (2016) found the same results 37 year later that 93% of all crashes are due to human error. This is in line with the Safe System approach recognising that humans are fallible, and this is a condition that is difficult if not impossible to change. A fresh take on the safe system approach is needed to understand how serious crash outcomes can be mitigated. The Safe System approach is therefore recommending that we design the roads that should be forgiving, and when crashes occur they should not result in death or serious injury.

Results of these investigations as well as other in-depth crash investigation studies show that most serious crash outcomes can be prevented or mitigated through multiple interventions for each crash.

Despite several behavioural campaigns in Laos run by various organisations, there were only minor improvements in terms of lives saved. Below indicates that public information and education campaigns have minimal benefit when compared with other measures. Nonetheless, large scale community engagement activities were carried out in the state of Victoria, Australia and this was centred around Safe System education to the public. The results of this campaign are attached here: https://www.tac.vic.gov.au/road-safety/tac-campaigns/tac-latest-campaigns/towards-zero.

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[35] Global Road Safety Partnership. (n.d.). Retrieved September 28, 2020, from https://www.grsproadsafety.org/programmes/countries/laos/

[36] *Department of Transport. (2019). Draft Strategy LDPR. Vientiane: MPWT.*

Police enforcement is not adequately implemented, and mutual agreements often take place between police officers and road users that are found to break the road rules. The issue is exacerbated in the rural regions where a stronger community bond exists. Tackling this issue is essential and the NRSC need to address this as a matter of urgency.

Table 6: Benefit Cost Ratio of Various Road Safety Interventions[37]

Type of Measure	Benefit Cost Ratio
Road safety audits and inspections	1.34 - 242
Vehicle design and personal safety equipment	0 – 31.7
Increasing traffic police enforcement	1.0 - 27
Traffic control, including new speed limits	0.5 – 10
Vehicle and garage inspections	1.9 – 7.2
Improving road design and roadside equipment	0.1 – 5.7
Road maintenance	0.7 – 2.87
Driver training, public information and education campaigns	< 0 – 1.1

6.4.3. Recommendations and opportunities for improvement

- Introduce a Zero Blood Alcohol Concentration (BAC) Standard for all road users[38] so that Laws can be enforced, and consequences established for drink driving

- TPD to implement a graduated licensing system for obtaining and/or retaining a driver/rider licence. This can be a points based system where points are obtained each time one breaks the road rules with a capped maximum number of points where you may lose your license temporarily e.g. drink driving is an offence carrying 3 points for instance with a max of 12 points allowed. Another system is the 3 strikes (caught breaking road rules 3 different times) and your license is suspended/removed temporarily as a result.

- TPD to improve the testing methods and standards for motor vehicle driver licence tests.

- TPD to review the level of penalties for drink driving and speeding in particular for the repeat offenders

- All agencies to promote the Safe System vision within communities and campaigns, using practical examples to support increasing awareness of the approach and its potential benefits.

- Promote using existing traffic infringement cameras to enforce legislation on driving against red light, not using helmets, etc. to deter road users from disobeying the law and follow up with strict enforcement.

6.5. Post-crash response (Pillar 5)

Post-Crash Response is the 5th Safe System pillar and it relates to the importance of improving post-crash support. It covers issues such as emergency roadside care and retrieval of the injured, hospital care, rehabilitation for injury, mental health care, legal support, and

[37] *The World Bank. (2019). Environment & Social Framework for IPF Operations (Vol. Good Practice Note Road Safety). Washington: The World Bank.*

[38] BAC calculator. (n.d.). Retrieved September 28, 2020, from https://www.baccalculator.com.au/

accurate data on crashes and injuries. It is believed that introduction of good international practice emergency care could address over half of the deaths currently experienced in low- and middle-income countries[39].

6.5.1. Main findings

The Ministry of Health (MOH) has eight (8) rescue teams in and around Vientiane. This includes 36 ambulances and 700 personnel. Not all hospitals have ambulances and existing ambulances often rely on locals to provide technical maintenance. The Ministry of Health is working with JICA to set up an Emergency Management Service system. JICA is to provide US $1m to establish an ambulance control centre.

Ambulance users are required to pay for the service with costs exceeding 2m LAK (US$220) for serious cases. In 2018 Mittaphab hospital had to waive 300m LAK ($UD33,400) in ambulance fees that poor families were unable to pay. These costs were covered by hospital operational budgets as the MOH were unable to cover the cost.

Vientiane Rescue is run by volunteers. It received 3,817 calls in 2019 and responded to 2,969 calls. 2,500 of those were in Vientiane Capital and the remainder in Vientiane Province, Champasack and Xiengkhouang.

Vientiane Rescue has 11 ambulances, 1 fire truck, 2 boats and 20 scuba diving sets. It comprises of 250 volunteers in Vientiane Capital and additional 100 volunteers in other three (3) provinces. The operating and maintenance budget is 20m LAK (US$2,230).

Often the consequences of serious injuries result in lifelong disability. There are only [3] physical rehabilitation centres nationwide able to assist with prosthetics, physiotherapy, etc.

6.5.2. Gap analysis

The team could not find information to indicate the (%) percentage of road crash deaths which occur at the scene, the number and % of deaths occurring on the way to treatment facilities from the roadside or the number or % of road crash deaths occurring after admission of injured to hospital.

An Emergency Management System (EMS) is not in place in Lao PDR however work is underway with JICA to implement one.

Rehabilitation services in Lao PDR are reliant on NGO's to provide support and funding.

6.5.3. Recommendations and opportunities for improvement

- The backbone of Lao PDR ambulance emergency services is run by volunteers. The qualifications of the volunteer staff to provide emergency medical care should be continually monitored, improved and sustained. Not all hospitals have ambulances, they all rely on volunteers.

- NRSC to embed post-crash care within the road safety strategies and allocate adequate funding

- The EMS project to be implemented with JICA support is fully supported and requires the Government of Lao support as a priority.

[39] *World Health Organization. (2016). (WHO, Ed.) Retrieved September 28, 2020, from who.int: https://www.who.int/violence_injury_prevention/publications/road_traffic/Post-crash_response_booklet_rev2.pdf?ua=1*

6.6. Safer Speeds (Pillar 6)

6.6.1. Main findings

'Safe Speeds' can be considered as a survivable travel speed. It aims to rely upon the provision of a suitable speed limit which reflects the safety quality of the road and roadside infrastructure and environment which will reduce the risk of serious or fatal crashes should a crash occur at a speed up to the limit at any given location. It considers the driver's ability to comply with the posted speed limit as well as the road environment. This includes interventions such as roadside barriers, roundabouts etc

Managing travel speed will need to play an important role in achieving the Road Safety Vision in Laos. Campaigns should therefore consider speed management necessary to apply a Safe System approach. It is recommended that National highways have a posted speed limit of 80 km/h and Urban areas a speed limit of 30km/h.

The traffic police play an important role in speed management and enforcement. The low cost of penalties and the low rates of enforcement of offences are not a sufficient deterrent currently to achieve driver compliance with road rules. The lack of likelihood of detection and insufficient levels of penalties provide insufficient negative consequences for drivers committing serious breaches such as speeding. The perception exists that you can speed to reach your destination faster if one is on a time limit, without the unwanted risk of receiving a heavy fine.

The rapid motorisation of Laos and poor driver/ rider discipline i.e. speeding, not wearing seatbelts and not wearing helmets, (which are in fact responses to a lack of enforcement and deterrence) are the main reasons for the high death tolls on the roads of Laos. A 5% cut in average speed can result in a reduction of some 30% in the number of fatal road traffic crashes[40]. Suitably intensive and unpredictable law enforcement with adequate penalties to deter these behaviours along with complementary public education focusing on the undesirability of these behaviours and emphasising that police are out there on the roads enforcing the law, is the only readily available immediate way to improve this needless loss of life.

6.6.2. Gap analysis

Speed limits are hardly enforced today. There are high rates of noncompliance with road safety rules and it is acknowledged by all stakeholders that speed and alcohol are the major factors leading to crashes. Given its important role in achieving a Safe System, it requires a greater acknowledgement that is mirrored in actions by management teams.

Due to the lack of data and information available on speed enforcement measures, police often rely on cultural views when it comes to speeding and speeding enforcement. In rural areas there is a reluctance to enforce the speed limit and apply fines to the offending drivers. This situation appears to be convenient at the individual level but is certainly detrimental at societal level. This cultural view around speed and enforcement needs to change.

As indicated in chapter 5.3 'Legislation, Regulation and Standard', negotiations between Police and the offending drivers often leads to no penalty. This established habit needs to change but it will take time. The fastest solution and what is generally considered 'Good Practice' is to install fixed red light and speed cameras at high risk locations.

It is understood that the current level of fines in Lao PDR are not a deterrent to stop road users speeding. It has been demonstrated in many jurisdictions across the world that strict

[40] *World Health Organisation. (2017). Managing Speed. Geneva: World Health Organization.*

enforcement and enforcement through automated speed control (cameras) are effective countermeasures at reducing speed. In this view the fines for speeding must be appropriate so that they act as a deterrent to speeding.

Speed management and enforcement are essential to reduce the number of crashes and their severity.

6.6.3. Recommendations and opportunities for improvement

- DOT to review the speed limit on the National Highways where the road characteristics are not in line with the Safe System recommended speeds
- TPD to review the quantum of road speeding fines to ensure they act as a deterrent
- TPD to enforce the new speed limits and factor in future % targets of increasing speed compliance rates alongside annual reviews of these progress targets.
- A review and implementation of new management practices to improve monitoring and support of traffic police. Speed enforcement needs to be managed top down before, during and post implementation of changes.
- Undertake a review of the current speed management guidelines with the aim to reduce speed limits and enforce road rules.
- Undertake mean traffic flow speed surveys along the road routes where speed is the main contributor to crashes.
- DOT and Traffic Police to prepare and publicise a speed enforcement program to the community with a clear vision and clear rules and consequences. Road statistics will be helpful in this case as well as National and local media campaigns and school education programs.
- Introduce the Safe Speed management principles as part of future road improvement projects
- Undertake mass media campaigns linked to speed and speeding to support enforcement programmes

7. Recommended strategic priorities

Road safety management improvement is a change process that the MPWT will need to go through. The change will require the whole team to embrace the Safe System approach and principles as well as a sustained commitment to improving the road trauma situation in Lao PDR.

A cultural change around road safety and Safe Systems need to occur where all stakeholders and actors understand their roles, how important their roles are in addressing the road trauma in Lao PDR, and accept the challenges they will face in improving road safety performance.

Below are the recommendations which the Bank team believes should have priority status out of all the other recommendations listed above in this report. For each of these strategic priorities, there is a recommended approach included and some examples of tried and tested approaches.

7.1. Recommendations on strategic approach to NRSC

The NRSC act as a trusted advisor to the government, the private sector and the community. There is no better time than the present for the NRSC to make themselves seen and heard when activating the national campaign to save lives and reduce road trauma, launching the large-scale effort required to achieve the 2030 monumental road safety vision. It is not reasonable to expect the stakeholders to achieve such ambitious and essential goals without considerable collaborative support and clear direction. This is a national upgrade which can be achieved with the genuine commitment and sustained efforts of the NRSC and its members jointly.

Every large program of work has multiple teams that perform multiple roles. Each team must be clear about where they fit into the bigger picture and they need to know who is responsible for what, who is accountable, who plays a consultative and contributing role and who needs to be kept informed. This is called a RACI (Responsible, Accountable, Consulted, Informed). All change management requires a RACI to establish everyone's role at the start of every change activity. For example, at the highest level, the NRSC is responsible for this strategy to succeed, the DOT (mandated as the Lead agency and NRSS) is accountable for delivering the work on time and within budget. All other agencies need to be consulted and/or contribute when and where appropriate, and the public as well, as the NRSC need to be kept informed of decisions.

The Safe System Approach is professionally researched and proven to work in many countries already around the globe. It is the cornerstone of any successful road safety plan and a great guide and resource to use for all agencies. The NRSC plays a vital role in the governance, structure and delivery of programs to achieve the Road Safety Vision. The level of success will reassure stakeholders and communities that the road safety budget is justified when compared to other government commitments.

The Road Safety Strategy and Action Plan, when approved, will provide a strategic direction to the road safety program. Unless there is a governing body with credibility and mandated power, the direction of the program will be difficult to control.

NRSC has a clear governing role to play with the time appropriate support of the chair, the Minister of MPWT. The practical implementation of the program then rests with DOT.

It is recommended that the Minister of MPWT nominates a full-time team to work on this strategy and to provide the NRSC with clear outcomes and objectives such as the following:

- To ensure program outcomes align to strategy and policy outcomes

- To provide a clear line of sight and transparency of program and specific project related aspects such as time, quality and cost
- To provide strategic direction to the program and projects
- To review and monitor program and project goals, objectives and outcomes
- To prioritise programs and projects
- To consider stakeholder risk management (internal and external)
- To resolve escalated disputes and issues
- To provide program and project leadership and direction
- To provide richer and more robust discussions by bringing independence to the Road Safety Program

At present time several ad-hoc meetings take place at Minister's, Director General's and Deputy Directors' levels. The group that meets is small and with a targeted approach and set agenda with actions can become highly effective. The ad hoc meetings can continue however, it is proposed to formalise and structure some of these meetings to allow for better monitoring, evaluation, and reporting on implementation of the strategy and action plan. The following meeting structure and frequency is proposed to be adopted (Figure 10):

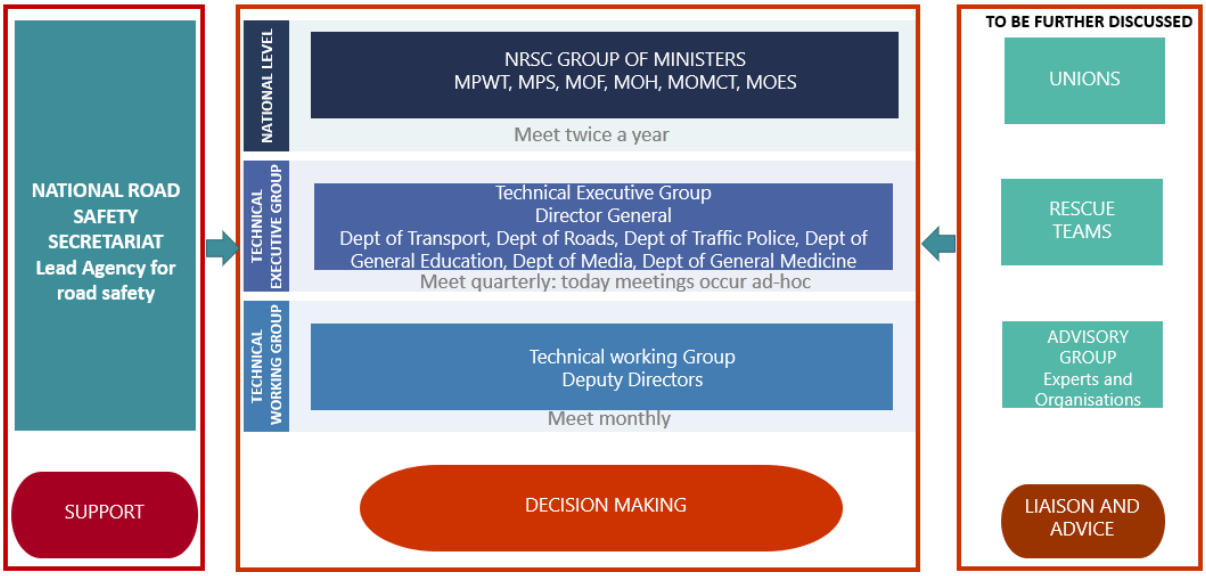

Figure 10: Proposed decision-making structure replacing ad-hoc meetings

Each group is proposed to have clear accountabilities, decision making delegation and clear agenda. Formalising these existing meetings is required to formally report on progress of the road safety and follow up on targets.

Table 7: Ministerial, executive and technical groups members

NRSC GROUP OF MINISTERS MPWT, MPS, MOF, MOH, MOMCT, MOES	
Purpose	**Members**
• Promote the strategic objectives of the National Road Safety Vision to the public and other agencies • Bring together a strong partnership between all Ministries	Minister of Ministry of Public Works and Transport Director General of Department of Transport (Head of Secretariat)

• Oversee the delivery of the National Road Safety Strategy • Sponsor innovation and best practice	Vice Minister of Ministry of Public and Security Vice Minister of Ministry of Education and Sports Vice Minister of Ministry of Health Vice Minister of Ministry of Media, Culture and Tourism Vice Minister of Ministry of Finance
Technical Executive Group **Director General** Dept of Transport, Dept of Roads, Dept of Traffic Police, Dept of General Education, Dept of Media, Dept of General Medicine	
• Monitor development and delivery of scheduled actions including the implementation of the Road Safety Strategy • Consider new policy demands and emerging adverse road safety performance trends and consider recommendations from TWG for action, including projects and programs for advice then provided to NRSC • Consider road safety performance reporting from TWG against KPI's, seek further information and issue instructions for actions to TWG as necessary, as well as reporting to NRSC. • Monitor consultation activity by TWG with PRSC and DRSC and update NRSC with progress and any issues/ relevant necessary recommendations • Implement decisions taken by NRSC and TEG and ensure effective delivery of projects	Director General of Transport Department, MPWT Director General of Road Department, MPWT Director General of Department of Traffic Police, MOPS Director General of Department of Education and Sports, MOES Director General of Department of Health, MOH Director General of Department of Finance, MOF Director General of Department of Media, Culture and Tourism, MOICT

Technical Working Group Deputy Directors	
• Monitor development and delivery of scheduled actions including the implementation of the Road Safety Strategy • • Consider new policy demands and emerging adverse road safety performance trends and provide recommendations for action, including projects and programs to TEG • Regularly review road safety performance and report to TEG • Ensure effective delivery mechanism of projects • Consult with PRSC and DRSC to inform national strategy and actions reviews. • Implement decisions taken by NRSC/ TEG. • Manage stakeholder relationships	Nominated from Deputy Directors of the Divisions or technical officers from MPWT, MOPS, MOH, MOES
NATIONAL ROAD SAFETY SECRETARIAT Lead Agency for road safety	
• Provide secretariat and certain policy development support to o TWG, TEG and NRSC. • Analyse and report to TWG and TEG and NRSC on road safety performance through final crash outcome data and intermediate outcome data. • Carry out overall management of the data collection and analysis and distribution task – with Police and DOT	To be mandated to DOT

7.2. Recommendations for coordinating the road safety strategy

DOT is mandated as the lead agency supporting the NRSC. The NRSC role is to make decisions, approve programs and policies based on recommendations from TEG and TWG.

TEG and TWG will provide recommendation to NRSC and implement the decision that are approved by NRSC. Any major policy or program action should be advised through the TWG to TEG to NRSC framework. The TWG and TEG will provide essential base work and consensus between all departments before NRSC consideration. DOT is mandated as the lead agency will provide support to these three groups (NRSC, TEG and TWG).

The role of the NRSC is to promote the strategic objectives outlined in the Lao Road Safety Strategy and bring together a strong partnership between the agencies. It has a responsibility to model and lead a fresh culture of positive, constructive practices and decision making.

The NRSC representatives are required to champion and promote the Safe System approach and Safe System thinking within their organisations. That means providing a high level of support and education to the road safety program and promoting a culture change/shift towards saving lives within each organisation.

The road infrastructure delivery agencies play a vital role in the planning, design and implementation stages of infrastructure projects. To ensure that the Safe System approach is included in every project it is essential that project approval is directly linked to achieving the requirements of the Safe System Pillars.

To effectively incorporate road safety during the planning and design stages, several functions are required to interact. An important aspect is the *Project Management* function and consequently the project scope approval process needs strong, clear and expedient governance.

Figure 11:Continuous improvement process

The NRSC is responsible for the Safe System implementation within the relevant agencies as well as adopting an aligned informed position on safe system reflected in the joint national strategy with each department/ agency having the responsibility for delivery of relevant interventions and enablers, which reflect the safe system commitment. The agencies undertaking the design and road infrastructure planning activities (DOT, DOR and DPWT) are accountable when ensuring these principles are implemented in the planning and design functions (Figure 11).

7.3. Recommendations to implement a Unified Road Crash Database (DRIVER)

DRIVER can serve as a single platform for multiple agencies (i.e., central/local government units, the police) to record crash data in one place, and it also has the potential to link health sector data. The Platform is currently being updated to latest programming language and create DRIVER 2.0, with numbers of enhancements being added (e.g., create advanced administrative privileges, add the ability to capture diagrams of crashes to improve the detail in crash records, integration with iRAP star-rating data, iRAP toolkit, and Mapillary, develop an iOS and improve Android Smartphone application), and planned to be completed by the end of 2020.

Thus, DRIVER can be used to support advocacy for road safety, improve the ownership of the road crash problem by governments by linking relevant agencies and supporting their roles in addressing the problem, as well as help to evaluate early wins and celebrate successes aimed at improving the sustainability of road safety actions through a public interface that is customizable by the entity responsible for reporting. This platform will help transport agencies identify, prioritize and design road safety interventions, as well as monitor the efficacy of those interventions. This system is well suited and in line with Key Actions 6 and 7 (specify new road crash and injury data system, as well as implementation) set out in the Road Safety Action Plan 2025 (see **Error! Reference source not found.**Appendix G of this document for more details) of the Road Safety Strategy 2030.

Based on key stakeholder meetings and discussion, all parties agree to adopt a modern, unified and reconciled crash database system and implement DRIVER nationally. In order to scale-up, the operational roadmaps need to be adopted and implemented. The roadmap for DRIVER deployment is enumerated in Annex F. Key tasks that have to be done are:

- National level MOUs - that set out an institutional and implementation arrangement, outlining clear roles and responsibilities of each agencies (i.e., MPWT, MPS, MOH/Hospital and others as needed) involved in the implementation and deployment of DRIVER nation-wide. The pilot implementation institutional arrangement is enumerated in Appendix L. The scale-up arrangement is to be finalized with stakeholders.
- Training-of- trainer (ToT) - to build a team of excellent trainers that can lead the city/country-wide training. There shall be a trainer and focal point representing each region (North, Central and South) for better cooperation and outreach.
- City-/country-wide training - to be conducted once a year in each province (with all district traffic police office attending the training) by the Training-of-Trainers. After the training, the Trainers shall follow-up and provide troubleshooting as needed via What's App or other means as appropriate.
- Equipment and server/cloud - to be installed and maintained, either locally (within MPWT, MPS) or in a Cloud.
- Hiring local IT staff (permanent or consultants) for backend support on maintenance, data management and analytics, trouble shooting, etc.
- The World Bank to continue to provide technical assistance and support (including training and facilitation) from ongoing projects for agreed priority recommendations , and gradually phase-out the provision of technical advice beyond that time when awareness of the path of transition from a project focus to a program focus across all safe system pillars has been well developed.

7.4. Recommendations for budgeting and resourcing on a national, regional and district level

A substantial proportion of the annual road safety funding is allocated to Vientiane Capital. It is important that regions and districts are equally involved as partners, and budget is allocated across all 18 provinces. The capability and safe system understanding of the provincial and regional engineering staff is crucial in reducing the road trauma across Lao's roads.

7.4.1. Proposed Investment plan model

A current investment program is in place, the challenge is to achieve highest return on existing investment in terms of lives saved. The mandated lead agency (DOT) plays an important role to build up the capacity across all institutions and communities for this task.

Key elements for funding under this model could be comprising of:

- Blackspot and black length treatment ($US1M / yr)
- Mass action treatment on rural roads ($US0.4M / yr)
- Implementing traffic calming measures ($US0.3M / yr)
- Enforcement and education ($US0.3M / yr)

Based on the assumptions and results from Table 8**Error! Reference source not found.**, a US $1M investment in blackspot is expected to return 4,880 death and serious injuries saved over a 20 year treatment life period. *($1m/yr = 20 blackspots @ 24.4 lives saved over 20 years =488 lives over 10 years =4,880 lives)*

The return on investment for mass action treatments on rural roads and traffic calming measures are dependent of the type of treatments chosen therefore the crash reduction factors. The crash reduction factors for such treatments is generally between 10% to 35%[41].

If current levels of investment continue to be made in road safety, it can be estimated an annual increased in fatalities by 7% every year[42]. That means by 2030 Lao PDR will record 2,237 fatalities if nothing is changing (See Figure 12).

[41] *irap. (2010). Road Safety Toolkit. Retrieved September 28, 2020, from http://www.toolkit.irap.org/default.asp*
[42] *Mektakul, S. (2016). unescap.org. Retrieved September 24, 2020, from UNESCAP: https://www.unescap.org/resources/day-1-presentations-regional-road-safety-goals-28-29-july-2016-seoul*

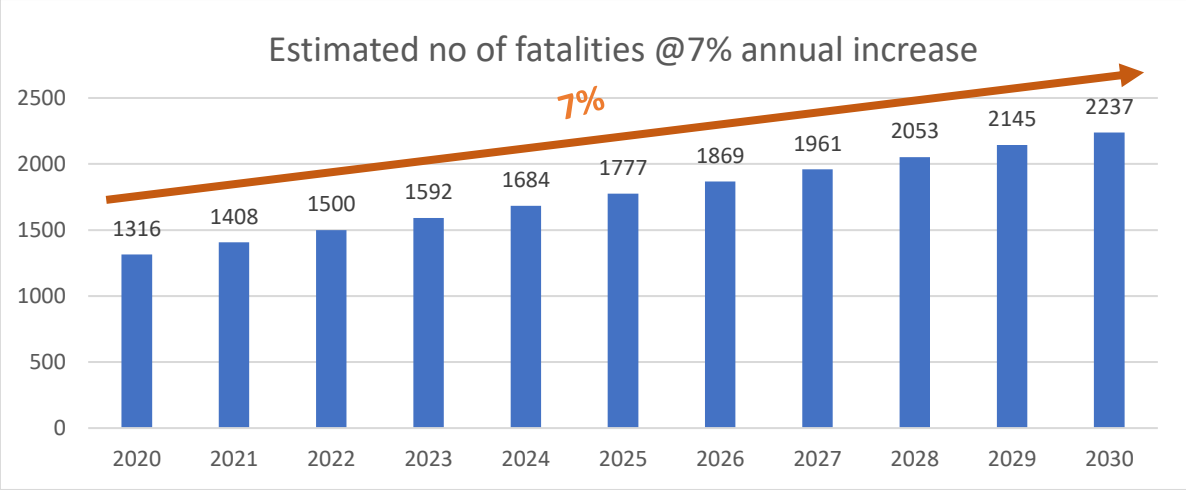

Figure 12: Estimated no of fatalities by 2030 with a 7% increase

Note: *the estimated number of deaths for 2020 is derived from the 2019 figure indexed by 7%*[42] *above. Estimated 2019 number of deaths is 1000 reported death + 230 deaths reported by one hospital. Therefore the 2020 estimated deaths is 1230 x 7%=1316.*

7.4.2. Proposed model investment funding for intersections

Without available crash data, an assumption is made that 40%[43] of all serious casualty crashes are occurring at intersections, and say, 25% are fatalities.

Costing for retrofitting intersections will depend on the treatment applied. Some suggested treatments are:

- Safety platforms at intersections regardless of control types and locations where posted speed limit is ≤60km/h;
- Compact roundabouts with safety platforms on all approaches; and
- New traffic signals with safety platforms on all approaches.

A conservative crash reduction factor for any of the treatments above is averaged at 40%- and 20-years lifespan. The cost of investment for each intersection is US$50,000. Based on McMahon, K. and Dahdah, S. (2008) The True Cost of Road Crashes[44], average crash-cost in Lao PDR are US$150,000 for fatal and US$37,500 for serious injuries.

Based on these values the Benefit Cost Ratio (BCR) calculation methodology that is extensively used in Victoria, Australia can be applied.

Table 8: Assumptions of number of crashes at intersections

Investment	No of Fatalities recorded within a	No of Serious Injuries recorded within a 5-year period	BCR	Number of Serious Casualty Crashes (DSI) Saved over

[43] *Based on Australian experience, DRIVER data and other LMIC*

[44] *McMahon, K. a. (2008). The True Cost of Road Crashes: Valuing life and the cost of a serious injury . Basingstoke Hampshire UK: iRAP.*

	five-year period			Project Life (20yrs)
US 50,000	1	4	5.3	9.8
	2	8	10.6	19.6
	3	12	15.8	29.3
	4	16	21.1	39.1

Based on the four scenarios shown in Table 8 for a US$50,000 investment and a treatment returning a 40% crash reduction factor, the average return (BCR) is 13.2 and average number of deaths and serious injuries saved over 20 years (life of the treatment) is 24.4.

Should only $US2M be invested per year in intersection treatments, (i.e. 400 intersection treatment delivered, with an average DSI of 24.4) over the life of the treatment (20 years), there will be a minimum of 9,780 death and serious injuries saved.

This is not enough to achieve the 50% reduction in Death and Serious Injuries by 2030. If the 7% annual increase in fatalities is not included and with an estimated 1,000 death per year, in 10 years there will be 10,000 deaths. With a 7% annual increase in fatalities, based on no interventions there will be 19,542 predicted fatalities by 2030. In this view, a predictive model will need to show at least a 50,000[45] reduction in fatality and serious injuries over 10 years in order to halve the number of deaths and serious injuries on Laos' roads.

It is an example of how a reduction in road trauma can be systematically calculated and projected to 2030 to achieve Laos' Road Safety Strategy vision. An in-depth analysis would be required to demonstrate its viability, level of investment and approach.

It is noted that the most common method used [46]to prioritise investment is the Benefit Cost Ratio followed by potential for Improvement. MPWT should be considering adopting such prioritisation for investment tools. It would ensure that the investments are targeting the highest return on investment location hence improving the highest risk sites.

The basis of this example is that planning, monitoring, and evaluation are essential.

In order to, at least partially, deliver the commitment, from the road safety action plan an absolute minimum ramp up in road safety investment will rapidly have to escalate to at least US$10M per year (see Figure 13).

[45] Estimated number of serious injuries 10 times of the number of fatalities

[46]. PIARC. (2019). Implementation of National Safe System Policies: A Challenge. Cedex, France: World Road Association (PIARC).

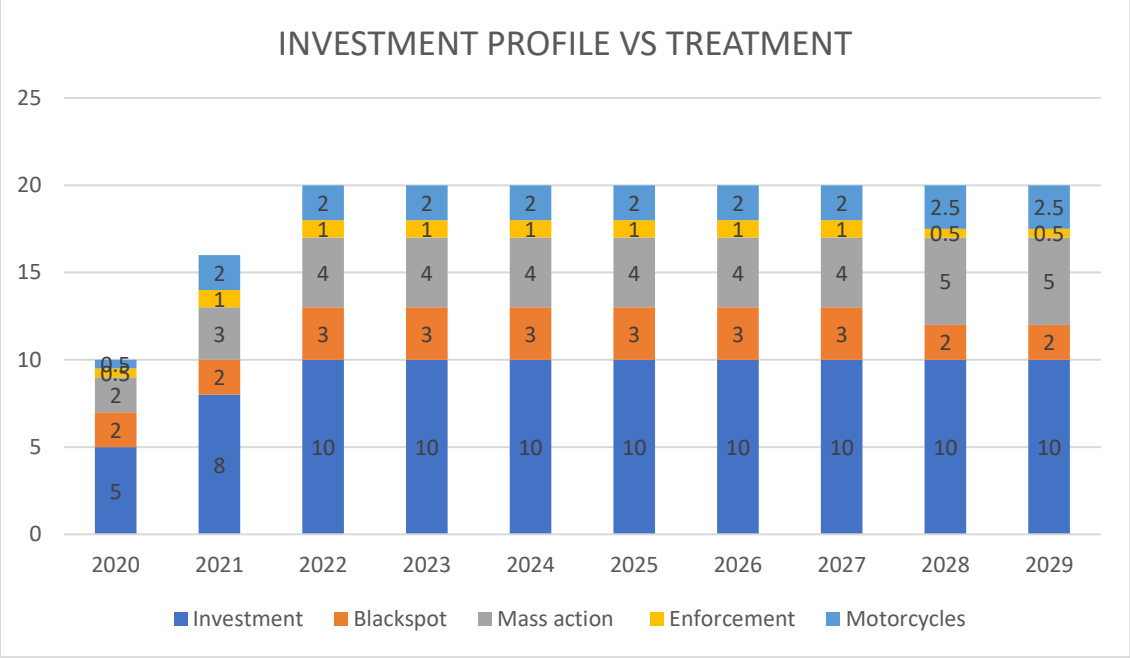

Figure 13: Proposed road safety investment scenario

Scenario 1: No significant road safety budget increase

Without any increase in the current road safety budget allocation, the current upward road traffic casualties' trend will continue.

In such circumstances it is necessary that a strategy is applied and only those projects that will return the highest rate of return on investment are approved. Enforcement of speed and alcohol limits will need to be scaled up immediately as a quick measure to save lives. This will be challenging, but essential. The road infrastructure investments should go through a rigorous approval process and be prioritized based on the estimated number of lives and injuries which will be saved.

Accountabilities need to be clear for every agency and group working to achieve the goal of saving lives and reducing the impact of road trauma. The community has a right to hold those responsible to account and the responsible entities can also hold the community to account when everyone is clear about their responsibilities, expectations, rules and consequences.

The capacity building may have to proceed under a 'no significant budget increase' scenario, unless the executive group (TEG) members are effective in advocating to Ministers/ cabinet for increased funding, which is an important responsibility they carry.

Scenario 2: Road safety budget increase

In Scenario 2, the road safety budget is significantly increased from $2m/year at present to $10m/year.

An increase of road safety budget is urgently required to start retrofitting existing network in the next 5 to 10 years. The budget is required to be incrementally increased as the skills, and capacity of the teams increases. Initially the budget would have two elements:

- Funding for blackspots and black length
- Mass action treatments addressing vulnerable road users and run off the road crashes in rural areas

Starting in year two, the program can become more sophisticated targeting individual crash types e.g. head on, run off road, crashes on curves etc. That is reliant on the uptake of the DRIVER platform to provide such essential data.

Implementing the recommendations from this report, the road safety strategy and the action plan, requires a road safety budget increase. If the recommendations from the three documents are implemented, effectiveness and efficiency of developed road safety programs will increase from a 35% injury reduction factor (average conventional approach) to 70% (more Safe System compliant).

To estimate the annual lifesaving impact of an increased budget an assumption is made that there are 1,000 deaths and 10,000 serious injuries per year.

- If 10 % of the road trauma (100 deaths and 1,000 serious injuries) are targeted each year the increase of effectiveness of the solutions will mean additional 35 deaths (35%*100) and 350 serious injuries (35%*1000)
- If 20 % of the road trauma (200 deaths and 2,000 serious injuries) are targeted each year the increase of effectiveness of the solutions will mean additional 70 deaths (70%*100) and 1,400 serious injuries (70%*1000).

We can apply a more practical conservative estimating of lives saved, through application of the proposed targeted investment.

It should be noted that while conservative, the values in the model below are estimates based on investment models applied in Victoria, Australia and tailored for Laos' conditions.

Scenario 3: Use road maintenance fund for low cost road safety improvements

The 2.5% budget for road safety from road maintenance fund to address road safety matters is certainly not going to achieve the 2030 vision the Lao PDR has embarked upon.

Austroads[47] recently released a Research Report (AP R618-20) which enables road managers, planners, and designers to achieve improved safety outcomes by applying consistent standards along a road corridor. A process was developed to assign stereotypes to roads and intersections and prepare network-wide safety plans on a corridor basis. Among other variable, the process takes into consideration available funding for the network (maintenance funding plus road safety funding) and treatment costs.

Retrofitting of existing road network can be done as part of the regular maintenance contracts by including road safety and mainstreaming related items in the bill of quantities of the contracts, instead of financing separately from the road safety budget from the road fund. This work should be delivered within in the next 5 to 10 years and start on a priority basis focusing on black spots and black length.

In this way the road safety budget from the road fund can be used for actions other than civil works such as introducing simple measures to save lives through improvements to the current practices to align with the Safe System philosophies and undertaking of Road Safety Audits for all new infrastructure works.

A realistic investment modelling forecasting road safety benefits is required to be undertaken for each scenario to understand the impacts of investments and life saved.

[47] *Austroads is the peak organisation of Australasian road transport and traffic agencies*

7.5. Recommendation for roles and responsibilities on national, provincial and district level during the planning, design, and implementation of road safety measures

This recommendation ensure that every infrastructure project have regard of the Safe System approach and includes measures that prevent death and serious injuries. That means that the National, Provincial and District road safety committees outlined in **Error! Reference source n ot found.** play an important role in providing a high level of support.

The prioritisation of maintenance and construction of road infrastructure rest with the provincial governments and supported by districts. It is extremely important that the Provincial and District road safety committees strongly believe in the road safety and are continuously trained and educated. This is to build capability and ensure that the practices and beliefs between current methodologies and approaches and Safe System methodologies and approaches are gradually merged to achieve Laos' road safety vision to eliminate deaths and serious injuries. The role of the central government (NRSC and NRSS) is to ensure that funding is allocated to support the National Road Safety Strategy agenda.

It is recommended that implementation of any large scale infrastructure project is approved by a skilled Safe System group or a Project Control Committee that understands and is appropriately trained in recognising value of road safety interventions as well as understand Lao PDR road safety vision. A Project Control Committee is the direct result of the direction given by NRSC. It comprises of the heads of the departments together with the District and Provincial heads. A healthy debate within these committees will result in a better investment.

7.6. Timeframe for delivering recommendations

The recommendations in Table 9, Appendix A below are taken from the report and categorise in three (3) outputs:

i. Institutional recommendations
   - Deliverables that seek improvements in intermediate and final outcomes which can also be measured, targeted and monitored

ii. Intermediate recommendations
   - Targeted, measurable safety performance indicators for activity linked to preventing deaths and serious injuries

iii. Final recommendations
   - Long-term Safe System goal & interim targets to reduce and ultimately prevent deaths and serious injuries

Each recommendation is prioritised according to *benefits* and *capacity* to deliver the recommendation.

- A high priority is deemed to be delivered immediately (within 6 months)
- A medium priority:
  - M1 priority within 6 months
  - M2 priority within 12 months
  - M3 priority within 24 months
- A long term priority:
  - L1 priority by 2023
  - L2 priority by 2026
  - L3 priority by 2030

Priority of each recommendation is based on a simple methodology fit for the purpose of this advice (see Figure 14). There are two matrices that need to be used to determine the priority for each recommendation:

1. Investment Priority Matrix
    - Priority is based on level of investment (high to low) vs potential for saving lives (high to low).
2. Capacity Priority Matrix
    - Priority is assigned based on the team's capability to deliver the recommendation (the task) vs the level of effort it takes to implement the recommendation.

Investement Priority Matrix		Potential for saving lifes		
		Low	Medium	High
Investment	Low	Low (L3)	High	High
	Medium	Low (L2)	Medium (M3)	High
	High	Low (L1)	Medium (M2)	Medium (M1)

Capacity Priority Matrix		Capability to deliver		
		Low	Medium	High
Effort required to deliver	Low	Low (L3)	High	High
	Medium	Low (L2)	Medium (M3)	High
	High	Low (L1)	Medium (M2)	Medium (M1)

Figure 14: Recommendation priority ratings

For example, the recommendation for *enforcing drink driving*:

- Investment Priority: Low to Medium Investment with an expected High potential for saving lives. High Priority
- Capacity to implement: Low to Medium effort and Medium to High Capability to deliver.

Therefore, *enforcing the drink driving* is a **High Priority recommendation**.

8. Conclusions

Lao PDR needs a commitment to improve its road safety outcomes. Measures do exist and actions are identified by the study team in this report, which could reduce fatalities and serious injuries at a cost which would be much less than the associated economic benefits of the trauma reduction.

Road safety management improvement is a change process that the NRSC and the member departments will need to go through. The change will require the whole government departments team to embrace the Safe System approach and principles as well as a sustained commitment to reducing road trauma in Lao PDR.

A cultural change around road safety and Safe Systems need to occur where all stakeholders and actors understand their roles and how important their roles are in addressing the road trauma in Lao PDR.

This review has considered the road safety results in Lao PDR in recent years and examined the factors contributing them. The rate of fatalities per 100,000 population based WHO estimated data for 2018 was 16.6 and based on Police data for 2019, the reported road traffic crash deaths in Lao PDR were 1,020. This is high when compared to, for instance, Indonesia (12.2) or Philippines (12.3) but lower than Thailand with 32.7 fatalities per 100,000[48].

Road crashes in Lao PDR are the number one cause of death for 5-14-year-olds, number two cause of death for 15-49-year-olds, and number one cause of disability for the entire population. Economic losses from road crashes in 2017 can conservatively be estimated at over LAK5,098 billion (US$565m), this is 3.3% of the GDP.

It is the view of the study review team, that several serious crash risks could be addressed with focused and sustained effort. This would enable meeting the Lao Road Safety Strategy 2030 outcome target to halve the fatality numbers by 2030. However, this requires firm commitment from decision-makers as identified in the recommendations made by the study Team.

Lao PDR has taken a first good step to improve road safety by earmarking road safety funding from the Road Maintenance Fund (RMF), but funding is not meeting needs. Further, important steps were taken on regulations by preparing:

- A draft Lao People's Democratic Republic Road Safety Strategy 2030
- A draft Lao People's Democratic Republic Road Safety Action Plan to 2025**, but actions need to be reviewed to consider existing and future realistic funding**
- A draft Road Safety Audit Manual 2019/2020.

Finally, the existing road safety management set-up includes a NRSC and a NRSS at central level and at local level in each of the Lao provinces and districts, Road Safety Committees supported at provincial level by Road Safety Committee Offices, **but the organisational set-up needs to be reviewed and strengthened. better resourced and the senior executives need to demonstrate a firm commitment to lead.**

[48] *World Health Organization: WHO. (2018 and 2015). Global Status Report on Road Safety.*

The aforementioned provide a good basis for taking the road safety commitments made in the strategy and action plan forward. However, there are challenges and constraints that need addressing.

The study Team describes in Chapter 5 of this report the findings of the road safety capacity review of Lao PDR by depicting every institutional management function described in the GRSF Guidelines for Road Safety Management Reviews and Safe System Projects (2013). Chapter 5 is discussing the necessary interventions, and Chapter 7 is detailing the most important recommendations to achieve the Lao road safety objectives.

The Team reached the following key conclusions:

Coordination

- NRSC needs to become visible, meet at least every 6 months, and promote the strategic objectives outlined in the Lao Road Safety Strategy. It must model and lead a fresh culture of positive, constructive practices and decision making. Formalise the current ad-hoc meetings into the TEG and TWG as outlined in chapter 7.1.

- All NRSC members must champion and promote the Safe System approach and Safe System thinking within their organisations. This means providing a high level of support and education to the road safety program and promoting a culture change towards saving lives within each organisation's mandate.

- MPWT must provide DOT, as the NRSS, the legal authority and power to make decisions and coordinate the road safety governmental vision and assign at least four full-time staff and a lead to support the NRSC and manage the work of the NRSS.

Legislation & Enforcement

- MPWT to approve the draft Road Safety Strategy 2030, a revised and fully funded Road Safety Action Plan to 2025 and draft Road Safety Audit Manual and enforce road safety audits as required in Article 32 of the Lao Traffic Law.

- MPWT to mandate DOT as the responsible authority for accrediting road safety auditors.

- DOT, DOR and DPWTs will ensure they have trained personnel qualified in undertaking Road Safety Audits, and provide necessary training based on the approved Road Safety Audit Manual and Lao Traffic Law.

- Police must conduct increased and regular speed, helmet wearing, valid driving license and alcohol limit enforcements on key routes.

Funding and Resource Allocation

- The current investment program funded under the RMF with about USD2 million per year is inadequate to deliver the Road Safety Strategy. This needs to be reflected in the likely target to be achieved by 2030. Allocation of funds for projects funded must therefore be based on achieving the highest return on investment in terms of lives saved.

- Additional funding sources to be approved from the Road Maintenance Fund, or sought from externally funded development project, fines for traffic violations, etc.

- Most crashes are a result of violation of traffic rules such as speeding, drunk driving, unlicensed drivers, etc. Addressing these violations through regular frequent campaigns which support specific enforcement programs will provide immediate results in reducing road trauma.

- Provide additional funding from RMF to support NRSC, NRSS, TEG, TWG and DOT as the mandated lead road safety agencies to implement the National Road Safety Strategy.

- Improve road safety of the existing network in the next 3 to 10 years through the annual maintenance program by mainstreaming road safety in the road maintenance contracts, and in improvement and construction contracts' bills of quantities based on mandatory road safety audits. That should include items such as signs, line marking, pedestrian crossings, improved surfaces at side roads and intersections, etc.

Promotion

- Accountabilities need to be clear for every agency and group working to achieve the goal of saving lives and reducing the impact of road trauma. The community has a right to hold the responsible to account and the responsible should hold the community to account when everyone is clear about their responsibilities, expectations, rules and consequences. This will guide the promotional activities.

- NRSS to develop a National Road Safety awareness strategy and promote Vision Zero to the public by frequent regular and sustained TV, radio, and social media events.

- Winning hearts and minds of citizens including young adults is critical. Creating a consistent message from the LYU, LWU and LTU in road safety awareness campaigns will allow this. Focus should be on informing about the law, cost of road trauma, ways forward and expectations on citizen support.

Monitoring and Evaluation

- NRSS to develop and NRSC to confirm interim targets (for say 2025 and 2028) from Road Safety Strategy using a backcasting methodology for achieving the 2030 targets.

- NRSS to report quarterly to the TWG, TEG and NRSC on progress of road safety.

- Police to report on infringements from regular law enforcement checks on key routes in the reporting to TWG, TEG, NRSC.

- The World Bank will under ongoing projects support Traffic Police and DOT in leading the roll out of DRIVER nationally and integrating ambulance and hospital data

- Use DRIVER to support advocacy for road safety. It has the potential to improve ownership of the road crash problem by holding government relevant agencies accountable but also supporting their day to day roles in addressing the problems identified.

Research and Development, and Knowledge Transfer

- DOT and DOR will pilot the Safe System Assessment Framework platform on Vientiane Expressway & Vangvieng Expressways with ongoing World Bank support.

- DOT will deliver training of road safety awareness in provinces and communities ensuring different groups representative of diversity (gender, age, people living disability, ethnicity) are targeted

Final conclusion: Unfortunately, without major new commitment and investment, the trend in the last decade of increased fatalities and serious injuries will continue. Major change is needed to avoid this unacceptable outcome. **Immediate decisions to allocate funds to address road trauma based on evidence of saving lives, and a decision to increase resources, both funds and human, in the coming 2-3 years, without these the Road Safety Strategy 2030 outcome target to half the fatality numbers and rate by 2030 cannot be met**.

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Appendix A. Timeframe for implementing the recommendations

Each recommendation is assessed based on the potential to save lives and assessed capability to deliver each recommendation.

Table 9: Recommendations

No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
	HIGH PRIORITY: IMPLEMENTATION IMMEDIATELY (WITHIN 6 months)			
1	**H/H**	NRSC to become more visible	DOT	DOT as the mandated Lead Agency for road safety in Laos and the Secretariat for NRSC. DOT should appoint a senior staff member accountable for setting up the semi-annual meetings and ensuring follow up in order to provide for smooth operation of NRSC meetings.
2	H/H	National aggregated data on road traffic crashes published annually by NRSC	MPWT	Before each Lao New Year the NRSC to publish the 12 month rolling data for deaths and serious injuries
3	**H/H**	Mandate DOT as the Lead Agency and provide it with the legal authority and power to make decisions and coordinate the road safety governmental vision.	NRSC, MPWT	The Minister of MPWT is the chair of NRSC and the vice chair is the Vice Minister of MOPS. It is a requirement for the Minister and Vice Ministers to take decisions on recommendations from the Technical Executive Group (TEG). Support from DOT for the NRSC operation is essential as is support from all the Departments represented on the TEG.
4	**H/H**	The NRSC to meet every 6 months and the Minister for Public Works and Transport is to chair these meetings	NRSC, DOT	DOT to schedule calendar invitations and agendas for the NRSC meetings.

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
5	**H/H**	NRSC to ensure that the strengthened governance arrangements for operation of the TEG and the Technical Working Group (TWG) in providing recommendations and advice to the NRSC are put in place.	NRSC, MPWT	Strengthen and formalise the operation of the TEG which will meet 4 times a year, and the TWG which will meet monthly.
6	**H/H**	DOT to assign at least four (4) full time staff and a lead to support the NRSC, TEG and TWG. Additionally, appoint a position to lead the leading agency	MPWT	MPWT to arrange allocation of four fulltime staff and a lead who will be dedicated to working with the senior staff member proposed in *Recommendation 1*, in supporting operation of the NRSC, TEG, TWG including monitoring and reporting on the status of NRSS actions,.
7	**H/H**	TEG to review a report on progress with the NRSS from the TWG and provide advice on necessary changes in priorities, to NRSC, or as appropriate advise TWG of outcome and monitor delivery by TWG. Lead agency to advise Minister for MPWT as Chair of the NRSC quarterly of progress.	TEG DOT	TEG Minutes and DG communication to representative within relevant department on TWG Written advice to Minster MPWT quarterly
8	**H/H**	Assign an institution that will be responsible for accreditation of the road safety auditors	MPWT	The Minister of MPWT to mandate DOT as the responsible authority for accrediting road safety auditors.
9	**H/H**	Sign MOU on institutional arrangements on data collection, quality assurance, analysis for DRIVER implementation.	Initially MPWT & MOPS Expand to MOH when hospital data will be integrated	National level MOU - that sets out an institutional and implementation arrangement, outlining clear roles and responsibilities of each agencies (i.e., MPWT, MOPS, MOH/Hospital and others as needed) involved in the implementation and deployment of DRIVER nation-wide.

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
10	**H/H**	All road safety partners consent through NRSC and the Lead Agency on quantitative medium- and short-term targets	NRSC, DOT	Establish mechanism that ensures road safety partners are accountable for the overall and relevant action sub component results
11	**H/H**	Undertake mass media campaigns linked to speed and speeding and establish enforcement linked drink driving campaigns.	NRSC, DOR, MOPS, DOT, MICT	It is important that strong media campaigns are undertaken at the launch of the Road Safety Strategy and Action Plan and to support ongoing specific enforcement activities The campaigns can be as simple as Social Media advertising, and consistent radio and TV ads
12	**H/H**	Guided by an MOU, DRIVER should be identified as the national road crash database systems and should be rolled out. Equipment and server/cloud - to be installed and maintained, either locally (within MPWT, MPS) or in a Cloud	MPWT, MOPS	
13	**H/H**	The TWG drawing upon all NRSC member organisations to create a new and fully funded Road Safety Action Plan (RSAP) that is in line with the National Road Safety Strategy. Milestones and Achievements to be reported to the Lead Agency	DOT	As the Lead Agency, DOT and NRSS to instruct and support the NRSC organisations to produce a RSAP and establish milestones and KPI's through TWG and TEG to NRSC
14	**H/H**	Review the RSAP to prioritise business case development for high return projects to support proposed road crash reduction investment programs.	DOT	Use the Strategy and Action Plan to identify higher return program priorities in order to make the case for necessary funding.
15	**H/H**	Each NRSC member organisation is accountable , as part of the executive group, for supporting the NRSS, implementing relevant actions agreed at TEG and at NRSC and reporting on progress and policy	ALL NRSC MEMBERS	Each NRSC member organisation to provide the Lead Agency (DOT) with the nominated officer accountable to follow up on the actions of NRSC

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
		opportunities agreed at TEG to NRSC to following up on the NRSC actions and outcomes		
16	**H/H**	Lead agency (DOT) to promote ownership and accountabilities among senior management staff within each relevant department to assist development of high priority road safety awareness and understanding. Develop and circulate a program of action to further develop that capacity within 6 months for implementation of this internal training program to support implementation of the high priority recommendations within this report over the following 2 years.	DOT Lead Agency Group/ NRSC	The members of the NRSC are responsible to distribute the road safety message back to their own organisations.
17	**H**	The World Bank to continue to provide technical assistance and support (including training and facilitation) for agreed priority recommendations , and gradually phase-out the provision of technical advice beyond that time when awareness of the path of transition from a project focus to a program focus across all safe system pillars has been well developed	The World Bank	The World Bank to provide support under ongoing projects e.g. technical advice, capacity building etc.
18	**H/H**	DOT as Lead Agency group to develop with TWG and TEG for NRSC confirmation of interim targets (say 2025 and 2028) from implementation of specific Road Safety Strategy recommendations using a *Backcasting Methodology* for achieving the 2030 targets (Appendix B)	DOT	Unless interim targets are set and monitored, based on estimated implementation impacts of specific actions it will be a pure coincidence if the 50/30 targets are met. Setting interim agreed targets based on the available investment will create a realistic scenario and the NRSC is not set for failure

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
19	**H/H**	Strong and frequent enforcement of traffic law and regulations. TPD to develop and implement a specific strategic plan for strengthening Regular Breath Testing, speed enforcement and helmet wearing, including use of new technologies and support from specific strengthened legislative changes.	TPD	TPD to start immediately seriously enforcement to combat drink driving and speeding; and ensuring helmet wearing; seat belts, and valid driving license, and report on results. Legislate for all occupants in a vehicle to wear available seat belts. Legislation to require child restraints. Requirement for seat belt fitment in all imported vehicles.
20	**H/H**	Pilot a Safe System Assessment Framework on Vientiane and Vangvieng Expressways to demonstrate compliance with Safe System principles for all new road improvements	DOT/DOR	Piloting the Safe System Assessment Framework, provide opportunities to incorporate the methodology as part of future investments
21	**H/H**	Consider a mandatory requirement for daytime running lights vehicles with a start on motorcycles	MPWT	This may require change in legislation, or waiver in a decree
22	**H/H**	Implement proposed 56 blackspot treatments identified in 2019 by Climate resilience road asset management consultant under LRSP2 and undertake evaluation of the outcome.	DOR	Implement proposed measures and monitor the effects of the treatments. Should the outcome be positive, implement a "Simple Measures Save Lives" road safety program as part of the maintenance program.
	MEDIUM PRIORITY RECOMMNEDATIONS[49] (WITHIN 24 MONTHS)			

[49] M1: implementation within 6 months, M2 implementation within 12 month and M3 implementation within 24 months

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
23	M1/L2 **M1**	DOT and DOR to coordinate inclusion of mandatory training to private industry on the Safer System philosophy as part of bidding for services and works	DOT	Private consultants need to benefit from the road safety training and become accredited road safety auditors. Where applicable, the contract documentation should request road safety experience and training requirements.
24	M1/L2 **M1**	Mainstream road safety as part of road maintenance program and for all improvement and construction of roads	DOR	DOR to develop methodology for inclusion of road safety measures as part of the maintenance activities. Road safety audits will support
25	M1/M2 **M1**	DOT through TEG to arrange Road Safety capacity building training across Lao PDR	DOT	DOT to train the Institute of Training in order for this to be able to deploy basic road safety training across Lao PDR
26	H/M3 **M1**	Traffic Police to release quarterly crash causality and crash reporting reports, initially manually compiled and using DRIVER when fully introduced	TPD	TPD to present to NRSC quarterly the crash data. TPD to present the data monthly to DOT and release in the media the number of fatalities for the month, using it as an opportunity to create an educational campaign.
27	M1/H **M1**	Introduce the Safe Speed management principles as part of road improvement project	DOT	In parallel with the implementation of speed management guidelines, introduce as part of the infrastructure projects speed management treatments.
28	H/M2 **M1**	DOT/MPWT and Traffic Police/MPS to roll out DRIVER nationally and in a second phase, integrate ambulance and hospital data.	DOT/DTP	
29	M1/H **M1**	DOT to ensure that provincial and district road safety committees are adopting the Safe System approach	DOT	DOT require to licence training material and appoint experienced road safety trainers to undertake capacity building across all districts and regions.

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
				A training implementation program is required to be produced and followed. The training shall include all levels of staff in the government involved in road infrastructure.
30	M1/M1 **M1**	DOT to establish a process for project screening, selection and prioritisation of projects that are submitted from provinces as part of the road safety fund e.g. including a benefit cost analysis for selection of road safety projects	DOT	DOT to develop blackspot project development guidelines. That can be done by adopting other neighbourhood countries guidelines adopted to Lao PDR condition.
31	M1/M2 **M1**	Introduce and adopt a modern crash filing system (DRIVER) under TPD of MOPS and in all provinces, and train all in use of this platform	TPD	DRIVER is in use. TPD to ensure its uptake is extended to all districts
32	M1/M1 **M1**	DOT to fund a national road safety public awareness campaign	DOT	The National road safety awareness campaign to be coordinated with all stakeholders undertaking stakeholder engagement i.e. Unions, Media Units, insurance companies etc. The NRSC to be informed of these activities.
33	H/M2 **M1**	Create a Benefit Cost Ratio (BCR) mechanism for road safety funds allocation by inclusion of a Busines Case Template	DOT	A BCR approach to prioritising road safety project can easily be achieved by adapting international best practice examples to Lao conditions. Projects will be funded which have the highest return on investment. DOT to produce a BCR template based on international best practice.
34	M1/M2 **M1**	Promote the Safe System vision within communities	Unions	All Unions to undertake a short road safety training and spread the message through communities

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
35	H/M2 **M1**	Ensure DOT, DOR and DPWT have trained personnel qualified in undertaking Road Safety Audits	DOT	DOT to invite staff from interested agencies for Road Safety Audit training and they rightfully obtain qualification.
36	M1/M1 **M1**	Conduct formal Safe System training and briefing for all Directors General	DOT	DOT to prepare and approve the material for presentation to the General Directors
37	M1/M2 **M1**	Ensure high risk projects are funded and create opportunities for all provinces to access the funds	DOT	Subsequent to the introduction funding of projects based on BCR, DOT to lobby all provinces to submit projects and access funding
38	M2/M2 **M2**	Immediate penalty or suspension of driving licence when detected driving or riding under the influence of alcohol	NRSC, TPD	The TPD to lobby introduction of legislation that require licence suspension when caught under influence of alcohol. Different levels of suspension and fines can be set and applied according to the level of offence.
39	M2/M2 **M2**	Review the level of penalties for traffic offences. These levels must be increased to a level that will act as a strong deterrent for drink driving and speeding offences. Repeated offenders shall pay an increased fine.	NRSC, DOT	It is important that the level of fines is high enough to detract motorist from breaking the law. DOT and TPD to work together to set the level of fines. Once set, advertise through the Unions the new level of fines and the message of Zero Tolerance and Zero Negotiations.
40	M2/M2 **M2**	Increase revenue for road safety funds and capture support under externally funded projects Highlight benefits of doing so. Provide additional funding to support NRSC member departments and the Lead Road Safety Agency (DOT) to implement the National Road Safety Strategy and Action Plan.	MPWT / DOT	Existing 2.5% of road safety funds need to be increased to at least match the revisedoad Safety Action Plan values Revenue for the road safety fund can be sourced from: - Allocate 100% of traffic offences revenue

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
				- Allocating percentage of the vehicle registration towards road safety - A road safety levy on 3rd party injury insurance premiums - External funded projects
41	M1/M3 **M2**	Unified and reconciled crash database – ambulance / hospitals to report quarterly to the Traffic Police on the road crashes that resulted in death or serious injuries (hospital care for more than 48 hours) for inclusion in DRIVER	MOH	MOH to record all traffic injuries separately and report to DOT and TPD
42	H/L1 **M2**	Undertake an extensive research into public perception of risk of being detected for driving offences i.e. speed and alcohol	MICT	Arrange for an inception survey across a large population sample in rural regions and urban areas of Lao PDR
43	H/M2 **M2**	Create an accredited National Road Safety Auditors database under the management of DOT. DOT to implement policy on certification of road safety auditors.	DOT	DOT to prepare a Policy Note on Certification of the Road Safety Auditors in Lao PDR. This Policy will need to be in line with Article 32 hence not require Ministerial approval
44	M2/M2 **M2**	Strengthen MPWT accountability for Road Safety projects and programs to align with the Safe System approach	DOT DOR, DPWT	As part of the project approval process the accountable agencies need to demonstrate alignment of project solutions with Safe System principles. DOT to provide training and release a guide on how to demonstrate Safe System alignment as part of the project submission.
45	M1/M3 **M2**	DOR to mainstream road safety in improvement, construction and maintenance contracts and not handle road safety as an add-on or separate task	DOR	DOR to ensure staff is undertaking road safety training. DOR to demonstrate that all investments in roads include a road safety component.

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
46	M2/M2 **M2**	Review the speed limit on the National Highways where the road characteristics do not match the Safe System recommended speeds	DOT	Undertake a project that is assessing current risk related to the operational vs posted speed limit and recommends solutions that align with the Safe System approach.
47	M2/M3 **M2**	Undertake a review of the speed management guideline	DOT	As part of the same project which review the speed along National Highways, an opportunity exists to review Lao PDR speed limit guidelines.
48	H/M2 **M2**	Undertake mean traffic flow speed survey along routes where speed is a high contributing factor to crashes	TPD	The Police with support from DOT to start recording the roads where speed is a contributor factor to crashes. A speed survey to be undertaken to confirm the findings
49	M2/M2 **M2**	DOT and Traffic Police to prepare and publicise a speed enforcement program	TPD/ TWG/ TEG/ NRSC	The TPD to prepare a speed enforcement schedule and publicise it through the media channels and Unions.
50	M2/M2 **M2**	Supporting equipment should also be procured such as GPS equipment, mobile phones, and computers and internet in police stations	TPD/ TWG, TEG, NRSC	Agreed funding of action plan priorities
51	M2/M2 **M2**	Data sharing agreements between the government ministries must be drafted and executed	TWG/ TEG	MOU's
52	M2/M2 **M2**	Aside from crash data, data on road safety performance such as driving speeds and motorcycle helmet use, % of drink driving detected from Regular Breath Testing activity, should be collected	TWG/ TEG	Lead agency to collect data for member agencies and share this to TWG and in summary, to TEG and NRSC
53	M2/M2 **M2**	Set performance requirements for road markings and road signs	DOR	Review the road maintenance contract specifications and standards for installations of signs and line marking. As part of the maintenance program, the contract shall stipulate intervention levels for damaged signs and line marking.

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
				New installation of signs and line marking have to be retroreflective.
54	M2/M2 **M2**	DOT, DOR and DPWT to undertake road safety audit in accordance with Article 32 for all key infrastructure projects, including maintenance activities	MPWT	All key funded projects to include a Road Safety Audit. That includes the maintenance and rehabilitation projects.
55	M2/M2 **M2**	Create a National Road Safety awareness strategy and promote Vision Zero to the general public using TV, radio and social media	NRSC, MICT	In collaboration with DOT produce a public awareness campaign
56	M1/H **M2**	Citizens engagement - winning hearts and minds of citizens including young adults. Create a consistent message among the LYU, LWU and LTU when road safety awareness campaigns are rolled out to maximize benefits of the messages conveyed and the value for money	LYU LWU LTU	In collaboration with MICT, Unions to send a consistent message to their members
57	M2/M2 **M2**	Use enforcement data for monitoring and evaluation	TPD	All the results from enforcement to be captured by TPD. DOT/Universities to analyse the data and evaluate effectiveness of the treatments
58	M2/M2 **M2**	Training of road safety awareness in provinces and communities ensuring different groups representative of diversity (gender, age, people living disability, ethnicity) are targeted. Training-of- trainer (ToT) - to build a team of excellent trainers that can lead the city/country-wide training. There shall be a trainer and focal point representing each region (North, Central and South) for better cooperation and outreach	DOT Unions	Unions have access to all communities and groups across Laos. Include in the agenda, road safety as an item for debate

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
59	M3/M3 **M3**	Road safety is a Key Performance Indicator (KPI) on which agencies are measured when delivering results, in particular DOT, DOR, provincial DPWT	DOT; DOR. DPWT	Agencies to set road safety KPI's for all infrastructure projects
60	H/M3 **M3**	Place measures in place that will detract officers and traffic offenders to reach outcomes based on 'negotiations', such as online payments e.g. BCEL ONE	NTSC TPD	NRSC to direct the TPD to start implementing measures that will detract officers continuing current practices. Officers at every level must understand that unless they are doing their job in combating the road trauma, current practices are counterproductive.
61	M3/M3 **M3**	Using existing available facilities at PTTI and NUOL, expand the knowledge skills to cover area of evaluation of the road safety treatments	MOE NUOL	MOE to find the most appropriate University which is able to undertake research and evaluation of the road safety measures
62	M2/M3 **M3**	Under DOT supervision and direction, provinces and districts to set local road safety targets that are within the road safety strategy framework and action plan	DOT DOR DPWH TPD	Every District and Region need to bring its contribution to road safety. Under DOT supervision each region to produce an action plan demonstrating how they will contribute to achieving the Laos' road safety vision
63	M1/M3 **M3**	Traffic Police to report quarterly on Safety Performance Indicators[50] (SPI) that are directly linked with prevention of fatalities and serious injuries	TPD	The TPD to report on the number of lives lost each month and on the following items: - number of alcohol tests undertaken and infringements - number of speed survey and infringements

[50] Safety Performance Indicators

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
				- number of infringements of riders without helmet TPS to report monthly to DOT. DOT to compile the results and present at NRSC meeting
		LONG TERM PRIORITY[51]		
64	M3/L2 **L1**	Promote infrastructure safety measures and consider using existing traffic infringement cameras together with strict legislation that is deterring road users from disobeying the law and follow up with strict enforcement	DOT DOR DPWH TPD	The infrastructure agencies to create processes that ensure Safe System and road safety is part of all investments. Use existing or Install new red light and speed cameras at the intersections as part of the traffic signal installation program.
65	L1/M1 **L1**	Strengthen road safety and Safe System capability at provincial and district levels City-/country-wide training - to be conducted once a year in each province (with all district traffic police office attending the training) by the Training-of-Trainers. After the training, the Trainers shall follow-up and provide troubleshooting as needed via What's App or other means as appropriate	DOT	DOT to support the Institute of Training to develop materials and arrange targeted trainings
66	L1/L2 **L1**	MOH to establish their own health database system which should be integrated with DRIVER. MOH to also strengthen post-crash care rehabilitation and evaluate the results.	MOH	

[51] L1 by 2023; L2 by 2026 L3 by 2030

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
67	L1/L2 **L1**	Driver and rider licencing improvements	DOT / TPD	Review of the licencing systems including licence testing. It is understood there are current discussions in relation to licencing and vehicle registration system. It is encouraged that this continues and gets materialised.
68	L1/L2 **L1**	Introduce road safety as part of the curriculum within the National University of Laos under Department of Road Transport and Transport, Faculty of Engineering.	NUL	National University of Laos to work with DOT and create a module for delivering Road Safety to the last year students. Upon completion of the module offer Engineering students internships of 6 months divided into 3 rotation in 3 areas. The internship to be shared among DPWT, DOT and DOR. Graduates will have the opportunity to experience different working areas and determine the areas they are most interested in to continue their career
69	L1/L2 **L1**	Include traffic safety into the curriculum at all grades from primary to last year of high school and involve police in promoting safety for pedestrians and motorbike driver	MOE	Promote road safety as part of the curriculum to all schools and include it in teacher's KPI's.
70	L1/L1 **L1**	DOT to work closely with JICA on the Emergency Management System and DRIVER to link the two databases i.e. DRIVER and JICA's dispatch centre database	DOT/MOH	DOT to allocate a Director accountable for the task
71	L3/L3 **L1**	Develop a standard for installation of Traffic Signals including the hardware and software with the view of	DOR	All traffic signals across Lao PDR must be consistent. One aspect is that is easier to

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
		having a fully adaptive urban traffic control system in the future.		secure spare parts and drivers will get easily accustomed with a single system. DOR to produce a single standard design.
72	M2/L1 **L1**	Introduce Blood Alcohol (BAC) limits for all road users	MPWT	Introduce Blood Alcohol (BAC) limit legislation that applies to the category of licence and the type of vehicle driven. - Learner Drivers and Motorcycles: zero - Driver of public transport and commercial vehicles 0.02 - All other drivers 0.05
73	M3/L2 **L2**	Enforce "vehicle road worthy certification". There are several tuk-tuks and vehicles running without head or taillights, no rear-view mirrors, poor tire conditions or defective breaks	DOT / TPD	TPD to enforce the technical inspection of vehicles
74	L1/L2 **L2**	Police to enforce the mandatory third-party compulsory insurance for vehicles and DOT to make it a requirement for registration	DOT / TPD	A requirement to run vehicle on the road is to have at least 'third party insurance". That means that insurance will cover for unintentional damage caused to other people's property
75	L2/L2 **L2**	Introduce UNECE regulations for all imported vehicles i.e. Reg 78: motorcycle antilock braking system; Reg 140: electronic stability control; Reg 14, 16: seat belts and anchorages; and Reg 94, 95: Frontal and side impact crashworthiness; all imported vehicles to be less than 5 years old.	MPWT	The Minister of Public Works and Transport to introduce in the National Assembly legislation for importing vehicles
76	L2/L2 **L2**	Enforce compulsory wearing of seat belts also in the rear	MPWT	
77	L3/L2 **L2**	DOT to introduce helmet standards and progressively phase out existing unsafe helmets	DOT / MPWT	Legislation regarding the helmets is required to eliminate unsafe helmets from the market.

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No.	Priority (investment/ capacity)	Recommendation	Accountable Agency	Methodology for implementing the recommendation
				There are examples of helmets certified by European countries or Australia. Adopting one of these systems will be appropriate for Lao PDR.
78	L1/M3 **L2**	Embed post-crash care within the road safety strategies and allocate funding to it.	MOH / DOT	Post-crash care is an essential part of achieving the road safety vision. MOH will require funding to improve its crash response and post-crash car.
79	L1/L3 **L2**	Develop a Network wide design process that embeds the Safe System philosophies	DOT	This recommendation is based on the Austroads AP-R618-20 and requires development of road stereotypes showing how the maintenance activities improve the star rating of the road network.
80	M3/L3 **L2**	Implement a crash validation policy where the insurance companies, hospitals and police are sharing information to capture all crashes including fatalities and serious injuries	DOT	All agencies that have crash data are required to participate and enter it in DRIVER. DOT to provide DRIVER training
81	H/L3 **L2**	Strengthen post-crash care rehabilitation and evaluate results	MOH	Upon funding increase the MOH to be provided with the resources to address current post crash care gaps.
82	L3/L3 **L3**	DOT to introduce a driver license penalty points system	DOT	DOT to introduce legislation in regard to a driver licence penalty points system.

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Appendix B. **Key Stakeholders interviewed**

1. National Road Safety Committee
2. Ministry of Public Work and Transport
    - 2.1. Department of Roads
    - 2.2. Department of Transport
        - 2.2.1. Land Traffic and Driving License Management Division
        - 2.2.2. National Road Safety Committee Secretariat
    - 2.3. Public Work and Transport Research Institute
3. Ministry of Education and Sports
    - 3.1. Department of General Education
    - 3.2. National University of Lao PDR
        - 3.2.1. Faculty of Engineering (Civil Engineering and Transport)
4. Ministry of Finance
    - 4.1. Department of State-owned Enterprises Development and Insurance
    - 4.2. National Bureau of Insurance in Lao PDR
5. Ministry of Health
    - 5.1. Department of Health Care and Rehabilitation
    - 5.2. Mittaphab Hospital
    - 5.3. Laos Red Cross
6. Ministry of Information, Culture and Tourism
    - 6.1. Department of Media
7. Ministry of Public Security
    - 7.1. Department of Traffic Police
8. Laos Women Union
9. Laos Federation of Trade Unions
10. Laos People's Revolutionary Youth Union
11. Vientiane Capital Administration
    - 11.1. Department of Public Works and Transport
12. Provincial Authority (18 Provinces)
    - 12.1. Department of Public Works and Transport
13. Foundation for Assisting the Poor People of Lao PDR
    - 13.1. Rescue 1623

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Appendix C. Backcasting approach to achieve the 2030 vision (50/30)

Backcasting is a *'reverse-forecasting technique which starts with a specific future outcome and then works backwards to the present conditions'*[52].

This appendix will not dwell in detail into any of the present or future scenarios, but rather anticipate on a qualitative level the different options. It aims is to outline the importance of planning and understanding of the 2030 goals through an innovative planning process. The Capacity Review Report is identifying the current situation, the gaps, and recommendations to achieve the 2030 vision.

A backcasting approach is an innovative tool for policy making, which aims at generating alternative images of the future. It provides guidance and scenario results to ensure the 2030 Vision is met.

Developing scenarios can be as intricate and detailed as the beneficiary would like it to be. It can include the development of analytical and research models, qualitative as well as quantitative.

The first point is to understand, what will road safety look like in 2030 and how many lives will be lost if the current situation is not changing.

In a presentation given by Mr. Somnuk Mektakul of MPWT in Seoul on 29 July 2016, (Figure 15) it was estimated that in 2019 there will be 1,869 fatalities on Lao's roads. This number may be very close to reality when we include the unreported number of deaths.

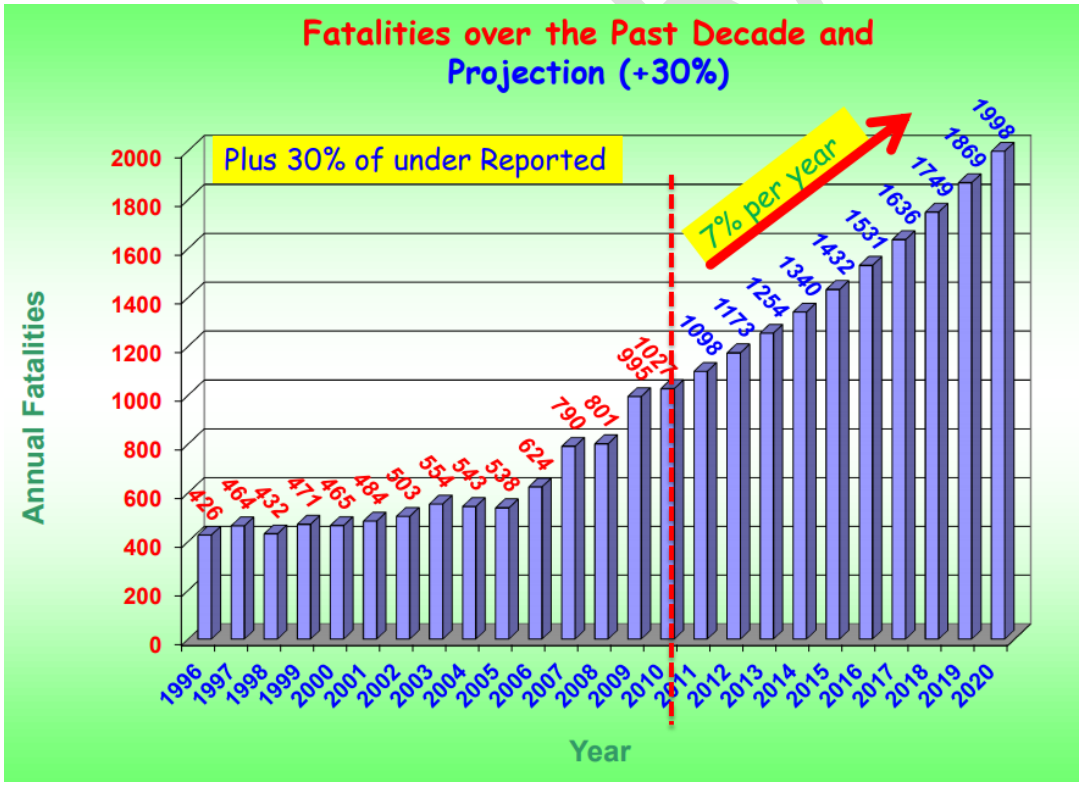

Figure 15: Fatalities 1996 to 2020

If we are recalibrating the year 2020 to say 1,316 deaths given the COVID-19 circumstances and apply a 7% growth in the number of deaths annually there will be an estimated 19,543

[52] http://www.businessdictionary.com

deaths on Laos' roads by 2030 (see Figure 16). According to average in other countries, the number of serious injuries is generally 10 times higher than fatalities. That means there will be an estimated 200,000 serious injured persons.

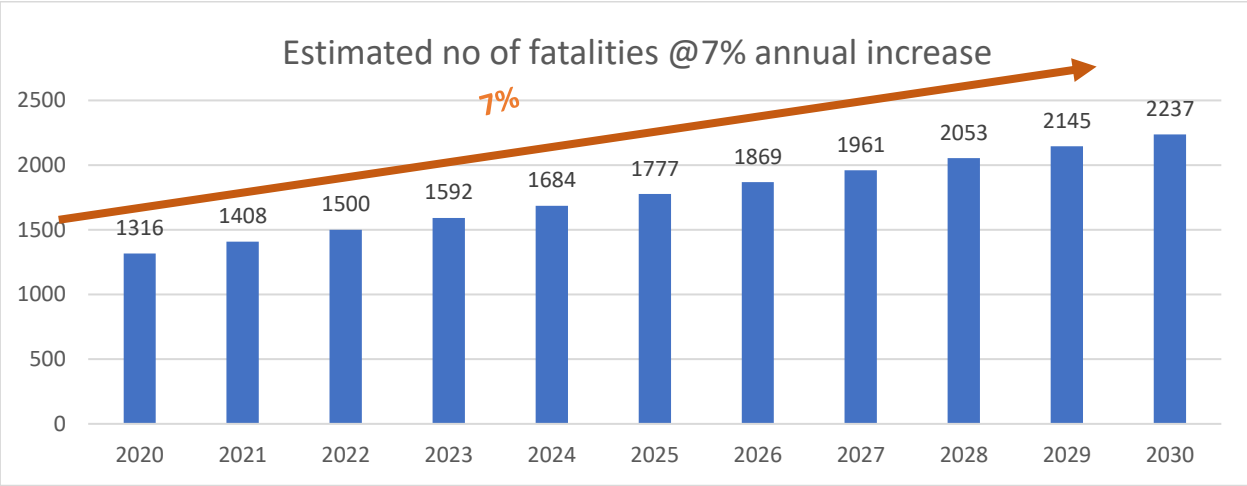

Figure 16: Estimated number of fatalities at 7% annual growth

The road safety measures and actions within the next ten (10) years will have to save 10,000 lives.

The question to ask is: *What would the Lao PDR road network, systems, the legislation will need to look like to reduce the fatalities and serious injuries by 50% by 2030?*

The main objective is to disclose the current challenges, barriers, and opportunities in achieving 50/30 in Lao PDR. Therefore, with a descriptive, exploratory methodology and research-based approach determine the interventions and involvement of key stakeholders.

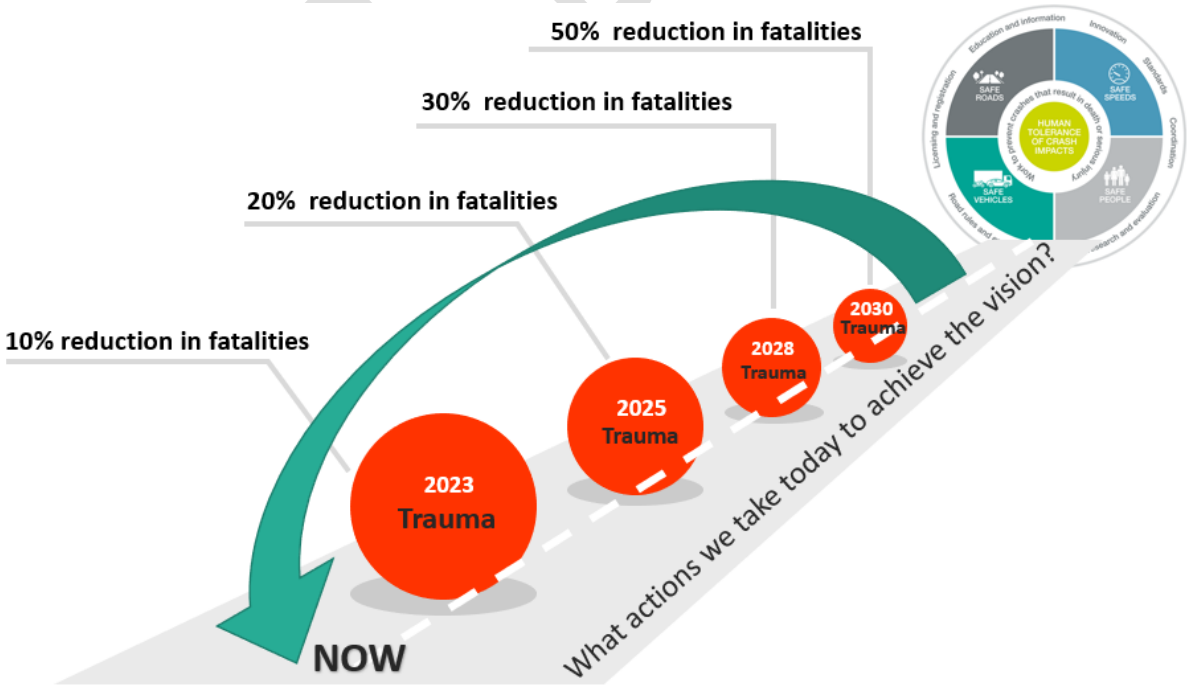

Figure 17: Backcasting approach to trauma

Small steps are required to be taken towards the future and each step is evaluated and monitored to ensure it meets the interim target (see Figure 17). Vientiane Capital and Lao PDR will predictably experience population growth. This will add further pressure on the transport system and create environmental challenges. Not only that the future needs to provide a safe transport system but an attractive, environmentally friendly, and sustainable transport system.

A forecast in the number of fatalities in 2030 is assuming that no new road safety measures are introduced besides to what is now in place i.e. current level of funding and current practices. We can define this as the '**Baseline**' (see Figure 18).

We can consider that the starting point of backcasting is the desired endpoint in the future i.e. achieving a Safe System road network. In effect, the desirable future point is a Safe System which is defined as an inherently safe transport system guarded by safe roads and roadsides, safe people, safe speeds, and safe vehicles.

That means that knowing the endpoint to the present, it requires working backwards from the 50/30 to the present and applying strategies that will take us to the destination. The 50% reduction in fatalities in 2030 is based on the 2020 estimated baseline value including a 7% annual growth in crash rate.

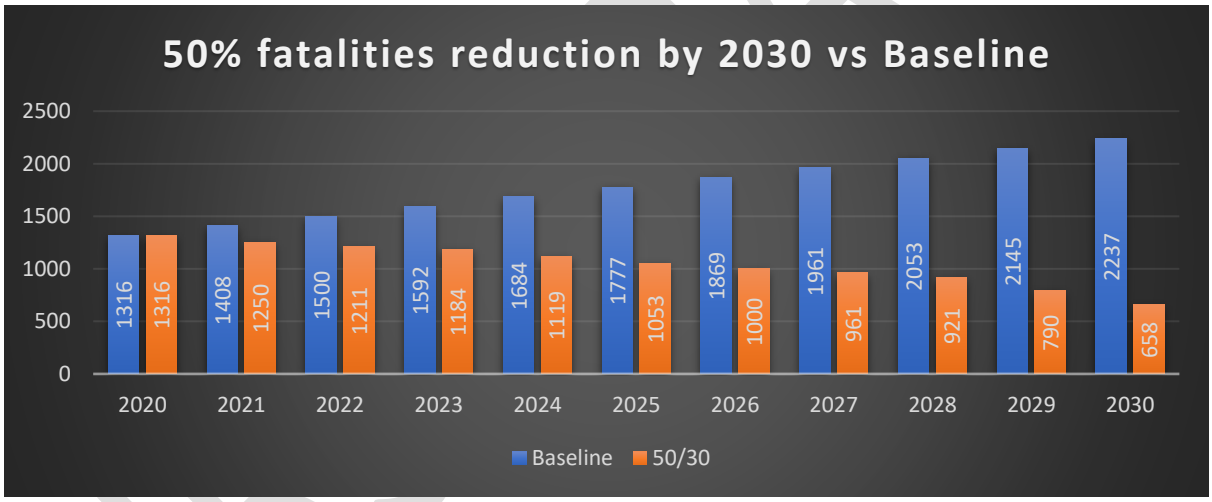

Figure 18: Number of fatalities prediction by 2030

The complex road safety problem in Laos can only be addressed through a major change. Based on the history and the records in other countries, we can easily anticipate the future trend, if nothing or little is changing in the way the road safety is approached in the current situation. Therefore, along the way to 2030 every Safe System pillars and principle have to be adopted and strengthen.

That will require the development of scenarios and targeted investment plans that are strategically created to systematically reduce the death and serious injuries. Setting targets is important to improve the road safety performance. It will continuously require monitoring and evaluation of the effectiveness of the treatments implemented.

In a simplified manner that can be achieved in two levels:

- Level 1 – requires a specific reduction in the numbers of fatalities and serious injuries **Error! Reference source not found.**
- Level 2 – target performance indicators related to speed, drink driving, seat belt wearing, use of helmets, vehicle, roads and trauma management Appendix C and Figure 19.

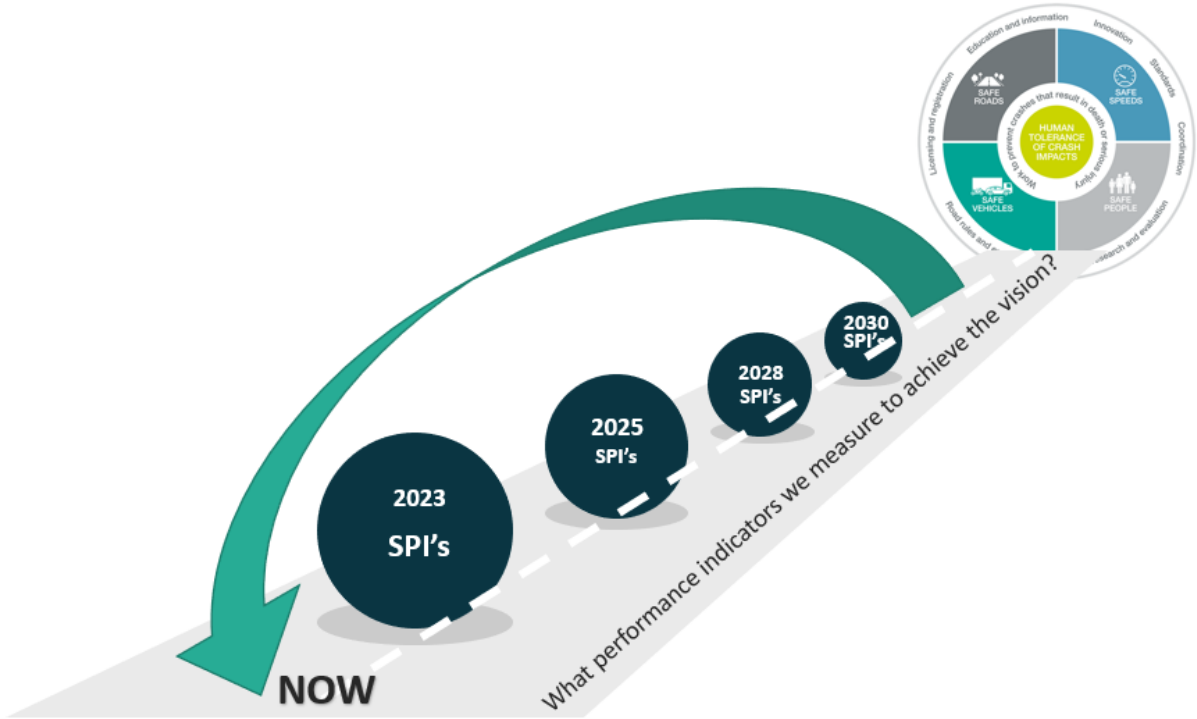

Figure 19: SPI backcasting

2023 Scenario

According to the baseline scenario, it is estimated that at the end of 2023 there will be 1,592 deaths in Lao PDR. Any road safety measures will have to save 132 lives by 2023[53].

Based on iRAP road safety toolkit[54], the average Safe Road treatment life is between 10 years to 20 years and treatment effectiveness between 25%-40%.

In order to calculate the investments required the following assumptions are made:

- A Benefit-Cost Ratio formula is adopted from Victoria, Australia,
- GDP per capita is estimated at US $2,150. The International Monetary Fund estimated the value of life due to road trauma as 70 x GDP per capita. Therefore, each death is estimated to cost the people of Lao approximately US$150,000
- Maintenance cost adapted to Lao PDR
- Average project life span 20 years
- An average Crash Reduction Factor of 30% or (Crash Modification Factor of 0.6)
- Treatments targeting a Benefit-Cost Ratio of 2[55]
- A conservative speed zone of 60 km/h
- Average growth of 1.1 was used to calculate the BCR

Based on the above it is estimated that besides the baseline investment i.e. US$2m there are required an additional minimum of US$7m.

[53] It is middle of 2020 and the road safety measures are tracking to the baseline
[54] http://toolkit.irap.org/
[55] Targeting a higher BCR will require a lesser investment

It is a challenging task and requires rigorous planning, continuous monitoring, and evaluation. Detailed analysis and understanding of crashes are required to ensure improvements and progress is made.

Understanding the efficiency of road safety interventions will assist resetting the next target, change strategy if required, and create realistic expectations.

Estimating the number of serious injuries

A valuation report is suggesting that the number of serious injuries can be as much as ten (10) times of the number of fatalities[56]. This methodology is supported by the inference made in a systematic analysis of population health data, that for every fatality there are 20 injured persons in need of medical treatment[57].

The recorded number of injuries vs fatalities (see Figure 20) provided by MPWT support these statistics. In average, the number of injuries in Lao is 9.43 times higher than fatalities.

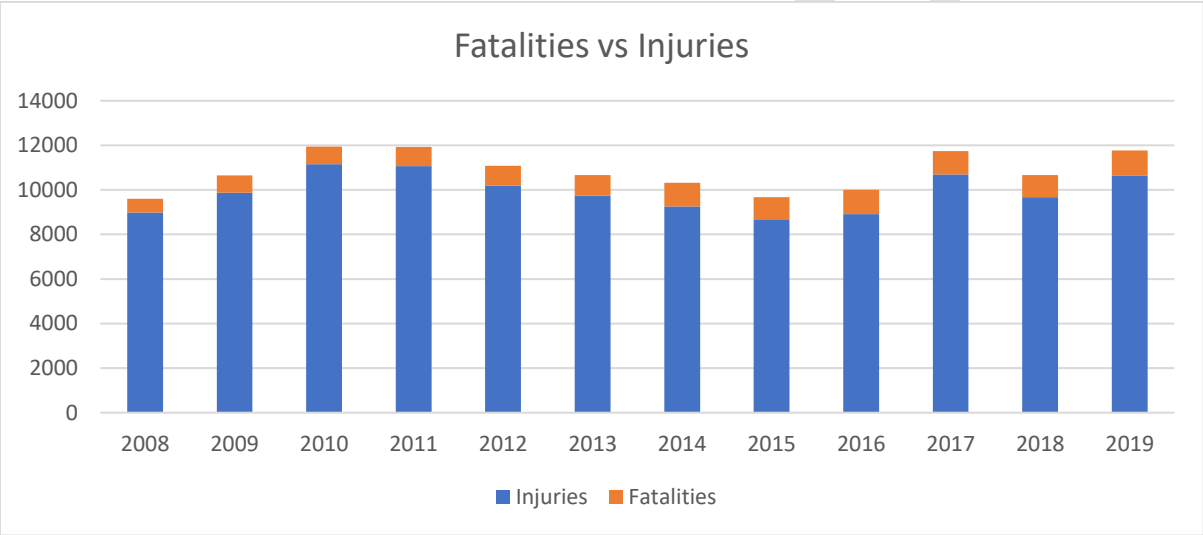

Figure 20: Recorded number of fatalities and injuries

A separate investment is not calculated for saving the serious injuries as this is considered to be a proportion of fatalities. It should be noted however that there may be a discrepancy in the ratio between the fatalities and serious injuries saved.

In this view, it is required that continuous monitoring and evaluation of the program is implemented. By doing so, the required outcome the least will be:

- establishing the ratio between the investment and Fatality and Serious Injury (FSI) saved,
- the cost for each treatment,
- the efficiency of each treatment.

Having this data will enable DOT to better estimate the amount of dollars to be invested for 2025 to 2028 period and the type of treatments.

[56] McMahon, K. & Dahdah, S. (2008) The True Cost of Road Crashes: Valuing Life and the Cost of a Serious Injury. International Road Assessment Programme.
[57] Guide for road safety opportunities and challenges: Low and Middle Income country profiles @2020 IBRD / The World Bank; Page 25

Examples of Infrastructure Investment Plans

The Infrastructure Investment Plans are based on the problem a jurisdiction is facing. In Lao PDR, the data received from DOT suggest that the highest number of recorded traffic offenses are for unlicensed drivers/riders (See Figure 21).

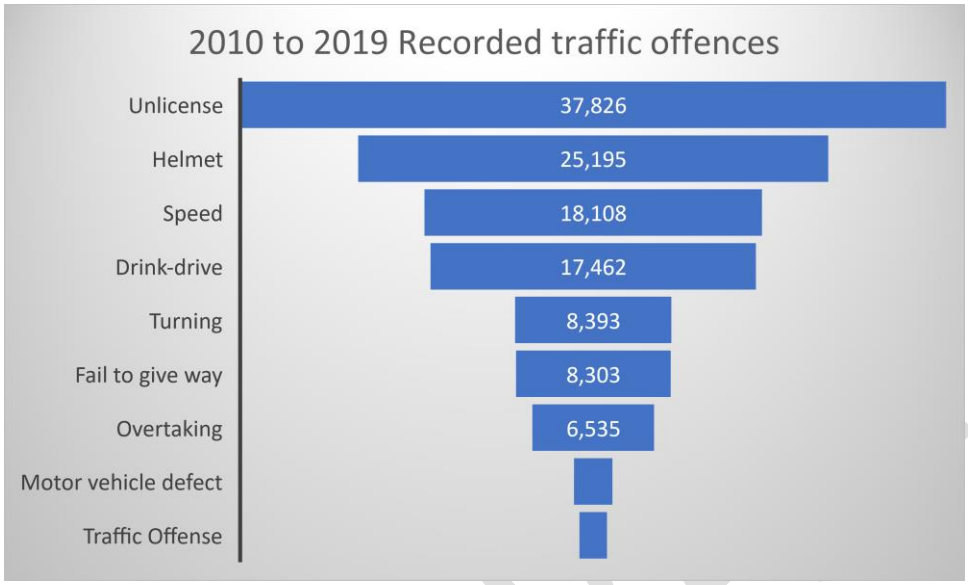

Figure 21: Recorded traffic offences

These records suggest that enforcement plays an important role in addressing some of the biggest issues in Lao PDR.

Example Investment Plan No 1: Enforcement and Education.

To successfully implement the plan, the Police require strong support from the central Government and DOT. Police will be targeting and enforcing the following:

- Licencing
- Speed
- Drink driving
- Helmet wearing compliance
- Wearing of seatbelt[58]

Also, this investment plan is a great opportunity to allocate funding and establish measures that will improve Helmet Standards in Laos. Currently, the helmets in use do not require to comply with any standards and they may not perform adequately in a crash situation.

Example Investment Plan No 2: Intersection treatments

This investment plan is targeting two types of intersection crashes:

- Turning, and
- Fail to give way

[58] In Australia, the Victorian Joint Standing Committee on Road Safety was key to the successful adoption of the first legislation worldwide on compulsory front seatbelt wearing. Victoria made seatbelt wearing compulsory from the beginning of 1971 which led to a reduction in car occupant deaths in Victoria by 18% by the end of 1971 and 26% by 1975

The proposed investment strategy, in line with the Safe System approach, is to reduce traffic speeds at high risk intersections to manage kinetic energy and reduce injury severity. This will create a safer environment for all road users, in particular for vulnerable users such as pedestrians and motorcyclists.

In general, this investment program should target intersections with a high risk of serious casualties and where the highest return from investment can be realised.

The treatments suggested in this program are summarised below:

- Safety platforms at high-risk intersections;
- Compact roundabouts with safety platforms on all approaches;
- Traffic signals with safety platforms on all approaches; and
- Trials of innovative treatments to effectively reduce vehicle speeds.

A target to achieve Safe System speeds for vehicles traveling through the treated intersections has been set as followed:

- 50km/h or less if there are no vulnerable road users present; and
- 30km/h or less if there are vulnerable road users using the intersections.

Example Investment Plan No 3: Rural Roads

This investment plan is targeting overtaking and run off-road type crashes. In the 10-year period ending 2019 recorded 6, 535 overtaking offences. It is not known how many crashed occurred in this same period due to 'overtaking'.

Figure 22: Typical rural undivided road with potential for head-on and run off road crashes

The Investment Plan is proposed to address route treatments that are categorised as a high risk for overtaking maneuver.

As a countermeasure, Wide Centre Line Treatment (WCLT) is proposed to be installed. It consists of a provision of 1.0m wide centreline marking. This treatment provides increased lateral separation between opposing directions of travel to improve safety, reducing head-on crash risk. Although a width of 1.0m is advised for WCLT, a narrower width is still expected to provide benefit where geometric constraints do not allow for this.

Example Investment Plan No 4: Mass Action Treatment of Rural Curves

This targeted Investment Plan proposes a low-cost route-based mass action type treatment. It is targeting curves located on rural sections road where the highest concentration of run-off-road and head-on crashes has been identified.

The provision of standardised delineation packages focuses on the curve approach of which the delineation will consistently match the risk of the curve. Being aware of the risk level in advance of the curve would allow drivers/riders to better respond and manage the risk of the curve ahead. The risk of loss of control and run-off-road would be reduced, and also head-on crashes caused by vehicles run off the road to the right would also be reduced.

The delineation package is grouped into three levels to match the three risk levels of the curves (low, medium, and high).

- All curves will have edgelines/centrelines and guideposts;
- Medium risk curves will have additional raised reflective pavement markers and curve warning signs; and
- High risk curves will have additional chevron alignment markers and advisory speed signs on top of the delineation for medium risk curves.

The key outcome of this Investment Plan is to assist drivers by providing a consistent level of curve delineation and warning, and thus, condition drivers/riders to better respond to a crash risk of the curves ahead and to achieve appropriate speeds on the approach of a curve.

Table 10 : Delineation treatment interventions

Curve risk rating	Low cost delineation treatment
Low risk curves	• Guideposts • Edgeline / centreline
Medium risk curves	All above Low risk package plus: • Raised Reflective Pavement Markers (RRPM) • Curve warning signs • Audio tactile edgelines (outside residential areas)
High risk curves	All above Medium risk package plus: • Chevron Alignment Markers (CAM) • Advisory speed signs

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Example Investment Plan no 5: Urban area treatment conducive to low speed

Infrastructure treatments commonly involve traffic calming devices which effectively reduce vehicle speeds, resulting in a reduction in crash frequency and injury outcome for unprotected road users. Lower vehicle speeds would also improve injury outcome for collisions between vehicles.

Traffic calming measures include:

a. ***Speed humps*** – they are raised area of the roadway causing an vertical upward deflection.

Figure 23: Speed hump

Source: City of Ottawa Traffic Calming Design Guidelines

b. ***Speed cushions*** – similar with raised humps, the speed cushions are not covering an entire area and allow large vehicles e.g. buses to drive between the cushions

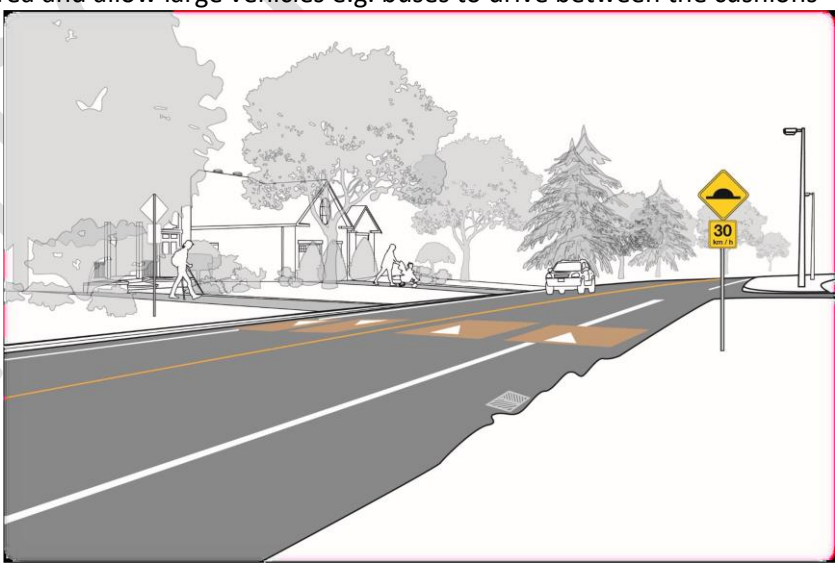


Figure 24: Speed cushion

Source: City of Ottawa Traffic Calming Design Guidelines

c. ***Road safety platforms and raised intersections*** – this type of treatment are encouraging drivers and riders to slow down as they are approaching the conflict point. It is significantly reducing the risk of serious injury or deaths.

Figure 25: Raised intersection

Source: City of Ottawa Traffic Calming Design Guidelines

d. ***Gateway treatments to towns and villages*** – their purpose is to make it easier to identify entry within a town or village hence increasing compliance with the speed limit

Figure 26: Gateway treatment

Source: City of Ottawa Traffic Calming Design Guidelines

e. Pavement narrowing – this type of treatment aims to reduce the carriage width leading to a drivers self-enforced speed reduction

Figure 27: Pavement narrowing/kerb extension

Source: City of Ottawa Traffic Calming Design Guidelines

f. ***Chicanes*** – these are physical features forcing driver to slow down due to a natural lateral shifting of the driving / riding path

Figure 28: Chicanes

Source: City of Ottawa Traffic Calming Design Guidelines

g. ***Pedestrian crossing*** - management of interactions between vehicular traffic and pedestrians can be achieved by several means e.g. segregation, integration or separation.

Figure 29: Pedestrian crossing Melbourne, Australia

Source: The World Bank team

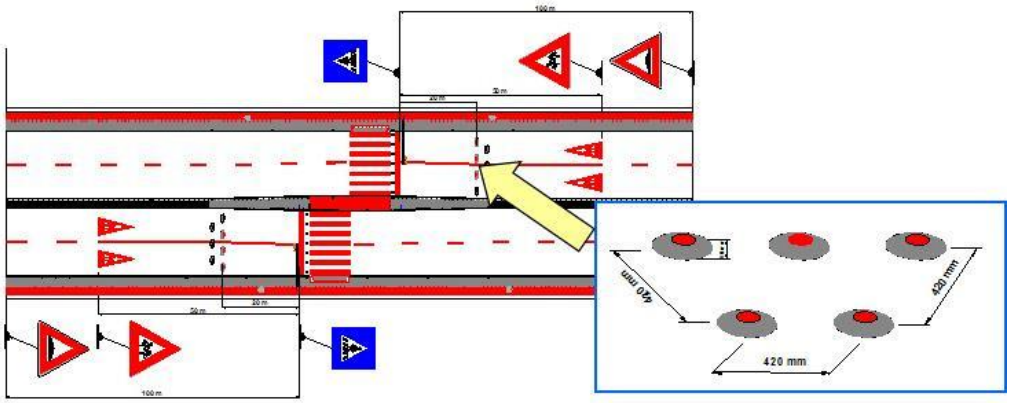


Figure 30: Example of zebra crossing near schools

Source: (Burlacu, 2014)

Figure 31: Lane width is narrowing at pedestrian crossing point

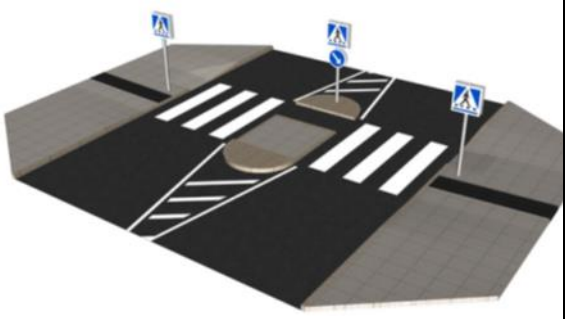
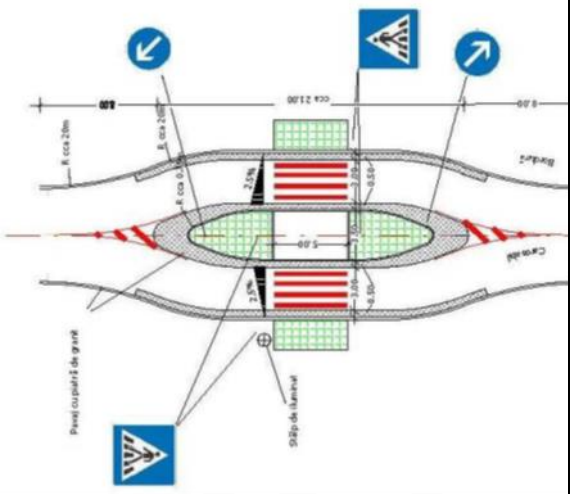


Figure 32: Lane width is maintained at pedestrian crossing point



h. ***Transverse rumble strips*** – raised bars creating noise and vibration within the vehicle

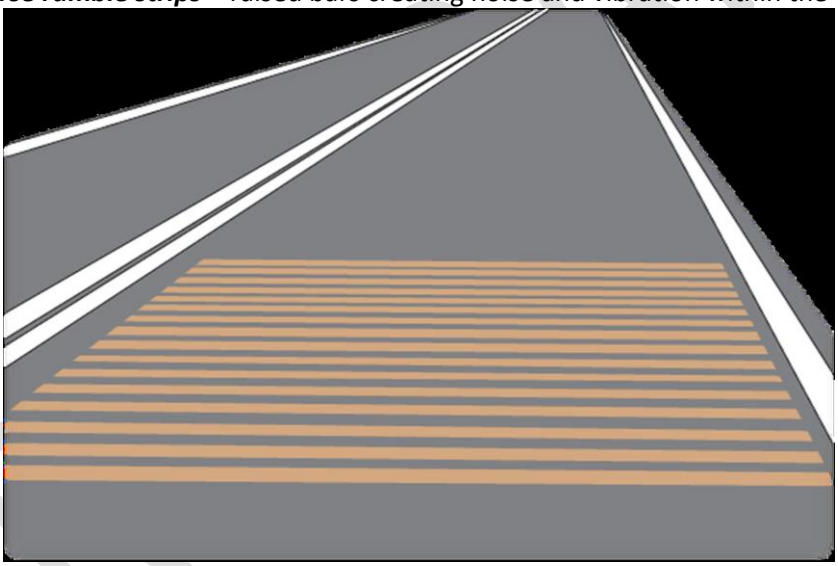


Figure 33: Transverse rumple strips

Source: City of Ottawa Traffic Calming Design Guidelines

Appendix D. Safety Performance Indicators

Crashes, in particular those leading to fatality or serious injuries, are final outcomes of a road traffic system. Monitoring the operational conditions of traffic, which means monitoring how road users behave in traffic, can help to explain why road safety risk changes.

The Safety Performance Indicators help jurisdictions illustrate road safety progress meeting the desired outcomes. They are a means of monitoring, assessing and evaluating the processes and operations of road safety systems concerning their potential to solve the problems they are up against. They use qualitative and quantitative information to help to determine a program's success in achieving its objectives. They could be used to track progress and could provide a basis to evaluate and improve performance.

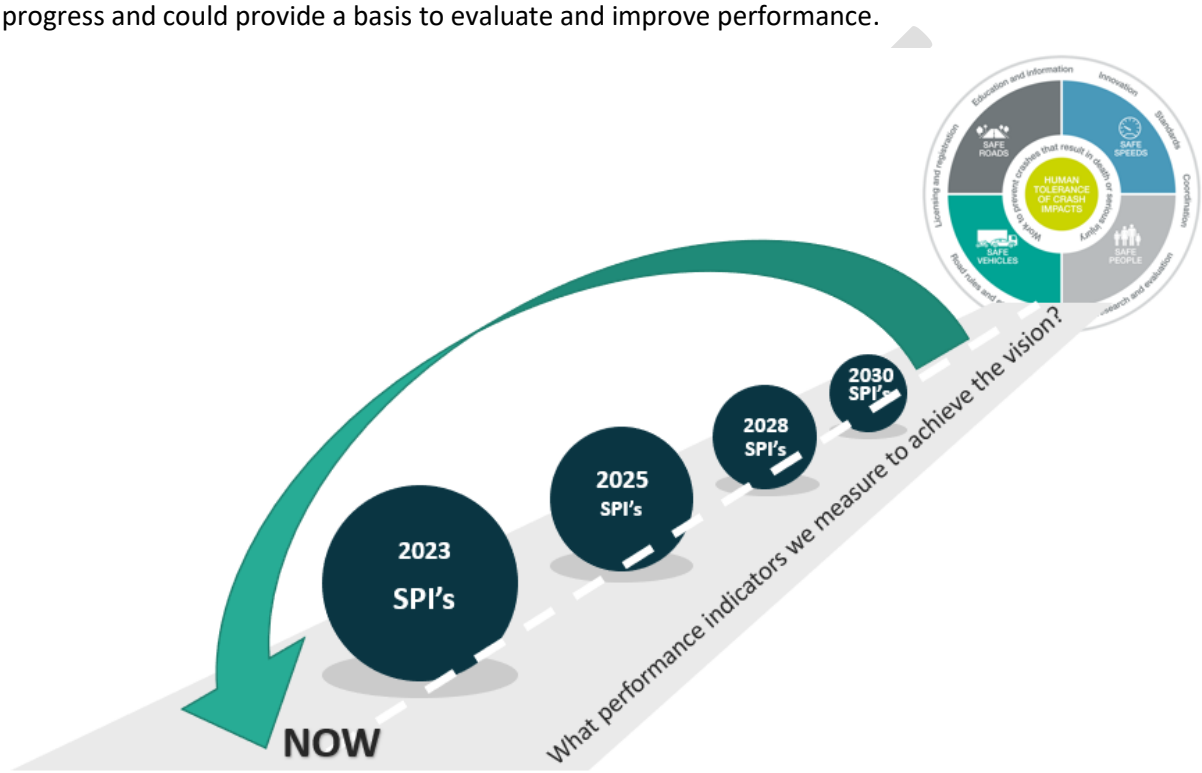


Figure 34: Backcasting SPI

The successful outcome of measuring SPI's is based on successfully implementing the intervention. The interventions are generally related to:

- Legislation
  - Introducing or make use of existing legislation that assist in positive results for the road safety situation
  - Penalties for detracts road user to break the law
- Standards
  - Introduce standards conducive to improving the severity of a crash e.g. helmet standards, vehicle standards (seat belts standards)
- Enforcement
  - Enforcement strategy and methodology
  - Police officers training
  - Introducing of deterrents for police officers reaching a negotiable outcome with the offending road users
- Public campaigns

- Target campaigns for different measures where the community understand the outcomes
- Post-crash response
  - Rescue and first aid requirements

There is a need for an integrated approach of all interventions in order to see results in reduced numbers of injuries.

SPI A - Speeds

Speeds that are most relevant for addressing safety. They are spot speeds measured at various locations on the road network during periods when traffic can be considered free flowing, i.e. not during periods of congestion when speeds are severely restricted. In order to consistently measure the speeds, it is required to evaluate the mean speed, the 85th percentile speed and the percentage of drivers exceeding the speed limit.

How can the Speed SPI be measured?

These indicators should be than segregated by road type, vehicle type, period of day and period of the week, i.e. weekdays and weekends. Another important factor is to consider comparability. When measuring and evaluating speeds, has to be undertaken on roads that present some of the following characteristics:

- on a straight section of road
- away from junctions (>500 meters)
- away from any speed calming device (> 500 meters)
- away from road works (> 500 meters)
- away from pedestrian crossings (> 500 meters)
- away from any speed limit change or sign (> 1000 meters)
- be on a section with a small gradient (<5% on the preceding 500 meters)
- Have a pavement surface in good condition

SPI B – Alcohol

Driving under the influence of alcohol probably increases the risk of road crashes more than most other traffic law violations. If this risk implies by use of alcohol is high, its potential for crash reduction should also be high.

It is proposed to measure two indicators:

SPI B1. Percentage of tested traffic volume with sober road users (under 0.2 permillage)
SPI B2. Percentage of fatalities resulting from crashes involving at least one driver / rider impaired by alcohol

It is important that cooperation between Police and communities occur where they can jointly help reduce the problem of drink driving. It includes work on breathalysing checks. It is important that there is a clear strategy on the numbers of tests undertaken every year and more authorities are brought together to reduce the numbers of people reoffending in drink driving / riding.

Some actions that can be undertaken to assist in the long term with improving the drink-driving related incidents are:

- Undertake various communication and educational campaigns against drink-driving
- Targeted drink driving campaign to high school students
- Police undertaking breath tests at random places and times in order to decrease the road user perceived risk of being caught. This including locations where there is a risk of unsafe road users e.g. vicinity of bars

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- Introduce a tough penalty system for reoffending drivers / riders
- DOT and DOR to assist Police establishing the targeted locations and increased enforcement
- DOT to work with alcohol manufacturers to label the number of standard drinks in each serve

SPI C - Protective Systems

The protective systems in vehicles that are relevant are the use of seat belts for adults and children, helmets used by moped riders and motorcyclists.

All the indicators should come from independent observational surveys carried out on an annual basis.

Helmets for two-wheelers protect, in case of crash, the most vulnerable part of users' body - the head - by absorbing a part of the kinetic energy. Their capacity of avoiding serious, or fatal injury is limited and strongly depends, beside collision type, on the speed at which the crash occurs.

It is proposed to measure three *protective system* indicators:

SPI C1. Percentage of seatbelt wearing in front seats
SPI C2. Percentage of seatbelt wearing in rear seats
SPI C3. Percentage of motorcyclists with helmets

How can the Protective system SPI be measured?

There are several ways how the value of the indicator may be obtained: Police reported rates, self-reported rates, roadside survey rates and crash rates. It is possible that Police presence on the side of the roads have a deterrent effect leading the road user to use a helmet (if readily available) or buckle up before being checked.

All indicators must come from independent observational survey carried out on annual basis. Measurements need to be classified according to road function e.g. National Road, urban roads.

It is proposed that the following performance indicators are measured in order to achieve the Lao PDR road safety effort:

Table 11: Safety Performance Indicators targets

Condition / Performance Indicator	Measurement	Target for 2023	Target for 2025	Target for 2030	Progress to date ↑ ↔ ↓
A. Compliance of speed limits.	Percentage of traffic volume compliant with the speed limit	30%	50%	75%	↔
	B1. Percentage of tested traffic	70%	80%	99.9%	↔

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B. Sober road users	volume with sober road users (under 0.2 permillage)				
	B2. Percentage of fatalities resulting from crashes involving at least one driver / rider impaired by alcohol	To be deter mined based on record s	To be deter mined based on record s	10%	↔
C. Use of seat belts	C1. Percentage of seatbelt wearing in front seats	50%	70%	95%	↔
	C2. Percentage of seatbelt wearing in rear seats	20%	50%	70%	↔
	C3. Percentage of motorcyclists correctly wearing a helmets	50%	70%	95%	↔
D. Trauma Management	Total health expenditure as GDP (%)	To be determined	To be determined	To be determined	↔
E. Motorcycles	Anti-lock brake systems	20% in new motor cycles	40% in new motor cycles	60% in new motor cycles	↔

A base case scenario needs to be established to understand what the value target SPI's are. It is likely that one year of data may be required to have statistically significant values to start with.

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Appendix E. The Safe System

Implementing Lao's PDR 50by30 Road Safety Strategy

The 'Safe System' approach advocates for a safe road system, better adapted to the physical tolerance of its users.

Sweden's Vision Zero approach

Vision Zero was adopted by Sweden in 1997 and has the long-term goal of eliminating death and serious injury from the road transport system. Under this approach, it is unacceptable to trade off human life and health for other benefits of the transport system (e.g. mobility).

The Netherlands' Sustainable Safety approach

The Sustainable Safety approach was launched in the Netherlands in the early 1990s. It aims to prevent road crashes or at least minimise their severity while allowing for human capacities and limitations. The approach recognises that human beings are susceptible to injury and prone to errors. Sustainable Safety aims to prevent these errors as far as possible or to reduce their consequences by allowing for human limitations in designing the traffic system.

While the Safe System approach to road safety recognises the need for responsible road user behaviour, it also accepts that human error is inevitable. It, therefore, aims to create a road transport system that makes allowance for errors and minimises the consequences - in particular, the risk of death or serious injury. By taking a total view of the combined factors involved in road safety, the Safe System approach encourages a better understanding of the interaction between the key elements of the road system: road users, roads and roadsides, vehicles, and travel speeds.

The vulnerability of the human body has been extensively studied establishing that it was not built to withstand impact forces greater than 30 km/h. A powerful model designed by Corben et al [59] is shown in Figure 12.

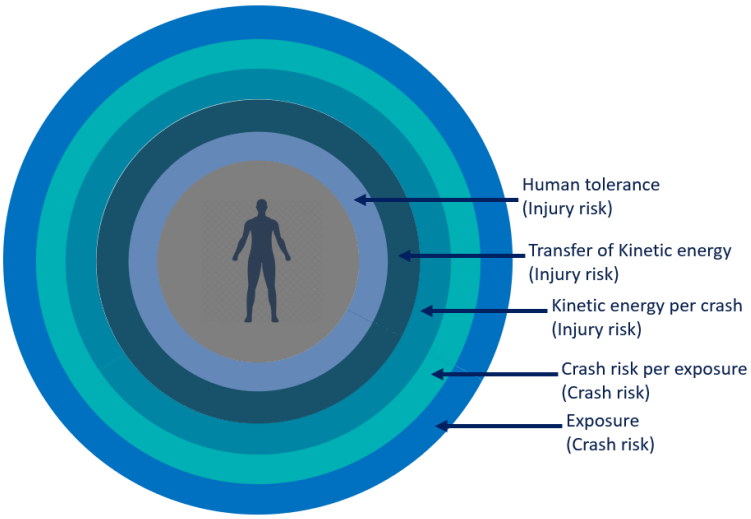

Figure 35: Trauma management

:

[59] Development of the visionary research model application to the car/pedestrian conflict

The model is based on the idea that each layer provides a different level of protection to the human. Indicators such as crash exposure, likelihood, and severity are taken into consideration.

A guide to Safe System impact speeds for common crash types is presented below. It should be noted that the angle of impact of a collision is also a factor that affects the severity of a crash. As far as is practically possible, infrastructure should be designed by and travel speeds managed so that the impact speeds when a crash occurs are below the thresholds shown in Figure 36.

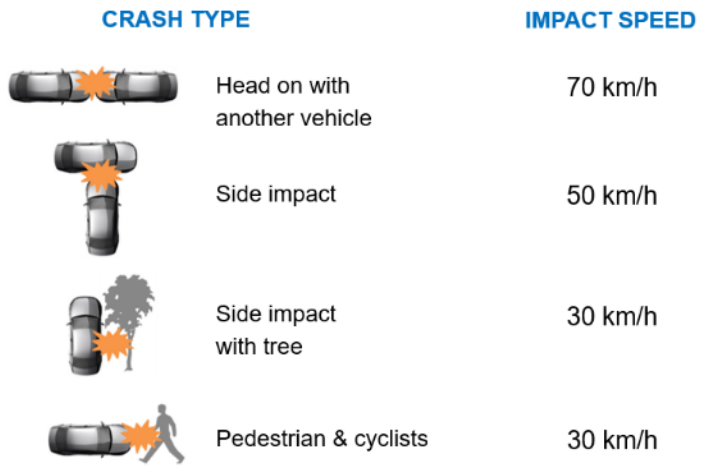

Figure 36: Safe System Impact Speeds.

The Safe System is recognising additional crash types and relates them to speed, that is rear end and frontal impact with a fixed object i.e. tree. Figure 37 is representing the Safe System speeds for rear end and front collision with a tree.

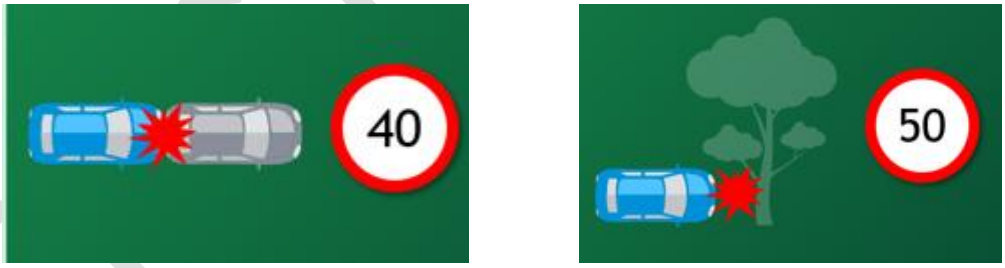

Figure 37: Gap analysis safe system speeds

What does Safe System mean for Lao PDR

The Safe System approach represents a significant shift in thinking. It will deliver the ambitious reductions in death and serious injuries when the institutional coordination and management of all transport system, including health sector, aligns with the common goal.

DOT and NRSC will be accountable to ensure that the Provinces and Districts are adopting Safe System thinking. Provinces and Districts will require support from the central Government in order to achieve Lao's road safety vision. Some of the actions that are required to embed a Safe System culture are:

- Promote capacity building

- Change the established culturally-based behaviours by introducing road safety values, beliefs, and expectations that resonates with Safe System principles

The Safe System recognises the need for compliant road user behaviour, however, accepts that human error is inevitable and when this occurs shall not lead to serious injuries or fatalities. It needs to be recognised that death on the road system is unacceptable, avoidable, and achievable.

To achieve the 50% reduction in fatalities and serious injuries by 2030 "50by30[60]" target, the pillars and principles of Safe System need to be implemented.

SAFE ROADS AND ROADSIDES

Safe roads and roadsides involve planning, managing, design, and operation of road infrastructure including the roadsides. It aims to create a predictable and forgiving environment where people's mistakes do not lead to death or serious injuries. Roads are self-explaining in that their design encourages safe travel speeds and helps avoid errors.

SAFE VEHICLES

Safe vehicles play an important role in reducing road trauma. Protective systems in vehicles (airbags and safety belts) work primarily by restraining their occupants in the event of a crash.

In the event of a crash, helmets for two-wheelers protect the most vulnerable part of their body, the head, by absorbing a part of the kinetic energy. ABS installed in motorcycles also plays an important role.

The safety features and technologies of vehicles are designed to prevent a crash or reduce the injury risk should a crash occur so that death and serious injuries are eliminated.

Research has shown that the use of three-point seatbelt during a crash reduces the risk of death for front-seat occupants by 45 percent and the risk of moderate-to-critical injury by 50 percent (Kahane, 2000)[61].

SAFE SPEED

The Safe System is recognising the importance of speed given human body's tolerance to external forces. Speeding crashes are one of the worst cases of speeding behaviour. Speed compliance and speed reduction would be one of the most successful measures to prevent death and serious injuries on Lao's roads.

SAFE PEOPLE

The Safe System acknowledges that people will make mistakes. It is the human condition that is, so far, proven difficult to change, however for such mistakes people shall not pay with their lives. It is unacceptable to account for death and serious injuries in the road system as inevitable.

Continuous education, enforcement, and promotion of the Safe System approach would bring its contribution to life-saving results.

POST CRASH CARE

[60] *A new target for a decade of SDG action for road safety*; http://www.towardszerofoundation.org/50by30/
[61] one.nhtsa.gov/people/injury/research/pub/HS810705/pages/Background.html

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Post-crash care is an important part of a safe road system. In the event of a crash, effective post-crash care, involving emergency treatment and trauma care and rehabilitation, can help reduce the risk of death and serious injuries.

IMPLEMENTING THE SAFE SYSTEM

There are demonstrated effective practice in implementing the Safe System approach that can be adopted for Lao's conditions:

- Focused coordinated partnership to assist with the delivery of the road safety program
- System wide intervention addressing the high risk rural roads and high risk intersections
- Infrastructure related measures (some examples)
    - Road lighting
    - Linemarkng including audio-tactile linemarking
    - Speed limit reduction
    - Upgrading pedestrian crossings
- Vehicle related measures
    - Frontal air bags
    - Side impact air bags
    - Seat belt
    - Emergency brake assistance
    - Crashworthiness
    - Alcohol interlock
    - Electronic driver licence
- Enforcement
    - Speed enforcement
    - Seat belt enforcement
    - Breath testing
    - Speed and red light cameras
    - Increased penalties
- Increase use of safety management tools
    - iRAP
    - Safe System Assessment Framework

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Appendix F. DRIVER

This note is intended for any road administrator to understand how **to use the Data for Road Incident Visualization, Evaluation and Reporting (DRIVER) System and effectively use crash data in prioritizing road safety interventions as a reactive program**. The guidelines set out the eligibility criteria for the project approval process and administrative arrangements. They also provide information and guidance on project development, evaluation and ranking.

The objective of this proposed program is to achieve the maximum reduction in crashes and crash severity, with the main areas of focus:

- Intersections and blackspots with a history of fatalities and serious casualty crashes;
- Lane departure crashes on rural/provincial and urban area roads.

DRIVER

DRIVER is a web-based and open-source system for geo-spatially recording and analyzing road crashes. DRIVER provides a centralized and national platform for gathering, reporting, and analysis of crashes developed initially for the Philippines, and now being rolled out in over ten countries/cities around the world. The platform includes:

- A web-based interface: http://52.9.164.59:4200/
- A companion android application for data entry;
- Automated reporting based on the most common reports across agencies;
- Custom search and filter tools; and
- Statistical tools for identifying high-incident areas over time, predicting likelihood of incidents throughout the day and week, and tracking infrastructure interventions.

The system links multiple agencies involved in recording road crash data (i.e., local government units, the police, and the health system), standardizes terms and definitions for reporting, and provides analytical tools to support evidence-based investments and policies and monitoring the impact of interventions.

DRIVER's main interface is the Map which enables both the national and the local government to effectively identify, visualize, assess, and address blackspots or black lengths. A screenshot of the platform is provided in **Error! Reference source not found.**. Since in the Philippines DRIVER is the most a dvanced, examples from this Guide are mainly from that platform.

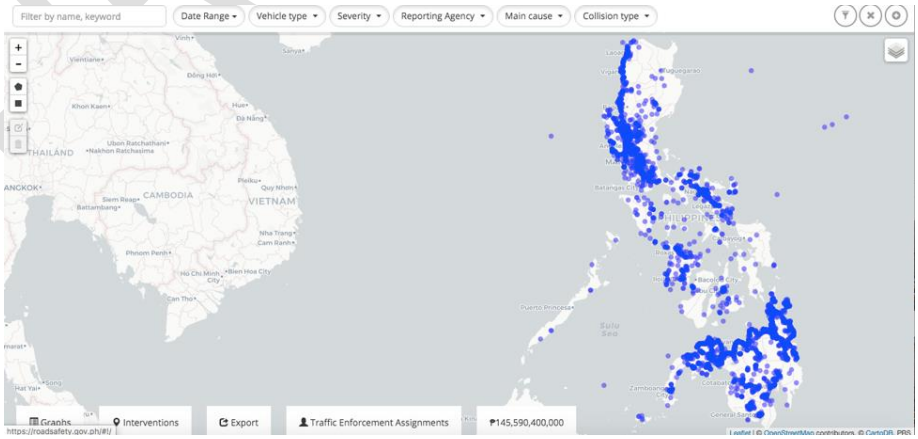

Figure 38: Screenshot of DRIVER in the Philippines and Map of Crash data encoded into DRIVER for 2019-2020

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Definition of Blackspot

Blackspots and other hazardous components of the road network are identified through analysis of data in DRIVER to target locations with a concentration of casualty crashes. These hazardous components take the form of:

- Single sites with high casualty crash frequencies.
- Routes with high casualty crash frequencies per kilometre.

In road safety engineering, the meaning of blackspot is any site with a maximum length of "x" meters at which at least "y" casualty crashes have been recorded in the last "z" years. In DRIVER however, the blackspot tool currently uses a predictive model that identifies blackspots through geography and historical severe and non-severe crashes. To avoid confusion, this document will follow the definition of blackspot as used in road safety engineering and will use other tools in DRIVER aside from the blackspot tool (this feature is being updated under the DRIVER 2.0 version).

Identifying Blackspots in DRIVER

Blackspots can be identified in DRIVER primarily through the use of the Map function and the different filters found on the Map. The Map interface is one of the principal tools in the DRIVER application and is used to view incidents in a variety of ways, such as through filter tools, layers, and more. Depending on the type of user, the Map also grants access to interventions, additional graphs, custom report builder tools, and data exports, among others.

How to Access the Map

While there are small map widgets available on the Dashboard, the main Map interface can be accessed by clicking the "Dashboard" drop down on the topmost left bar on the DRIVER dashboard and clicking "Map." (see Figure 39 below)

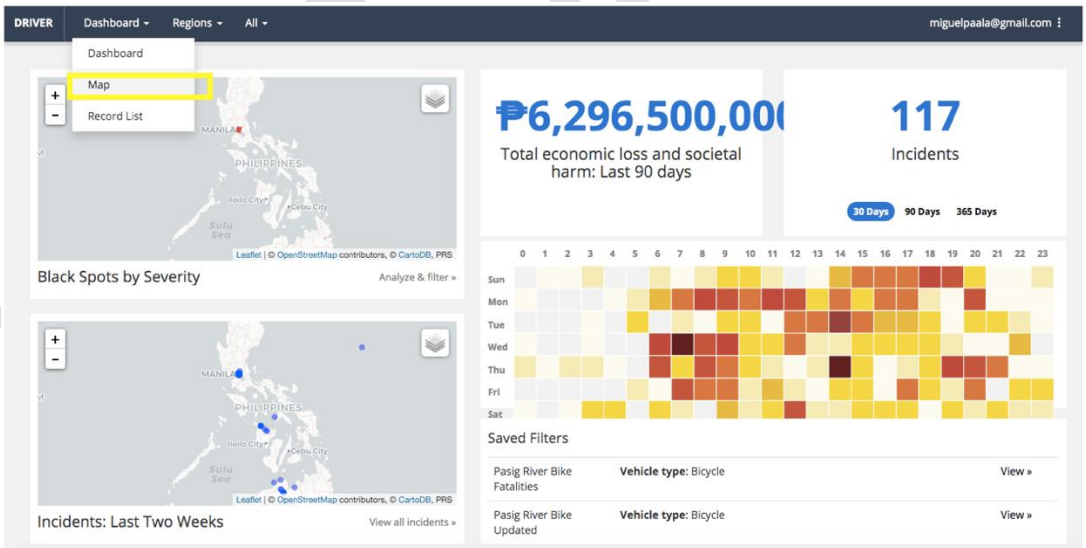

Figure 39: Accessing the Map by Clicking the Button at the Top-Left side of the Screenshot, Map is highlighted by a Yellow Rectangle

Map Tools

There are several tools that can be accessed using the map. These tools allow the user to view data more efficiently by providing different ways to filter and access data. The following tools that can be used for blackspot analysis are:

- *Zoom in/Zoom out.* Users may zoom in and out of the map by clicking the (+) and (-) button on the leftmost side of the map or may zoom in and out using a trackpad or mouse.
- *Attribute Filters.* DRIVER lets users narrow down their searches in order to easily find specific incident entries or sets of incident entries within the DRIVER database. They may choose between filtering the map towards only a specific area, or the severity of the incident, among others.
- *Layers.* Unlike Filters, setting a layer lets users choose what kind of map they want to access: Incidents, Interventions, Heatmap, City/Province, or Region. Users may also choose between viewing the Street View or the Satellite View. Users can choose more than one layer, or a combination of layers to further narrow down their searches.
- *Spatial Filters.* Users may filter a specific area on the Map using Spatial Filters which can be the Rectangular or Polygonal Tool. Upon applying a spatial filter, the user's selected filters will apply only on the selected area that the boundary was drawn on.

These are the tools that can be used to identify blackspots. Combining these tools will enable a comprehensive analysis of crash data. Figure 40 shows a screenshot illustrating where these tools as well as others can be accessed. More information about these tools can be found in the online user manual at roadsafety.ph.

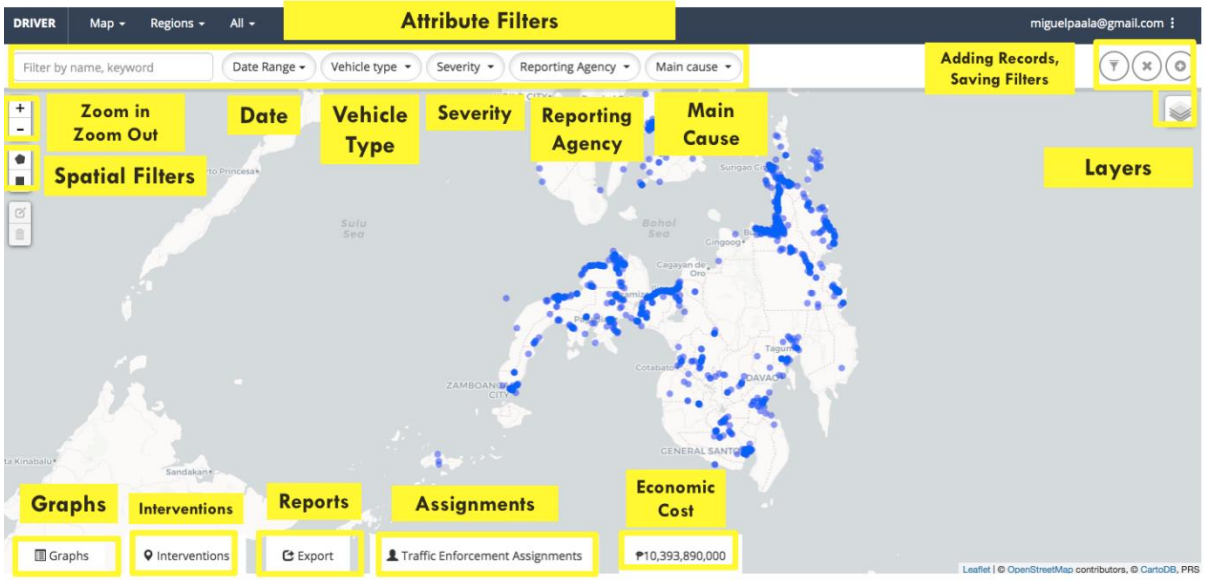

Figure 40: Different Tools Found in the Map

Potential blackspots can now be viewed through the DRIVER database by filtering the data on the map. The filters that will be activated will depend on the criteria that define blackspots. For example, in Figure 41, data is filtered by regions in the Philippines.

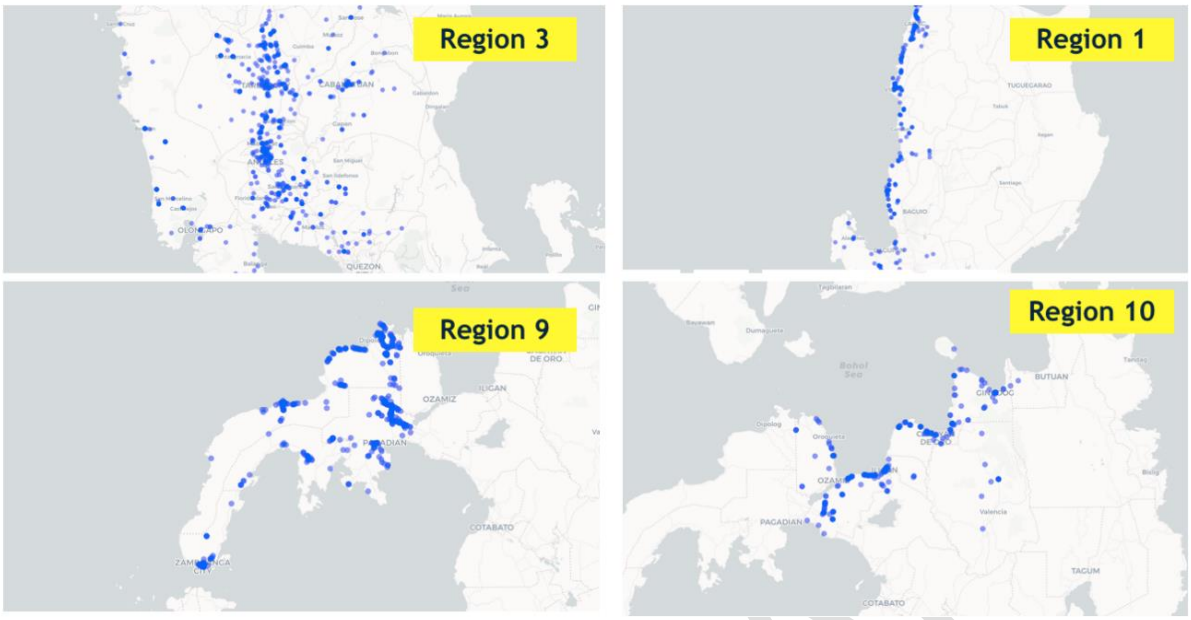

Figure 41:Crash data in four separate regions

The geographic filter can be used alongside the filter for crash severity Figure 42 shows how the data is filtered for Region 13 and for crash severity.

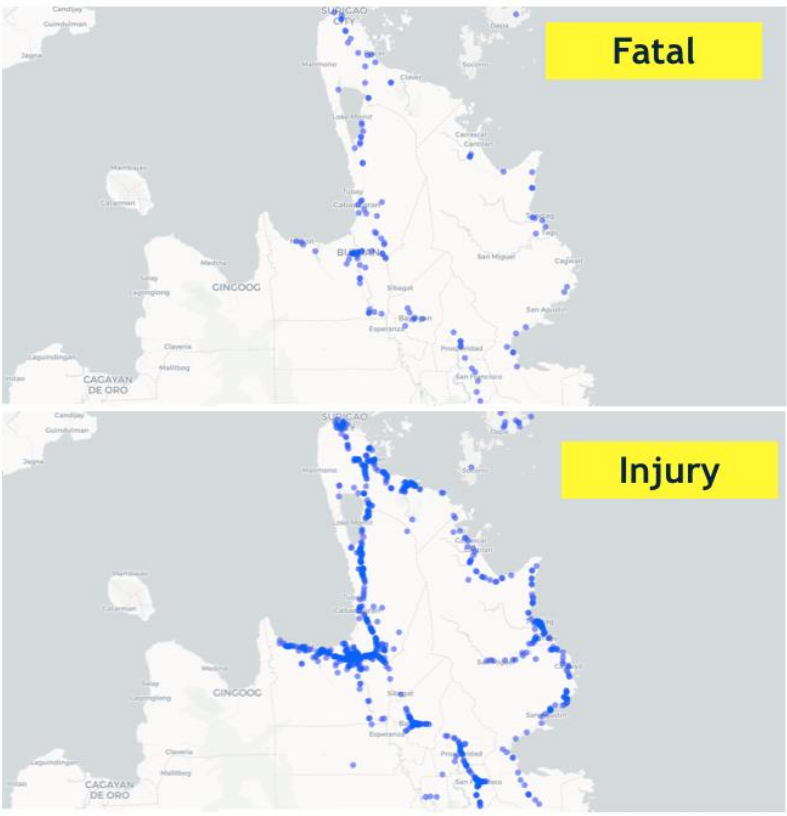

Figure 42: Crash data by Severity in Region 13 (Philippines)

Other filters can also be used such as the vehicle type filter (see Figure 40).

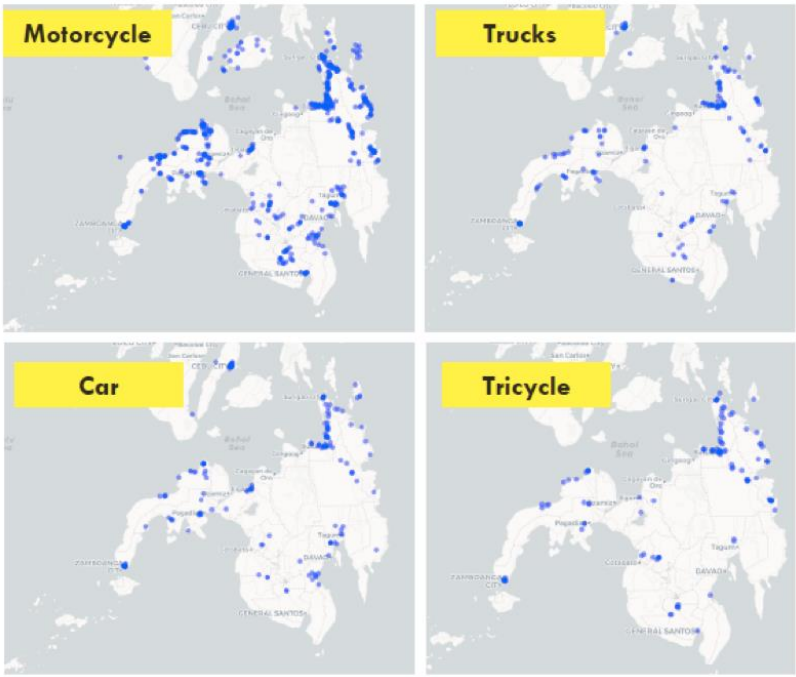

Figure 43: Crash Data in Mindanao by Vehicle Type

All these filters can be used all at once to have a more detailed and thorough investigations. An example is Figure 44 which uses the polygonal tool with the severity and vehicle type filter to examine motorcycle crashes. In addition, Google Street map is used separately to generate street-level photos.

Figure 44: Motorcycle Crashes in Butuan-CDO-Iligan Highway

Finally, an alternative to using the Map in DRIVER is to download the raw data through the Export CSV function and upload the data in a third part GIS software such as QGIS. There, blackspots can be generated by generating clusters that represent a specific number of crashes.

General Deployment Roadmap for DRIVER

A. Initiation (1-6 months)

1. One on one meetings with stakeholders to discuss on crash data challenges.
2. Introductory workshop(s) and stakeholder engagement discussion to determine desired future roles and responsibilities as well as reach consensus on a way forward (e.g., data sharing agreements, size of and involvement in a pilot, scale-up plan, etc.)
3. Drafting of local road map, including:
    - Pilot
    - Scale-up plan
    - Operationalization plan
    - Identification of funding streams for equipment, training, server/cloud space, etc.
4. Initial workshop on DEMO version
    - Hands on practice
    - Insert pilot data
    - Get feedback for future enhancements to local platform

B. Pilot (up to 2 years)

5. Local Adaptation
    - Drafting DRIVER enhancement needs based on lessons learned from comparison with existing system and/or pilot
    - Based on needs, costing of tasks for local adaptation
    - Drafting of ToRs for local adaptation
    - Hiring local development consultant and management costs
    - Trialing and debugging locally adapted version of DRIVER
    - Drafting local guidelines for users
    - Azavea support time for local developers
6. Operationalization of pilot
    - Training
    - Equipment and server/cloud costs
    - Analysis of outcomes and generation of lessons learned
7. Operationalization of locally adapted version of DRIVER
    - Drafting of formal, agreed upon roles and responsibilities to be co-signed by all stakeholders
    - Drafting of outline of data sharing arrangements to be co-signed by all stakeholders
    - Drafting of MoUs

C. Scale up

8. Operationalization of scale-up
    - Train-the-trainer
    - City-/country-wide training
    - Equipment and server/cloud costs
    - Hiring local staff (permanent or consultants) for backend support on maintenance, data management and analytics, etc.
    - National level MOUs

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Appendix G. Road Safety Action Plan Recommendations

Table 12: Road Safety Actions[62]

Immediate Priority Action	Short Term Priority Action	Medium Term Priority Action

Action	Agency	Investment
8.1.1. Promote the safe system approach		
1. Road Safety Leadership Program a. International knowledge transfer program in good practice high-income country b. Five day national program in Vientiane for institutional leaders across NRSC membership c. Three day provincial program for institutional leaders across Provincial Road Safety Committees	MPWT	$350,000
2. Extend Road Safety Leadership Program to 2022, and develop a wider road safety capacity building plan to 2030	MPWT	
8.1.2. Strengthen road safety governance & leadership		
3. Road Safety Management Strengthening Program a. Increase dedicated road safety staff, and establish a cross agency team, within MPWT b. Prepare Terms of Reference, and operating procedures for the National Road Safety Committee and Secretariat c. Begin preparation of a national road safety handbook for use by MPWT and partners d. Prepare road safety funding and investment plan	MPWT	$75,000
4. Prepare formal proposal (including work program, budget and staffing) to establish a dedicated Road Safety Division within MPWT	MPWT	
5. Invest in establishment of dedicated Road Safety Division, fully capacitated to lead national road safety effort in Laos	MPWT	
8.1.3. Upgrade data, monitoring & evaluation systems		
6. Specify new road crash and injury data system	MPWT, in consultation with	$75,000

[62] Department of Transport. (2019). Lao Peoples' Democratic Republic Road Safety Action Plan 2025. Vientiane: MPWT.

a. Assess current road crash data systems in Laos, including collection-collation-analysis processes b. Prepare full proposal for: i. a revised road crash data form for use by Police ii. integration between Police and health sector data iii. road crash data system processes and practices iv. related investment project	the Ministry of Public Security, and the Ministry of Public Health	
7. Based on the full needs assessment above, tender and implement a major development project to: a. Develop an electronic searchable database of road crashes and injuries b. Provide associated training, analysis and reporting applications c. Source and install equipment d. Rollout national system (with pilot in two provinces)	MPWT, in consultation with the Ministry of Public Security, and the Ministry of Public Health	$1,000,000
8. Initiate a program of observational surveys for annual national reporting of: a. Motor vehicle speed in excess of legal speed limit (by motorcycle, light vehicle, truck and bus) b. Motorcycle helmet wearing (by rider and passenger) c. Seatbelt wearing (by front seat and rear seat) d. Alcohol involved crashes, including dead drivers with alcohol e. Unlicensed driving (by motorcycle, light vehicle, truck and bus)	MPWT, in consultation with the Ministry of Public Security	$1,000,000
8.1.4. Tackle motorcycle safety		
9. Pilot in two provinces, and then rollout nationally across all provinces and districts, a motorcycle enforcement program targeting licensing, helmet wearing (properly fastened) and child riders. Key supporting activities: a. Prepare a motorcycle enforcement strategy with template deployment plans for use at provincial and district level b. Prepare a supporting awareness program which reinforces legal requirements, and increases perceived risk of detection and fines by Traffic Police	Ministry of Public Security	$250,000

10. Prepare a motorcycle safety plan which includes plans to address: a. The process for strengthening motorcycle helmet standards, and for enforcing these standards b. The process for introducing anti-lock braking systems legislation, and for enforcing this legislation c. The standards to apply for new road construction, and existing road improvement, which support safe motorcycling	MPWT	$50,000
11. Begin delivery of motorcycle safety plan	MPWT	
8.1.5. Sustained rider/driver enforcement & campaigns		
12. Undertake a comprehensive review of legislative policy and operations applying to all aspects of driver licensing, and key safety behaviours: a. End to end analysis of the driver licensing system – from identity verification to licence issue and to licence removal b. Theory and practical testing requirements c. Options for a graduated licensing system to reduce and control exposure to risk d. Options for licence sanctions against serious and repeat traffic offenders e. Options for strengthening law regarding key safety behaviours	MPWT	$50,000
13. Initiate a Traffic Police development program: a. Road safety enforcement and planning focused development program for provincial Traffic Commanders b. Train the trainer based development program for all Traffic Police officers c. Preparation of general deterrence enforcement strategies, templates etc for officer deployment and reporting d. Rollout general deterrence enforcement programs targeting drink driving and speeding	Ministry of Public Security	$5,000,000
14. Prepare a comprehensive reform of road safety legislation including driver licensing and key safety behaviours	MPWT	
15. Conduct a full peer review of traffic safety enforcement planning and operations, and prepare major new investment in enforcement capability	Ministry of Public Security	

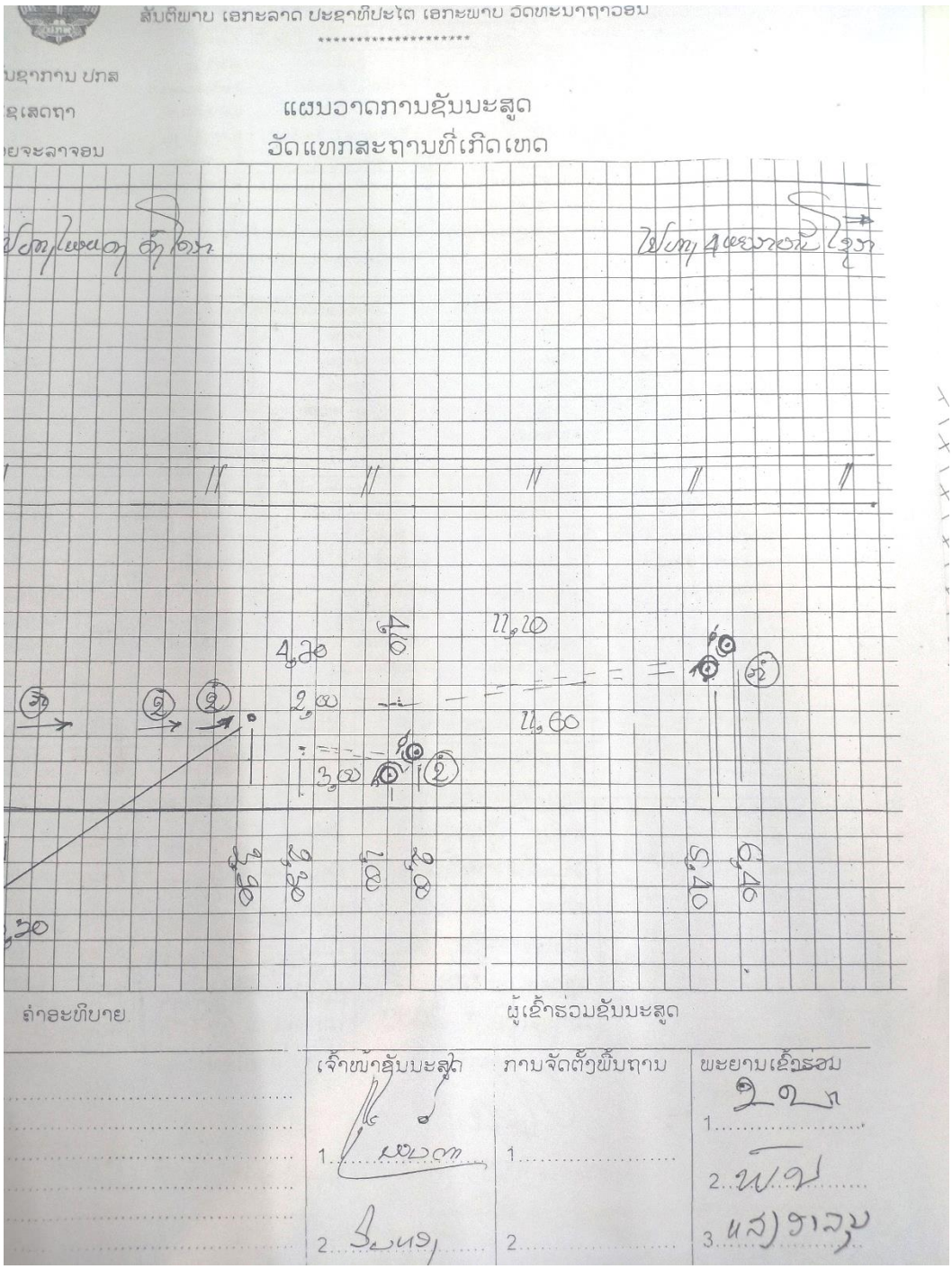
8.1.6. Regulate vehicle safety technology		
16. Initiate a vehicle safety technology program that will: a. Explain and promote key UN vehicle safety regulations b. Prepare a Regulatory Impact Statement to scope necessary change, including: i. Required change to law ii. Required audit and control systems iii. Capital and ongoing operational expenditures required iv. Vehicle fees and charges required to fund the cost of safety regulation	MPWT	$50,000
17. Based on the Regulatory Impact Statement, tender and begin implementation of a major development project to: a. Begin passage of key safety regulations into law b. Establish necessary revenue and expenditure budgets to implement new regulatory system c. Specify MPWT workforce and resource requirements for new regulatory system d. Specify and prepare tender documents to introduce audit and control systems.	MPWT	$100,000
18. Complete legislation requirements, and begin delivery of new vehicle safety regulatory system	MPWT	
8.1.7. Demonstrate and rollout safe road environments		
19. Undertake an iRAP study of the Asian Highway network, and of major urban roads in Vientiane, Savannakhet, and Pakse to establish a baseline of current infrastructure safety performance	MPWT (Department of Roads)	$1,000,000
20. Develop and implement infrastructure safety demonstration projects: a. On AH11, between Vientiane Capital and Champasack, including adjacent villages b. On a different, mountainous section of the Asian Highway network c. On major urban roads in Vientiane, Savannakhet, and Pakse	MPWT (Department of Roads)	$20,000,000
21. Based on the above projects, prepare a multi-year infrastructure safety investment program to achieve the intermediate safety outcome targets.	MPWT (Department of Roads)	$50,000

22. Based on the needs identified in Action 12, and learnings from Action 13, develop road safety engineering manuals which give effect to safe system principles	MPWT (Department of Roads)	$100,000
23. Develop a schools program to increase student understanding of road safety, and improve the safety of school trips (including stopping illegal motorcycle use and improving safety of road environment)	Ministry of Education and Sport	$250,000
24. Begin delivery of infrastrastructure safety program	MPWT (Department of Roads)	
8.1.8. Invest in post-crash response		
25. Undertake a comprehensive assessment of road trauma response capacity within Laos, including: a. Emergency alerts to the crash incident b. Victim transport from crash site to a health facility c. Medical treatment from trained and equipped staff d. Recovery and return to fitness for the crash victim	Ministry of Public Health	$50,000
26. Prepare a post-crash investment plan for integration within, and delivery through, the health sector	Ministry of Public Health	$50,000
27. Investigate options for strengthening national injury insurance systems for road crash victims	Ministry of Public Health, in consultation with MPWT	$50,000
28. Begin investments in post-crash response, and prepare regulatory amendments to establish a national injury insurance scheme	Ministry of Public Health	
8.1.9. Planning, Monitoring and Evaluation		
29. Publish annual and quarterly reports on road safety in Laos using best available local data, and estimates from multilateral institutions	MPWT	$25,000
30. Undertake a comprehensive, outcomes and performance based evaluation of the implementation of the road safety strategy	MPWT	$75,000
31. Revise and update last two years of this road safety action plan	MPWT	$25,000
32. Develop a comprehensive road safety action plan to 2030, focusing on policy and investments required to achieve 2030 targets	MPWT	

Appendix H. **Sample Crash Record Form**

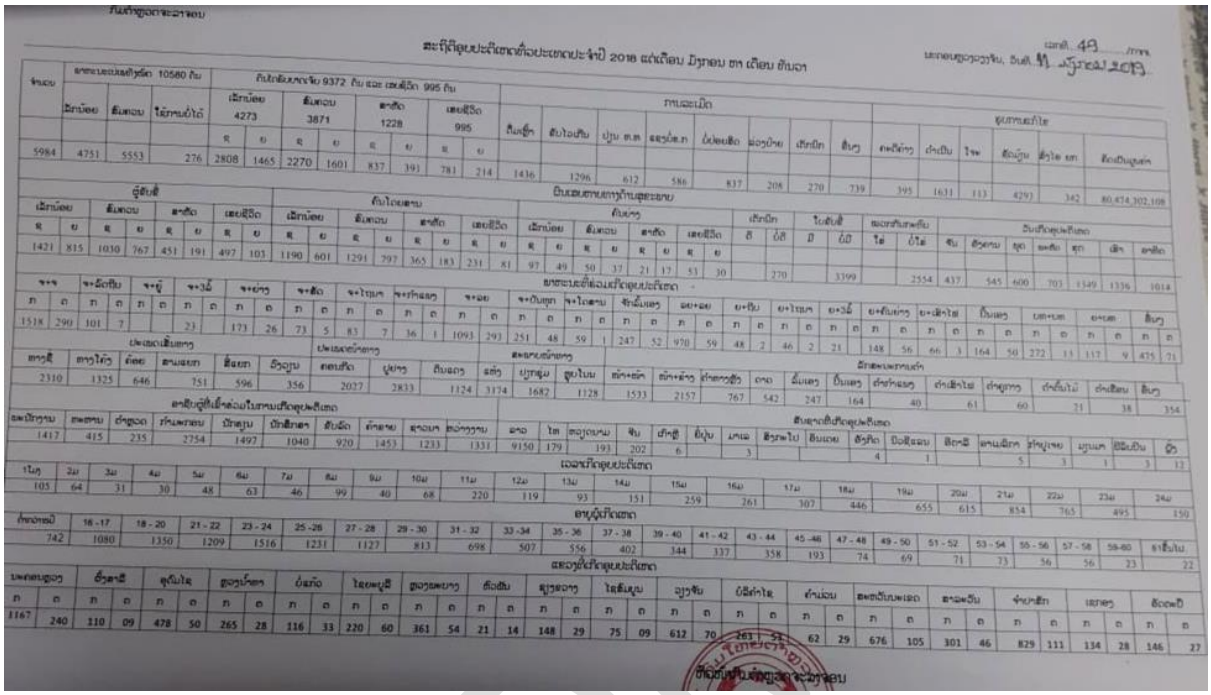
Accident Report Form							
Case No.	Village.....Street.....			Time.....hour.....minute		Types of Roads	
	District	Province		Date.....		1. Straight	7. wetted road
	Casualty	Car damage		Day of the Accident		2. Curved	8. earthed road
	1. minor	1. minor		1. Sunday	5. Thursday	3. 3 intersections	9. Walkway/ footpath
	2. moderate	2. moderate		2. Monday	6. Friday	4. 4 intersections	10. concrete road
	3. severe	3. damaged/ not usable		3. Tuesday	7. Saturday	5. Round-about	11. road with potholes
	4. death			4. Wednesday		6. dry road	12. Others
Driver's License	Driver's conditions	Environment		Time of accident (24hrs)			
1. yes	1. drink alcohol	1. Day time	3. heavy traffic	1. 2. 3. 4. 5 .6. 7. 8. 9. 10			
2. No	2. No alcohol	2. Night time	4. light traffic	11. 12. 13. 14.15.16.17.18.19.20.21.22.23.24			
Accident details	Injury-killed	Type of vehicles					
1. Hit Front+front	1. driver	1. motorcycle+mortocycle		7. motorbike+person walkin		13. car flip-over by itself	19. tooktook+truck
2. Hit back	2. passenger	2. motorcycle+car		8. car+road		14. motobike+truck	20. truck flip-over by itself
3. Hit side	3. passenger	3. car+car		9. car+person walking		15. car+truck	21. motobike fall by itself
4. Hit person walking	4. person walking	4. car+road		10. car+tooktook		16. bicycle+truck	22. .....
5. scratch	5.	5. motorbike+tooktook		11. car+bicycle		17. road+truck	23. .....
6. fall down by themselves		6.		12.		18. road+car	24. .....
7. hit house		types of vehicle in accident					
8. hit electricity pole	Articles violated	types of motobike		types of car		types of truck	types of tooktook
9. Hit tree	1. dangerous passing over	1. Chinese		1. Chinese		1. Chinese	1. Chinese
10. lost self-control	2. change direction	2. Korean		2. Korean		2. Korean	2. Korean
11.....	3. not keeping the distance	3. Thai-Japanese		3. Thai-Japanese		3. Thai-Japanese	3. Thai-Japanese
12.	4. not driving on the right	4. American		4. American		4. American	4. American
	5. drink and drive	5. Russian		5. Russian		5. Russian	5. Russian
	6. overspeed	6. German		6. German		6. German	6. German
	7. dangerous crosswalk	7		7		7	7
	8. crosswalk at wrong section	8		8		8	8
	9.	9		9		9	9
Technical condition	Occupation of casualty	Casualty A		Casualty B		Casualty C	
1. good	1. construction worker	Name:.....		Name:.....		Name:.....	
2. not good	2. student	age.....year, nationality.....		age.....year, nationality..		age.....year, nationality.....	
3. headlights not work	3. college student	occupation.....		occupation.....		occupation.....	
4. emergency light	4. office worker	Village.....		Village.....		Village.....	
5. free steering wheel	5. military	Unit.....		Unit.....		Unit.....	
6. no break	6. police	district.....		district.....		district.....	
7. no tyre	7. farmer	province.....		province.....		province.....	
8. ถังสี่ป์ก็	8. unemploy	license plate no.....		license plate no.....		license plate no.....	
9. others	9. commerce	Signature		Signature		Signature	
10	10. enterpreneur						
11	11.						
Nationality							
1. Lao							
2. Thai							
3. Vietnamese							
4.		Tel.....		Tel.....		Tel.....	
5.							
			Recording Officer				

- 'Crash Report Form' with sample of actual drawing of a crash diagram.



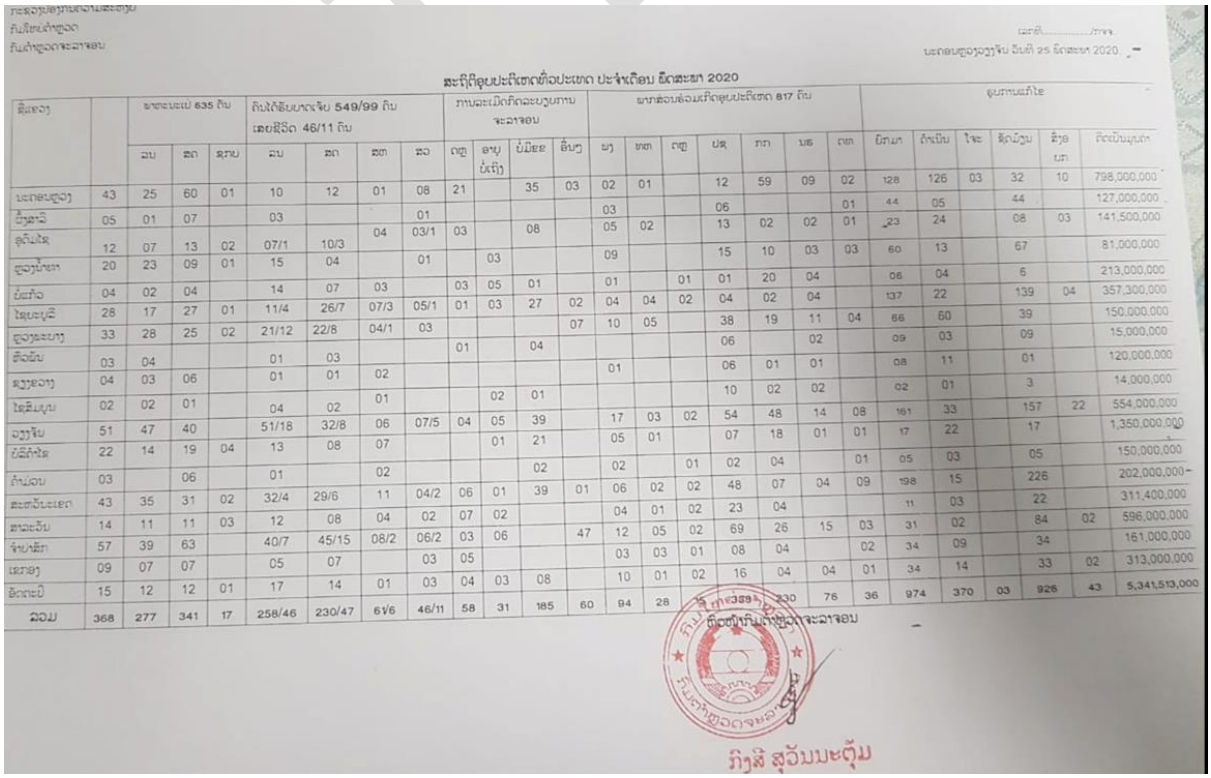
Appendix I. **Provincial/Vientiane Capital crash data statistics**

- Vientiane capital data



Appendix J. **National level crash data statistics for May 2020**

- including all provinces



Appendix K. **Scope of works**

This report is analysing the current internal structure and road safety management of MPWT. As part of this report the work included extensive interviews, research and consultation with all public, private, academical sectors and other relevant stakeholders.

The status of road safety management in the country has been assessed and measures are recommended to address existing institutional capacity barriers that are impeding implementation of road safety improvements in Lao PDR.

The study team coordinated the delivery of five (5) output areas:

A. Capacity Review of Road Safety Management.
B. Advanced Road Safety Management Platform Implementation.
C. Pilot: Research on Improving Urban and Rural Road Safety.
D. Capacity building through trainings and workshops
E. Support DOT in Coordinating and Overseeing Implementation Road Safety Activities

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Appendix L. **Road Safety Management Checklist**

The following checklist was used during the interview process with the stakeholders.

Checklist 1: Results focus at system level						
Question no	Agency	Questions	Yes	Partial	Pending	No
1	DOT; DOR	Are estimates of the social costs of crashes available?		x		
2		Are data on road deaths and injuries readily available?		x		
3	DOT; DOR	Have the risks faced by road users been identified?	x			
		Drivers?				
		Passengers?				
		Motorcyclists				
		Pedestrians?				
		Cyclists?				
		Children?				
		Others?				
4	DOT; DOR	Has a national vision for improved road safety performance in the longer-term been officially set?			x	
5	DOT; DOR	Have national and regional targets been set for improved safety performance?			x	

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		Social cost targets?				
		Final outcomes targets?				
		Intermediate outcomes targets?				
		Intervention output targets?				
		At risk group targets?				
		Industry targets?				
6	DOT; DOR	Have all agencies responsible for improved safety performance been identified and are they formally held to account for performance achieved to achieve the desired focus on results?	x			
		Highways?				
		Police?				
		Transport?				
		Planning?				
		Justice?				
		Health?				
		Education?				
		Others?				

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7	DOT; DOR;	Have industry, community and business responsibilities for improved roads safety performance been clearly defined to achieve the desired focus on results?		x		
8	DOT; DOR	Are regular performance reviews conducted to assess progress and make improvements to achieve the desired focus on results?				x
9	DOT; DOR; ;	Has a lead agency been formally established to direct the national road safety effort to achieve the desired focus on results?	x			
10	DOT; DOR;	Is the lead agency role defined in legislation and/or policy documents and annual performance agreements to achieve the desired focus on results?	x	x		
Checklist 2: Planning, design, operation and use of the road network						
		Questions	Yes	Parti al	Pendin g	No
11	DOT; DOR	Have comprehensive safety standards and rules and associated performance targets been set for the planning, design, operation and use of roads to achieve the desired focus on results?			x	
12	DOT; DOR; Police	Are the official speed limits aligned with Safe System design principles to achieve the desired focus on results?				x
13	DOT; DOR; Police	For each category of roads are compliance regimes in place to ensure adherence to specified safety standards and rules to achieve the desired focus on results?				x
		Road safety impact assessment?				
		Road safety audit?		x		
		Road safety inspection?		x		

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		Black spot management?		x		
		Network safety management?				x
		Speed management?		x		
		Alcohol management?				x
		Safety belts management?				x
		Helmets management?		x		
		Fatigue management?				x
14	DOT; DOR; Police	Do the specified safety standards and rules and related compliance regimes clearly address the safety priorities of high-risk road user groups to achieve the desired focus on results?				x
15	DOT	Do the specified safety standards and rules and related compliance regimes compare favorably with international good practice?				x
Checklist 3: Entry and exit of vehicles to and from the road network						
		Questions	Yes	Partial	Pending	No
16	DOT Police	Have comprehensive safety standards and rules and associated performance targets been set to govern the entry and exit of vehicles and related safety equipment to and from the road network to achieve the desired focus on results?				x
		Private vehicles?		x		
		Commercial vehicles?		x		

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		Public transport vehicles?		x		
		Motor cycle helmets?		x		
		Cycle helmets?				x
17	DOT; Police	For each category of vehicles and safety equipment (private, commercial, public, helmets) are compliance regimes in place to ensure adherence to the specified safety standards and rules to achieve the desired focus on results?				x
		Vehicle certification?		x		
		Vehicle inspection?		x		
		Helmet certification?				x
18	DOT	Do the specified safety standards and rules and related compliance regimes and safety rating surveys clearly address the safety priorities of high-risk road user groups to achieve the desired focus on results?				x
19	DOT	Do the specified safety standards and rules and related compliance regimes and safety rating surveys compare favorably with international good practice?				x
Checklist 4: Entry and exit of road users to and from the road network						
		Questions	Yes	Partial	Pending	No
20	DOT	Have comprehensive safety standards and rules and associated performance targets been set to govern the entry and exit of road users to and from the road network to achieve the desired focus on results?				x
		Private drivers and passengers?		x		

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		Cars?		x		
		Heavy vehicles?		x		
		Mopeds?		x		
		Motorcycles		x		
		Commercial drivers?		x		
		Public transport drivers?		x		
		Taxis?				x
		Buses?				x
		Non-motorized vehicles?				x
21	Police	For each category of driver (private, commercial, public) are compliance regimes in place to ensure adherence to the specified safety standards and rules to achieve the desired focus on results?				x
		Driver testing?		x		
		Roadside checks?				x
22	Police	Do the specified safety standards and rules and related compliance regimes clearly address the safety priorities of high-risk road user groups to achieve the desired focus on results?				x
		Young drivers?		x		
		Older drivers?				x

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		Commercial drivers?	x			
		Public transport drivers?		x		
23	DOT	Do the specified safety standards and rules and related compliance regimes compare favourably with international good practice?				x
Checklist 5: Recovery and rehabilitation of crash victims from the road network						
		Questions	Yes	Partial	Pending	No
24	Hospitals Insurance	Have comprehensive safety standards and rules and associated performance targets been set to govern the recovery and rehabilitation of crash victims from the road network to achieve the desired focus on results?				x
		Pre-hospital?				x
		Hospital?		x		
		Long-term care?				x
25	Hospitals	For each category of post-crash service (pre-hospital, hospital, and long-term care) are compliance regimes in place to ensure adherence to the specified safety standards and rules to achieve the desired focus on results?				x
26	Hospitals	Do the specified safety standards and rules and related compliance regimes clearly address the safety priorities of high-risk road user groups to achieve the desired focus on results?				x
Checklist 6: Coordination						
		Questions	Yes	Parti al	Pendin g	No

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27	All	Are interventions being coordinated horizontally across agencies to achieve the desired focus on results?		x		
28	All	Are interventions being coordinated vertically between national, regional, provincial and city agencies to achieve the desired focus on results?		x		
29	All	Have robust intervention delivery partnerships between agencies, industry, communities and the business sector been established to achieve the desired focus on results?			x	
30	DOT	Have Parliamentary committees and procedures supporting the coordination process been established to achieve the desired focus on results?			x	
		Checklist 7: Legislation				
		Questions	Yes	Parti al	Pendin g	No
31	DOT	Are legislative instruments and procedures supporting interventions and institutional management functions sufficient to achieve the desired focus on results?		x		
32	DOT	Are legislative instruments and procedures supporting interventions and institutional management functions regularly reviewed and reformed to achieve the desired focus on results?		x		
Checklist 8: Funding and resource allocation						
		Questions	Yes	Partial	Pending	No
33	DOT MOF	Are sustainable funding mechanisms supporting interventions and institutional management functions in place to achieve the desired focus on results?		x		

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		Central budget?	x			
		Road fund?	x			
		Fees?	x			
		Other sources?	x			
34	DOT; ; DOR; Police MOF	Are formal resource allocation procedures supporting interventions and institutional management functions in place to achieve the desired focus on results?				x
		Cost effectiveness?		x		
		Cost benefit?		x		
35	DOT MOF	Is there an official Value of Statistical Life and related value for injuries to guide resource allocation decisions?				x
36	DOT MOF	Are funding mechanisms and resource allocation procedures supporting interventions and institutional management functions sufficient to achieve the desired focus on results?				x
Checklist 9: Promotion						
		Questions	Yes	Partial	Pending	No
37	Media; Trade Union, Youth Union, Lao Woman Union Ministry of	Is road safety regularly promoted to achieve the desired focus on results?	x	x		

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	Education and Sport					
		Overall vision and goals?	x			
		Specific interventions?		x		
		Specific target groups?	x			
Checklist 10: Monitoring and evaluation						
		Questions	Yes	Partial	Pending	No
38	DOT; DOR; Police	For each category of roads are sustainable systems in place to collect and manage data on road crashes, fatality and injury outcomes, and all related road environment/vehicle/road user factors to achieve the desired focus on results?		x		
39	DOT; ; DOR; Police	For each category of roads are sustainable systems in place to collect and manage data on road network traffic, vehicle speeds, safety belt and helmet wearing rates to achieve the desired focus on results?		x		
40	DOT; ; DOR; Police	For each category of roads are regular safety rating surveys undertaken to quality assure adherence to specified safety standards and rules, to achieve the desired focus on results?			x	
		Risk ratings?				x
		Road protection scores?				x
41	All	For each category of roads are systems in place to collect and manage data on the output quantities and qualities of safety interventions implemented to achieve the desired focus on results?				x

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		Safety engineering treatments?		x		
		Police operations?		x		
		Educational activities?		x		
		Promotional activities?	x			
		Driver training?				x
		Vehicle testing?		x		
		Emergency medical services?	x			
42	All	For each category of vehicles and safety equipment (private, commercial, public, helmets) are systematic and regular safety rating surveys undertaken to quality assure adherence to the specified safety standards and rules to achieve the desired focus on results?				x
		Vehicle safety rating?				x
		Helmet testing?				x
43	Hospitals	For each category of post-crash service (pre-hospital, hospital, long-term care) are systematic and regular surveys undertaken to quality assure adherence to the specified standards and rules to achieve the desired focus on result?				x
44	DOT	Are systems in place to monitor and evaluate safety performance against targets regularly to achieve the desired focus on results?				x
45	All	Do all participating agencies and external partners and stakeholders have open access to all data collected?		x		

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Checklist 11: Research and development and knowledge transfer						
		Questions	Yes	Partial	Pending	No
46	All	Has a national road safety research and development strategy been established to achieve the desired focus on results?				x
		Vehicle factors?				x
		Highway factors?				x
		Human factors?				x
		Institutional factors?				x
		Other factors?				
47	All	Has an independent national road safety research organization been established to achieve the desired focus on results?				x
		Vehicle factors?				x
		Highway factors?				x
		Human factors?				x
		Institutional factors?				x
		Other factors?				
48	All	Have demonstration and pilot programs been conducted to achieve the desired focus on results?		x		

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		Vehicle factors?				x
		Highway factors?				x
		Human factors?				x
		Institutional factors?				x
		Other factors?				
49	All	Are mechanisms and media in place to disseminate the findings of national road safety research and development to achieve the desired focus on results?	x			
		Conferences?	x			
		Seminars?	x			
		Training?	x			
		Journals?		x		
		Other?				
Checklist 12: Lead agency role and institutional management functions						
		Questions	Yes	Partial	Pending	No
50	DOT	Does the lead agency (or de facto lead agency/agencies) effectively contribute to the results focus management function?		x		
		Appraising current road safety performance through high-level strategic review?				x
		Adopting a far-reaching road safety vision for the longer term?	x			

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		Analyzing what could be achieved in the medium term?				x
		Setting quantitative targets by mutual consent across the road safety partnership?				x
		Establishing mechanisms to ensure partnership accountability for results?		x		
51	DOT	Does the lead agency (or de facto lead agency/agencies) effectively contribute to the coordination management function?		x		
		Horizontal coordination across central government?		x		
		Vertical coordination from central to regional and local levels of government?		x		
		Specific delivery partnerships between government, non-government, community and business at the central, regional and local levels?		x		
		Parliamentary relations at central, regional and local levels?		x		
52	DOT	Does the lead agency (or de facto lead agency/agencies) effectively contribute to the legislation management function?				x
		Reviewing the scope of the legislative framework?				x
		Developing legislation needed for the road safety strategy?				x
		Consolidating legislation?				x
		Securing legislative resources for road safety?				x
53	DOT	Does the lead agency (or de facto lead agency/agencies) effectively contribute to the funding and resource allocation management function?		x		
		Ensuring sustainable funding sources?		x		

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		Establishing procedures to guide the allocation of resources across safety programs?				x
54	DOT	Does the lead agency (or de facto lead agency/agencies) effectively contribute to the promotion management function?		x		
		Promotion of a far-reaching road safety vision or goal?		x		
		Championing and promotion at high level?		x		
		Multisectoral promotion of effective interventions and shared responsibility?		x		
		Leading by example with in-house road safety policies?				x
		Developing and supporting safety rating programs and the publication of their results?				x
		Carrying out national advertising?	x			
		Encouraging promotion at local level?	x			
55	DOT	Does the lead agency (or de facto lead agency/agencies) effectively contribute to the monitoring and evaluation management function?			x	
		Establishing and supporting data systems to set and monitor final and intermediate outcome and output targets?				x
		Transparent review of the national road safety strategy and its performance?		x		
		Making any necessary adjustments to achieve the desired results?				x
56	DOT	Does the lead agency (or de facto lead agency/agencies) effectively contribute to the research and development and knowledge transfer management function?				x

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		Developing capacity for multi-disciplinary research and knowledge transfer?				x
		Creating a national road safety research strategy and annual program?				x
		Securing sources of sustainable funding for road safety research?				x
		Training and professional exchange?	x			
		Establishing good practice guidelines?		x		
		Setting up demonstration projects?		x		

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Appendix M. DRIVER Institutional Arrangement

Category	Responsibilities	Lao PDR (Pilot)	Lao PDR Scale-up (To be discussed with stakeholders)
Program Management	Over-all lead and focal point Managing technical, communications, policy, and data analysis, ensuring seamless coordination between different government agencies, both at national and local levels Executing policy and legal instruments (e.g. data sharing, data collection process, quality assurance)	MPWT in partnership with MPS	
Program Management	Development and printing of manuals	MPWT in partnership with MPS	
Program Management	Funding of equipment (e.g. tablets, mobile phones, computers)	MPWT and World Bank	
Program Management	Support hotline, responding to general queries	World Bank (Whatsapp Group)	
Training	Organize and implement training workshops for encoders in the use of the platform and mobile app	DOT, World Bank, and MPS	
Training	Organize training for server administration and troubleshooting		
Training	Organize training for system administration		
Server Admin.	Solely responsible for all aspects of server management (back-up, app updating) Responsible for server set up, system monitoring, establishing and using back-up systems, providing summary analytics reports and responding to server and database-related inquiries	World Bank	
System Admin	Troubleshooting, bug fixes, regular check if functions are working	World Bank	
System Admin.	Data Quality Control; Resolve Duplicates; External database link reviews		
System Admin.	Ensure regular recording of all encoders	Vientiane Capital Traffic Police	
System Admin.	Linking with other database systems (i.e. Health Database)		

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Category	Responsibilities	Lao PDR (Pilot)	Lao PDR Scale-up (To be discussed with stakeholders)
System Admin.	Field Customization, Editing the DRIVER Input Form	MPS	
System Admin.	Implement Other Enhancements such as updating of the maps	DOR and World Bank and other agencies	
User Management	Design, implement User Policies and Grant or Revoke User Access	DOT and MPS	
User Management	Updating of User Access list (excel sheet)	DOT and MPS	
Data Entry	Encoding of Crash Data	Vientiane Capital Traffic Police	
Data Entry	Interventions	Many agencies	
Data Analysis	Use and Analyze Data for Road Safety Programs	Many agencies	
Data Analysis	Use and Analyze Data for Traffic Enforcer Assignments	Vientiane Capital Traffic Police, MPS	
Data Analysis	Monitoring impact of Interventions	Many Agencies	
Internal Communication	Informing everyone about changes to the platform, server downtimes, bugs	MPS	
External Communication	Promoting the use of DRIVER to the general public	DOT	

FIRST DRAFT