

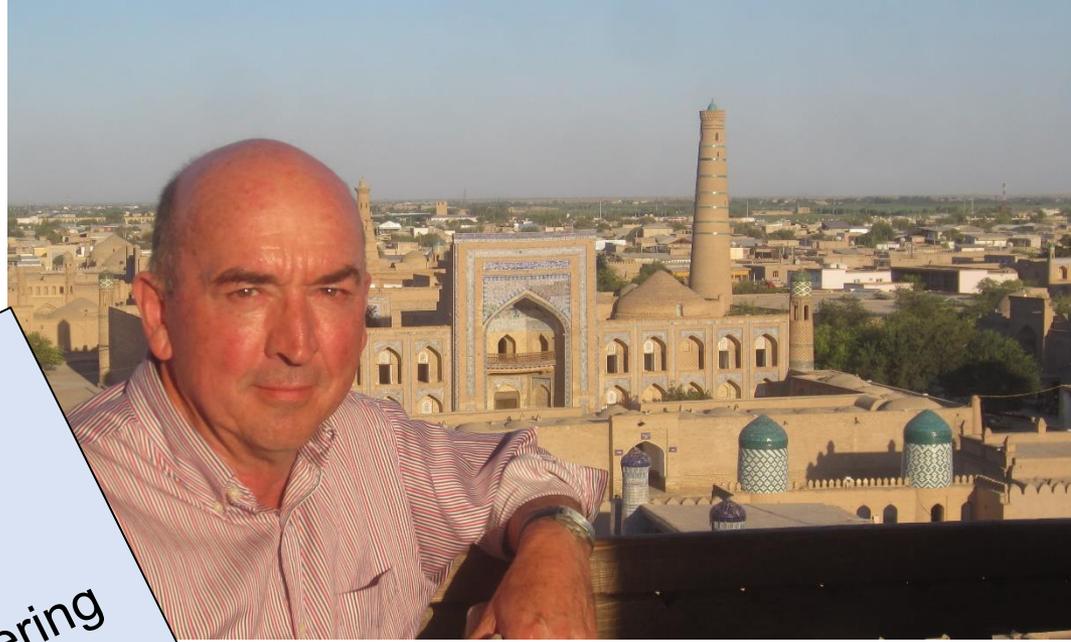


Road safety engineering - the essentials

An outline of the road safety engineering profession and what it can achieve for CAREC roads

Phillip Jordan
ADB CAREC Road Safety Engineer

- Here today as a friend, a foreigner and a road safety engineer.
- Worked in 41 countries including all CAREC countries
- Here to help you understand how you can make safe roads for all.



Phillip Jordan - consultant

- 31+ years with VicRoads
- 13 years in consulting
- Traffic and road safety engineering
- 41 countries of work....





What is road safety engineering?



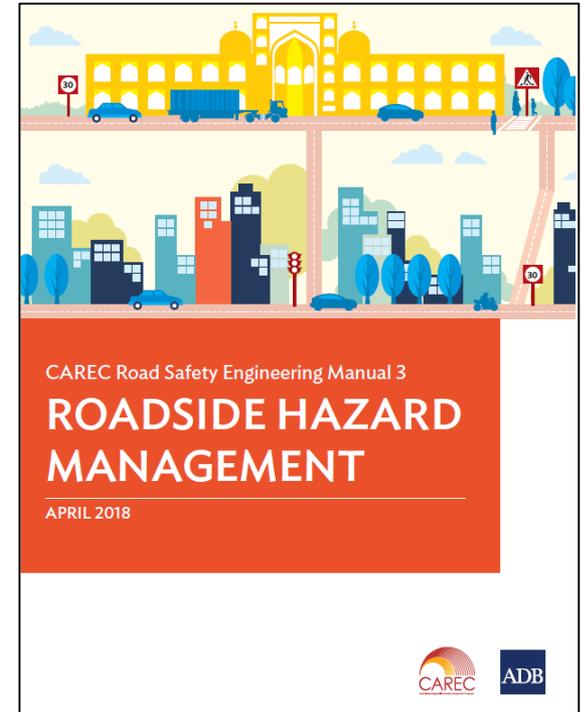
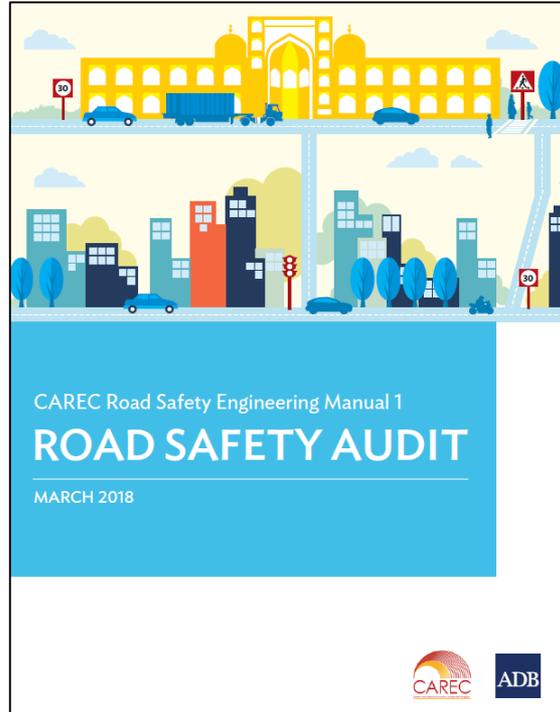
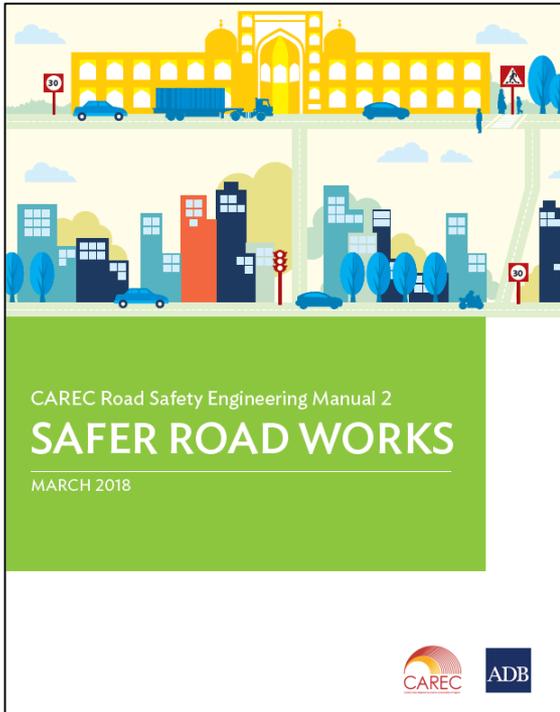
INDIAN OCEAN

PACIFIC OCEAN

SOUTHERN OCEAN

I WISH TO THANK OUR INTERPRETER.....

This workshop would be impossible without an interpreter – and so I would like to express my thanks for your help at this workshop.





Road trauma is a worldwide health crisis.

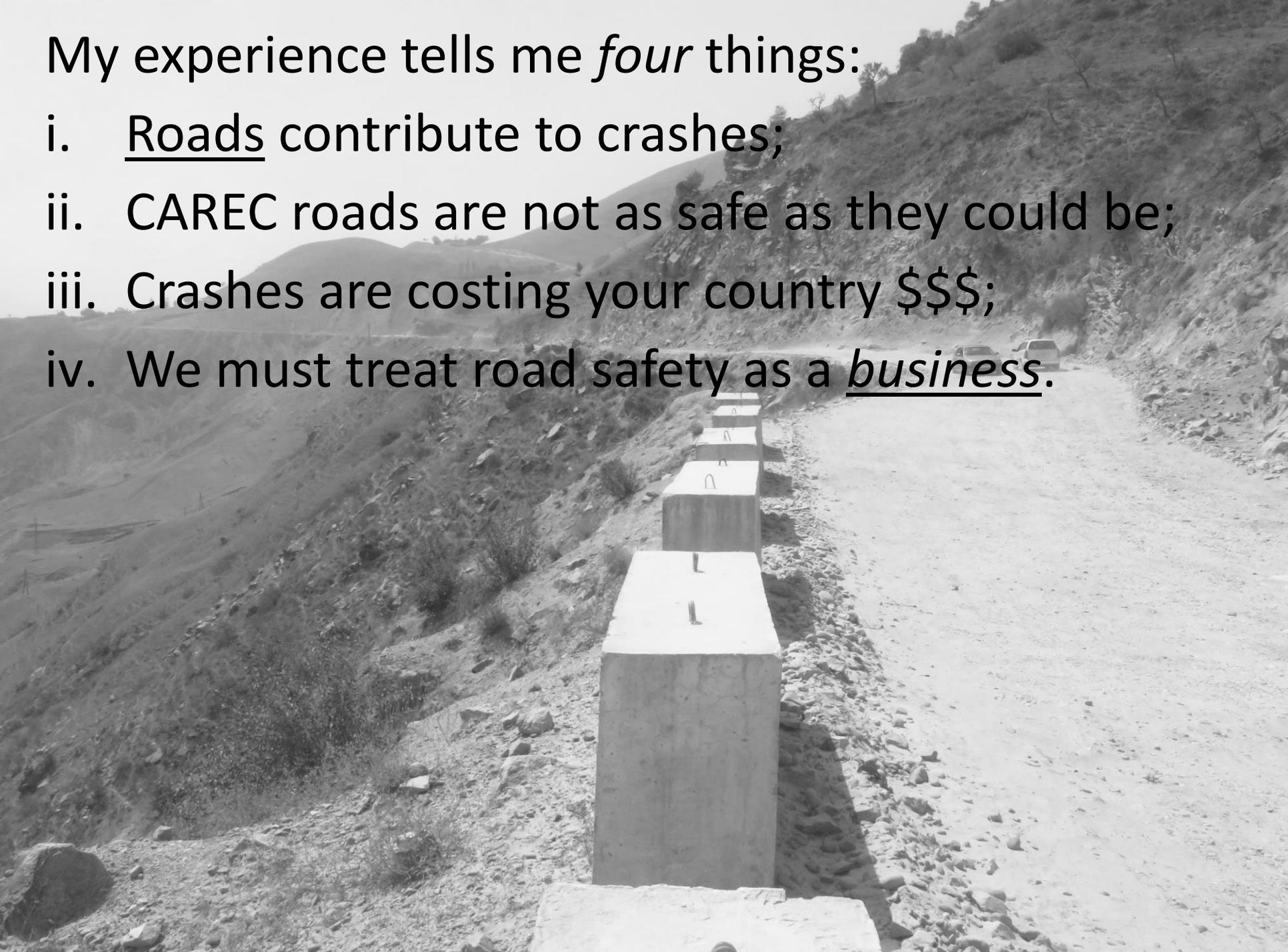
Road crashes involve:

- Humans
- Roads
- Vehicles

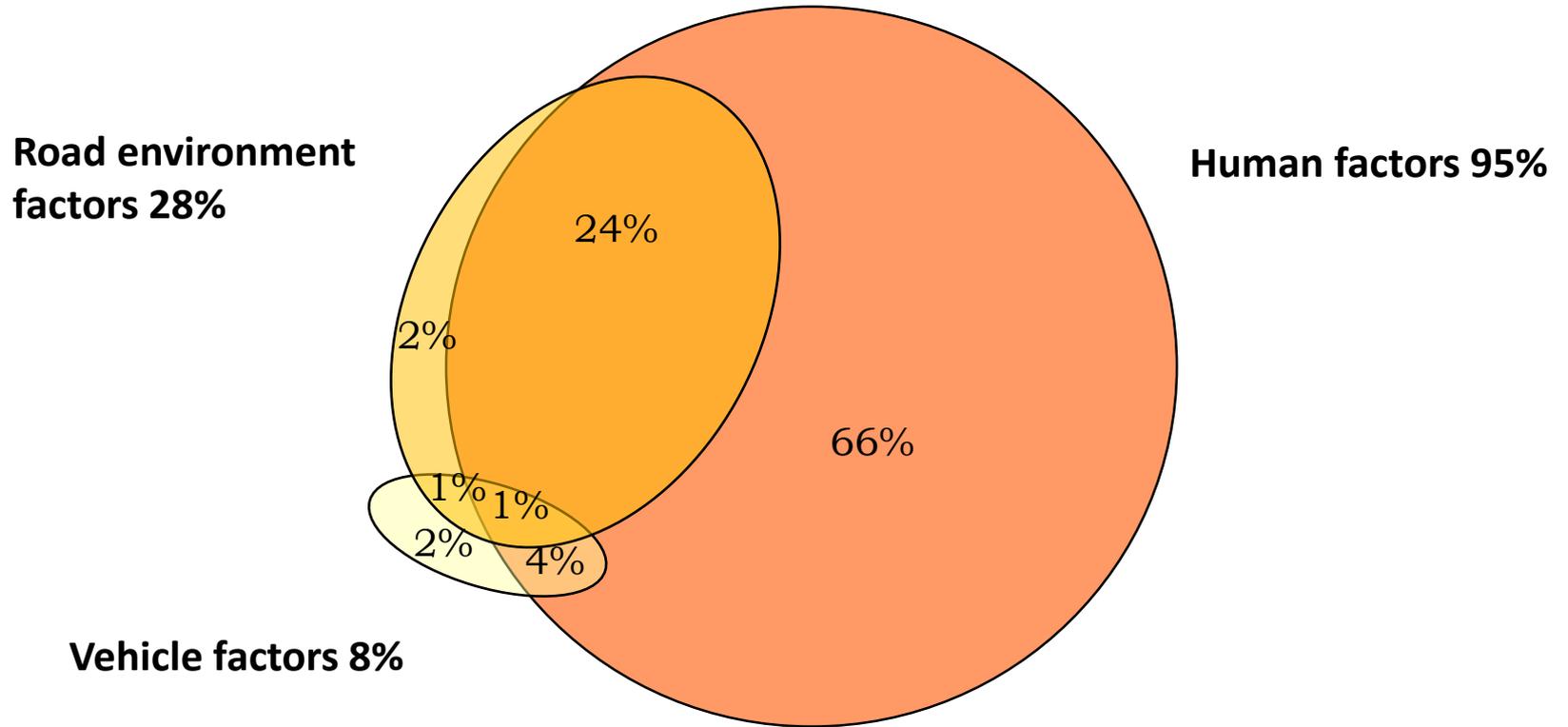
It's so easy for one group to leave it to the others!

My experience tells me *four* things:

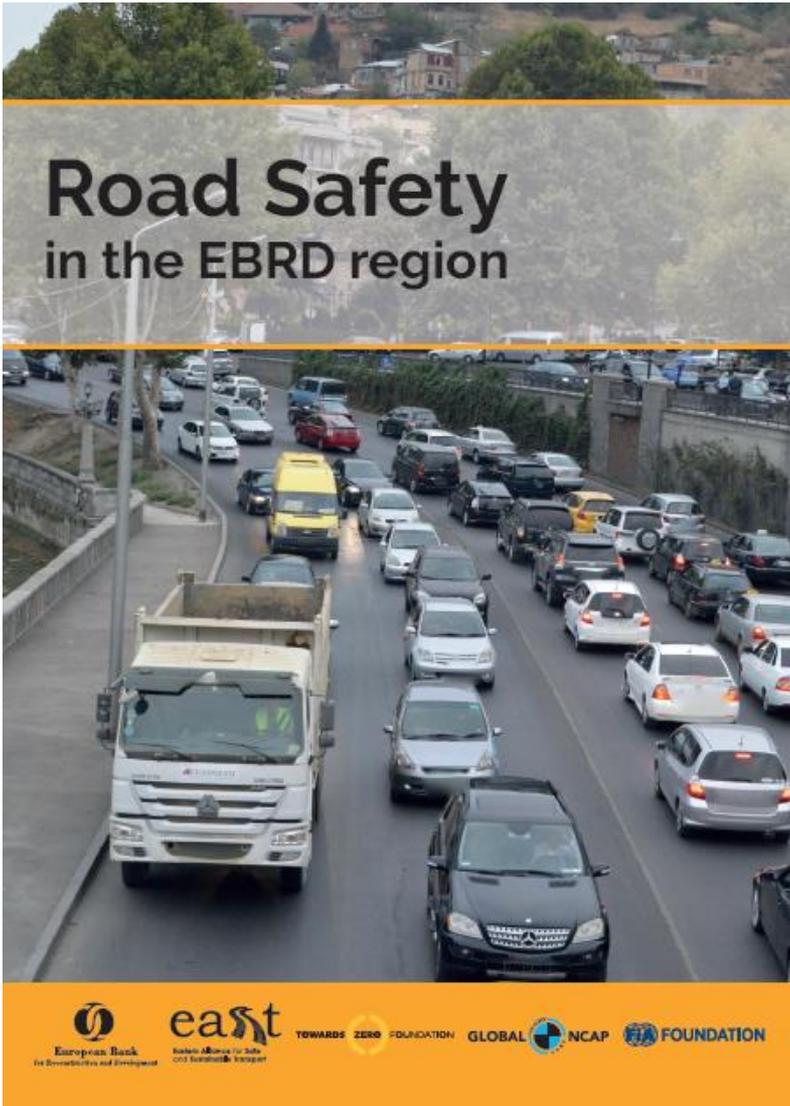
- i. Roads contribute to crashes;
- ii. CAREC roads are not as safe as they could be;
- iii. Crashes are costing your country \$\$\$;
- iv. We must treat road safety as a business.



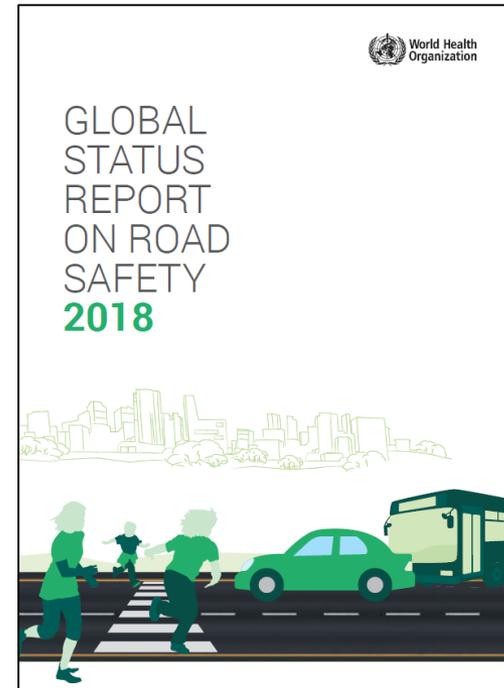
i. Roads contribute to crashes



Based on British and American research



ii. CAREC roads are not as safe as they could be!



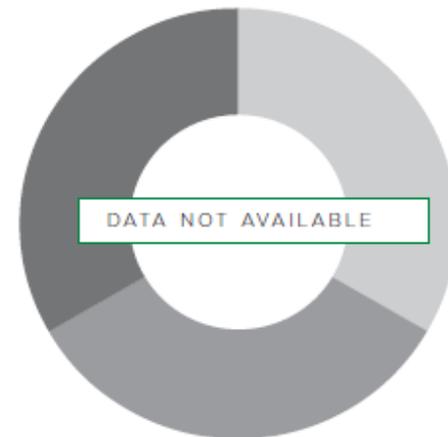
AFGHANISTAN



GLOBAL
STATUS
REPORT
ON ROAD
SAFETY
2018



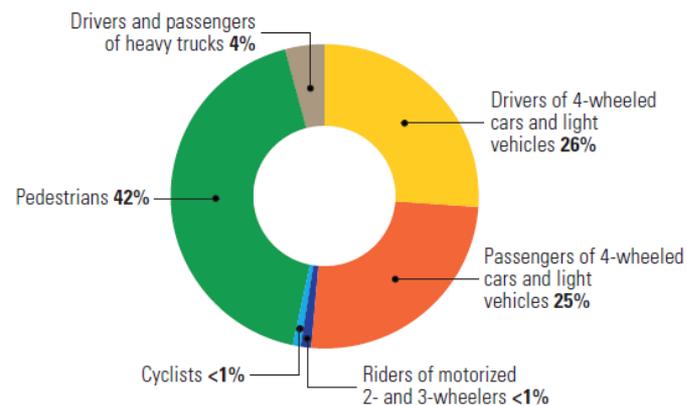
Deaths by road user category



GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category



Source: 2016, Internal statistical data of State Road Police

AZERBAIJAN

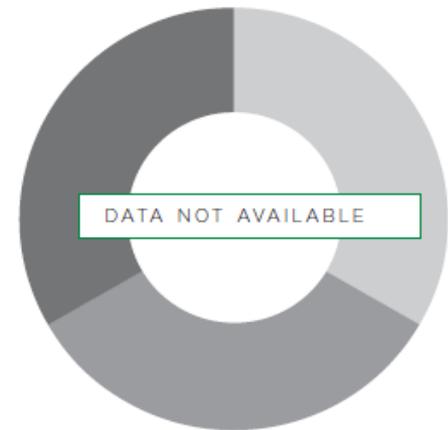
CHINA



GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category

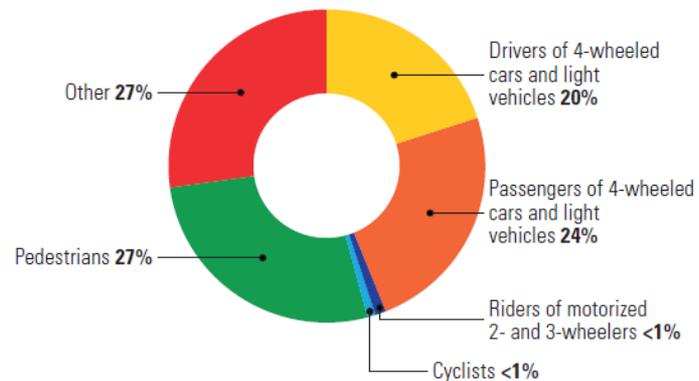




GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category



Source: 2016, Patrol police of the Ministry of Interior Affairs

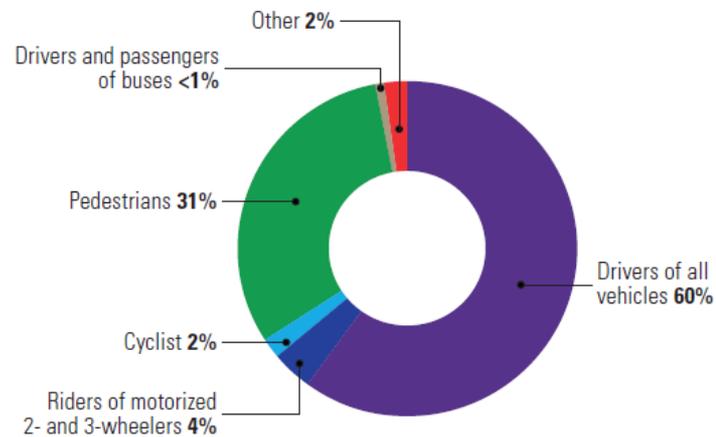
GEORGIA



GLOBAL
STATUS
REPORT
ON ROAD
SAFETY
2018



Deaths by road user category



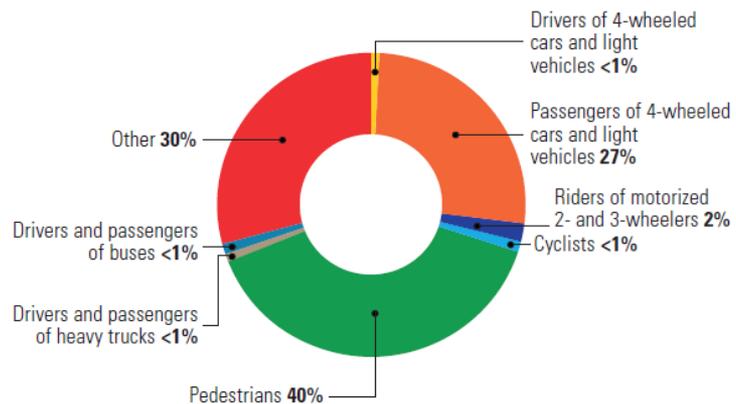
Source: 2016, Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

KAZAHKSTAN

GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category



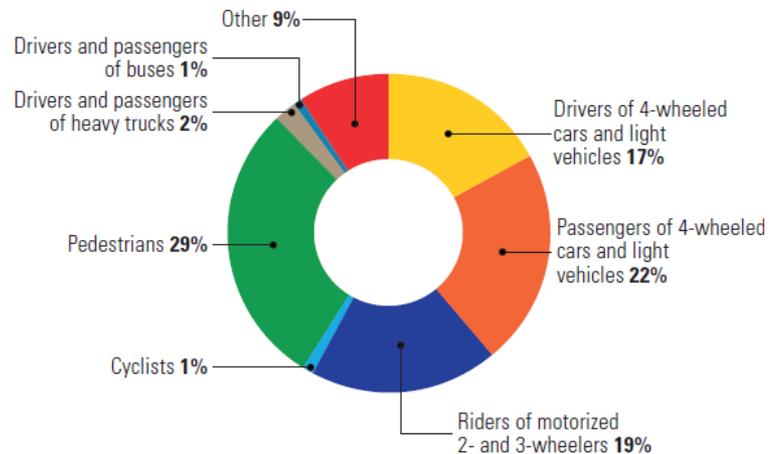
Source: 2016, National Statistical Committee

KYRGYZSTAN

GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category



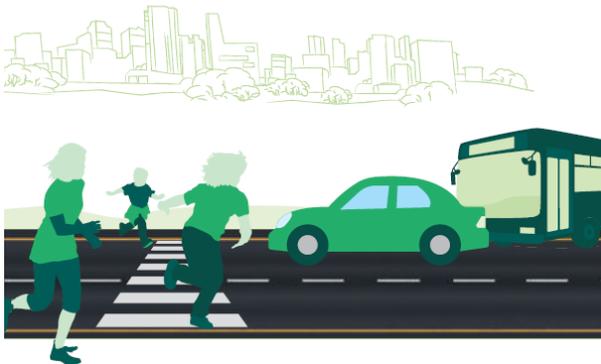
Source: 2016, General Police Department, "Statistics on road traffic injury and violation"

MONGOLIA

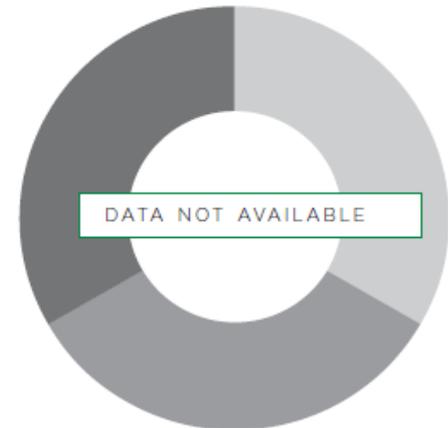
PAKISTAN



GLOBAL
STATUS
REPORT
ON ROAD
SAFETY
2018



Deaths by road user category

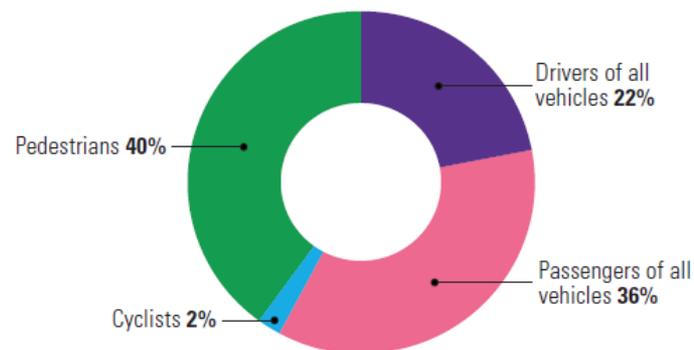




GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category



Source: 2016, Department of the State Automobile Inspection, Ministry of Internal Affairs

TAJIKISTAN

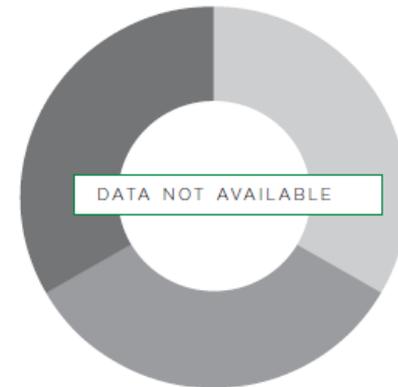
TURKMENISTAN



GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category



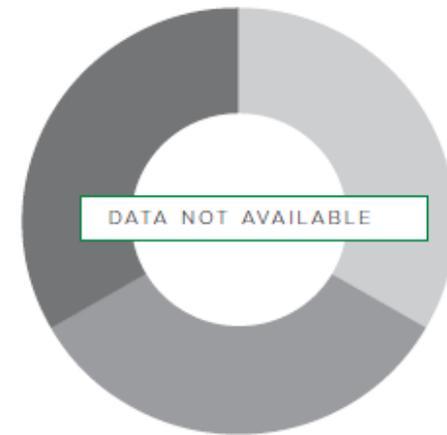
UZBEKISTAN



GLOBAL STATUS REPORT ON ROAD SAFETY 2018



Deaths by road user category



South-eastern Europe - 10.3 per 100,000 population

Central Europe and Baltic States - 8.2 per 100,000 population

Eastern Europe and the Caucasus - 13.3 per 100,000 population

Central Asia - 19.1 per 100,000 population

Southern and Eastern Mediterranean - 18.8 per 100,000 population

Fatality rates
are high!

EBRD 2017

Fatality rates are high!

WHO 2018

Afghanistan	15.1 per 100,000 population
Azerbaijan	8.7 per 100,000 population
China	18.2 per 100,000 population
Georgia	15.3 per 100,000 population
Kazakhstan	17.6 per 100,000 population
Kyrgyzstan	15.4 per 100,000 population
Mongolia	16.5 per 100,000 population
Pakistan	14.3 per 100,000 population
Tajikistan	18.1 per 100,000 population
Turkmenistan	14.5 per 100,000 population
Uzbekistan	11.5 per 100,000 population

Fatality rates are low!

WHO 2018

Sweden	2.8 per 100,000 population
United Kingdom	3.1 per 100,000 population
Netherlands	3.8 per 100,000 population
Denmark	4.0 per 100,000 population
Iceland	6.6 per 100,000 population
Australia	5.6 per 100,000 population

Road Trauma in Victoria (Australia), 2018

- 214 people killed (down by 45 deaths from 2017 – 17.4%)
- Lowest lives lost ever!
- 6,000+ people seriously injured
- 16,000+ people with minor injuries
- Economic cost = \$3B+



iii. crashes cost your country \$

A road fatality cost 70 x GDP per capita

A casualty costs 0.25 the cost of a fatality

4 McMahon and Dahdah, 'The True Cost of Road Crashes: Valuing Life and the Cost of a Serious Injury', International Road Assessment Programme, (2008), p. 11.

iii. crashes cost your country \$

In 2008, iRAP published 'The True Cost of Road Crashes: Valuing Life and the Cost of a Serious Injury' by Kate McMahon and Said Dahdah of the World Bank.

The authors devised a methodology for analysing the cost of road deaths and serious injuries – a relatively simple 'rule of thumb' approach based on available data and designed to be a practical way to estimate the economic costs of road crashes as a percentage of GDP.

A road fatality costs your country

• Afghanistan	\$49,000 USD
• Azerbaijan	\$515,000 USD
• China	\$460,000 USD
• Georgia	\$250,000 USD
• Kazakhstan	\$810,000 USD
• Kyrgyzstan	\$85,000 USD
• Mongolia	\$265,000 USD
• Pakistan	\$95,000 USD
• Tajikistan	\$69,000 USD
• Turkmenistan	\$482,000 USD
• Uzbekistan	\$132,000 USD

Economic cost of road deaths and serious injuries as a percentage of GDP

Central Asia

Kazakhstan - 5.73

Kyrgyzstan - 5.22

Mongolia - 5.10

Tajikistan - 4.62

Turkmenistan - 4.27

Uzbekistan - 2.63

Total costs of road deaths & injuries by region:



Eastern Europe & the Caucasus - US \$5.6 bn
Central Asia - US \$18.2 bn

Economic cost of road deaths and serious injuries as a percentage of GDP



Eastern Europe and the Caucasus

Armenia - 4.62

Azerbaijan - 2.45

Belarus - 3.32

Georgia - 3.33

Moldova - 3.01

iv. We should treat road safety as a business

Why? Because governments will only provide sustainable resources to programs proven to yield positive results.

Governments have heavy demands on their national finances – spending on road safety has to compete with many other programs.





What can CAREC engineers do to make roads safer for all?



Road safety engineering is one profession that tries to break the chain of events that leads to a crash

A road crash is the end result of a chain of events...

To break a chain, we need to remove one “link”. Where do we start?

Let’s look at a “typical” chain of events.....





The chain of events.....

A 35 year old male is the driver of this truck. His boss allows him to drive it home to his village on weekends - he maintains it.

Chain of events continued...

- He spends a whole (frustrating) weekend repairing it.
- The brakes were very worn. He replaces the discs.
- He finishes late Sunday – much later than expected.
- Friends drop around – just as he finishes.
- They relax, chat, drink, and eat until very late.
- He does not get much sleep.



Chain of events
continued...

- Monday morning – very cold, but he must start early at a building site in the city.
- Little sleep, no breakfast, late for work.
- Drives the truck on a National Highway towards work.



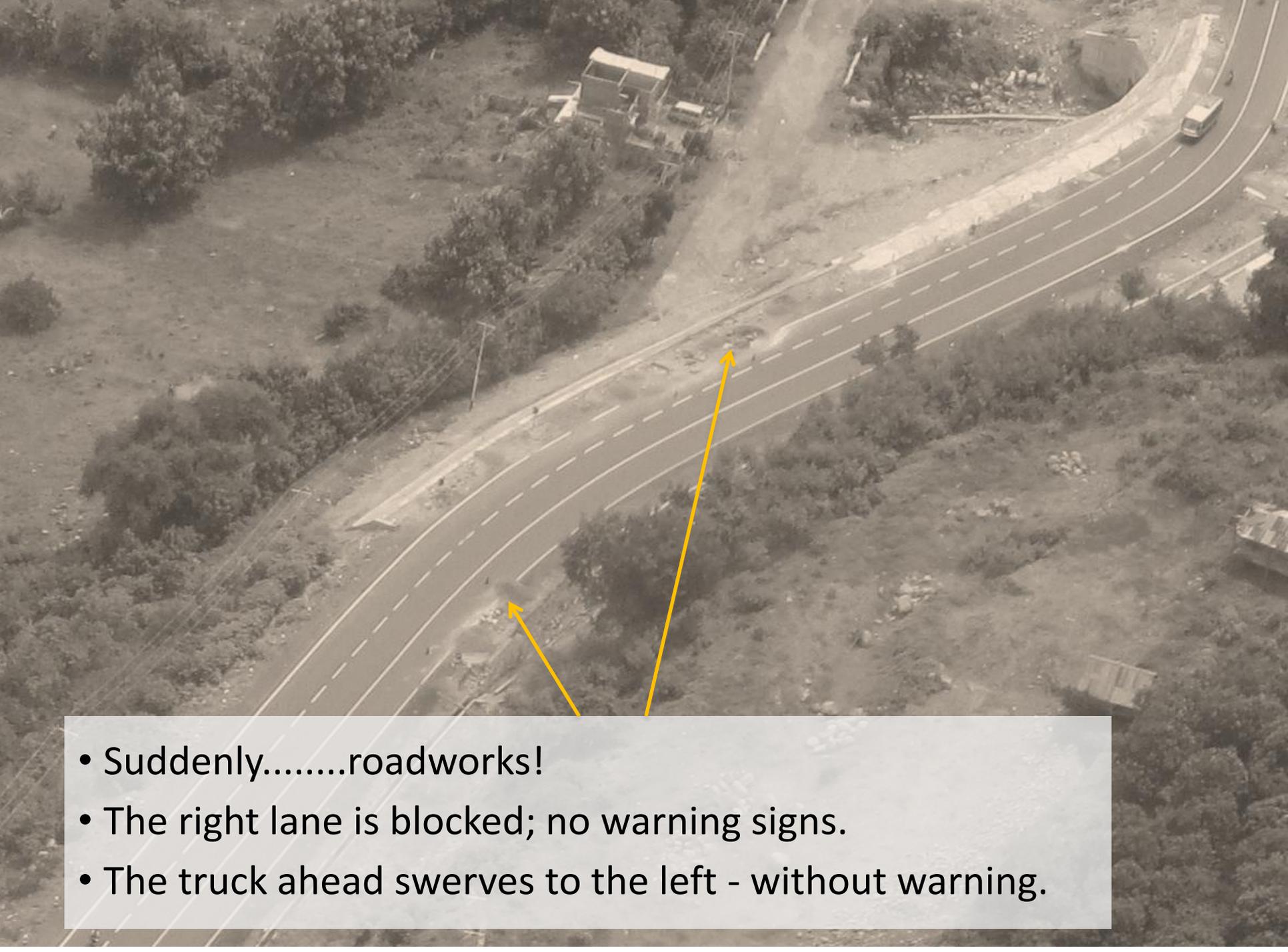
- There is frost; the highway pavement is slippery.
- The highway has unsealed shoulders, and no line marking.
- He travels fast.

He drives closer and closer to the truck ahead of him – eager to overtake. That truck is not well maintained; it has broken rear lights.





Our truck driver knows there is an overtaking lane ahead – he accelerates so he can overtake the truck.

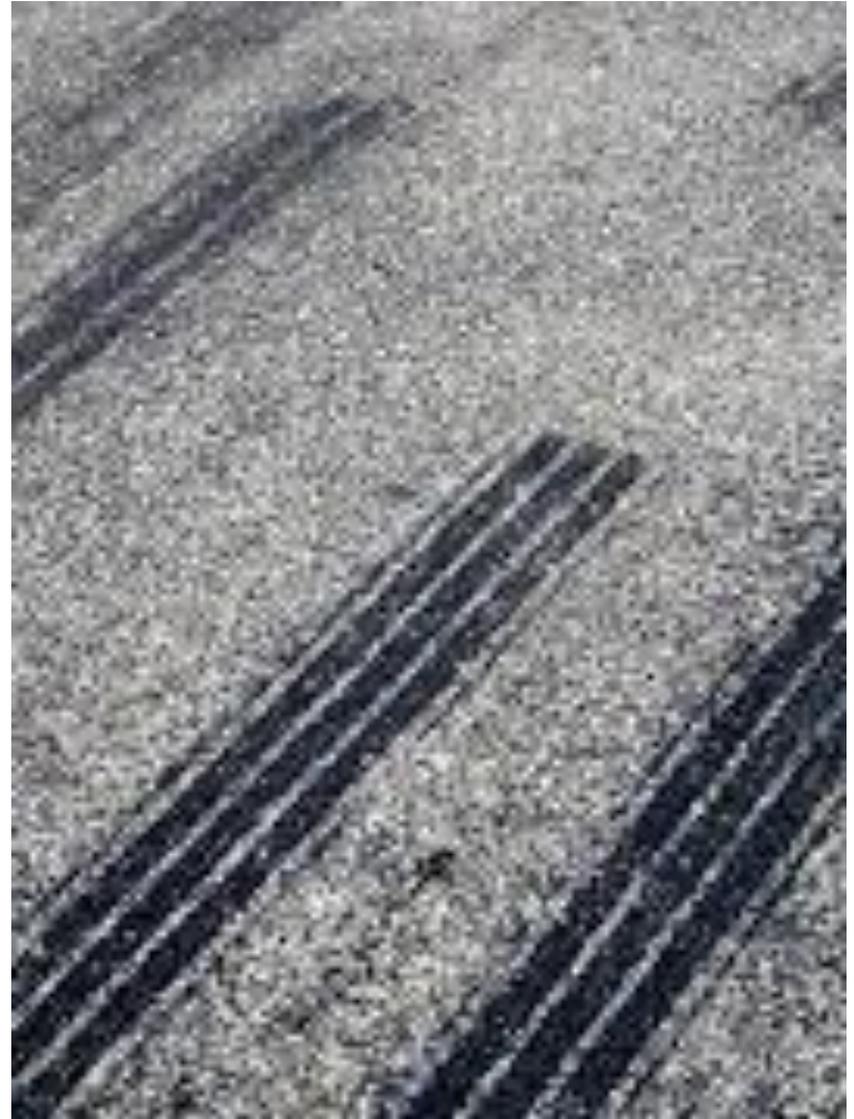


- Suddenly.....roadworks!
- The right lane is blocked; no warning signs.
- The truck ahead swerves to the left - without warning.



- To avoid a “side swipe” our driver swerves his truck left.
- At that instant a bus is passing in the other direction.
- There is a deep drain along the roadside here.

- Our truck driver brakes hard – but the new brakes “grab”. His truck slides.
- It side swipes the other truck – forcing it into the drain where it tips over.
- Our truck careers across the highway, directly into the bus, still at speed.





Our truck driver and two bus passengers are killed. The other truck driver is seriously injured along with 10 bus passengers.



What “caused” this crash?

And what could our profession have done to prevent it – or minimise its effects?

Possible Causes

- His frustrating weekend?
- His drinking? His lack of sleep?
- Excessive speed?
- His impatience and inattention?
- The new brakes of his truck?
- The broken rear lights of the other truck?
- The frost/ice?
- No advanced warning of the roadworks?
- Materials being stored on the road?
- The lack of sealed shoulders?
- The deep roadside drain?
- The absence of line marking?

Break one “link” and the chain will collapse.

Engineers could have:

- ✓ Stored materials away from the road.
- ✓ Inspected the road work site; ensured good warning signs.
- ✓ Removed/covered the deep drain.
- ✓ Paved the shoulders.
- ✓ Maintained line marking



Engineers can
save lives – on
your roads and on
all CAREC roads
(and globally)

What is needed
to make your
roads safer?

- Road safety audits of new projects.
- Blackspot investigation programs.
- Safer road works.
- Safer roadsides.
- Improved pedestrian facilities

Road safety
audits.
What does your
country need?

- Road safety auditors
- More road safety engineers – to give a pool of auditors
- National accreditation
- A national RSA policy
- A willingness for road agencies to receive road safety audit reports
- Willingness to accept recommendations – even those which may not meet existing “standards”
- CAREC RSE Manual 1



Many more trained local auditors

Blackspot
programs.
What does your
country need?

- Better Police crash data (to identify the sites)
- Blackspot programs need funding
- More engineers trained in crash investigations
- Codes of practice about this process
- Low cost/high benefit treatments



Accurate Police crash data is essential

Safer road works What does your country need?

- Explicit safety requirements written in to all road project contracts
- Compliant Contractors
- Compliance enforcement
- CAREC RSE Manual 2



CAREC road work sites must be made safer

Roadside hazard
management.
What does your
country need?

- Roadside hazard management needs road safety engineers and funds
- An agreed method of calculating a clear zone
- Newer, safer types of safety barriers
- Safer roadside furniture
- CAREC RSE Manual 3



Safer roadsides are important for all CAREC road projects



Newer, safer barriers

Safer
pedestrians.
What does your
country need?

- More, and improved, pedestrian facilities
- A changed attitude towards road safety for pedestrians
- Codes of practice for pedestrian facilities



MIKE
TYSON
ЧЕРУИ
ТАЙСОН
BLACK
RECORDS

АЗ ТАЛОШУ ҲИММ
ПАРЧАМАТ БОДО ПА

КАШКА

ТАЖИКИСТОН



ТАВИС
PUB

ACRA





There are other issues for CAREC road safety engineers too – speed management, safer bridges, signs and more





Throughout this workshop we have presentations on road safety audit, on blackspot programs, on low cost ways to reduce roadside hazards and to improve pedestrian safety, and safer road works.

We are keen to help you to move your country, and the CAREC Region, forward in safety.



CAREC roads can be made safer for all



Engineers can
save lives on
CAREC roads
(and globally)

