OVERVIEW OF VEHICLE SAFETY SCENARIO IN INDIA

3rd AAI Summit , Vehicle Safety Session
IMPACT Bangkok (Thailand)
3rd December 2014

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ARAI Overview

Establishment	: 1966
Location	: Pune, INDIA (150 km from Mumbai)
Manpower	: 600+
Facilities	: 12 Laboratories – Vehicle Evaluation, Powertrain, Emissions, Safety & Homologation, Passive Safety, Materials, Automotive Electronics, NVH, CAE, Structural Dynamics, Calibration, Post Graduate Academy & Forging Industry Division
Our Offices	: China, Korea and Chennai
Investments	: USD $ 60 Million
Accreditations	: ISO 9001, 14001, OHSAS 18001 & NABL (ISO 17025)

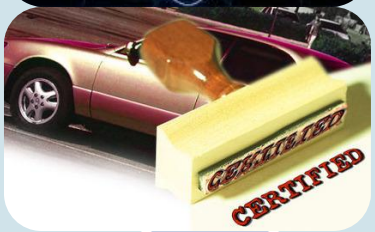
ARAI Roles

- Ministry approved test agency to carry out certification testing.
- Engaged in sponsored R&D work and development testing.
- ARAI is actively engaged in
  - Preparation & Harmonization of standards.
  - Secretariat for AISC and CMVR-TSC.
  - Deliberation of policy matters affecting Auto R&D.
  - Creation of facilities and building up competence by undertaking forward looking research & technology demonstration projects.




ARAI's Activities

R&D: Automotive Industry Projects,
National Interest Projects and Internal R&D Projects



Certification Testing / Homologation

Assisting Govt. of India in Formulation of Regulatory Standards and Harmonization of Regulations

Education and Training

Consulting Services

ARAI® Progress through Research

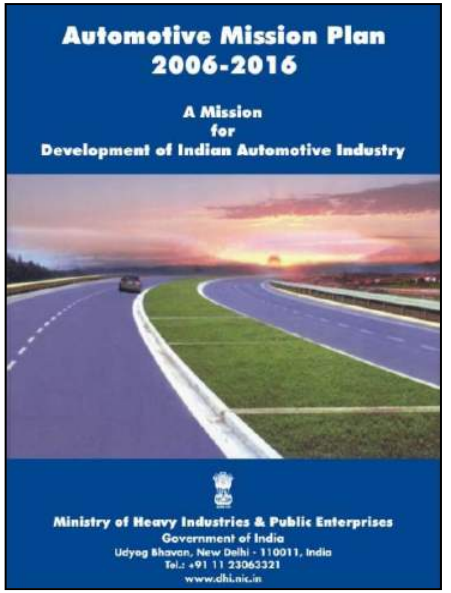
INDIA Mobility Scenario – Automotive industry at a glance

ARAI®
Progress through Research

Indian Automotive Industry

- 2nd Largest Two-Wheeler Manufacturer in the World
- World's largest Motorcycle Manufacturer is in India
- 2nd Largest Tractor Manufacturer in the World
- 5th Largest Commercial Vehicle Manufacturer in the World
- 4th Largest Car Market in Asia – 1,545,000 Vehicles

Source :SIAM

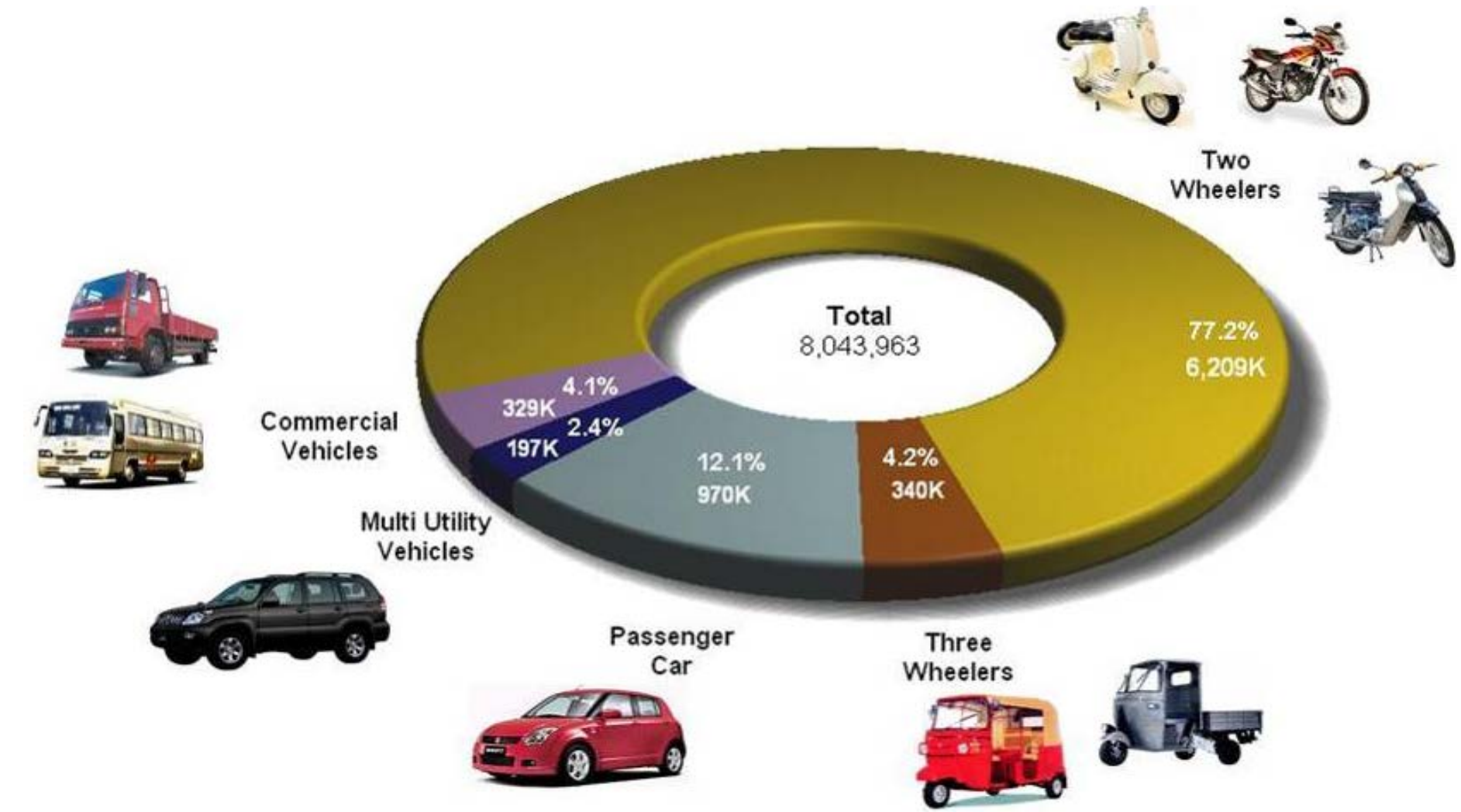


Turnover from 35 to 145 bn USD

Exports from 4.1 to 35 bn USD

Total Registered Vehicles ~160 Mn

Distribution of Automobile Industry in India



India – Key Statistics

Population
125+ Billion

Road Network
4.8 Million kms

Registered Vehicles
160+ Million

Source – Ministry of Road Transport & Highways, Govt. of India

India Road Accidents - Statistics

Road Accidents in India					
Year	Registered Vehicles (in thousands)	Total Accidents (In Numbers)	Accidents/ 10,000 vehicles	Fatalities (in Numbers)	Fatalities/ 10,000 vehicles
2002	58,924	4,07,497	69.2	84,674	14.4
2003	67,007	4,06,726	60.7	85,998	12.8
2004	72,718	4,29,910	59.1	92,618	12.7
2005	81,502	4,39,255	53.9	94,968	11.7
2006	89,618	4,60,920	51.4	1,05,749	11.8
2007	96,707	4,79,216	49.6	1,14,444	11.8
2008	1,05,353	4,84,704	46.0	1,19,860	11.4
2009	1,14,951	4,86,384	42.3	1,25,660	10.9
2010	1,27,746	4,99,628	39.1	1,34,513	10.5
2011	1,41,866	4,97,686	35.1	1,42,485	10.0
2012	1,59,491	4,90,383	30.7	1,38,258	8.7

Source – Ministry of Road Transport & Highways, Govt. of India

Worldwide Benchmarking

S No	Country	Killed per 100,000 Population	Injury Accidents per 100,000 Population
1	Australia	6.06	5.53
2	Canada	6.41	359.90
3	China	4.88	16.41
4	Denmark	4.60	63.05
5	France	6.13	103.42
6	Germany	4.46	352.54
7	**India**	**10.94**	**35.17**
8	Indonesia	8.28	27.72
9	Italy	6.76	349.52
10	Japan	4.51	569.45
11	Niger	2.99	8.28
12	Russian Federation	18.72	140.52
13	United Kingdom	2.97	248.13

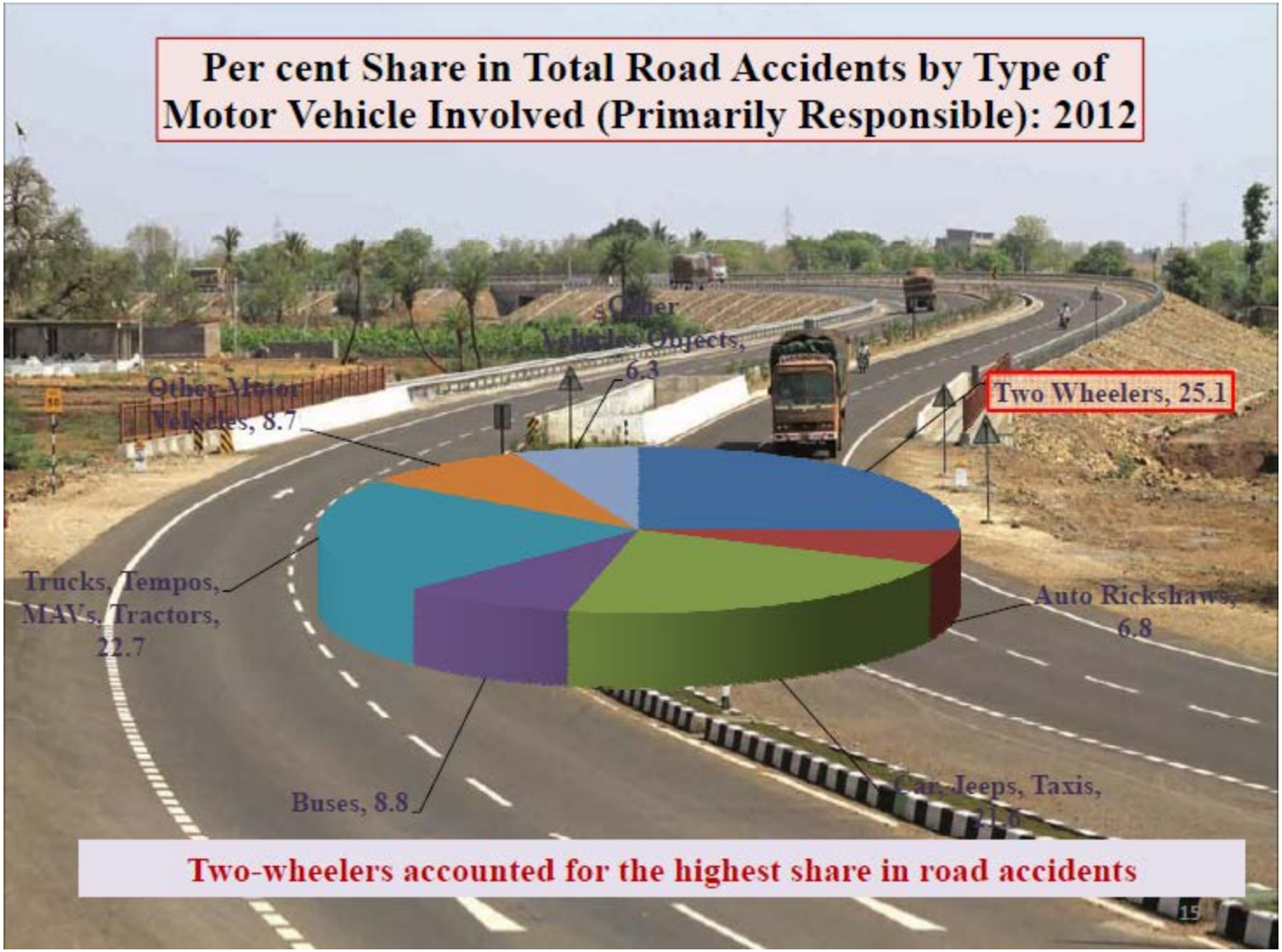
Source: World Road Statistics, International Road Federation, 2012

Source – Ministry of Road Transport & Highways, Govt. of India

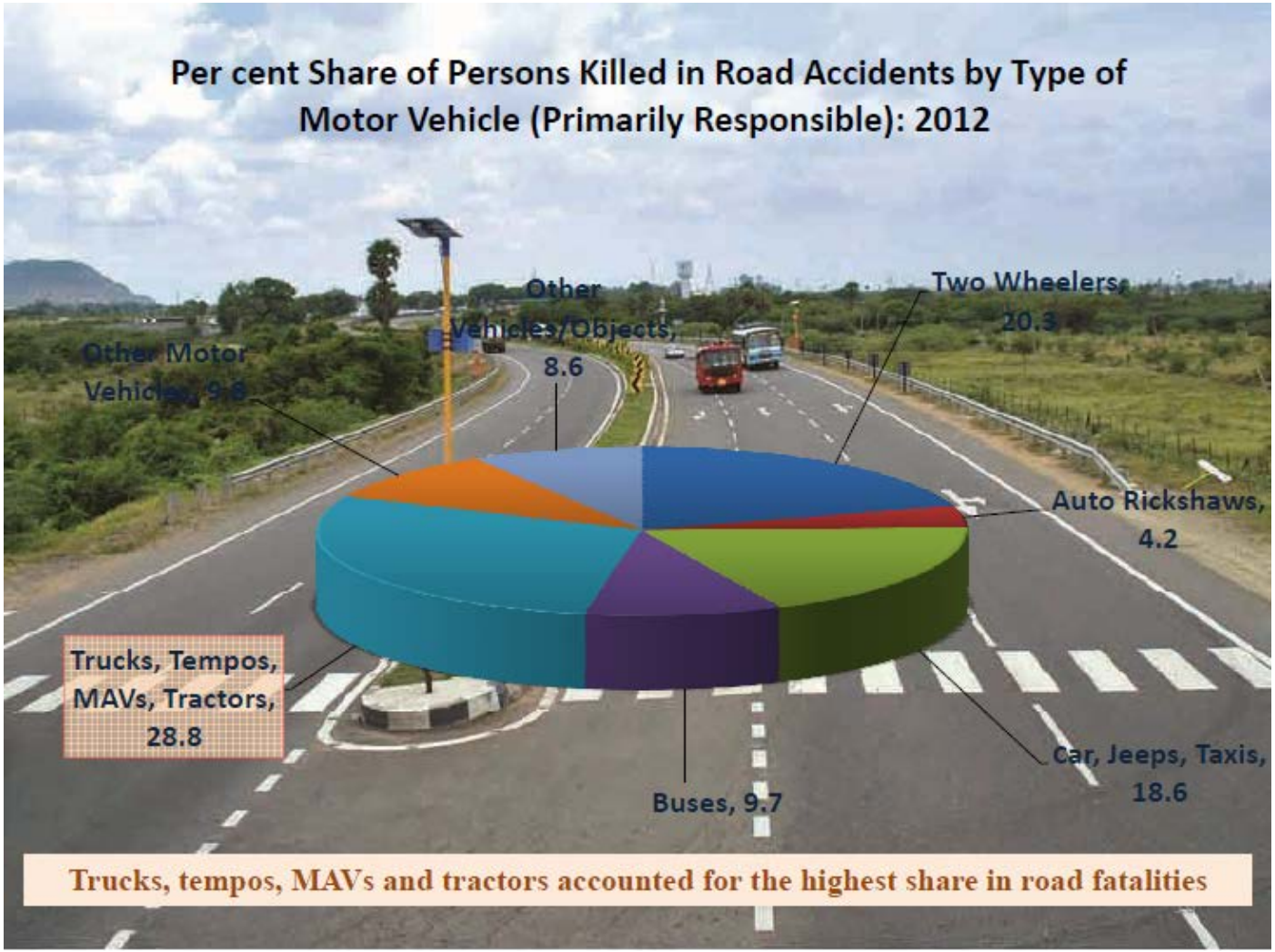
Road Accident Parameters

Parameter	2011	2012	% change
Accidents	4,97,686	4,90,383	-1.5
Person Killed	1,42,485	1,38,258	-3.0
Person Injured	5,11,394	5,09,667	-0.3
Accident Severity*	28.6	28.2	-1.4
* Accident Severity : No. of persons killed per 100 accidents			

Source – Ministry of Road Transport & Highways, Govt. of India

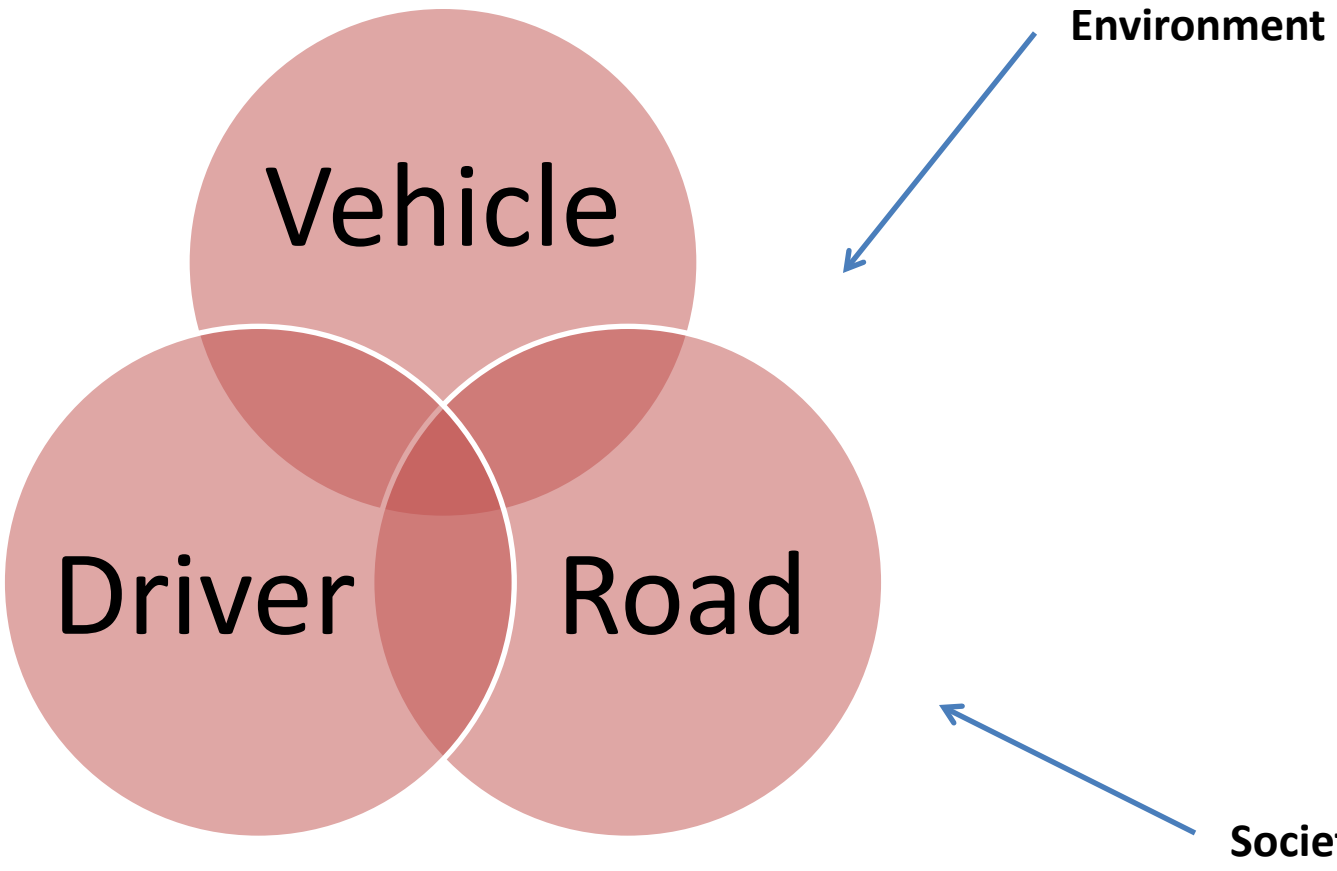


Source – Ministry of Road Transport & Highways, Govt. of India



Source – Ministry of Road Transport & Highways, Govt. of India

ROAD SAFETY - STAKEHOLDERS

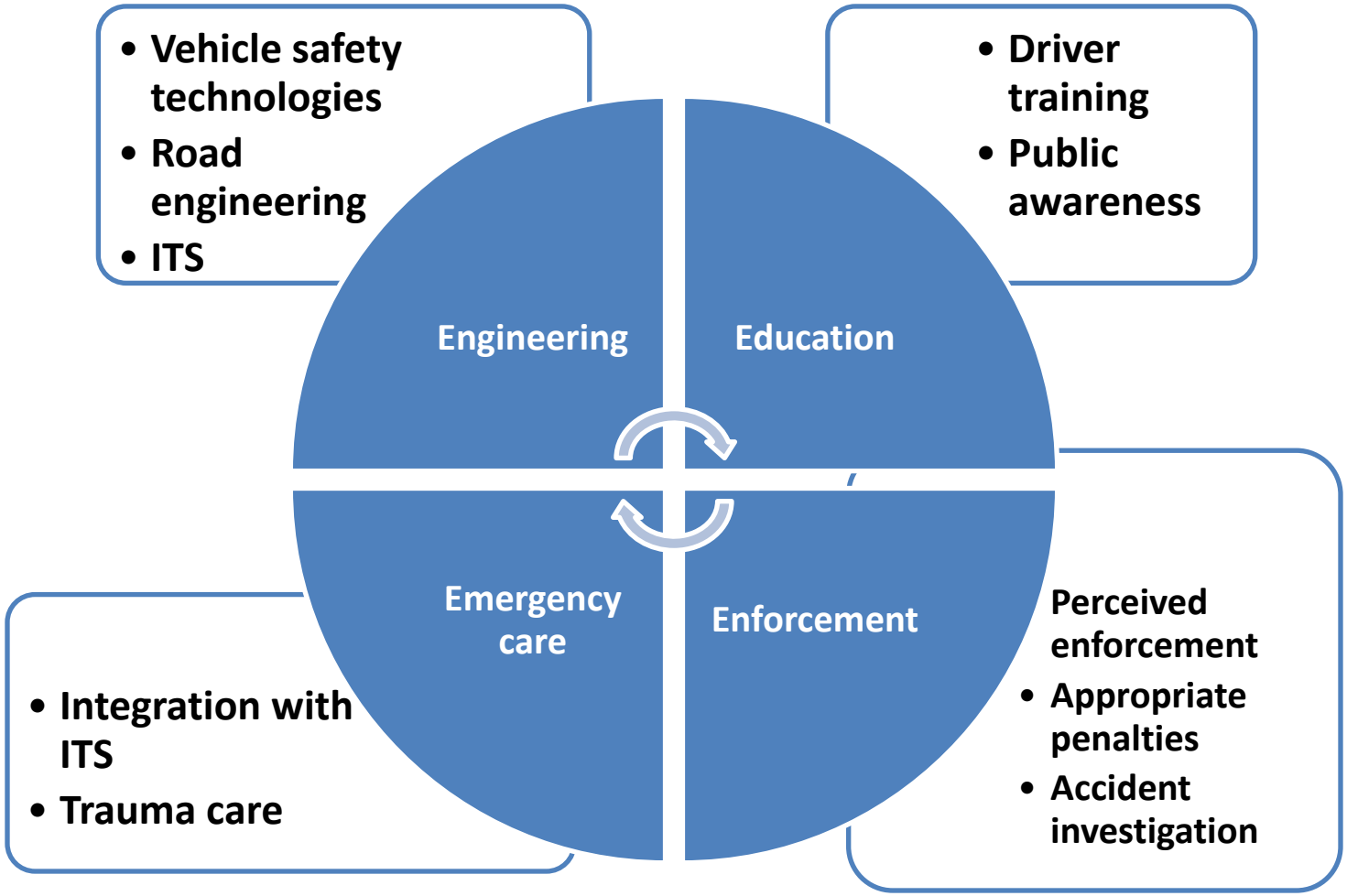


Factors Influencing Road Safety

PHASE		HUMAN	VEHICLES AND EQUIPMENT	ENVIRONMENT
PRE-CRASH	CRASH PREVENTION	• Information • Attitudes • Impairment • Police Enforcement	• Roadworthiness • Lighting • Braking • Handling • Speed Management	• Road Design and Road layout • Speed Limits • Pedestrian Facilities
CRASH	INJURY PREVENTION DURING THE CRASH	• Use of Restraints • Impairment	• Occupant restraints • Other safety devices • Crash protective design	• Crash-protective roadside objects
POST-CRASH	LIFE SUSTAINING	• First-aid skill • Access to medics	• Ease of access • Fire risk	• Rescue facilities • Congestion

Haddon Matrix

4 ”E” s for Road Safety



Indian Roadmap of Vehicle Safety Standards

2000-05	2005-10	2010-15	2015-20
• Lighting and signalling • Seat Belts and Anchorages • Seat Anchorages • Steering impact • Safety Critical components installation • Rear View Mirrors • Tyres • RUPD/ SUPD • Safety Glazing	• EMI • ABS • FUPD • Roll over for buses • Survival space for trucks • CoP of safety critical items • Conspicuity tapes • Anti-theft devices for 2/ 3 wheelers • Wind screen wiping • Pass-by noise • Spray suppression • Interior noise	• Offset frontal crash • Side Crash • Head restraint • Child restraint systems • Airbags • Bus Code • Truch Code • Trailer Code • Tractor Code • Protection from fire hazard • EMC • LED technology • Anti-theft devices and vehicle alarm • Defrost and de-mist	• OBD Embedded Technology • Collision avoidance • AFS • Night Vision • Intelligent traffic system interface • Lane departure • Blind spot correction • Drowsiness detection • Road Infrastructure • Hinges/ latches- GTR 1 • Pedestrian safety- GTR 9 • Safety Glazing- GTR 10 • Whole vehicle CoP • Advanced fire detection and control

Engineering Solutions and Enabling Technologies for Improving Safety : Short Term (3-5 years)

Passive Safety	Active Safety & General Safety
Two wheelers •Mandatory use of crash helmets, rider gear •Light and ventilated helmets **Three wheelers** •Improved seats •Occupant safety and comfort **Passenger cars & Utility Vehicles** •Safety Belts for all occupants , Safety Belt Reminders •Crashworthy vehicle structures •Occupant protection: Frontal and side impact •Occupant restraints : Airbags, Air-curtains and Head Restraint with controlled backset **Commercial Vehicles** •Retrofitting Under Run Devices for in-use HCVs •Bus Code •Mandatory use of Tachographs •Fire Protection in buses **All categories** •Component Type Approval, CoP and marking	**Visibility & Conspicuity of Vehicles** •Night Vision •Visibility Enhancement by use of cameras •Daytime running lights •Use of reflective tyres •High-mounted stop lamps in cars •Improving the visibility of non-motorized vehicles •Improving visibility for 3 wheelers •Conspicuity of Pedestrian and Vulnerable Road users •LED technology with less power consumption **Stability & Braking** •Anti-Skid braking (ABS) •Tire Pressure Monitoring **Use of Speed Limiting Devices and Functions** •Setting and enforcing speed limits •Speed enforcement on rural roads •Speed limiters in heavy goods and public transport vehicles **Electro-magnetic Compatibility (EMC)**

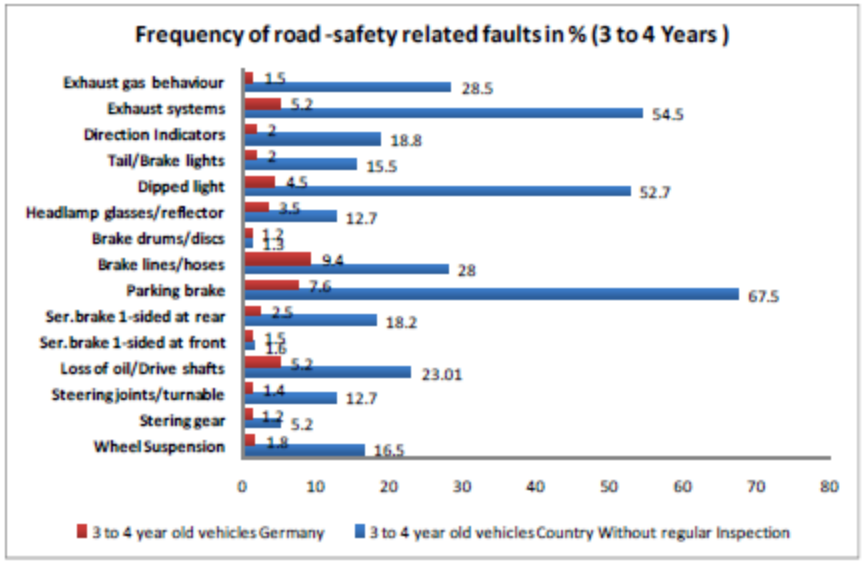
Engineering Solutions and Enabling Technologies for Improving Safety : Intermediate (5-10 years)

Passive Safety	Active Safety and General Safety
Pedestrian Safety •Safer car fronts to protect pedestrians and cyclists •Safer bus and truck fronts **Child Restraint Systems** •Safer Child Seats for all age groups **Commercial Vehicles** •Truck Code implementation •Trailer Code implementation **Agricultural Tractors and Construction Equipment Vehicles** •Rollover Protective Structure along with Safety Belts for tractors •Falling object protective structures with enclosed cabin. •To enhance safety requirements for Construction Equipment Vehicles and Off Road Vehicles under CMVR certification.	**Use of Speed Limiting Devices and Functions** •Speed Gun •Speed cameras **Crash Avoidance Systems** •Collision Avoidance Techniques like lane departure warning, Adaptive Cruise Control, Adaptive Front Lighting •Advanced Vehicle Stability Control technologies like Electronic Stability Control (ESC) **General requirements** •Alcohol interlocks •Safety against displaced luggage

Engineering Solutions and Enabling Technologies for Improving Safety : Long Term (>10 years)

Passive Safety	Active Safety and General Safety
Vehicle Compatibility Design of the vehicle structure for colliding partners' safety **Advanced Restraint Systems** Adaptive Head Restraint Smart Restraint Systems sensitive to occupancy and its Anthropometry **Vehicles to Road Furniture Interaction** Protection against roadside objects like Poles, Trees and narrow objects Development of Road Restraint Systems **Indian NCAP System– beyond regulations** Introduction of Indian NCAP for evaluation and overall safety rating of vehicles	**Driver Assistance Systems** Drowsiness Alarm Vehicle to Vehicle Communication Intelligent Transport Systems for better traffic management

Effect of Vehicle Inspection & Maintenance (I&M) on Frequency of Safety Related Faults



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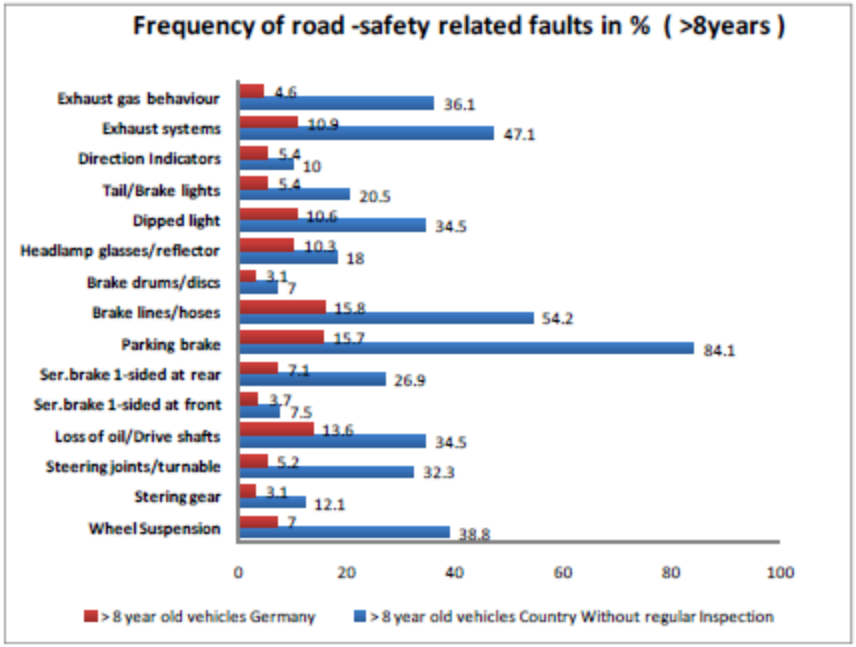


I&M Implementation Plan In India

Phase 1 (up to Year 2015)

- In the first phase, cities (Metros)with significant transport vehicles should introduce a modern Inspection and Certification regime
- In these cities, a modern inspection regime should be first introduced for commercial vehicles
- And then it must be extended to rest of India for commercial vehicle category

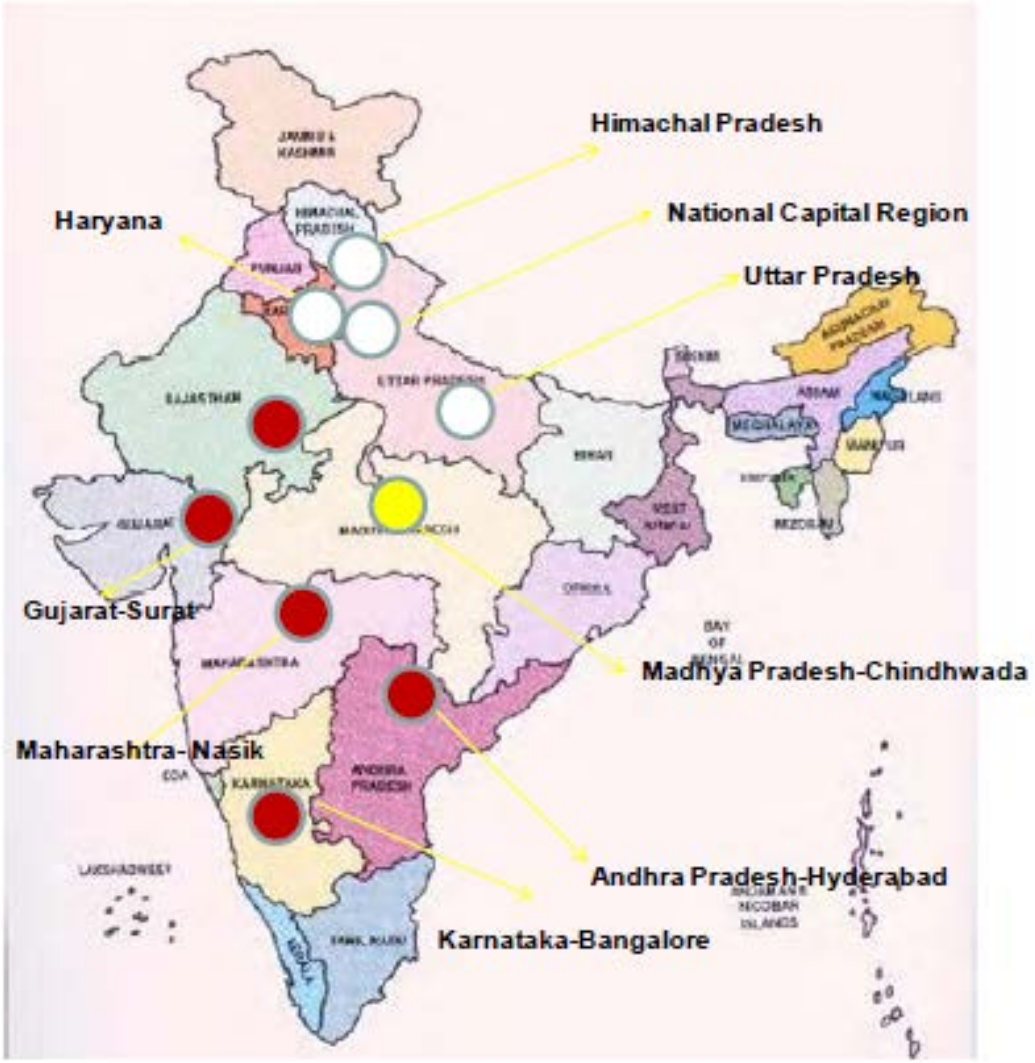
Phase 2 (2015-2020)

- Introduce the I & M regime to private vehicles including 2 wheelers
- Start initially with older vehicles (more than 9 years old)

Phase 3 (Year 2020 onwards)

- And then extend the regime to newer fleet in private vehicles category (3-9 year old)

India - I&M Pilot Centres



Road Engineering Aspects of Safety

- Road Geometry Design (curves, grades, camber, super elevation)
- Road Signs, Markings and Delineation (mandatory, warning, informatory)
- Road Junctions (layout, geometry, capacity, control)
- Access Control (segregation, acceleration/deceleration, VRUS)
- Safety barriers (high embankments, medians, bridges, built up areas)
- Visibility (roads, junctions)
- Facility for Driving maneuvers (merging, diverging, weaving)

ROAD SAFETY – Road Furniture

Road Safety Barriers

Terminals of Safety Barriers

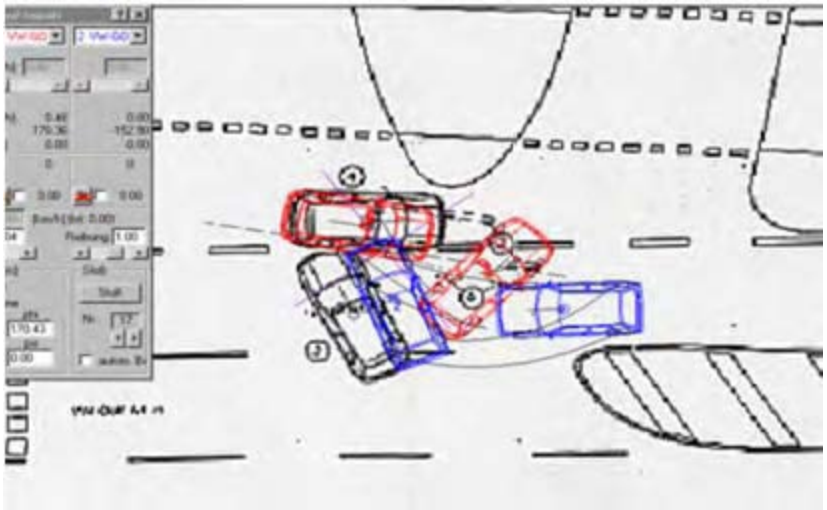
Crash Cushions

Arrester Beds

Road Reflectors

Noise Barrier

Accident Investigation & Reconstruction



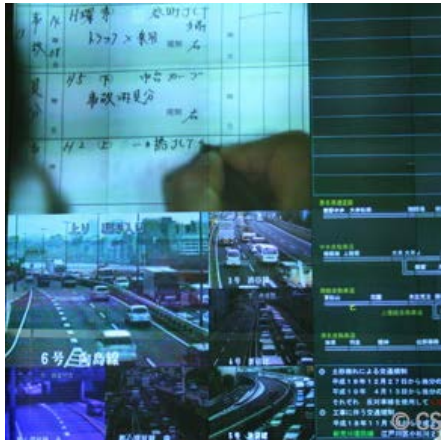
Intelligent Transportation Systems(ITS)

Recommended ITS Implementation on Pilot City Basis

- Provision of real time traffic information to vehicle users
- Electronic toll collection on all major highways
- Public transportation information system
- Adaptive traffic signals at major traffic junctions in the cities
- Congestion charging in crowded city areas
- Parking guidance system in cities
- Weighing in motion (WIM) for goods carrier vehicle to avoid overloading of such vehicles on the highways
- Incidence Management

ITS Way Forward

- National ITS Roadmap to be prepared
- Provision of necessary funding over years
- State level initiatives to be encouraged



Public Awareness & Enforcement

Speed

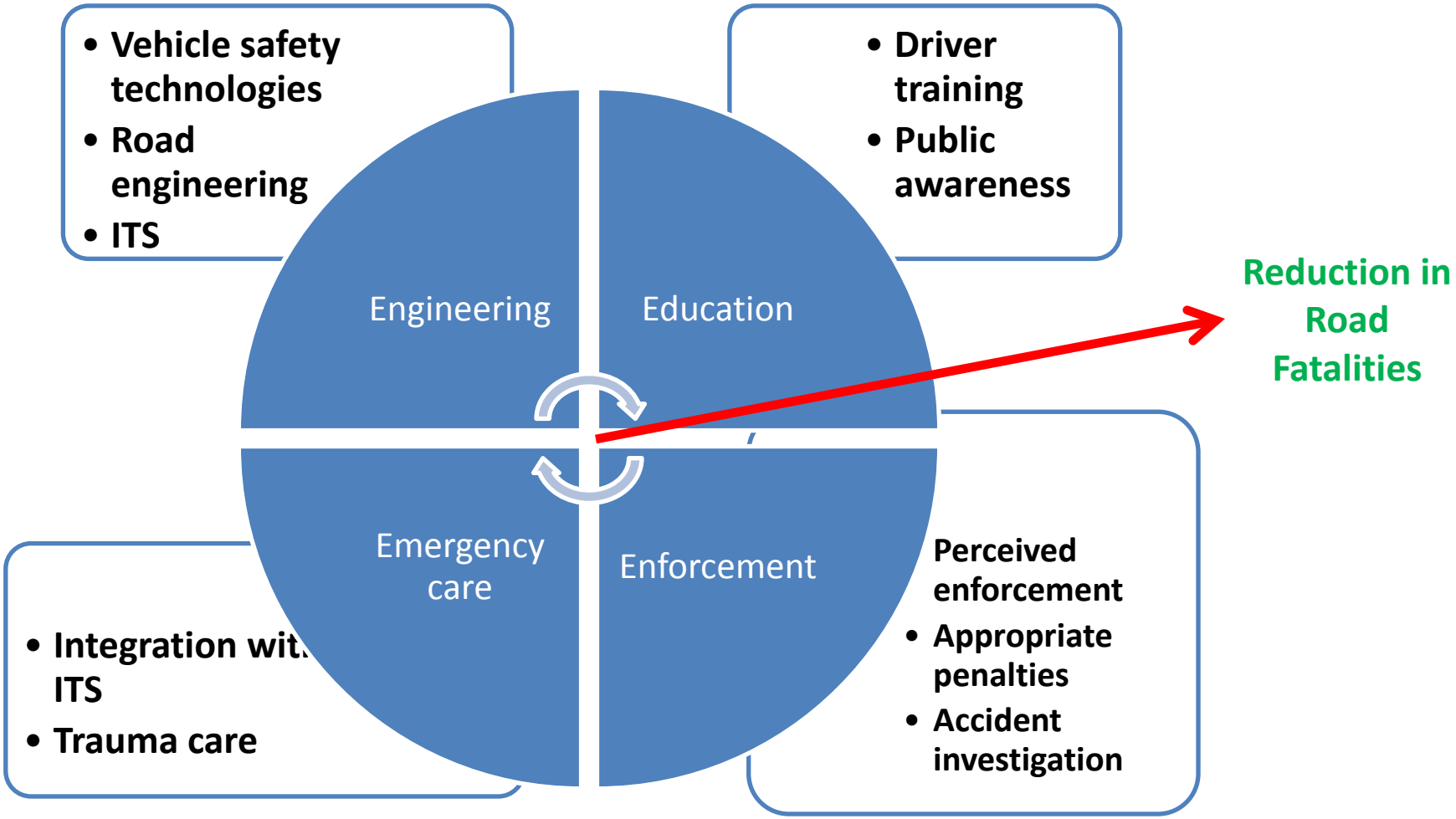
Drink-driving

Motorcycle helmets

Seat-belts

Child restraints

4 ”E” s for Road Safety



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