

Role of AI, BIM, and ATMS in Engineering and Enforcement measures of Road Safety in India

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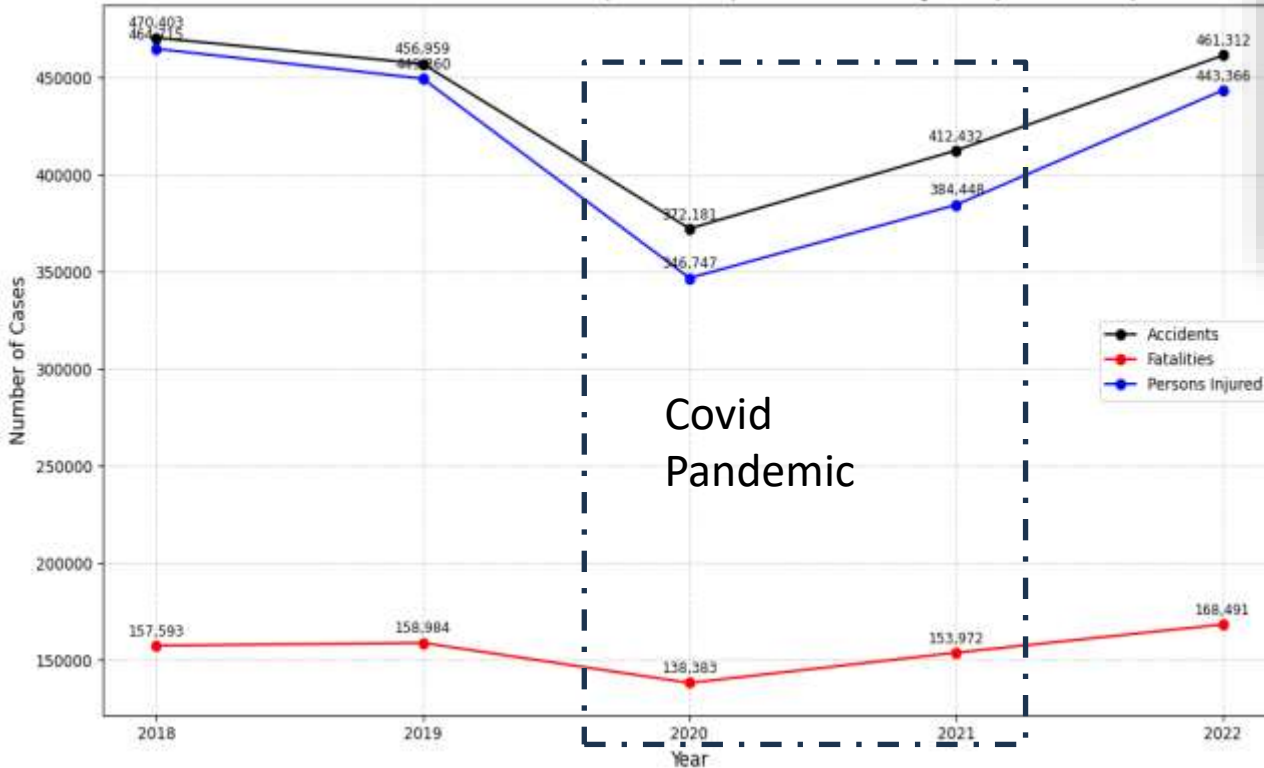
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Road Infrastructure in India

- India has the **second largest road network in the World of about 63.45 lakh km**. This comprises National Highways, Expressways, State Highways, Major District Roads, Other District Roads and Village Road.
- Out of the above, the total length of **National Highways is about 1.46 lakh km, State Highways 1.79 Lakh km** and other roads are 60.19 Lakh kms.
- Length of 4 lane and above NHs (excluding HSCs) increased by 2.5 times from 18,278 km in 2014 to 45,947 km at present. Length of National High-Speed Corridors (HSC) has expanded from 93 km in 2014 to 2,474 km at present.
- Capital expenditure (including private investment) of MoRTH increased 5.7 times from around 53,000 crore in 2013-14 to about 3.01 lakh crore in 2023-24 (highest ever).

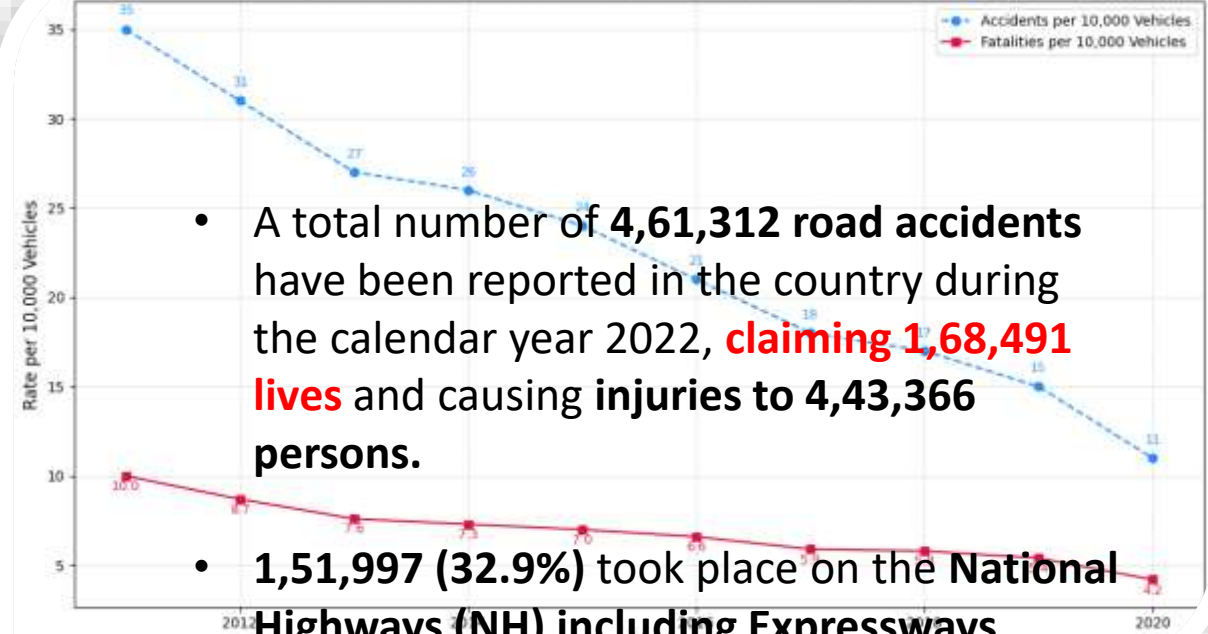
Road Accident Scenario in India

Trends in Number of Accidents, Fatalities, and Persons Injured (2018-2022)



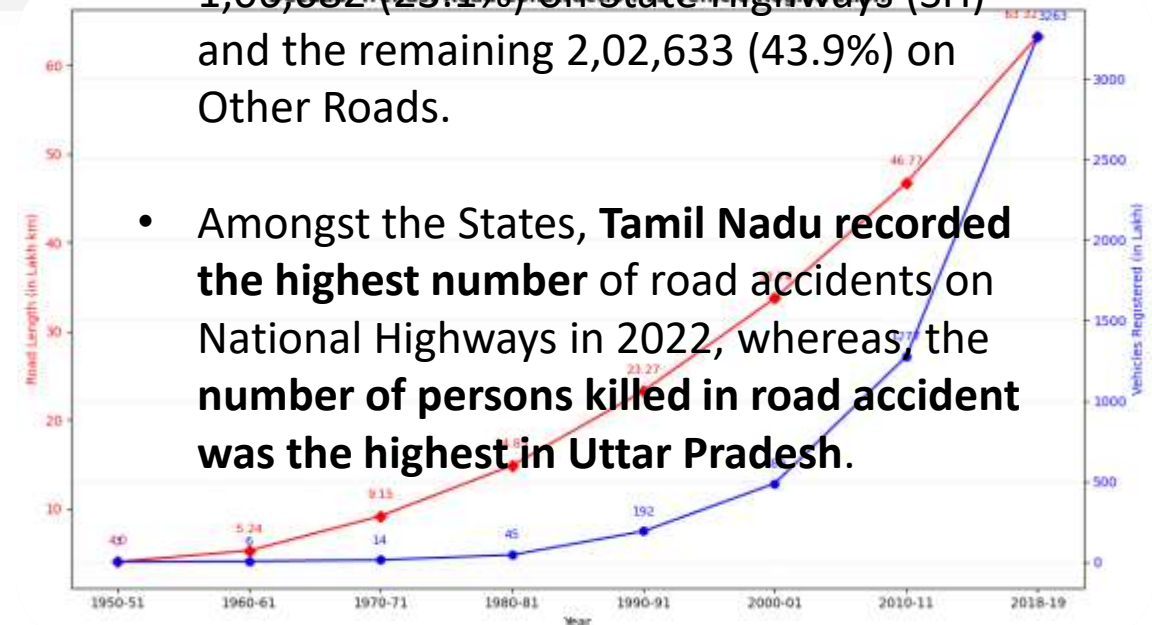
Data source: Road Accidents in India-2022, MoRTH

Trends: Accidents and Fatalities per 10,000 Vehicles (2011-2020)



- A total number of **4,61,312** road accidents have been reported in the country during the calendar year 2022, **claiming 1,68,491 lives** and causing injuries to **4,43,366** persons.

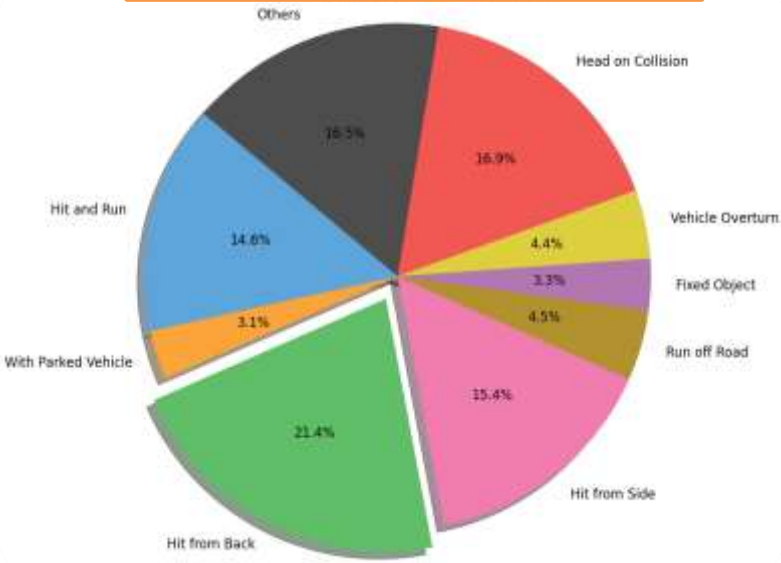
- 1,51,997 (32.9%)** took place on the **National Highways (NH) including Expressways**, **1,06,682 (23.1%)** on **State Highways (SH)** and the remaining **2,02,633 (43.9%)** on **Other Roads**.



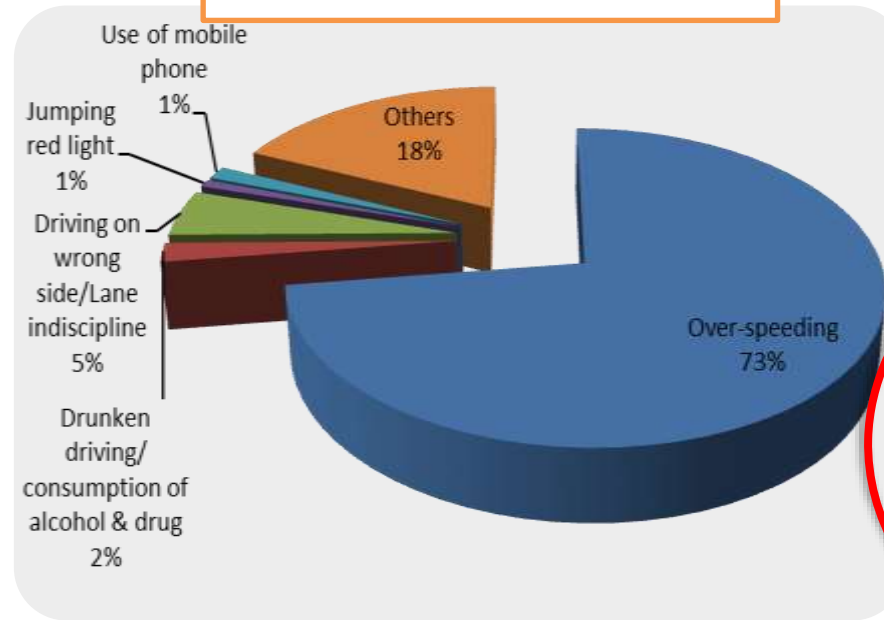
- Amongst the States, **Tamil Nadu recorded the highest number** of road accidents on National Highways in 2022, whereas, the **number of persons killed in road accident was the highest in Uttar Pradesh**.

Road Accident Nature, Collision Type and Vehicle Involved

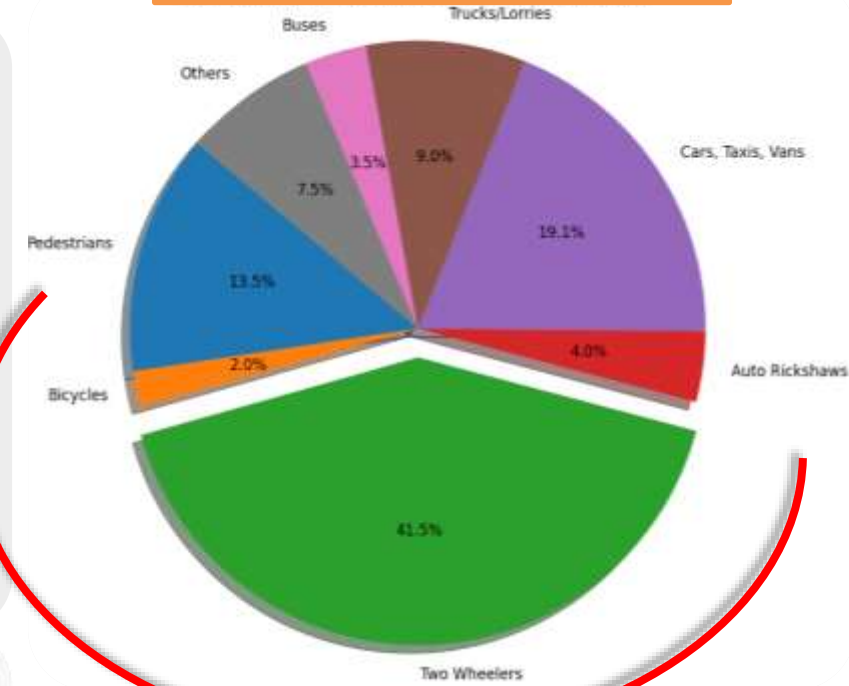
Road Accidents by Type of Collisions



Road Accidents by Violations



Road Accidents by User Category



VRUs=61%

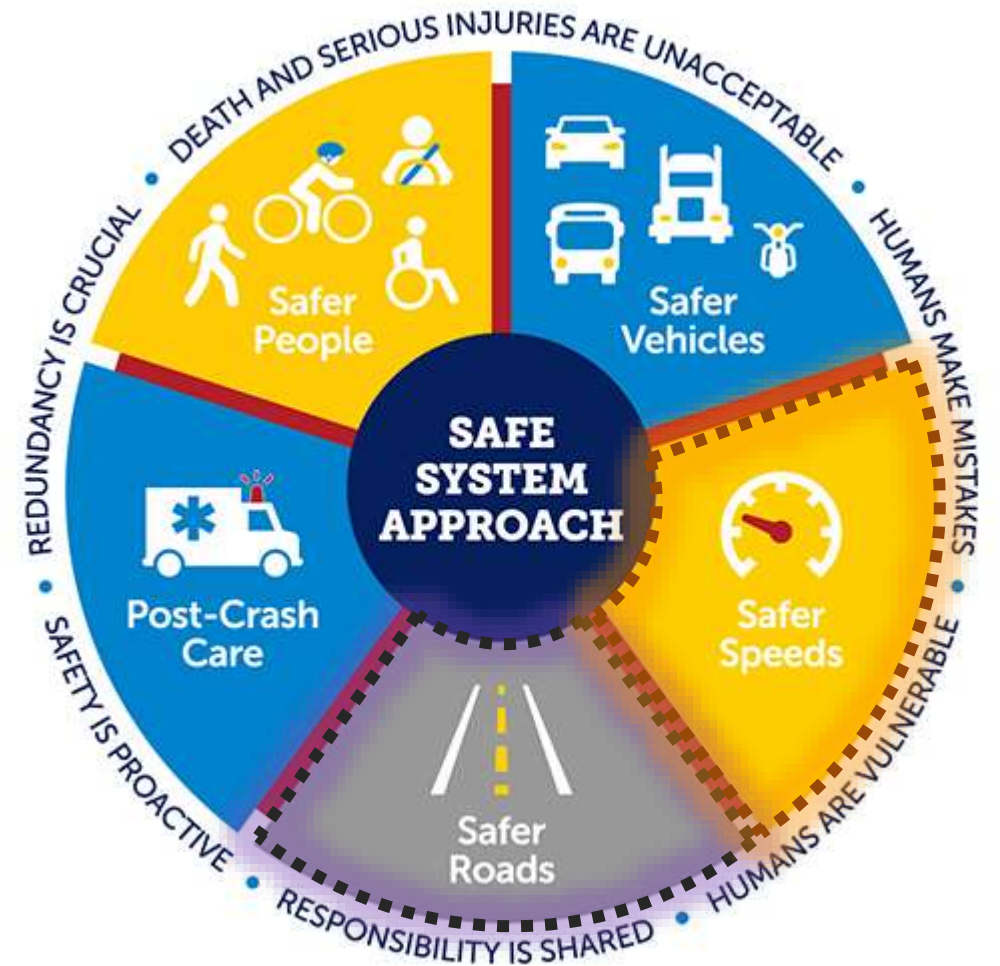
UN Decade of Action for Road Safety 2021-30

UN General Assembly Resolution 74/299 declared a **Decade of Action for Road Safety 2021-2030**, with the target to **reduce road traffic deaths & injuries**

By At least **50%** during that period

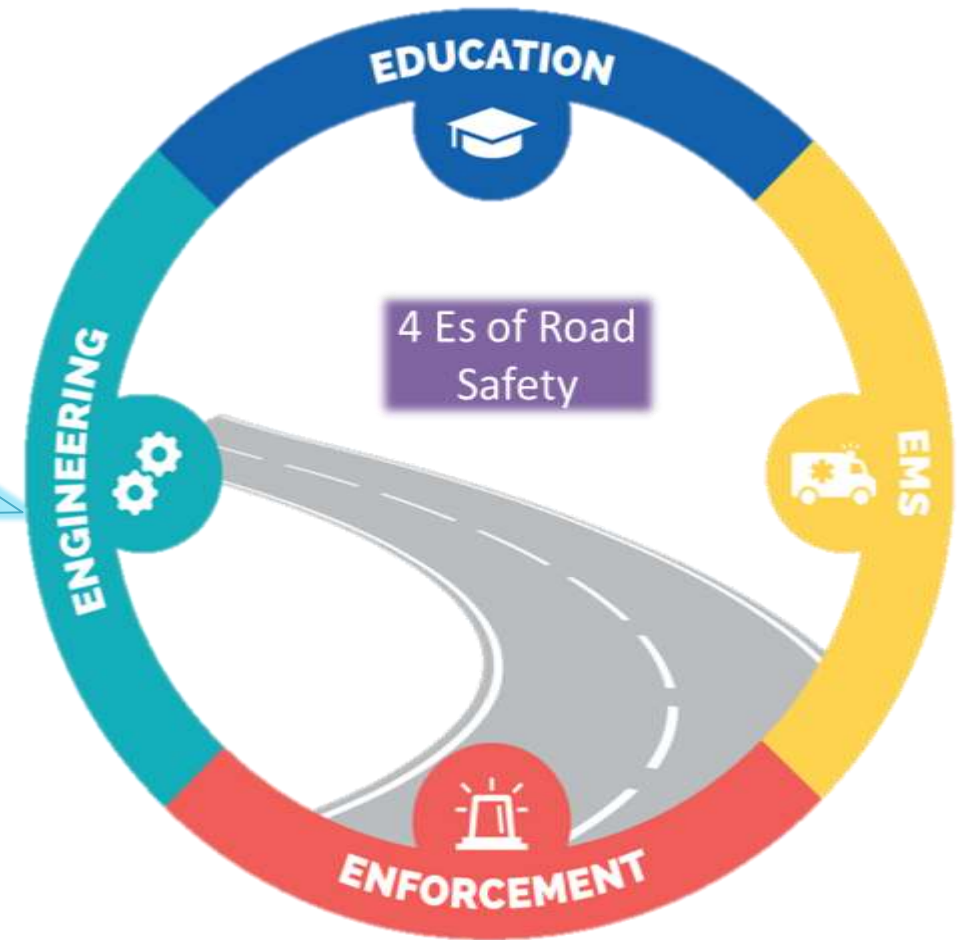
Global Plan describes what is needed to achieve that target, and calls on governments & partners to implement an integrated

SAFE SYSTEM APPROACH



4 Es of Road Safety, Govt Actions and Initiatives

- Road Safety Audit (RSA) of all National Highways (NHs) has been made mandatory
- Identification and rectification of black spots*
- Administers the electronic Detailed Accident Report using Integrated Road Accident Database (iRAD)
- Various Policy Circulars/guidelines for the improved road safety measures on Expressways and National Highways
- Amendments have been made in the Motor Vehicles Act, 1988



- The Motor Vehicles (Amendment) Act, 2019 as stands implemented provides for strict penalties
- Issued rules for Electronic Monitoring and Enforcement of Road Safety
- Technological interventions for ensuring compliance with Motor Vehicle Act, 1988.

The Ministry has identified 13,795 accident prone blackspots for rectification by 2024-25. Out of these, 4,777 black spots have been rectified through permanent measures till December 2024.

Use of BIM, AI-driven analytics in Road Safety

Engineering

 Accident Data Analysis & Investigation

 Road Safety Interventions

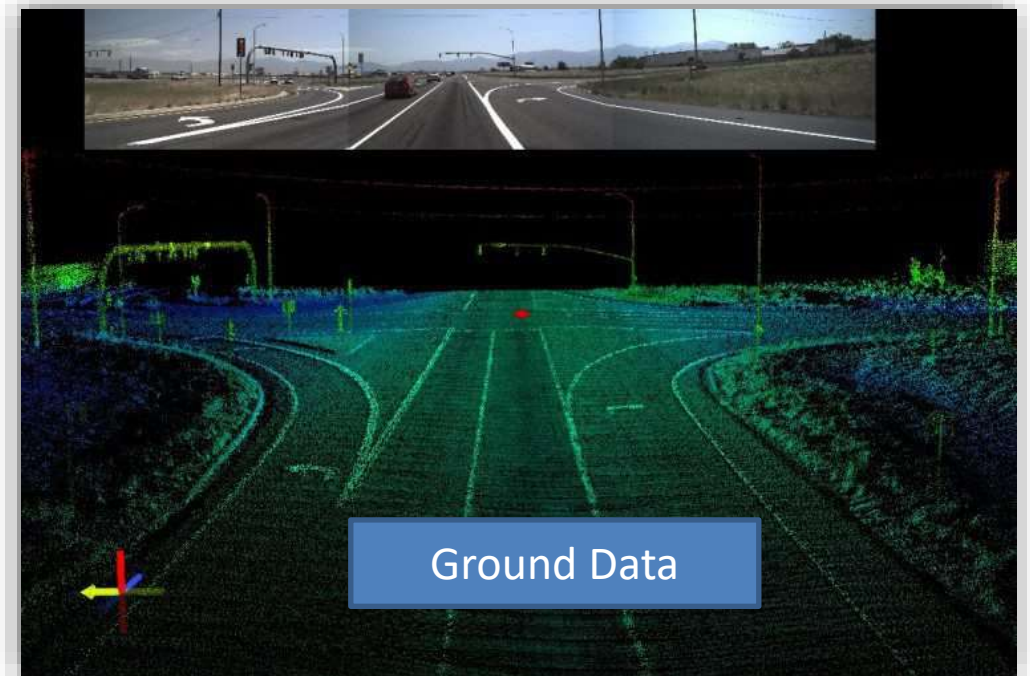
 Conceptual to Detailed Design

 Costing and Bidding

 Monitoring of Works

Gap and Needs AI Interventions




Data source: Road Safety Cell, NHAI

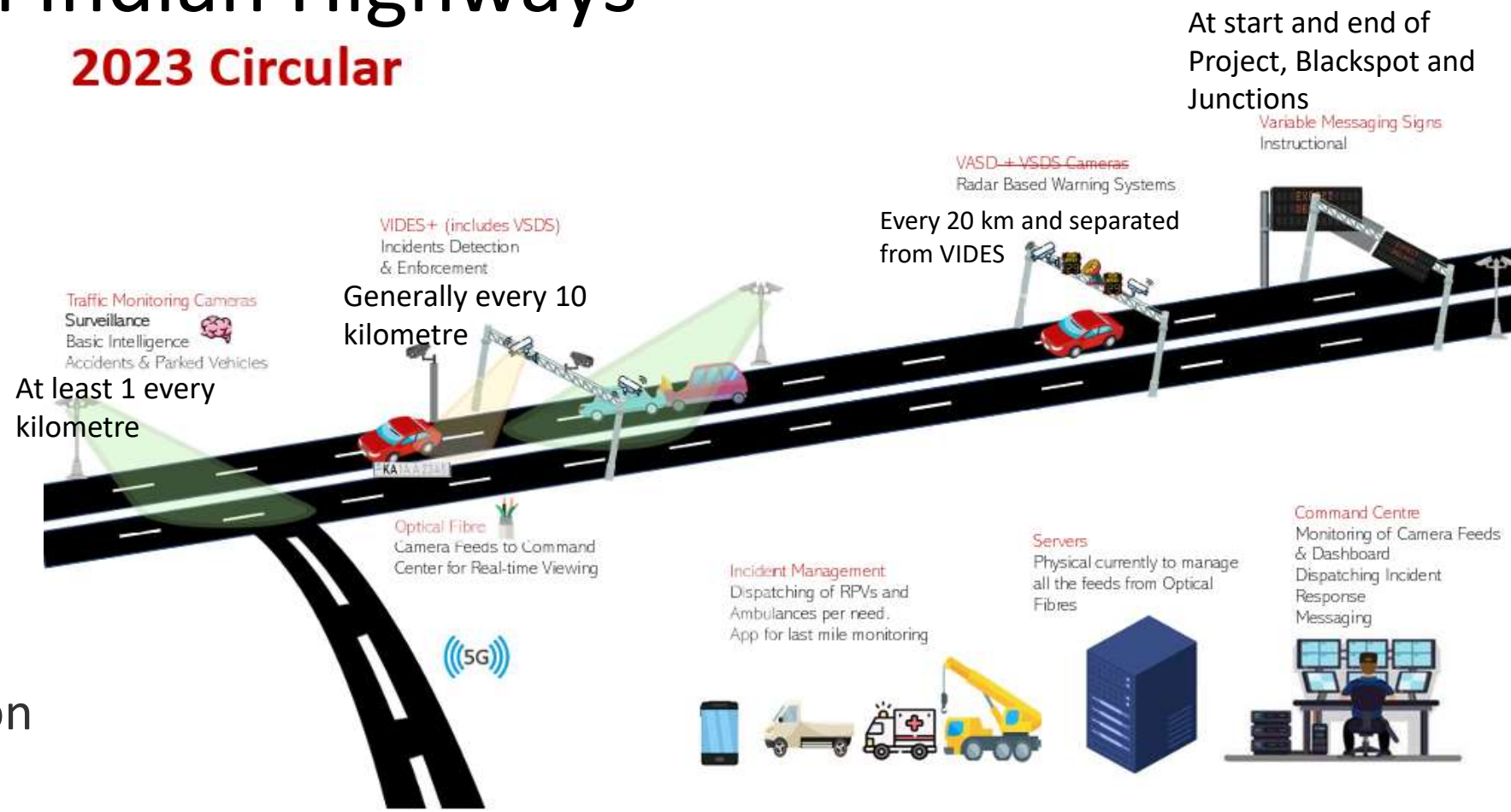


ATMS Systems on Indian Highways

2023 Circular

Enforcement

-  Advanced Traffic Management System
-  Traffic Management and Enforcement
-  Stakeholder Coordination



- ### Integrations
- Data Lake for daily reporting and camera access [API]
 - IP based video access with NHAI HQ for ICCC and Traffic Police Command Centers
 - Integration with Rajmargyatra for broadcasting incidents [API]
 - Integration with echallan system on Vahaan and E-courts to for online case settlements

Case Studies-Installation of VIDES

- Delhi Traffic Police reported a 19% reduction in fatal accidents in areas equipped with Over-Speeding Violation Detection (OSVD) cameras.
- The ***Outer Ring Road*** also showed a **34% decrease in fatal accidents** after OSVD installations
- ***At Signature Bridge***, along with engineering measures reduced ***fatal accidents from eight in 2019 to one in the same period of 2023.***
- The Bengaluru-Mysuru access controlled highway recorded a significant ***drop in road fatalities, from 188 in 2023 to 50 in 2024***, after the installation of the Advanced Traffic Management System (ATMS) in July 2024



Way Forward

- Focus on vulnerable road users
- Data-driven interventions- Data Analysis and Preparation of Effective Algorithms
- Integrated Approach- Use of BIM, GIS and AI to expedite the conceptualising the engineering measures along with Effective Enforcement
- Preparation of toolkits
- Knowledge sharing session and discussion of case studies

Thank you 🙏

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Road Safety Engineering measures

A. Basic Mandatory Facilities

- Line markings
- Road Signages
- Lighting



B. Median and roadside barrier

- Median barrier
- Roadside barrier
- End treatment



C. Delineation

- Delineator
- Chevron marker
- Raised pavement marker
- Flexible delineation post



D. Non-Motorised

- Pedestrian crossings
- Sidewalk (footpath)
- Pedestrian refuge island
- Bicycle lane



E. Speed control and regulation

- Speed hump
- Visual traffic calming
- Vehicle Actuated Program



F. Intersection

- Protected turn lane
- Intersection channelization
- Grade Separation



H. Others

- Crash cushion
- Rumble strips
- Central hatching

