IRF INDIA CHAPTER

IRF INTERNATIONAL ROAD FEDERATION

GRIS

Global Road Infratech Summit & Expo

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ARCADIS

Managing Road Safety the BHARAT Way

From Vision Zero to Net Zero Growth in Fatalities

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ARCADIS (IBI) Group

THE REALITY CHECK: India Road Safety Crisis

Road Safety = Human Suffering at Scale. National Development Crisis
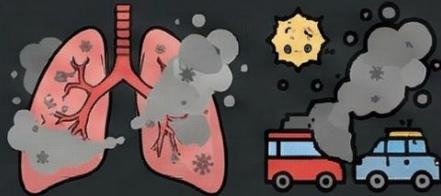
1. Driver Stress – The Invisible Risk

Causes for Drivers:
- **Bus, Cab, Truck:** Fatigue, Congestion, Income Pressure
- **Commuters:** Unpredictability, Aggression

IMPACTS: Mental Exhaustion, Fatigue-Related Mistakes, Reduced Reaction Real Time. Stress becomes a safety hazard.
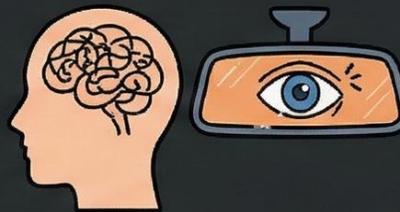
2. Community Health Impact

Road Corridors Expose Citizens to:
- Air Pollution
- Particulate Matter
- Respiratory Illness
- Cardiovascular Disease

Children & Elderly near roads face continuous exposure. **Road safety is Environmental Health Management.**

3. Psychological Burden

- Daily Fear of Crashes
- Near-miss Experiences
- Congestion Frustration

REDUCES: Quality of Life, Trust in Public Systems.

4. Social & Family Family Impact

Behind Every Fatality:
- Families lose lose-breadwinners
- Children lose educational support
- Long-term economic hardship.

5. Economic Cost of Loss of Life

Road Fatalities Represent:
- Loss of Productive Workforce
- Medical & Rehabilitation Costs
- Insurance & Legal Burdens
- Long-term Dependency

At national scale, road crashes **is an ECONOMIC COMPETITIVENESS ISSUE.**

CORE FRAMING LINE: This is not just a transport problem. It is a public health crisis, an economic loss, and a social suffering issue. Managing road safety is national risk management.

MEDIA SOUNDBITE: "Our roads are creating stress, sickness, and economic loss every day. Road safety is about protecting human life and national productivity."

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RATIONALE FOR TRANSFORMATION: LESSONS FROM FIVE NATIONAL EXPERIENCES

1. NEW YEAR'S EVE SAFETY OPERATIONS
(Bengaluru, 2026–2026)

KEY INSIGHT: Prevention depends on prediction

Coordinated monitoring, enforcement, preparedness controlled predictable risks. Need for continuous surveillance and predictive intelligence.

2. COVID PUBLIC BEHAVIOURAL CAMPAIGNS

KEY INSIGHT: A few simple, actionable commitments drive mass compliance

Always wear ✓   Never drive under influence ✓   Do not use phone ✓

Clarity, repetition, simplicity enable widespread adherence. Focus on high-impact behavioural commitments.

3. AVIATION SAFETY & CRASH INVESTIGATION SYSTEMS

KEY INSIGHT: Safety improves through continuous monitoring, control, and learning

Surveillance → Predictive Risk Management → Structured Control → Scientific Investigation → System Improvement → Surveillance

Implement Road Traffic Control (RTC) model with real-time visibility and a learning loop.

4. FRAGMENTED EXCELLENCE CANNOT DELIVER SYSTEMIC OUTCOMES

ITS   Enforcement   NGOs   Academia   Private Sector

KEY INSIGHT: Collaboration is essential

COMMON DIGITAL PLATFORM

Isolated initiatives fail. A unified platform is crucial for scaling outcomes.

5. CLARITY OF DUTY – SWADHARMA AND RAJDHARMA IN ROAD SAFETY

KEY INSIGHT: Road safety improves when responsibilities are not diffused, but clearly defined.

Engineer   Enforcement   Health   Driver

Swadharma (Individual Duty): Each actor performs their defined role with commitment.

Rajdharma (State Duty): The state has a core obligation to protect citizen life and welfare through safe mobility.

TAKEAWAY: Shift from procedural compliance to duty-based responsibility. Clear ownership of outcomes and defined accountability for preventable fatalities.

THE BHARAT WAY: ACHIEVING IMPACT AT SCALE

A SYSTEMIC, INTELLIGENCE-LED, COLLABORATIVE, AND DUTY-DRIVEN FRAMEWORK

SYSTEMIC   INTELLIGENCE-LED   COLLABORATIVE   DUTY-DRIVEN

Addressing India's road safety challenge requires a paradigm shift, not incremental adjustments.

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THE NEW INDIAN EXPRESS

2024 NYE

The city traffic police booked 330 motorists who were found driving under the influence of alcohol on Sunday night and early Monday morning. The traffic police checked over 7,620 vehicles across the city.

Till midnight on Sunday, one fatal and 10 non-fatal accidents were reported. On Monday between midnight and 7 am, three fatal accidents were reported.

Between 31-12-2024 7:00 PM to 01-01-2025 7:00 AM :

4 Non-fatal accidents reported

In NYE-2025: **73%** decrease in accident rate compared to NYE-2024

New Year Eve 2023	31st Dec 2022	1st Jan 2023	31st Dec 2022 7 PM to 1st Jan 2023 7 AM
Total Accident	22	24	23
Fatal Accident	1	5	4
Fatality Rate	5%	21%	17%

New Year Eve 2024	31st Dec 2023	1st Jan 2024	31st Dec 2023 7 PM to 1st Jan 2024 7 AM
Total Accident	2	21	15
Fatal Accident		3	1
Fatality Rate	0%	14%	7%

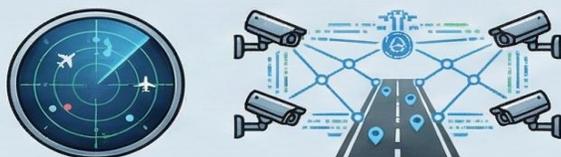| New Year Eve 2025	31st Dec 2024	1st Jan 2025	31st Dec 2024 7 PM to 1st Jan 2025 7 AM
Total Accident	4	6	4
Fatal Accident			
Fatality Rate	0%	0%	0%

0 (ZERO) FATALITY DURING NYE'25

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INDIA ROAD SAFETY MISSION: A Systemic, Coordinated National Approach

TARGET: Zero Fatalities (Project Level) | Net Zero Incremental Growth (National & State Level)

### 1 SURVEILLANCE — "Seeing the Risk"

ATC Equivalent: Radar tracking aircraft

RTC Role: Continuous visibility of road conditions

- Corridor and junction monitoring
- Speed pattern tracking
- Wrong-way movement detection
- Stalled vehicles
- Congestion build-up
- Work-zone risks
- Weather alerts

"You cannot manage safety without real-time visibility."

2 PREDICTION — "Anticipating the Conflict"
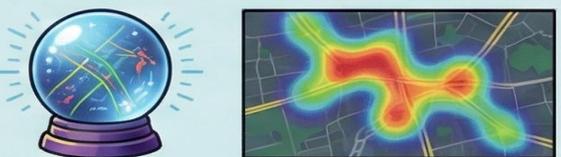
ATC Equivalent: Aircraft conflict prediction

RTC Role: Identifying where risk will rise

- Crash probability heatmaps
- Seasonal risk modelling
- Festival and migration travel spikes
- Behavioural violation trends
- Blackspot emergence detection

"The safest crash is the one we prevent before it forms."

3 CONTROL & GUIDANCE — "Managing Movement"

ATC Equivalent: Flight path separation rules

RTC Role: Actively shaping traffic behaviour

- Adaptive traffic signals
- Speed management systems
- Variable Message Signs
- Lane discipline enforcement
- Construction zone safety protocols
- Dynamic diversions

"Safety is not only enforcement — it is guidance."

5 LEARNING LOOP — "Improving the System"

ATC Equivalent: Aviation incident investigation

RTC Role: Every crash improves the system

- Scientific crash reconstruction
- Root cause analytics
- Engineering corrections
- Policy refinement
- Awareness targeting
- AI-based training updates

"Safety improves when systems learn."
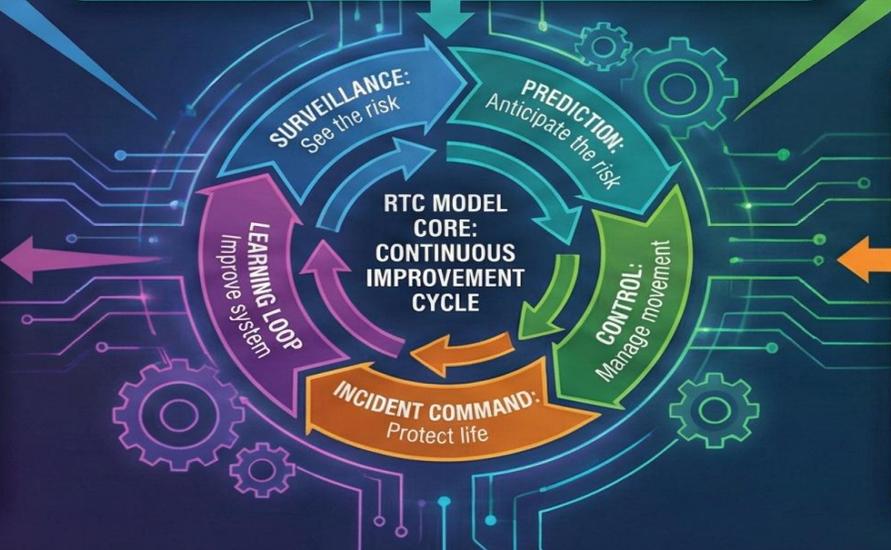
4 INCIDENT COMMAND — "When Prevention Fails"

ATC Equivalent: Emergency aircraft handling

RTC Role: Golden Hour survival management

- Automatic incident detection
- Fast verification
- Nearest ambulance dispatch
- Hospital capacity assignment
- Route clearance
- Real-time coordination

"Speed of response determines survival."

RTC MODEL CORE: CONTINUOUS IMPROVEMENT CYCLE

- SURVEILLANCE: See the risk
- PREDICTION: Anticipate the risk
- CONTROL: Manage movement
- INCIDENT COMMAND: Protect life
- LEARNING LOOP: Improve system

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THE ARCADIS STRATEGIC SHIFT

FROM Reaction → TO **Prevention**

FROM Silos → TO **Platform Governance**

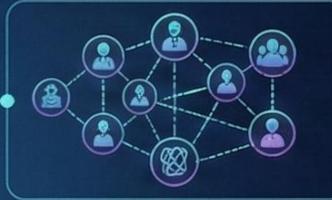FROM Slogans → TO **Measurable Progress**

NATIONAL ROAD SAFETY INTELLIGENCE PLATFORM: THE 'NERVOUS SYSTEM' OF THE BHARAT WAY

PURPOSE: To transform road safety from fragmented actions into a coordinated national intelligence system by connecting: **Authorities + Police + Health + NGOs + Academia + Industry + Citizens**

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LAYER 5 — GOVERNANCE LAYER (The Mission Control)

PROJECT	CORRIDOR	DISTRICT	STATE	NATIONAL
Zero fatality compliance	Monthly risk trends	Fatality movement	Net zero incremental deaths	Comparative performance

LAYER 4 — COLLABORATION LAYER (The Ecosystem Platform)

AUTHORITIES	NGOs	ACADEMIA	INDUSTRY	CITIZENS
Shared dashboard	Awareness targeting data	Research access	CSR safety projects	Hazard reporting + alerts

Everyone works on same intelligence.

LAYER 3 — OPERATIONAL LAYER (The Action Engine)

POLICE	ROAD AGENCIES	TRANSPORT DEPT
(Targeted enforcement)	(Infrastructure fixes)	(Policy decisions)
HEALTH DEPT	**NGOs**	**DISTRICT ADMIN**
(Trauma preparedness)	(Awareness targeting)	(Local interventions)

🎯 KEY PLATFORM FEATURES

- ✅ National + State + District dashboards
- ✅ Blackspot auto-detection
- ✅ Golden hour response tracking
- ✅ Predictive risk heatmaps
- ✅ Citizen reporting app integration
- ✅ Construction zone monitoring
- ✅ Repeat offender analytics

RISK HOTSPOT DETECTION
(Identifies emerging blackspots)

CORRIDOR RISK SCORING
(Ranks dangerous stretches)

SEASONAL RISK PATTERNS
(Festival, monsoon, fog trends)

BEHAVIOUR ANALYTICS
(Helmet, speeding, violations)

INCIDENT PREDICTION
(Predicts crash probability)

RESPONSE OPTIMIZATION
(Best ambulance dispatch)

→ All stakeholders feed into **ONE** data pool

TRAFFIC SURVEILLANCE
(Video feeds, violations)

HIGHWAYS ATMS
(Incidents, congestion, speeds)

URBAN SIGNALS
(Flow patterns, delays)

AMBULANCE SYSTEMS
(Response time, routing)

HOSPITALS
(Trauma data, injury severity)

e-DAR / IRAD
(Crash records)

CITIZENS
(Hazard reporting)

NGOs & RESEARCH
(Studies, behavioural data)

WEATHER SYSTEMS
(Fog, rain, heat)

ROAD ASSETS
(Blackspots, geometry)

LAYER 1 — DATA INTEGRATION LAYER (The Nerve System)

🔄 HOW THIS SUPPORTS YOUR 5-PRONGED PREVENTION

INFRA PREPAREDNESS (Identifies unsafe locations) → **AWARENESS** (Targets behaviour campaigns) → **EARLY DETECTION** (Real-time monitoring) → **GOLDEN HOUR** (Response coordination) → **PREDICTION** (Future risk modelling)
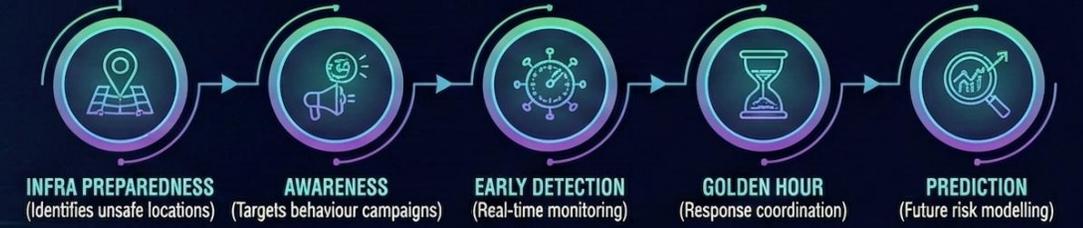
💡 BIG SHIFT THIS PLATFORM BRINGS

TODAY	WITH PLATFORM
• Siloed departments	• Connected ecosystem
• Reactive	• Predictive
• Annual review	• Monthly intelligence
• Data after crash	• Data before crash

> "Road safety cannot be managed by files and meetings. It must be managed like air traffic control — with a shared digital intelligence platform connecting every stakeholder in real time."

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Transforming junctions from accident-prone conflict points into intelligently managed safety zones, identifying risks before crashes occur and enabling timely interventions..,
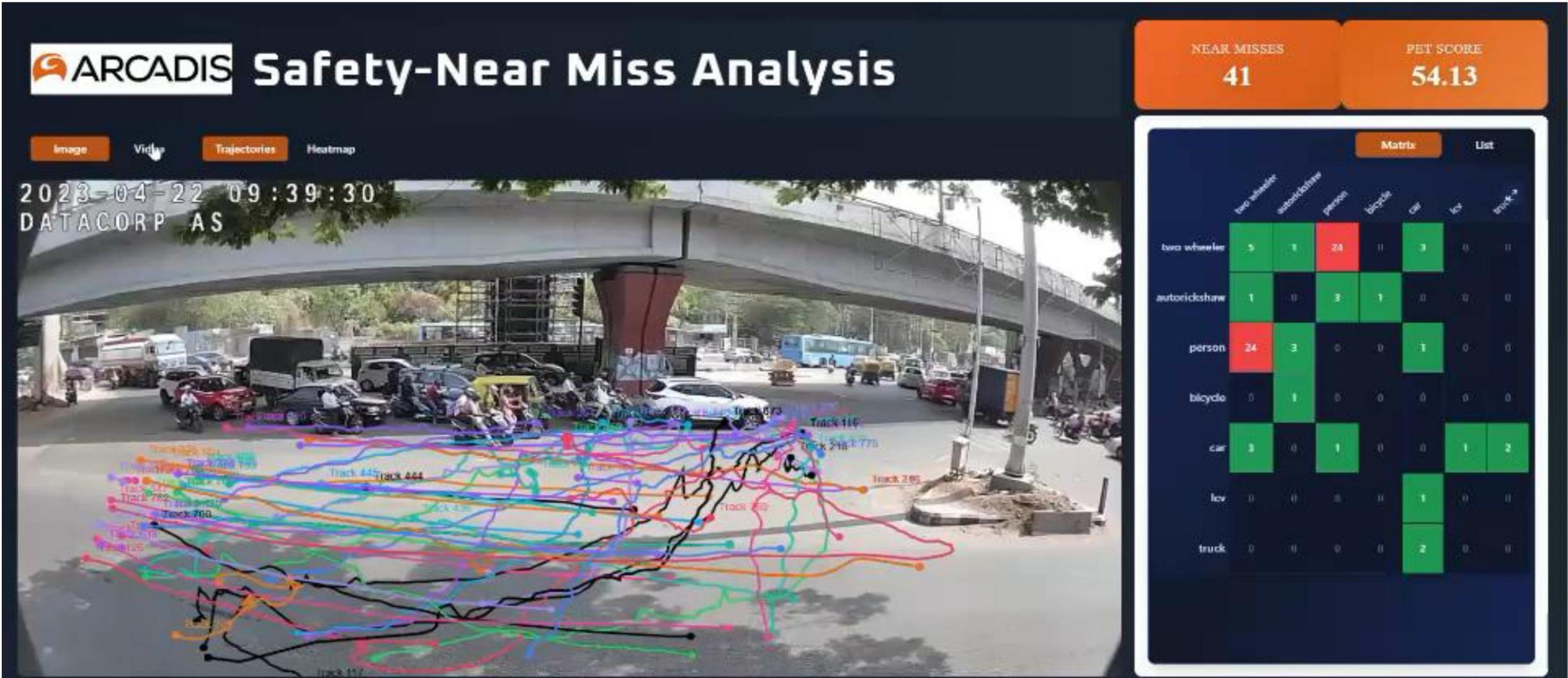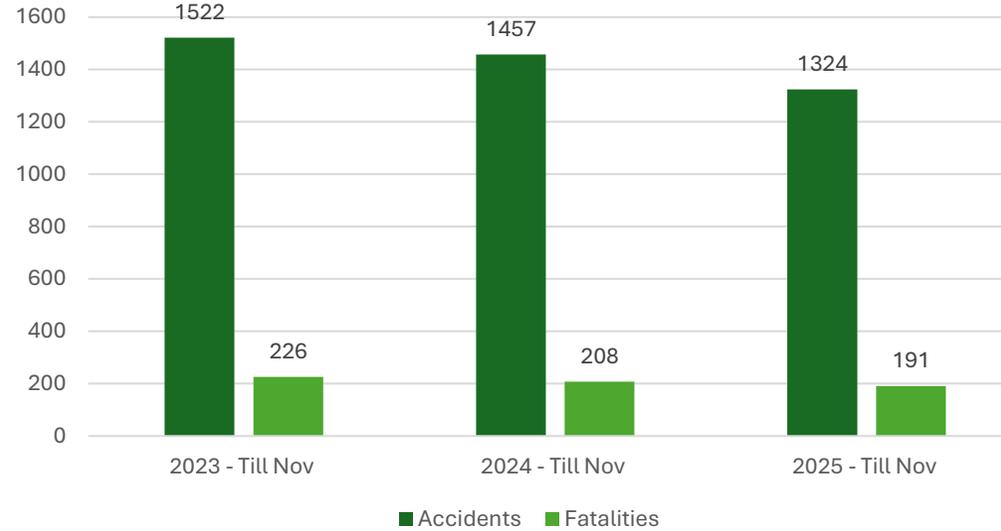
Safety Impact of New ATSC Traffic Signals at 169 Junctions

13% reduction in Total Accidents

15% reduction in Fatal Accidents

Reduced Red-Light Jumping
Lowers stress, reduces risky behavior

Better Pedestrian Compliance
Protects pedestrians, ensures safe crossings

No Conflicting Movements
Prevents violations through monitoring

Smoother Progression
Minimizes rear-end collisions, lane changes

Accidents & Fatalities - ATCS Implemented Areas

	2023 - Till Nov	2024 - Till Nov	2025 - Till Nov
Accidents	1522	1457	1324
Fatalities	226	208	191

Accidents & Fatalities - Across Bengaluru City

	2023 - Till Nov	2024 - Till Nov	2025 - Till Nov
Accidents	4455	4338	4419
Fatalities	796	762	720

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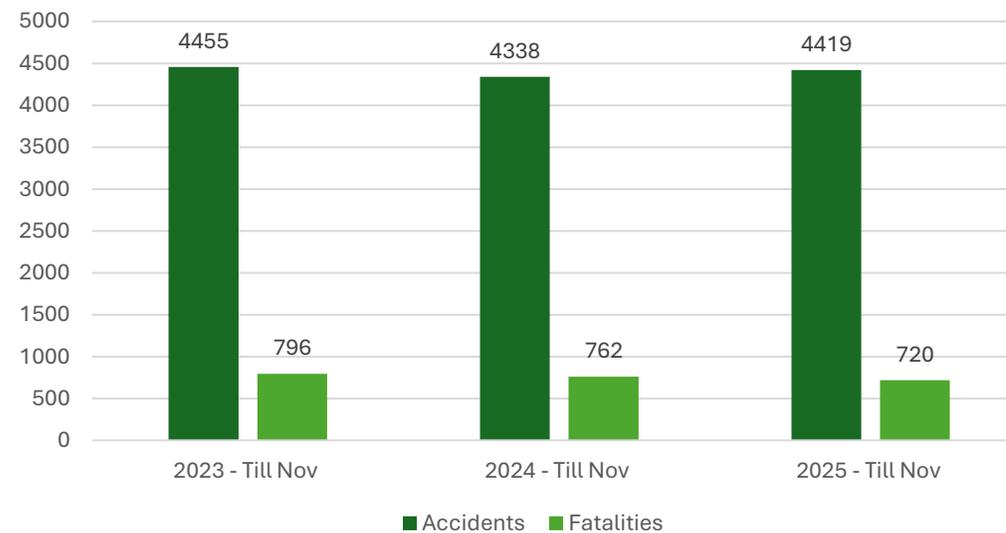
ROAD SAFETY GOVERNANCE: THE 'CARE → CAUSE → CORRECT → CAPABILITY' LEARNING LOOP

STAGE: PURPOSE	CARE (Save lives)	CAUSE (Understand why)	CORRECT (Fix system)	CAPABILITY (Train people better)	MATURE SAFETY GOVERNANCE

"We must treat road crashes the way aviation treats aircraft incidents — immediate rescue, scientific investigation, systemic correction, and continuous training. That is how nations move from accident response to safety management."

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POST-CRASH SURVIVAL & SYSTEM LEARNING – THE NEXT FRONTIER

Crashes will reduce, but survival after crash must improve dramatically.

❶ PARAMEDIC CAPABILITY GAP
CHALLENGE: Lives lost due to improper first handling.
DIRECTION: National trained paramedic pool, Tele-doctor grid for real-time guidance.
QUOTE: "Golden hour care should not depend on which district the crash happened in."

❷ AMBULANCE AVAILABILITY – UBERISATION MODEL
CURRENT: Limited fleet, location mismatch.
PROPOSED: Crowdsourced grid, nearest vehicle auto-dispatched, hospital pre-assigned.
QUOTE: "The closest life-saving vehicle should respond — not just the government vehicle."

❻ DOCTOR CROWDSOURCING NETWORK
Specialist doctors on-call grid, supporting paramedics remotely, especially in rural/highway areas.

❹ REWARDING GOOD SAMARITANS
Incentivize reporting and assisting. Remove fear, add recognition. Safety becomes socially rewarded behaviour.

SYSTEMIC LEARNING & PREVENTIVE ACTION

❸ BEHAVIOURAL NUDGING ON HIGHWAYS
FATALITIES LAST YEAR
Corridor-specific accident boards with real crash data. Turns statistics into emotional signals.

❺ PUBLIC FATALITY COUNTER
PUBLIC DASHBOARD 1,095 1,525 24.25
Like pollution AQI/Covid dashboards.
Purpose: Build awareness, create accountability pressure, make safety a public issue.

❼ CRASH RECONSTRUCTION SYSTEM
Aviation-style investigation: Witness input, camera analytics, root cause identification, engineering/policy feedback.

❽ ROAD CRASH INVESTIGATION AGENCY
DG ROAD SAFETY
Under national DG Road Safety. Structural reform similar to Aircraft Accident Investigation Bureau & Railway Safety Commissioner.

❾ AI-BASED GAMIFIED TRAINING
Simulated scenarios, skill gap detection for Paramedics, Control room staff, Traffic police, Highway patrol. Builds human capability.

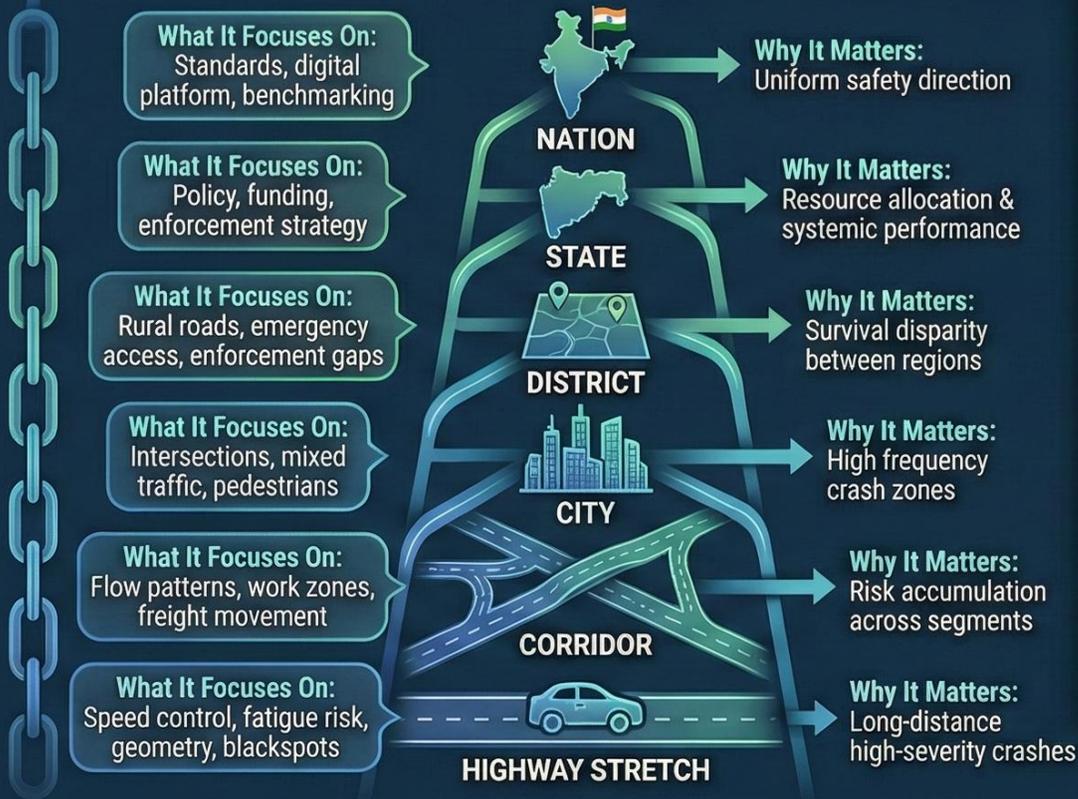## THE STRATEGIC SHIFT: From Reaction to Prevention & Learning

FROM Fragmented Efforts → TO Coordinated National System · **FROM Data Silos → TO Integrated Platform** · **FROM Accident Response → TO Mature Safety Governance** (Care→Cause→Correct→Capability)

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'GOVERNANCE ACROSS SPACE & TIME'
Safety Must Be Managed Like a Distributed System

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1 GOVERNANCE ACROSS SPACE
(Geographical Scales)

What It Focuses On:
Standards, digital platform, benchmarking
→ **Why It Matters:** Uniform safety direction

NATION

What It Focuses On:
Policy, funding, enforcement strategy
→ **Why It Matters:** Resource allocation & systemic performance

STATE

What It Focuses On:
Rural roads, emergency access, enforcement gaps
→ **Why It Matters:** Survival disparity between regions

DISTRICT

What It Focuses On:
Intersections, mixed traffic, pedestrians
→ **Why It Matters:** High frequency crash zones

CITY

What It Focuses On:
Flow patterns, work zones, freight movement
→ **Why It Matters:** Risk accumulation across segments

CORRIDOR

What It Focuses On:
Speed control, fatigue risk, geometry, blackspots
→ **Why It Matters:** Long-distance high-severity crashes

HIGHWAY STRETCH

"If one layer fails, the safety chain breaks."

2 GOVERNANCE ACROSS TIME
(Cyclical Review & Adaptation)

"To manage risk, we must see where it exists and when it peaks. Road safety governance must work across space and across time."

MONTHLY
Governance Action: Monitor emerging hotspots
Example Risks: New construction zone, new traffic diversion

SEASONAL
Governance Action: Anticipate travel patterns
Example Risks: Monsoon roads, fog season, festival travel

ANNUAL
Governance Action: Structural review
Example Risks: Infrastructure audit, policy changes

"Crashes follow patterns — weather, festivals, traffic cycles. Governance must follow the same rhythm."

WHY THIS MATTERS: BHARAT Way

Traditional Model:
Annual reporting | Centralised only | Static review

BHARAT Way:
Continuous monitoring | Multi-level accountability | Dynamic adaptation

"Safety is not a one-time audit. It is a distributed governance system operating across geographies and time cycles."

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THE BHARAT WAY: ROAD SAFETY ROOTED IN CIVILIZATIONAL THOUGHT

"Not borrowed, but rooted in our own civilizational thought. Protecting life is dharma, managing risk is statecraft, and acting to prevent harm is karma."
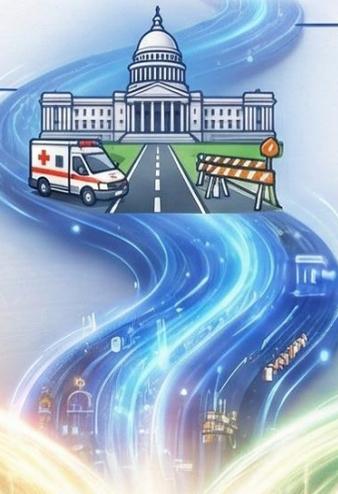
Triveni Sangam

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1 DHARMA: Citizen Responsibility

2 STATECRAFT (Rajdharma): Institutional Integrity

3 KARMA: Scientific Action

Safe Infrastructure →
Emergency Response →
Swift Enforcement →

GOVERNANCE:
Sovereign Guarantee.
Shift from Departmental
Activity to Protection Duty.
"State must guarantee
safe passage like
borders/health."

VALUE SYSTEM:
Self-Discipline,
Empathy. Shift from
Compliance to
Moral Obligation.
"Protecting life is an
inherent duty."

Self-regulation →
Respect for others →
Helmet/Seatbelt as duty

ACTIONABLE SCIENCE:
Cause & Effect. Shift
from Fate/Accident to
Accountability/Prevention.
"Positive actions inevitably
lead to saved lives."

→ Data-Driven Insights
→ AI & Prediction
→ Preventive Engineering

THE BHARAT WAY:
ROAD SAFETY AS NATIONAL DUTY

"Saving an Indian life on the road is as patriotic as defending the border.
A transition where safety is embraced as a natural duty to the nation."

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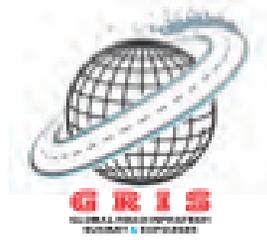
Managing road safety the BHARAT Way means —

Every INCIDENT is logged, so we LEARN from every life lost.

Every EFFORT is synchronised, so departments do not work in isolation.

Every STAKEHOLDER is aligned, from police to hospitals to NGOs to citizens.

Every SYSTEM is integrated, through a common digital backbone.

And every CITIZEN is aware, because safety is not only a government function

— it is a societal responsibility."