THE ROLE OF AI IN INCIDENT INVESTIGATIONS

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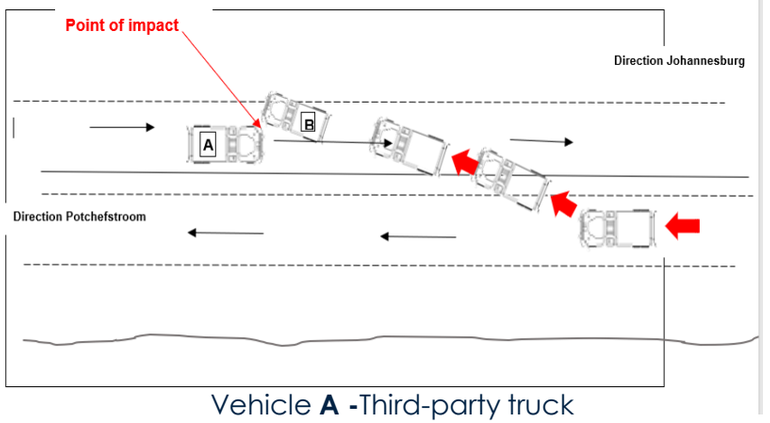
RK0021 – **Major** Accident

On the 8th February 2024 – RK0021 was involved in a Major accident on the N12 south bound near Potchefstroom

Facts

- Driver training and medical is up to date.
- Driver worked 66 hours (Limit 90) week prior to the accident.
- Shift prior to accident driver total shift time was 23.5 hour, 9 hours actual driving time 5 hours loading and offloading time and 9 hours waiting time.
- Driver was identified as possible high fatigue and given additional time to rest.
- Driver was given 20.5 hours of resting time prior to accident.
- Driver started his shift at 23h00 and 3 hours later stopped due to fatigue but did not report to his supervisor.
- Fatigue monitoring system recorded 9 alerts prior to accident that was not triggered at control tower due to API failure.
- Driver did not follow procedure when in-cab system warned him.
- Third Party Driver was taken to hospital for observation but was discharged the same day.
- Driver was briefed by supervisor prior to departure.



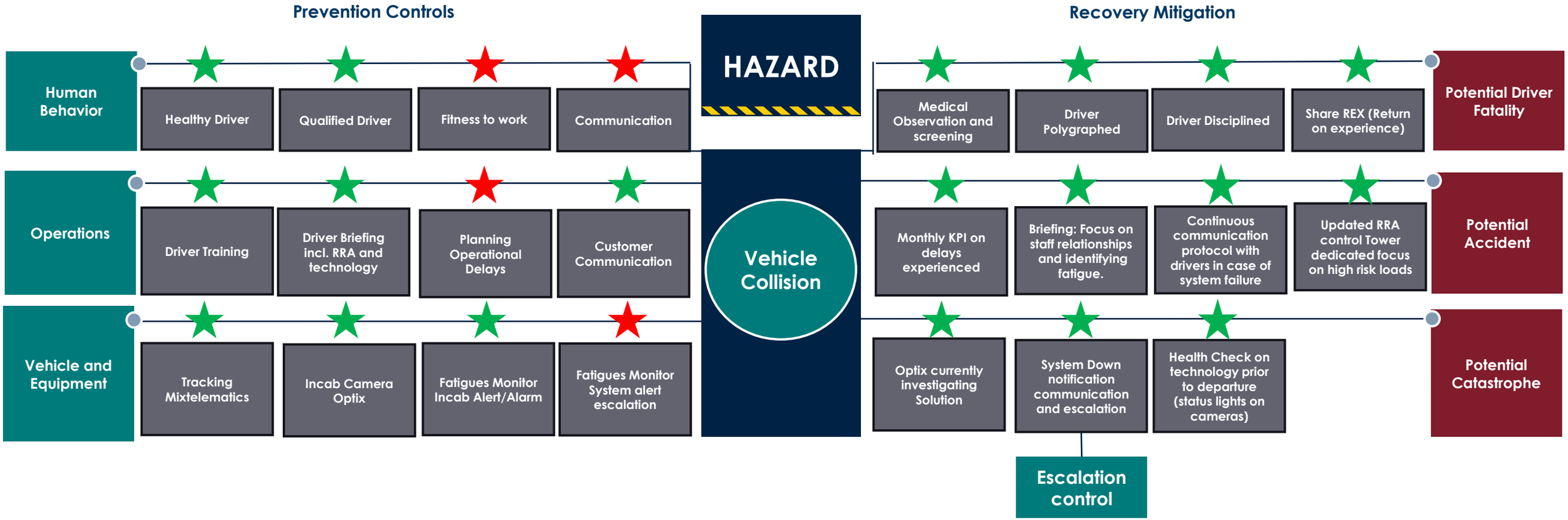
Vehicle **A** -Third-party truck
Vehicle **B**- Unitrans truck

RK0021 – **Major** Accident

Drivecam clip

RK0021 – **Major** Accident

Bow Tie Assessment



RCA indicates control was effective

RCA indicates control less than adequate

RK0021 – **Major** Accident

5 Why Assessment - Process 1 (Human Behaviour)

Why did the accident occur?

- The driver fell asleep and drifted over to the right-hand side colliding with an oncoming vehicle

Why did the driver fall asleep?

- The driver was fatigued

Why was he fatigued?

- The driver did not rest enough prior to his shift start

Why did he not rest enough?

- The driver had personal obligation he had to attend to

Why did he have to attend to his personal obligations?

- The driver was ill-disciplined and did not prioritize his rest

RK0021 – **Major** Accident

5 Why Assessment - Process 1 (Human Behaviour)

Why did the fatigue escalation notification system fail?

- The system API went offline, and the service provider did not notify Unitrans within acceptable time frame.

Why did the service provider not notify Unitrans within acceptable time frame?

- Notification was only sent to selected individuals after hours, the night prior to the accident.

Why was the notification only sent to certain individuals the night prior to the accident?

- There was no formal communication line in an event of system failure

Why was there was no formal communication line in an event of system failure?

- There was no procedure in the event of failure to follow

Why there was no procedure in the event of failure to follow?

- It was an oversight by management and service provider

South Africa's **Road Crisis**

A Positive Trend

According to the "Zutobi's The World's Safest and most dangerous roads report". South Africa has, for the second year in a row, ranked the world's most dangerous country to drive in.

12 000

Average lives lost to road accidents every year

South Africa

25.9 deaths per 100 000

(one of the highest in the world)

European Union

4.9 deaths per 100 000

(5 x lower than South Africa)

Source: optix SAFELY HOME

Leading Causes of Accidents

Due to **HUMAN ERROR** **84%**

Source: optix SAFELY HOME

Leading Causes of Accidents

The last 60 minutes before an accident we see the following prevalences:

Source: optix SAFELY HOME

AI's Roles in Preventing Incidents

Driver Behaviour Monitoring

- Detects speeding, harsh braking, fatigue, distraction (phone use, eyes off road).
- Real-time alerts help drivers correct behaviour immediately.
- Data used for targeted coaching & training.

Road Facing Safety

- Cameras flag tailgating, lane drifting, or sudden obstacles like pedestrians.

Intelligent Cameras (Cab & Box Bodies)

- In-cab cameras: seatbelt use, distraction, fatigue, smoking.
- Box body cameras: unsafe loading/unloading, restricted access, unsafe stacking.
- AI flags unsafe behaviours before they escalate.

Predictive Risk Alerts

- Systems analyzes and spots patterns (e.g., fatigue on long routes, weather risks).
- Alerts managers for proactive interventions and helps to Fleet plan safer schedules.

Driver Training

- AI will detect driver patterns and bad habits (behaviour) which can be corrected.

AI's **Roles** in Preventing Incidents

Key Behaviour identified (in 2024):

7 498 504

Driving behaviours in 2024 through MV & AI Triggers

Each event is provided with a comprehensive analysis of the identified risk. A trigger, behaviour and risk score are added to each event, along with commentary from our team to ensure coaches have the ability to engage and empower their drivers with rich insights.

Distracted driving	Fundamentals	Driver Conduct	Outcomes	Traffic Violations	Poor Awareness	Other behaviours
Food & Drink 38.5%	Following 1-2 sec 44%	Drowsy 68.5%	Near Collisions 52%	Failed to stop 62%	Late Response 81%	Food & Drink 24%

Source: optix SAFELY HOME

AI's Roles in Preventing Incidents

Key Behaviour trends (in 2024):

30%

of all fatal crashes annually are caused by distracted driving, making it the highest ranking and most prevalent behaviour identified in our Driver Safety Program in 2024.

Distracted driving remains a key factor in South African road fatalities. This includes mobile phone use, eating and other distractions. Although Cell Phone distraction behaviours are showing an overall reduction over the period, the overall trend for distraction related behaviours show an increase and remain a prevalent and dangerous risk for drivers

Cell phone distraction
Decreased

Overall distraction
Increased

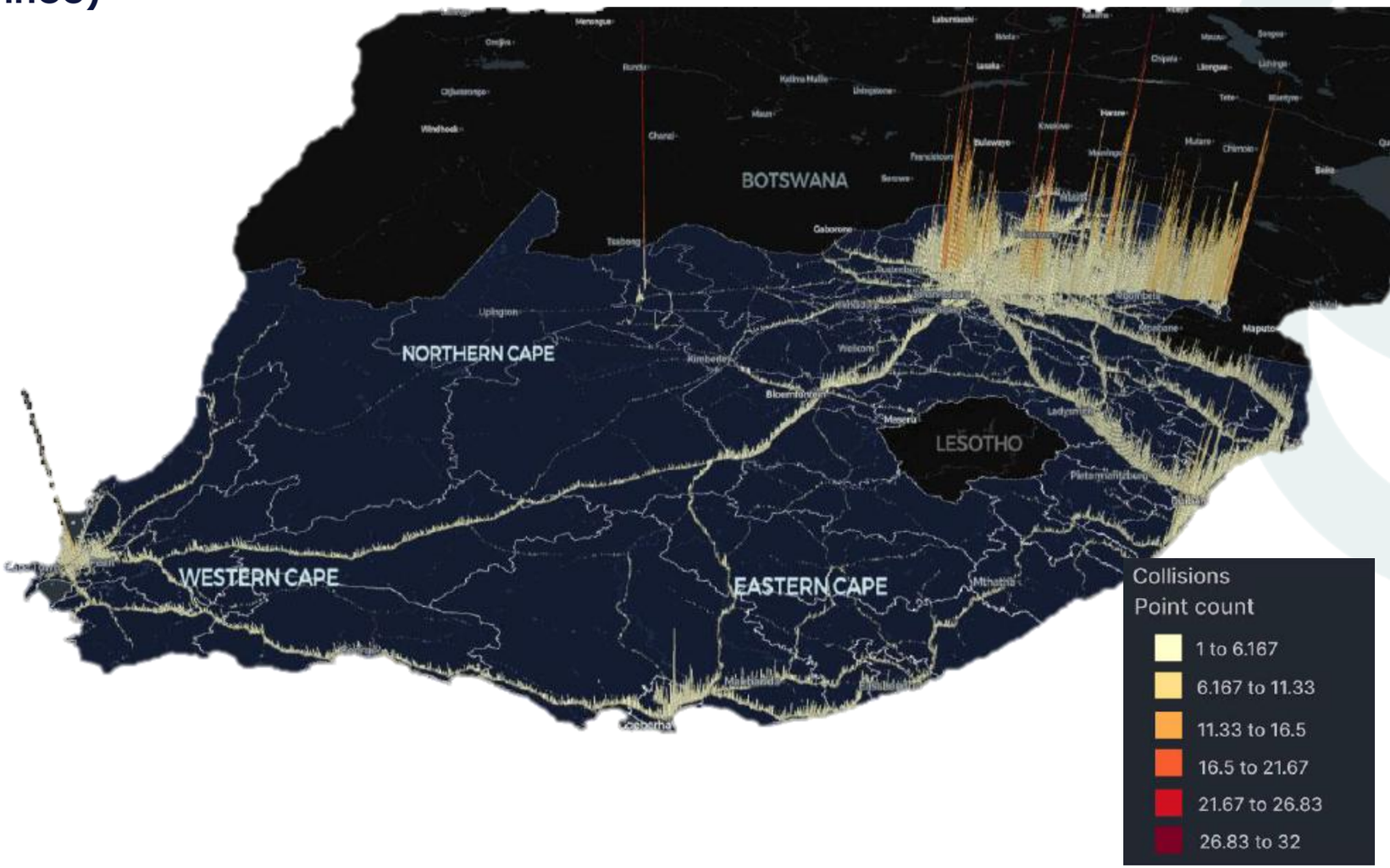
Behaviour	2024 Rank	2024 Performance
Cell phone distraction	1	▼ 31%
Food/drink distraction	2	▲ 8%
Fatigue	3	▲ 12%
Other distraction	4	▲ 24%
Following distance less than 2 seconds	5	▲ 10%
Near collisions	6	▲ 7%
Failed to stop	7	▼ 27%
Failed to keep an Out	8	▲ 4%
Late response	9	▲ 21%
Red light	10	▼ 1%

Source: optix SAFELY HOME

AI's Roles in Preventing Incidents

Collisions (peak density by province)

Understanding collision or behavioural risk hotspots enables our customers to take a proactive approach to optimally route their vehicles around areas of risk. If we understand where and when these collision have historically taken place, we have the ability to potentially avoid them in future.



Source: optix SAFELY HOME

AI's Roles After an Incident

Accurate Reconstruction

- Telematics: speed, braking, GPS, and impact data.
- Cameras: visual evidence of events (driver, environment, pedestrians).
- OPTIX integrates data for full context.

Root Cause Analysis

- Identifies whether incident was due to human error, environment, or equipment.
- Example: Telematics shows harsh braking, camera shows distraction, GPS confirms road/weather conditions.

Data for Reporting & Training

- Objective evidence for investigations, insurance, and compliance.
- Post incident Insights fed back into safety systems and driver training.

What Could **Go Wrong**

Signal / Reception Issues

- Poor connectivity may delay live data transmission.
- Gaps in monitoring from remote areas.

False Positives & Misinterpretation

- Cameras may misread shadows, reflections, or sudden movements.
- Potential unnecessary alerts or driver frustration.

Data Overload

- Large volumes of data need proper filtering.
- Requires strong AI models + human oversight.

Privacy & Ethics

- Drivers may feel “constantly watched.”
- Must comply with POPIA and ensure transparent use of monitoring tech.

Future **Innovation**

Smarter Cameras

Smarter AI in the cab: Detecting stress, drowsiness, or cognitive overload even earlier.

Cloud Processing

Edge + cloud processing: Cameras doing more analysis onboard, reducing reliance on perfect network coverage.

More Predictive AI

Predictive safety models: Combining driver history, route, time of day, and conditions to forecast risk proactively.

AI transforms incident investigations by preventing risks, enabling accurate root cause analysis, and improving safety culture. But success depends on strong data quality, infrastructure, and ethical oversight.

UNITRANS

THANK YOU