TECHNOLOGY-DRIVEN ASSET MANAGEMENT: INTEGRATED HIGH-SPEED ROAD SURVEYS

DISCOVER NTRO

IRSM

IRF INDIA CHAPTER

IRF INTERNATIONAL ROAD FEDERATION

Global Road Infratech Summit & Expo
05-06 February 2026, Hotel The Ashok New Delhi India
"Vision Zero India: Integrating Safety, Sustainability and Technology in Infra"

GRIS

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Well established 17 plus years JV **IRSM** in India

Transformation to NTRO

arrb
SHAPING OUR TRANSPORT FUTURE

Is now

NTRO
NATIONAL TRANSPORT RESEARCH ORGANISATION

- 65 years experience in applied research and delivering solutions
- NTRO is a leading Australian Government owned entity
- **For purpose organisation driving outcomes for transport agencies**
- **In depth and relevant expertise**
- Focus on providing solutions
- Working across all modes – road, rail, ports and airports

IRSM

NTRO
Formerly : arrb

Indian Road Survey & Management : IRSM

Hyderabad Office

Chennai Office

Delhi Office

- Established in the year 2009
- Technical partner and Shareholder is Australian Road Research Board
- IRSM is an ISO9001 2015 and ISO39001 certified Company
- Provides comprehensive surveys for a wide variety of clients in the World over including road condition surveys of roads and airfield pavements with technical consultancy services, training on various areas
- Having experience in Data Collection & Data Coding coverage of more than 6,50,000 lane km for Renowned Global clients

Empaneled

भा रा रा प्रा NHAI

MORTH Government of India

iRAP ACCREDITED

CRRI

IRSM NTRO

Network Survey Vehicle (NSV) – Functional Assessment

Falling Weight Deflectometer (FWD) – Structural Condition

iPAVE – Functional Evaluation+ Structural continuous Deflection

T5- Friction Tester (Skid Resistance)

Retro Reflectometer (RR)

Automatic Traffic Counting and Classification (ATCC)

iRAP

International Road Assessment Programme (iRAP)

Road Safety Projects

Mobile Bridge Inspection Unit (MBIU)

Axle Load Survey

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Context and Key Notes

- Data driven intelligence and decision support systems
- Tool: Asset management
- Good Data enables to make Good decision: Quality Data enables to Strategic Priority on key Focus Areas
- Validation
- Certification
- Data reform
- Comprehensive Condition Assessment : Pavement & Inventory
  Road Safety Audit & Assessment
- Proof & Record Ensuring Data Integrity

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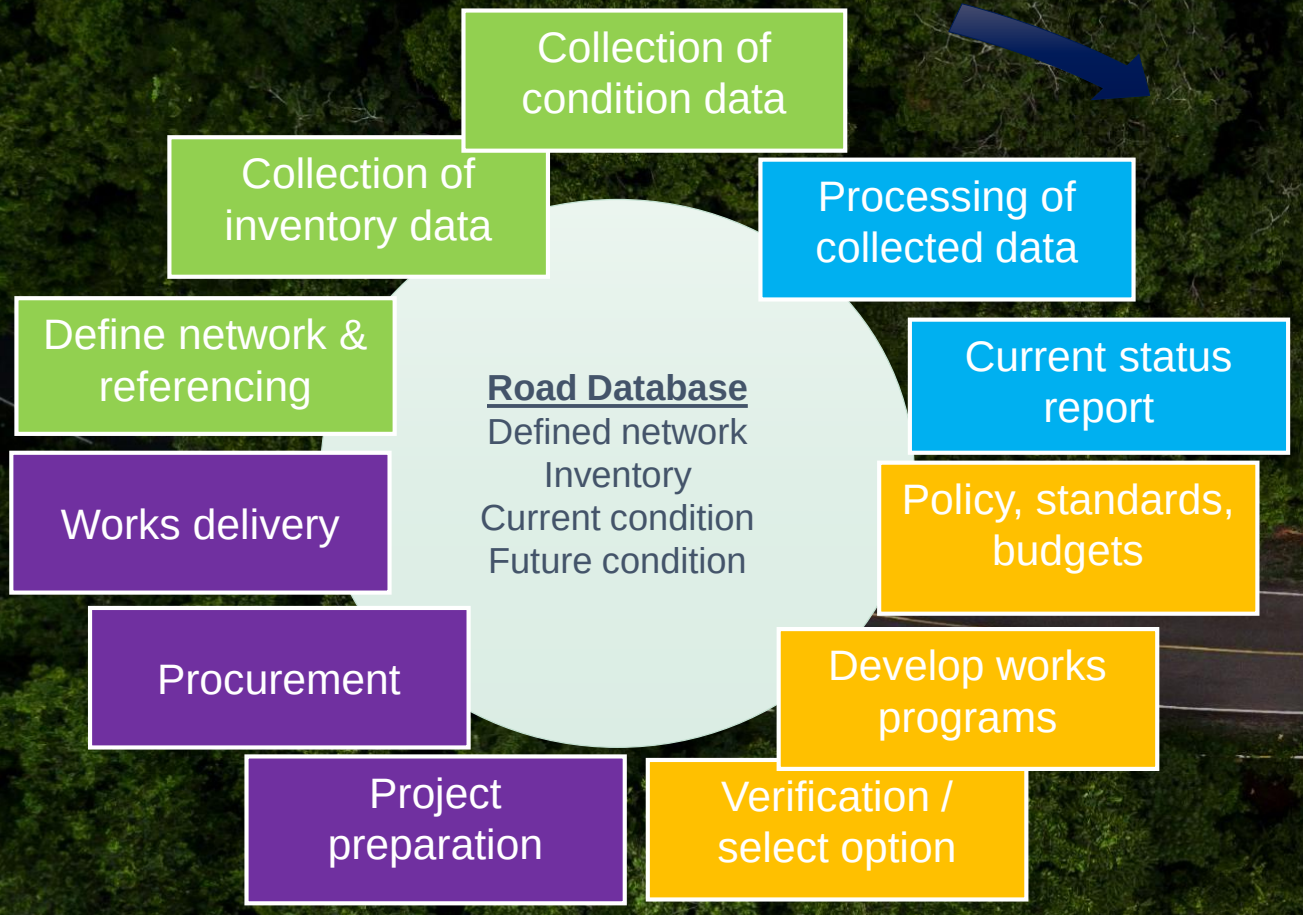
Asset Management Outcomes

Data Supporting Deep Knowledge

DIGITAL DATA SETS : HOW THEY ARE UTILISED



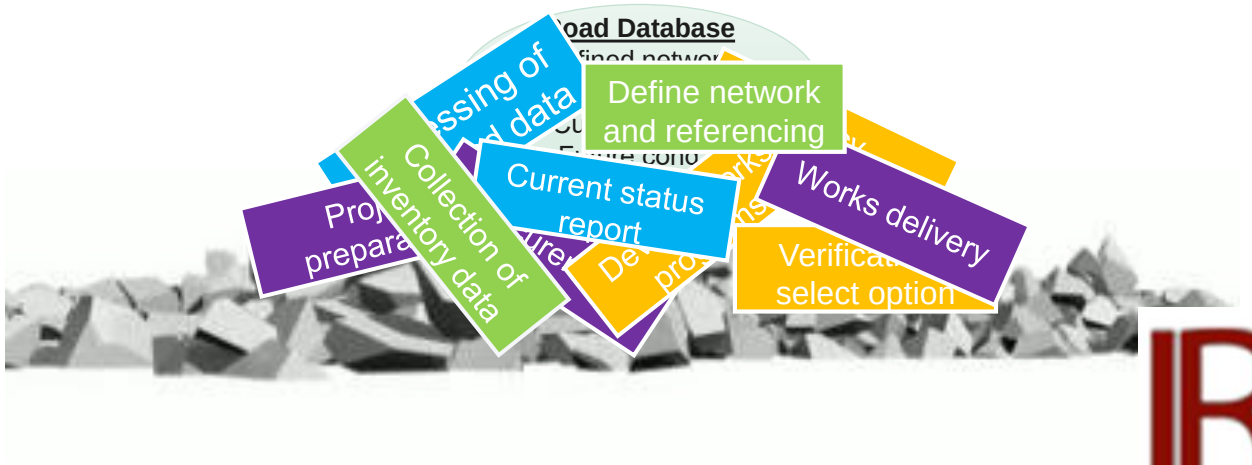
The Asset Management Cycle

The quandary with data

Good Data =

Good Information =

Good Decisions



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Data quality – uniformity of results

Not Accurate
High Precision

Accurate
High Precision

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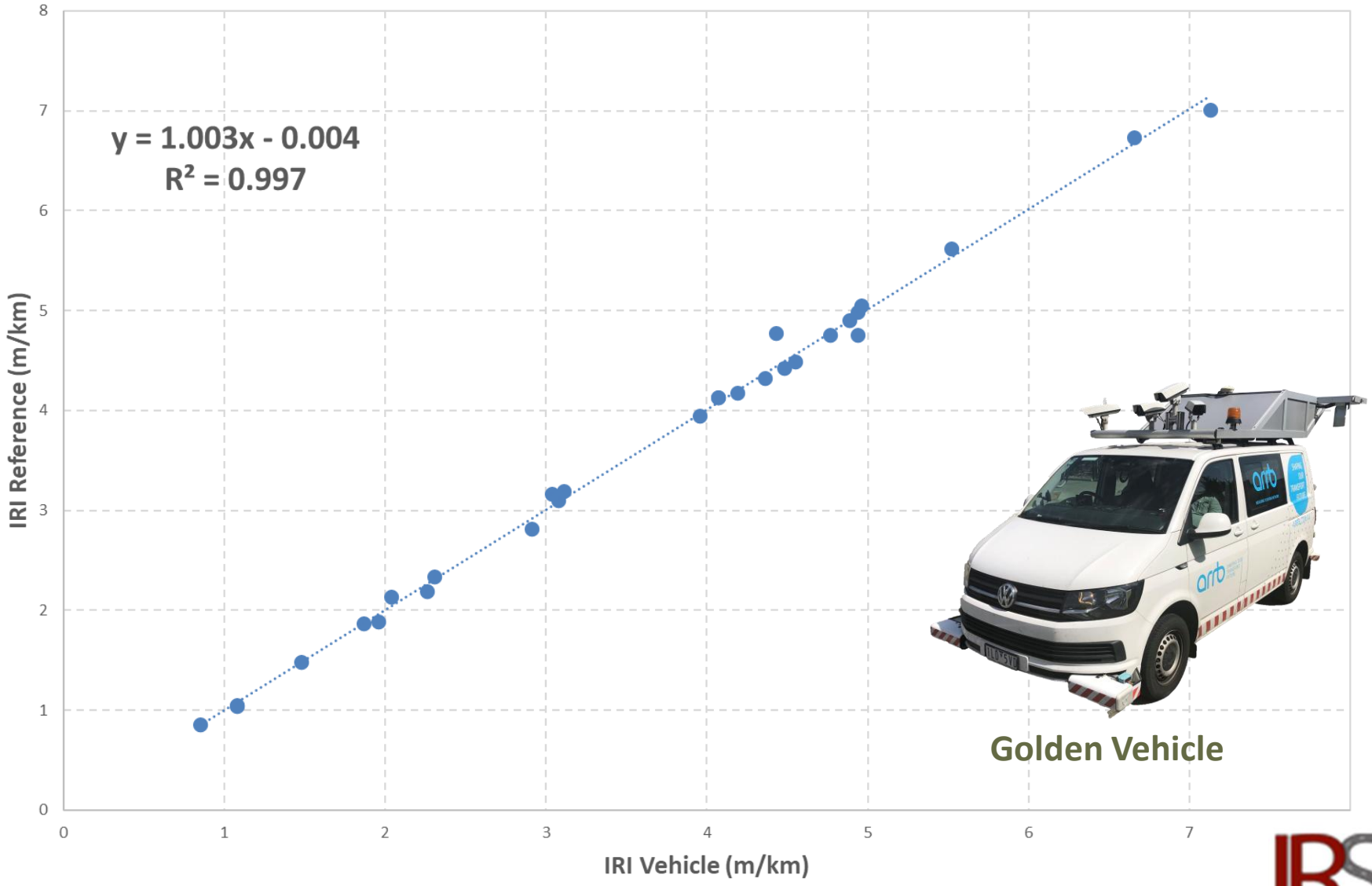
Roughness validation : reference device method



Golden Vehicle

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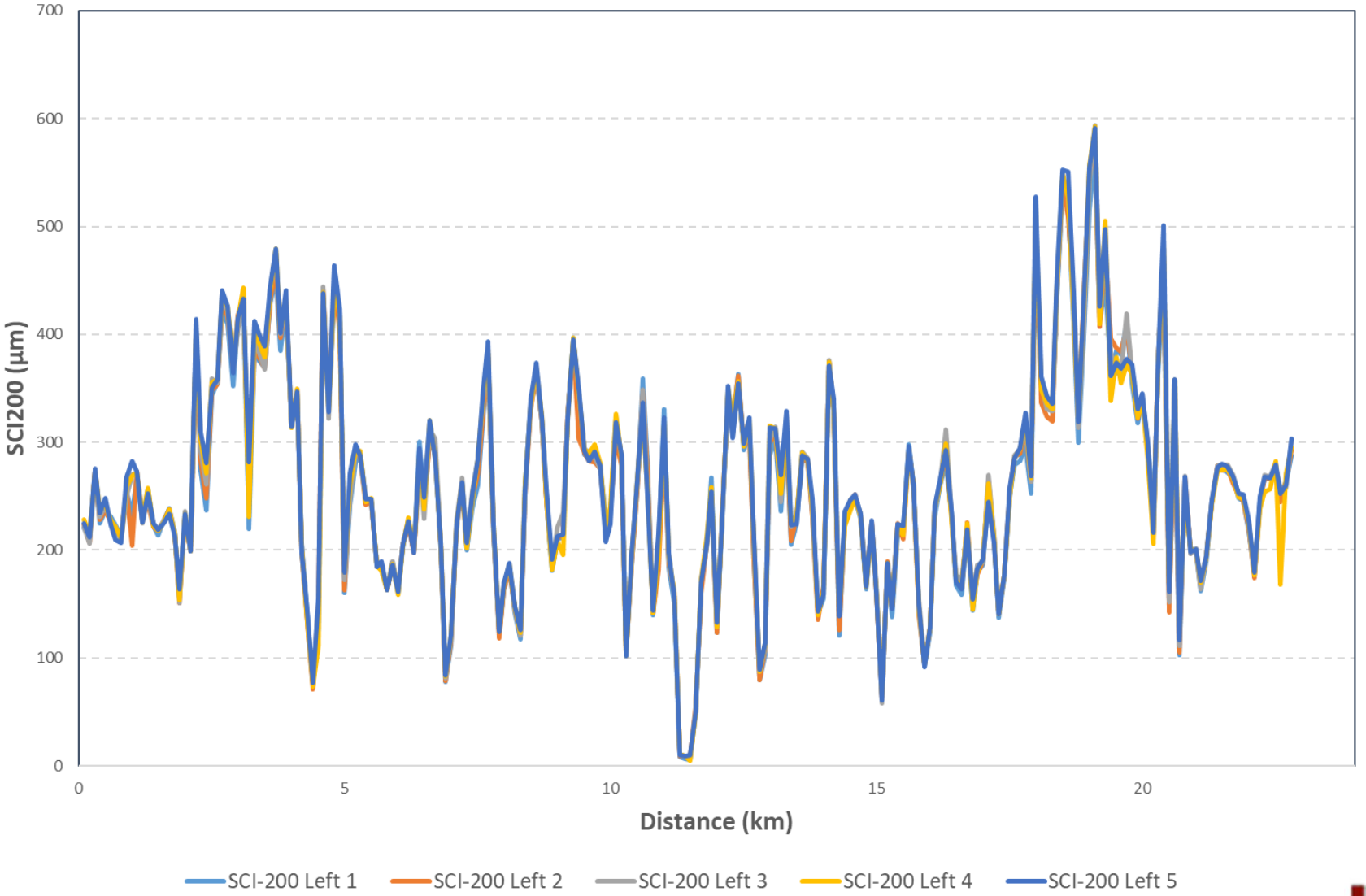
Repeatability



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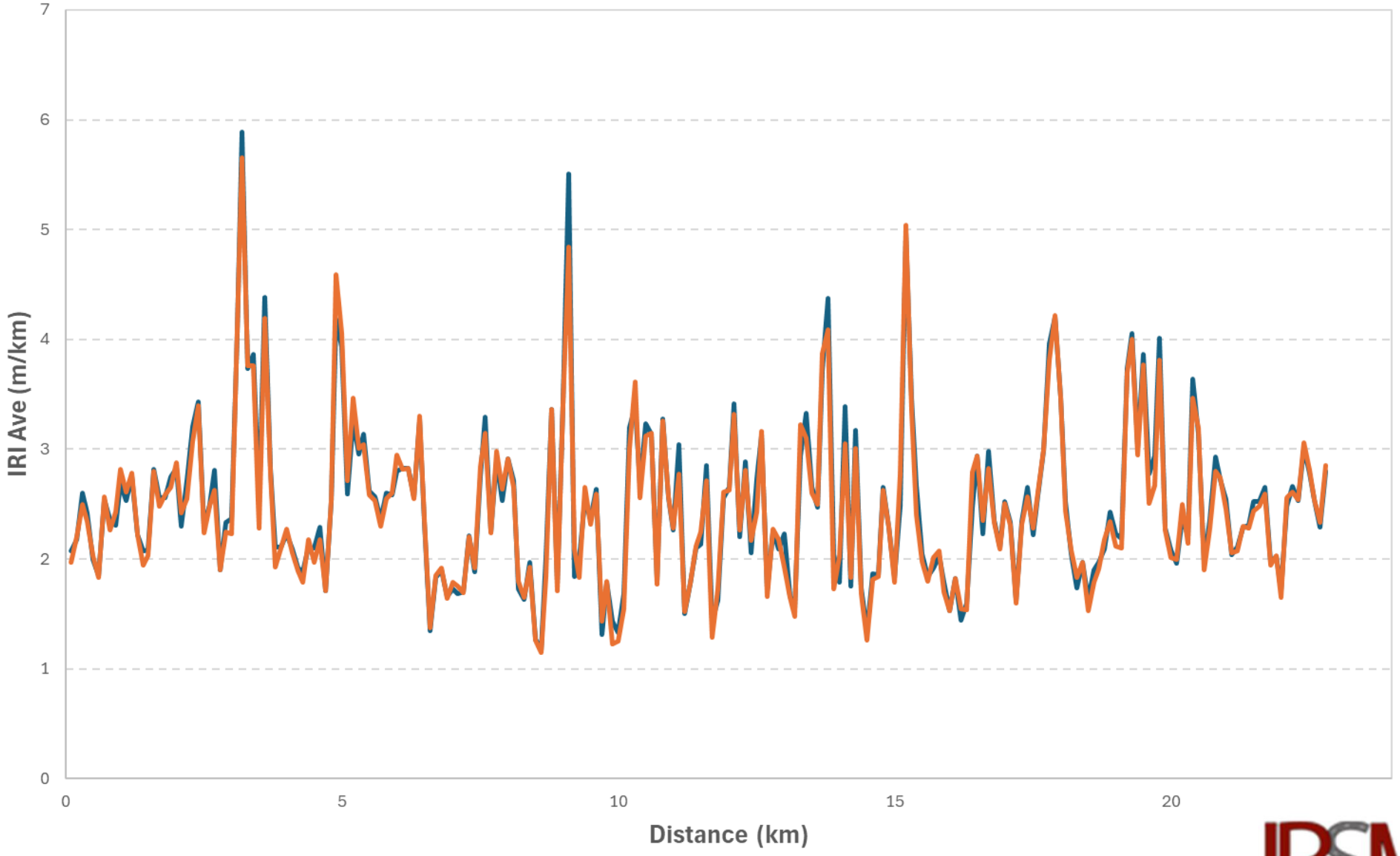
Reproducibility



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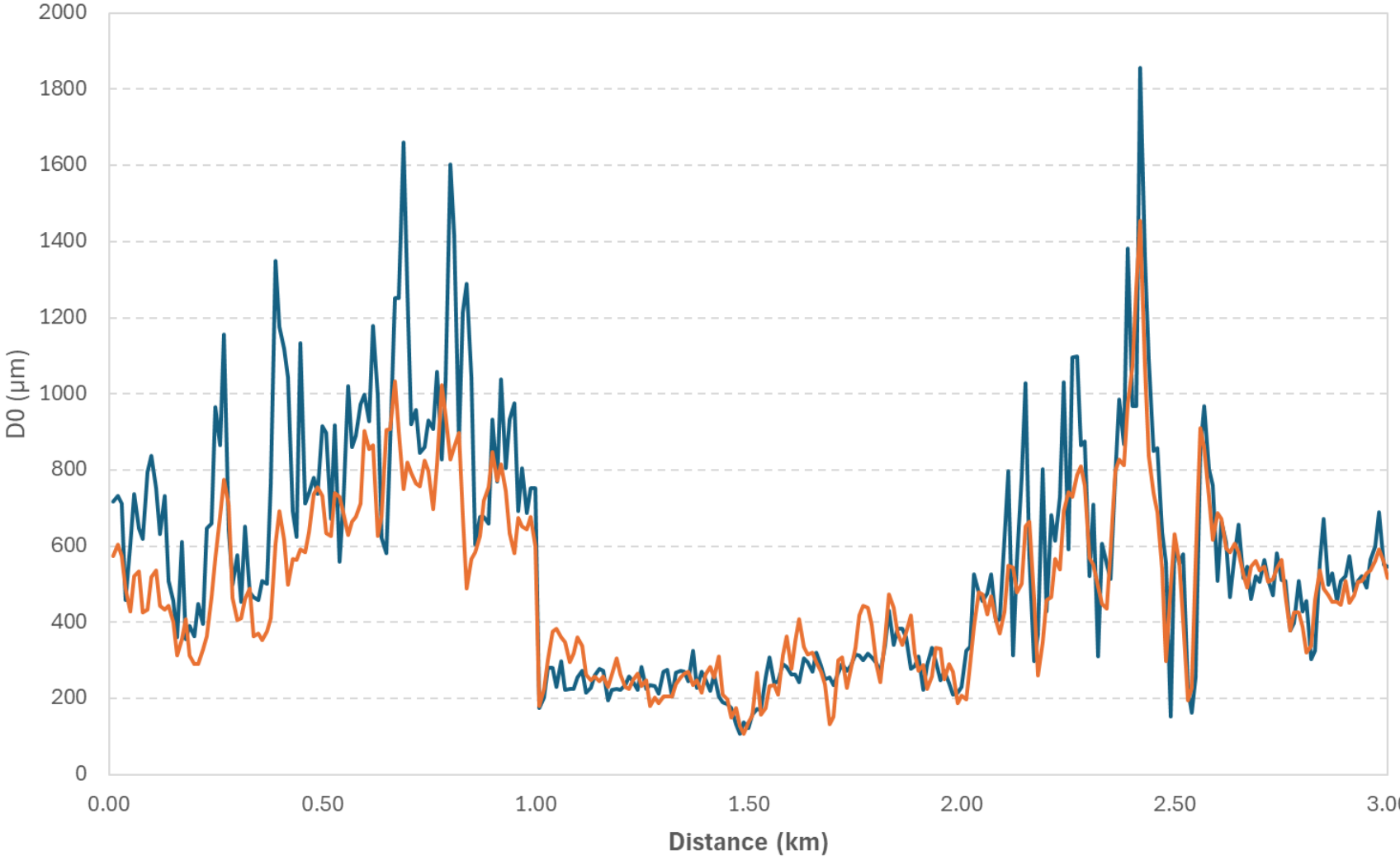
What validates what?



Process to Calibrate & Validate Equipment.....Standardization of Data

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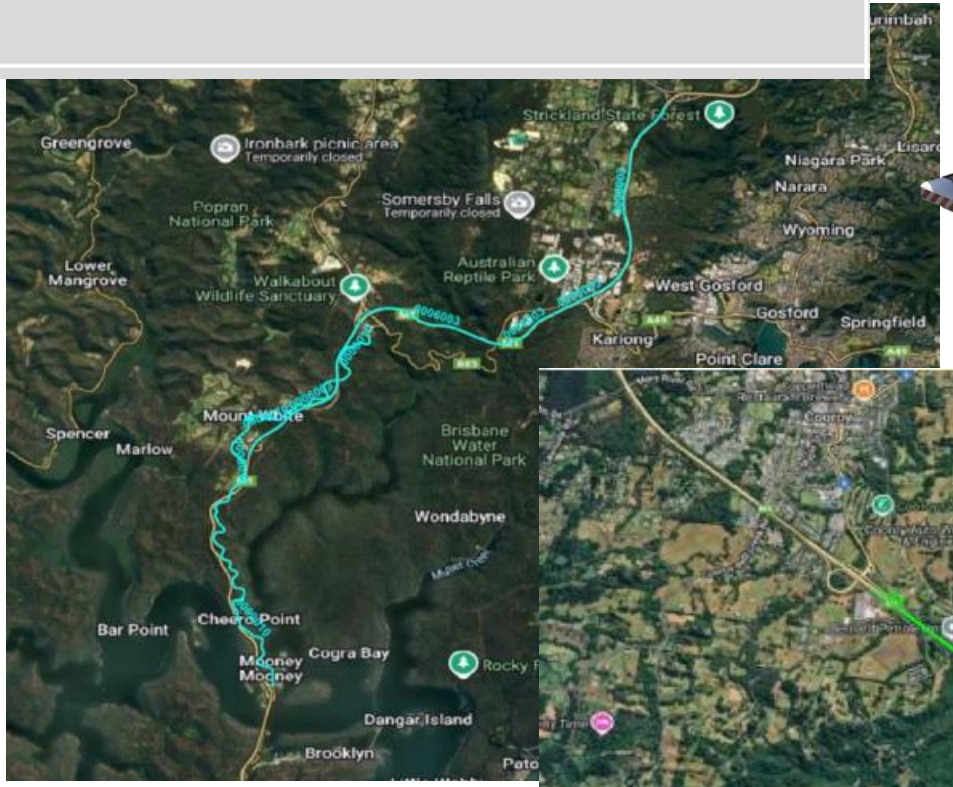
AGAM-T003-16	Validation of an Inertial Laser Profilometer for Measuring Pavement Roughness (Loop Method)

Certification loops

- Identify Stretch :

  Minimum 10 Km

- Record Stretch Maintenance trend



Golden Vehicle

QDTMR and TfNSW

Certification of Roughness Measurement Devices – Protocols and Process Manual

NTRO CERTIFICATION

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Certificate.....

NTRO NATIONAL TRANSPORT RESEARCH ORGANISATION

Laser Profiler Correlation

Supplier: CPBGGJV **Report No:** PR-002871-17

Profiler: AMES 8300 High Speed Profiler

Vehicle Registration: **Vehicle Description:** Toyota Prado

Driver: **Operator:**

The vehicle/crew combination as described above carried out the prescribed set of correlation runs on the TfNSW Roughness Calibration Sites situated between Mooney Mooney and the Somersby Interchange, north of Sydney on 28/03/2025.

These sites comprise two stretches of road covering the range of NAASRA Roughness Values from approximately 20 to 200. It also covers a range of road types from single lane winding road to full multi-lane freeway conditions.

The Supplier Laser Profiler made five (5) repeat runs and the results for each individual run were presented to NTRO, Data Analytics, for analysis. A mathematical correlation was performed on these results by comparing them individually, and as a whole, to the results obtained by the NTRO Reference Laser Profiler as per Test Method T187, Appendix A. The results of the correlation are as follows:

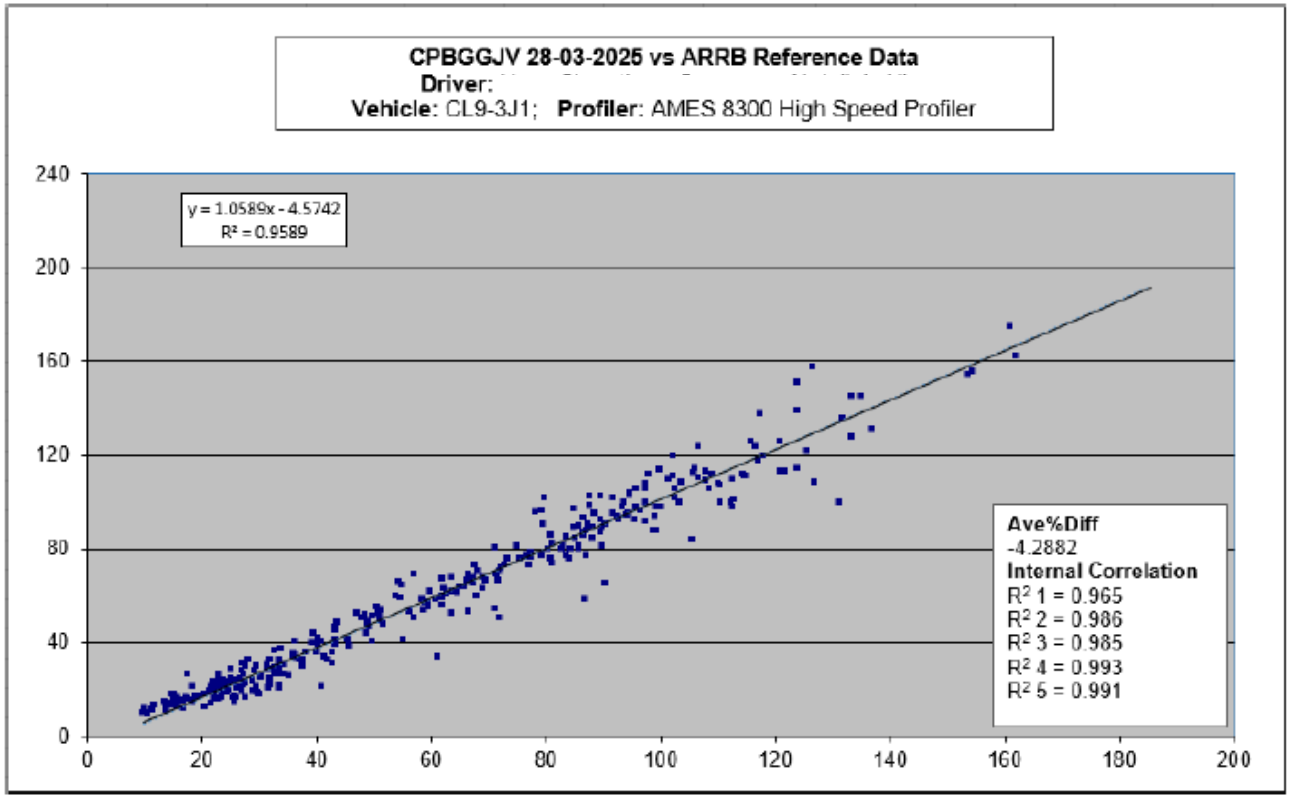
Overall Correlation	Slope:		1.0589
	Intercept:		-4.5742
	R Squared:		0.9589
	Average % Difference:		-4.2882
Internal Correlation:	Run 1	R Squared:	0.965
	Run 2	R Squared:	0.986
	Run 3	R Squared:	0.985
	Run 4	R Squared:	0.993
	Run 5	R Squared:	0.991
Average Speed:	F3:		107.6 kph
	HW10 (Pacific Hwy):		54.5 kph

These results represent a PASS on the R Squared and Average % difference for this vehicle/crew combination. (Discrepant results, if any, are indicated by an asterisk).

The above correlation results were derived solely from the data presented by the supplier. These results may not be applicable to other combinations of drivers and/or vehicles.

Shannon Malone
National Laboratory Leader,
Sustainability and Material Performance
4 April 2025

APPENDIX A: Comparison to Referance Data



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Collaboration : Expert Organization bringing World Class Solutions

CSIR-Central Road Research Institute (CRRI) has signed a Memorandum of Understanding (MoU) with the **National Transport Research Organization (NTRO), Australia**, to strengthen cooperation in transportation research. The partnership aims to focus on sustainable, innovative road construction, and advanced infrastructure development, enhancing technical expertise.

- **Key Focus:** The MOU facilitates collaboration in the infrastructure sector and road construction technology.
- **Significance:** This collaboration brings together expertise from both organizations to advance transport infrastructure projects.
- **Other Collaborations:** CSIR-CRRI frequently engages in such agreements to drive innovation in road safety, traffic planning, and sustainable materials.

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Right Treatment, Right Place, Right Time.

We provide data-driven, cost-effective solutions to ensure valuable maintenance dollars are spent on the right treatment, in the right place, at the right time.

NTRO SERVICES INCLUDE:

Policy
Government policy development and leadership

Planning
Road planning, freight corridor, and ESG advisory

Testing
Pavement testing for strength and deterioration

Design
Ridged and flexible pavement design

Delivery
Supporting you deliver real-world outcomes

Sustainability
Fuel transition pathways, environmental services

Automation
Digital technology and automation services

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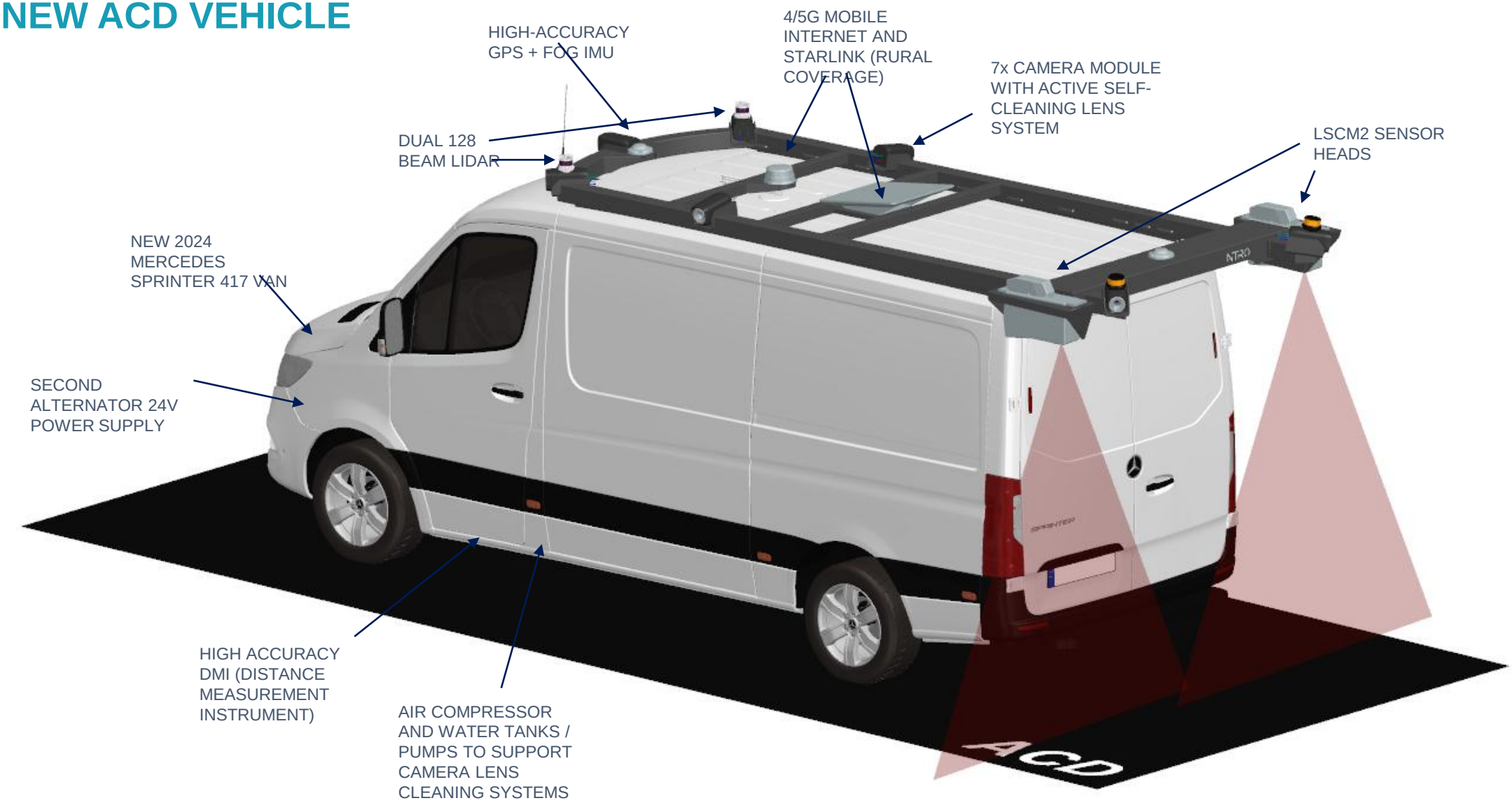
IRSM NTRO data reform

Potential areas of improvement involving data collection:

- efficient route planning (minimising collection time)
- completeness of collection
- minimisation of quality issues
- availability of results
- provision of additional insights

NEW ACD VEHICLE



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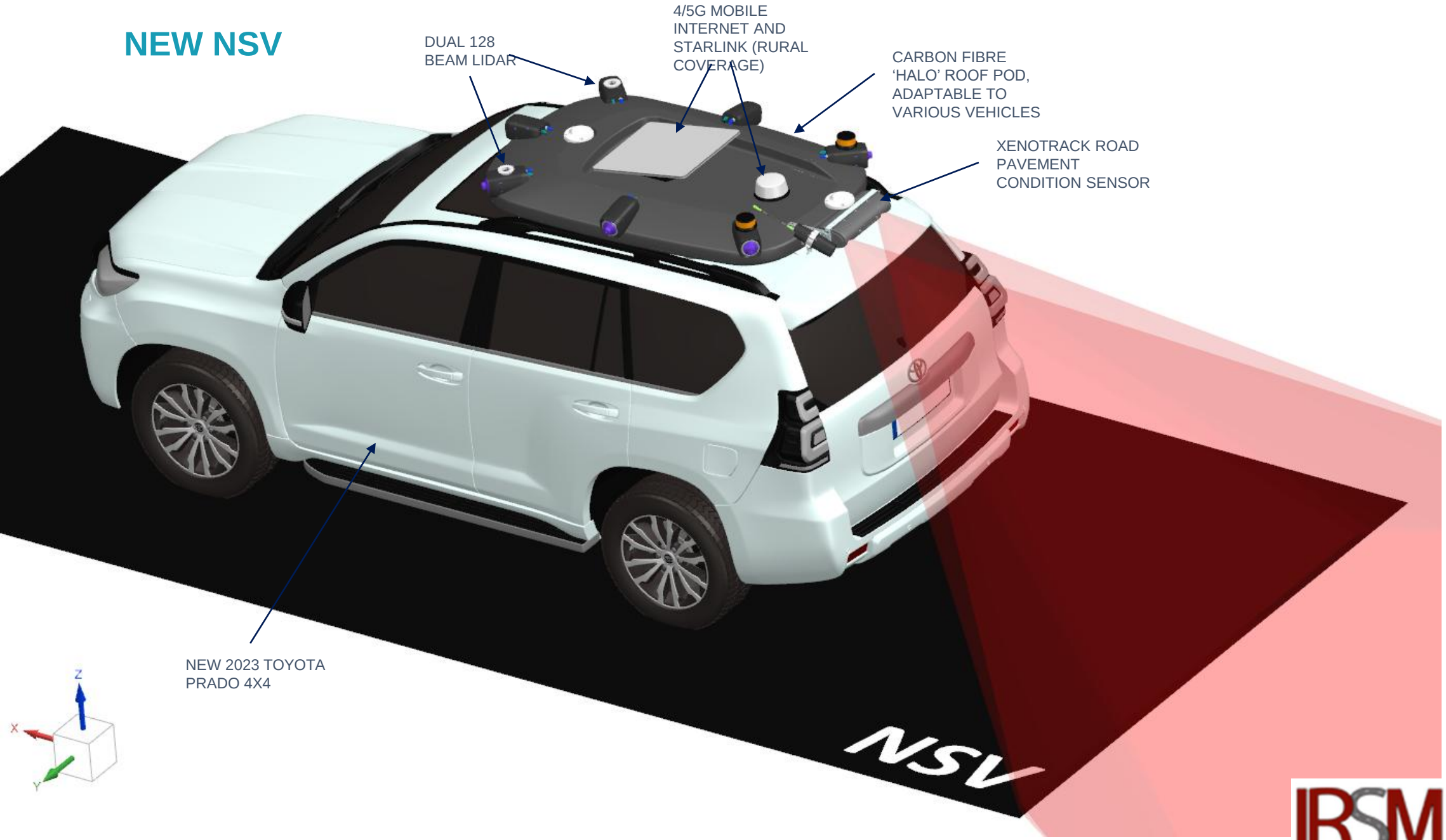
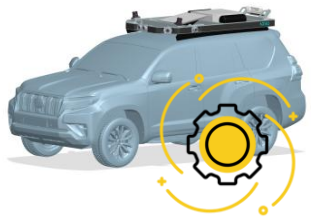
NEW NSV


DUAL 128
BEAM LIDAR
4/5G MOBILE
INTERNET AND
STARLINK (RURAL
COVERAGE)
CARBON FIBRE
'HALO' ROOF POD,
ADAPTABLE TO
VARIOUS VEHICLES
XENOTRACK ROAD
PAVEMENT
CONDITION SENSOR
NEW 2023 TOYOTA
PRADO 4X4
NSV
Z
X
Y

NTRO'S FUTURE-STATE DATA PROCESSING PIPELINE

DATA CAPTURE USING NEW VEHICLES

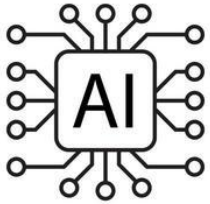
ON-VEHICLE PROCESSING (CLOSE TO REAL TIME)



REMOTE DATA UPLOAD USING STARLINK & 4/5G

CLOUD HOSTED DATABASE

AI VISUAL RATING & QA



CLIENT DELIVERY VIA WEB PORTAL

48 HOURS FROM CAPTURE TO DELIVERY

- New vehicles come online early 2024.
- Configurable with different sensors and compute.

- Real time processing allows for real time error detection and correction.

- We're optimising the design of our database to be efficient for querying large datasets.
- We have 1 Petabyte of data in storage currently, and likely to generate another PB in the next 4 years.

- We have developed AI solutions for privacy. E.g. number plate and face blurring.

- Our portal allows the user to select a road and investigate road conditions and other data sources.

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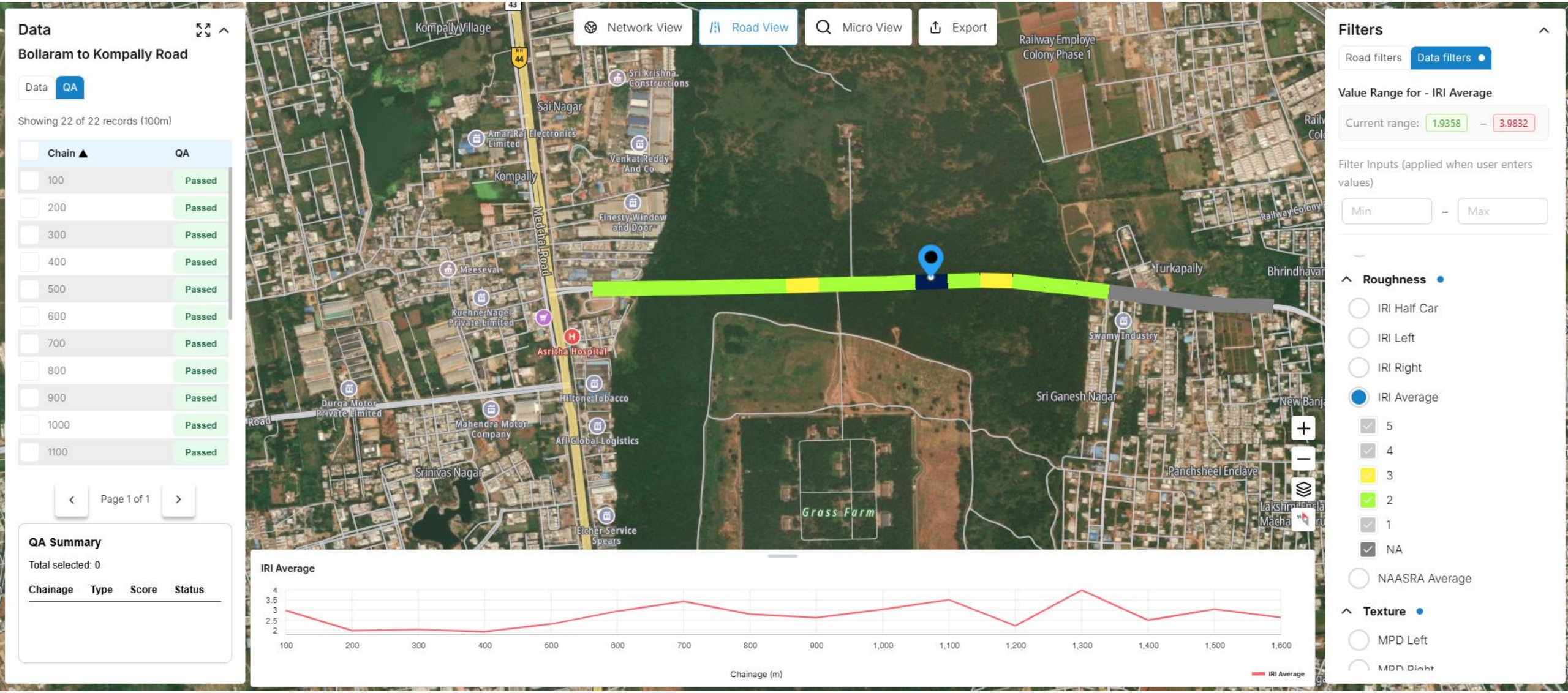
Route selection

Automated process & upload



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Additional insights

Data

Bollaram to Kompally Road

5m | +17.53970799+78.50062608+498.35/ | 5th Nov 2025, 12:58 PM

Charts | Details | QA

Geometry

Grade	1.9	Passed
Crossfall	-1.6	Passed
Curve Speed	-186	Passed
Vertical Curvature	-78.1	Passed
Horizontal Curvature	1000	Passed

Roughness

IRI Half Car	2.9	Passed
IRI Left	3.5	Passed
IRI Right	3.3	Passed
IRI Average	3.3	Passed
NAASRA Average	88.5	Passed

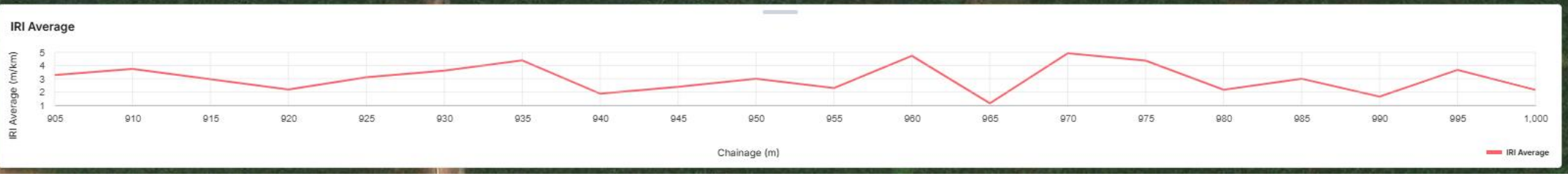
Texture

MPD Left	0.7	Passed
MPD Right	0.8	Passed
SPTD Left	0.4	Passed
MPD Centre	0.8	Passed

Rutting

2m Left Average	4.5	Passed
3m Lane Average	7.7	Passed
2m Right Average	4.4	Passed

« ‹ › »



Filters

Road filters | Data filters

Value Range for - IRI Average

Current range: 1.142 – 4.922

Filter Inputs (applied when user enters values)

Min – Max

Roughness

- IRI Half Car
- IRI Left
- IRI Right
- IRI Average
  - 5
  - 4
  - 3
  - 2
  - 1
  - NA
- NAASRA Average

Texture

- MPD Left
- MPD Right

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NTRO | iPAVE

Survey large networks in a fraction of the time, at a significantly reduced cost.

NTRO has developed the first fully integrated road surface and sub-surface condition assessment system, providing functional and structural data at traffic speeds.

Make an informed decision knowing what's happening above and below the surface of your road.

COVERAGE
80x faster than traditional methods such as FWD.

SPEED
Survey at 80 km/h, with typical outputs of 200-300km (20,000-30,000 tests) per day.

EFFICIENCY
Synchronised, collection of surface condition parameters, including cracking.

SAFETY
Minimal risk to general public and equipment operators.

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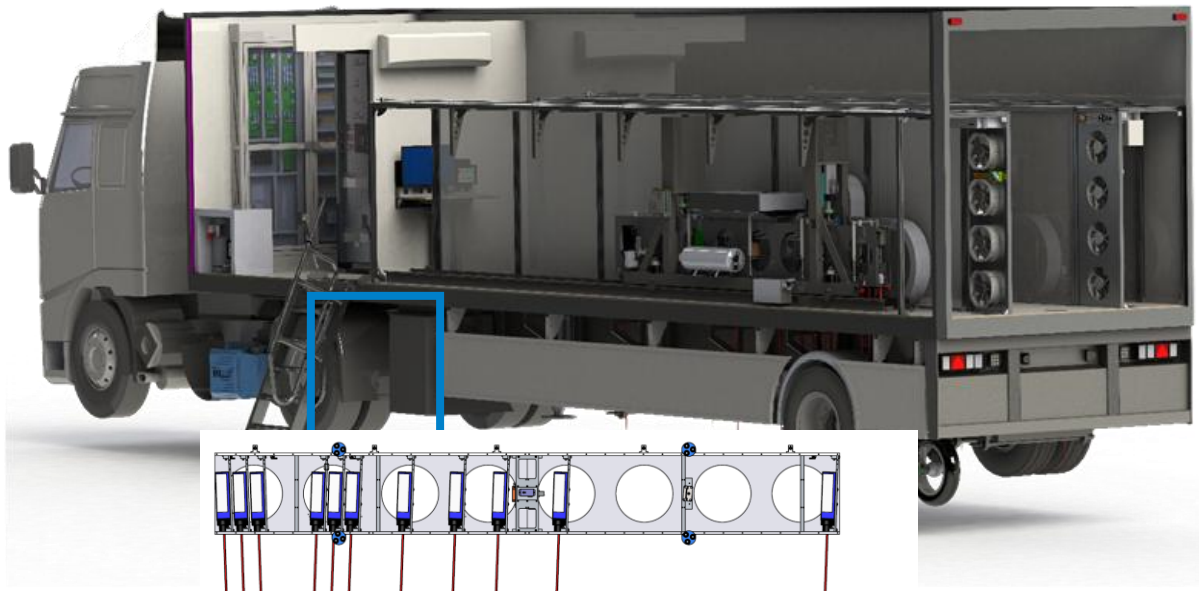
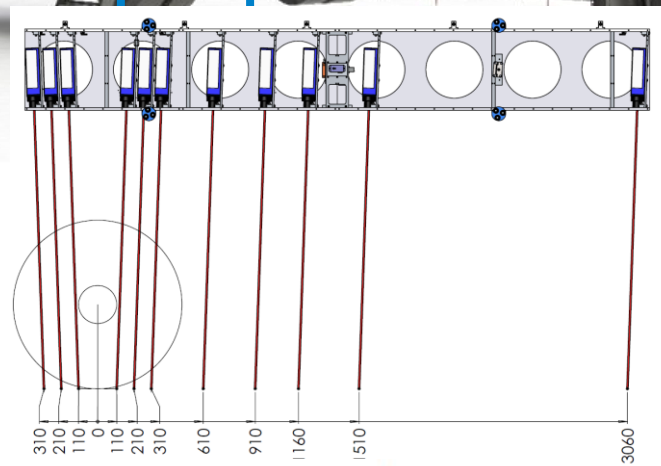
Structural and functional data

iPAVE





Doppler laser sensors:11 250kHZ Doppler sensors : deflection measurement

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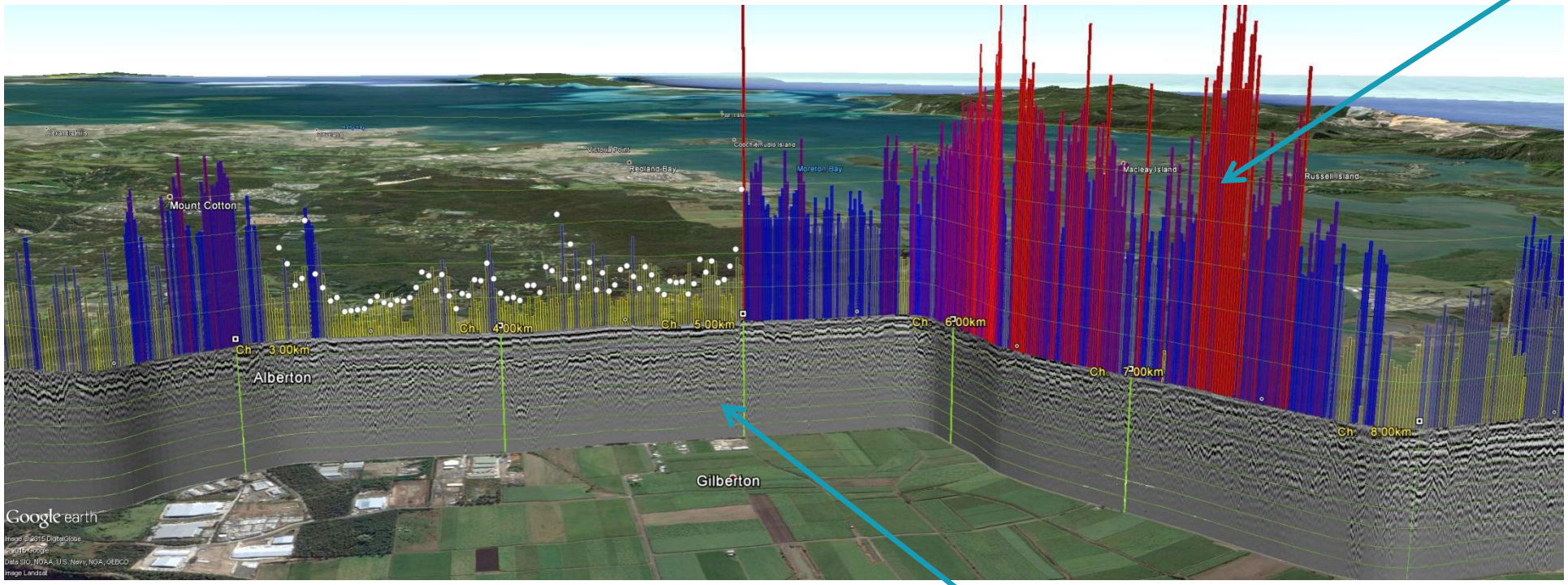
iPAVe3

Additional data stream for making informed decisions

Bearing capacity - TSD



Layer information - GPR

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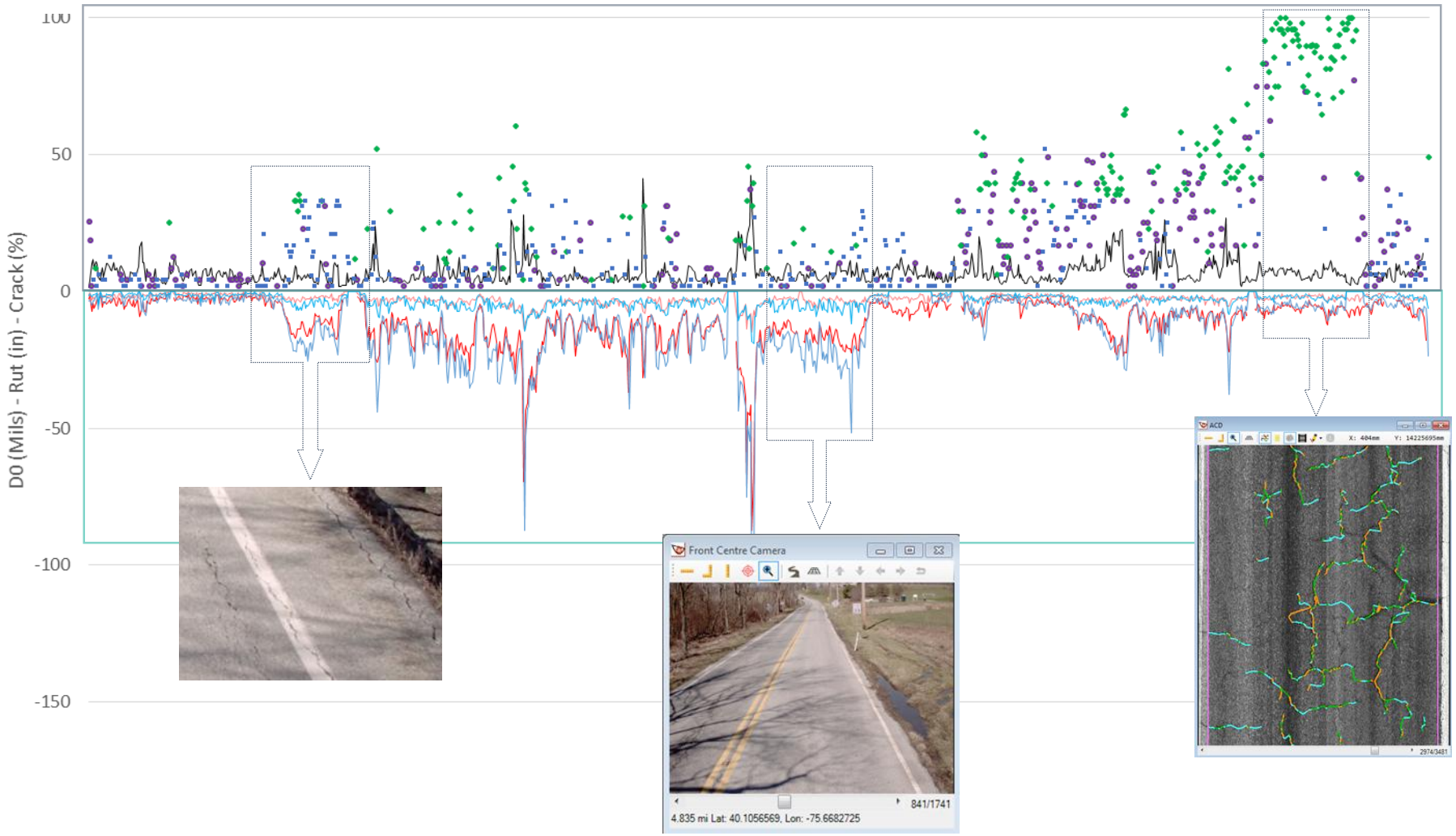
Case study

Deflection
Cracking



NTRO EQUIPTMENT

iPAVE Efficient Infrastructure Management Tool

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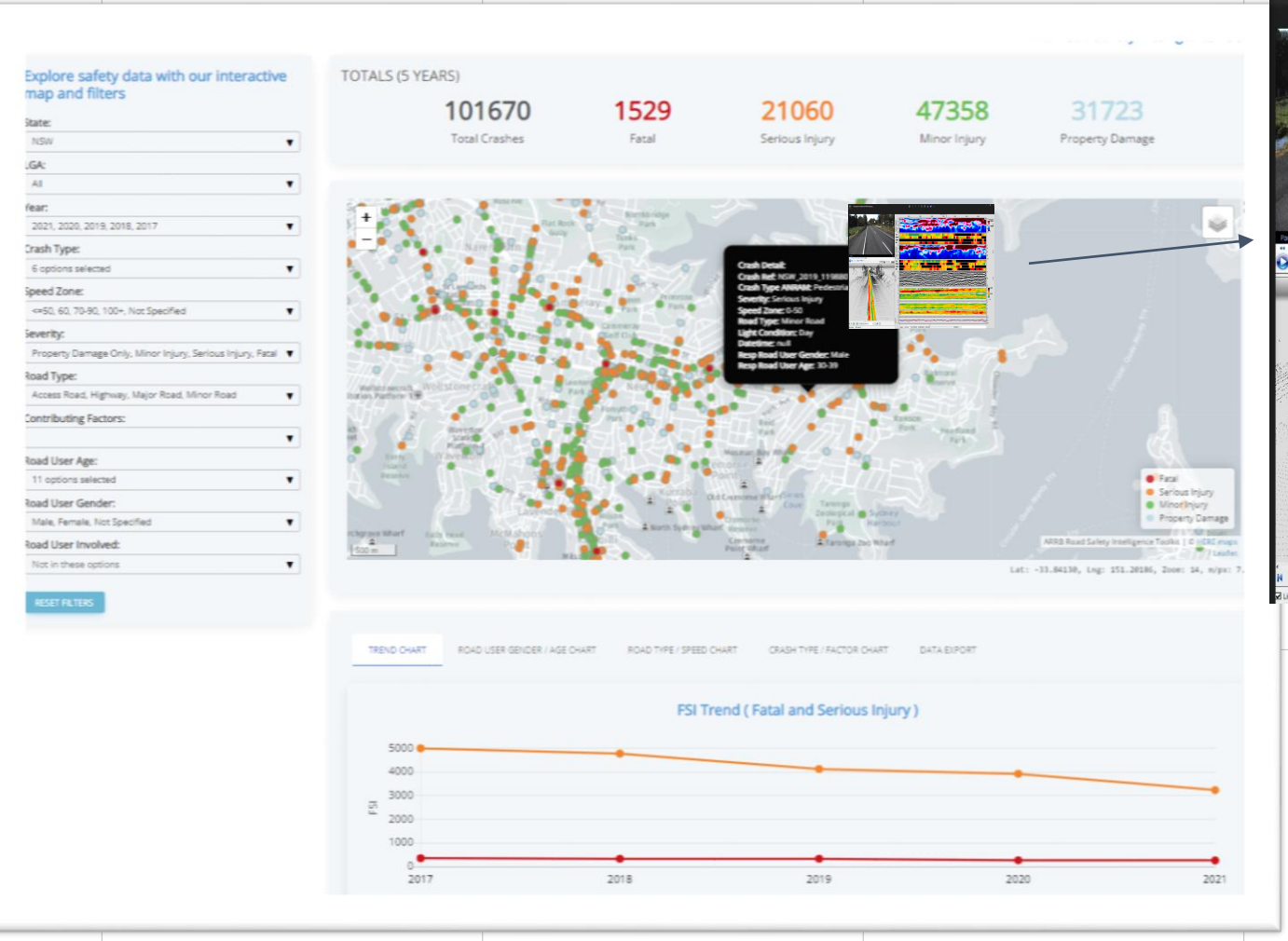
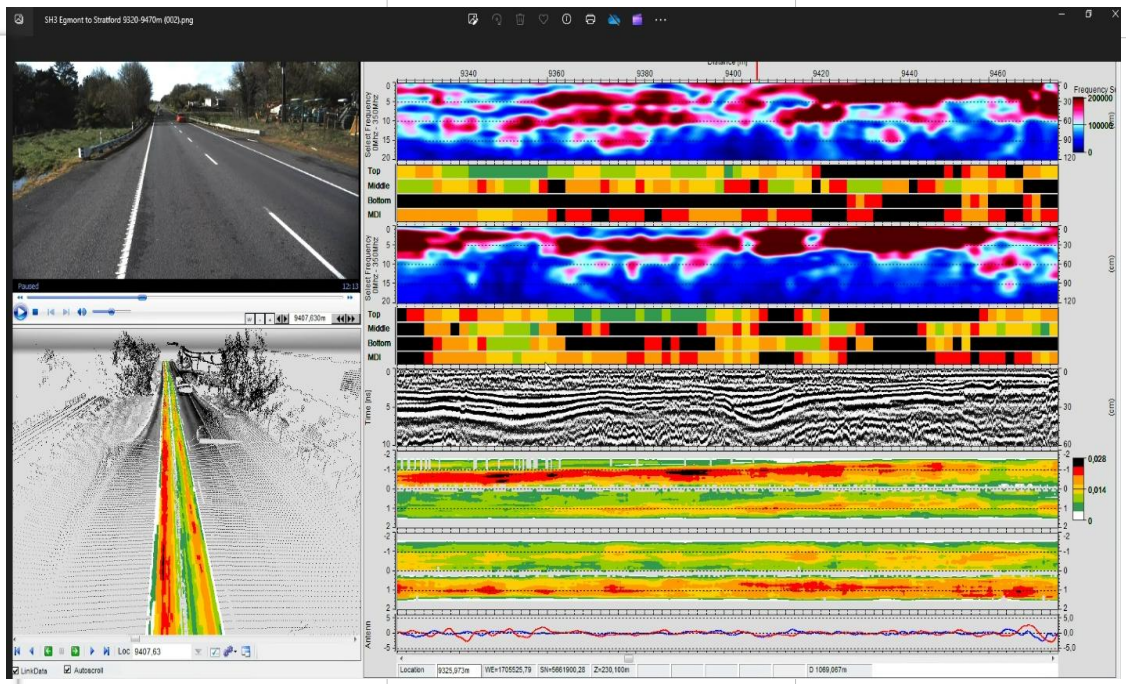
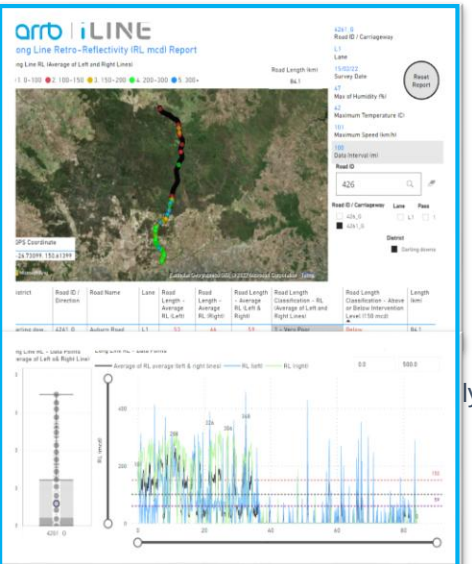
DIGITAL DATA SETS : HOW THEY ARE UTILISED

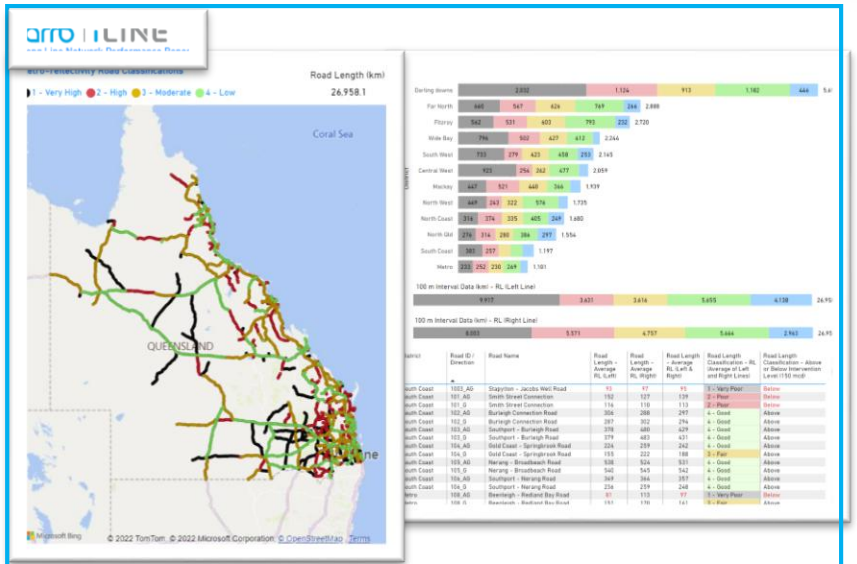
Automated Roadlist Generation Tool	Capture Navigation Application	New Data Capture Vehicles	Realtime Processing and Upload	Structured Cloud Database	**Visualisation Portal**
			Realtime quality control and data validation. Ability to repeat capture on road that had a failure, within the same hour, vs. months later. Results available next day, not 3+ months.	• Structured dataset. • Ingestion (overtime) of archive data (if feasible). • Overlaying of multiple datasets (e.g. weather, crash data, traffic data). • Scalable. • Australian hosted.	• Client and internal application. • Display of data stored in database. • Download of client data.





Reflectivity





iLINE

Retroreflectivity

Edge and centreline in one pass the only unit in Australia capable of measuring more than one line concurrently

Friction Assessments

NTRO

Innovation Driven

IRSM

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