



AI Use & AI RDI In The Smart Society Division

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science, technology
& innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA



CSIR
Touching lives through innovation

AI in NGEI and NICIS



AI use across NGEI and NICIS: one-cluster view

AI is positioned in the cluster as an operational productivity lever, an RD&I capability and a cyberinfrastructure-enabled capability across NGEI and NICIS.

Operational usage

Copilot Pro for selected IAMs/RGLs and Operations; Facilitator and Loops for project and meeting productivity; ClickUp explored for AI-enabled programme management.

AI adoption posture

NGEI applies machine learning, deep learning and NLP to conduct RD&I, with emphasis on adoption for productivity, performance and thought leadership.

FDCR capability spine

FDCR spans NSA, OI and EDT4IR and covers AI in NLP, telecoms, cybersecurity, blockchain, IoT, modelling, computer vision and mixed reality.

NICIS enablement backbone

NICIS adds the enabling compute, data, cloud, high-speed network, cybersecurity, skills and benchmarking layer for AI-relevant workloads.

Organized by Portfolio

e-Government

Applied GenAI and agentic workflows for delivery, research, documentation and productivity.

NSA

AI for spectrum, 5G networks, localised NLP, GenAI, misinformation detection and edge AI validation.

Operational Intelligence

ML, LLMs, NLP and RAG for decision support, forecasting, clinical AI and early warning.

EDT4IR

AI&XR and DLT capabilities, linked to the wider FDCR AI themes.

NICIS

CHPC compute/GPU/cloud, DIRISA data stewardship and SANReN network, transfer and cybersecurity capabilities enable AI workloads.

AI tools and platforms: Operations and RDI solution development

Operational productivity tools and RDI solution development tools

Operations

EDT4IR

Anthropic Claude: research, analysis, drafting, summarisation and productivity
Open WebUI: interface for local/open-source model access and knowledge-work use

Operational Intelligence

Anthropic Claude + ChatGPT: document, spreadsheet and presentation drafting, summarisation and productivity support

NSA

Copilot + Facilitator: meeting, document and proposal summaries; notes and action items
Miro: AI-assisted collaboration structures for proposals, planning and workshops
LLM-based chatbots: Copilot, Claude, DeepSeek, ChatGPT and Gemini for summarization, planning and general purpose tasks

e-Government

Anthropic Claude, ChatGPT and M365 Copilot: research, analysis, drafting, summarisation and productivity

RDI Solution Development

Open WebUI: experimenting with and deploying open-source/local AI models
OpenHands: prototyping, automation and code generation
Eigent: AI-agent-based workflows and automation
Anthropic Claude: AI development assistance and prototyping

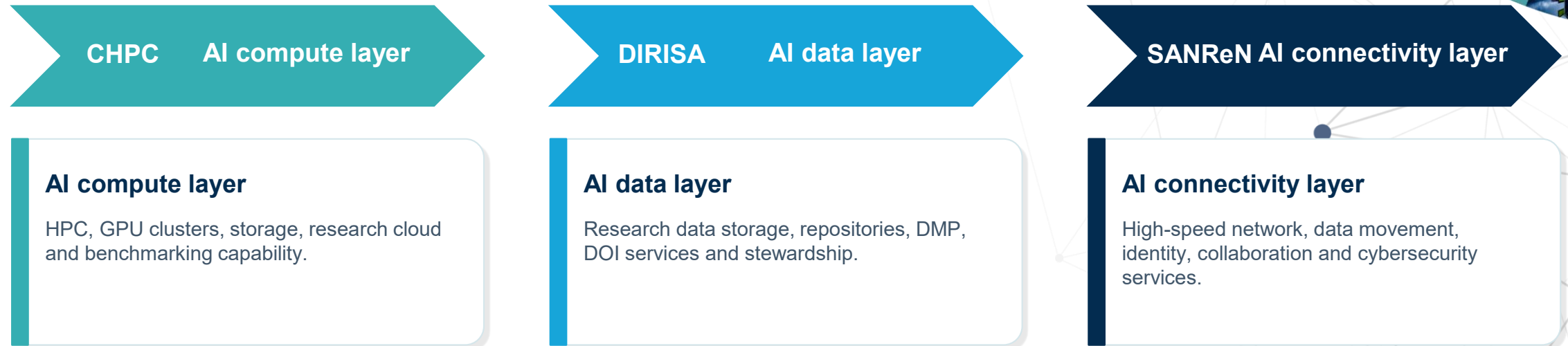
Keras/TensorFlow: machine and deep learning
Ollama: local LLM hosting to assist local LLM development

Anthropic Claude: AI development assistance and prototyping
Python toolkits: NLP, Generative AI and Agentic AI R&D
Ollama: open-source self-hosted models and downstream apps
Langchain/Langgraph/Neo4J: knowledge bases and LLM-based solutions
KNIME, RapidMiner, PyTorch and TensorFlow: machine and deep learning

Anthropic Claude: AI development assistance and prototyping

NICIS as the AI-enabling backbone

NICIS is best positioned as an enabling platform for AI, ML, data-intensive research and advanced computational workloads, rather than as one single AI application programme.



AI infrastructure: compute + data + connectivity form the practical NICIS stack that enables AI workloads across NGEI, the wider CSIR and the wider NSI.

AI-related partnerships and strategic positioning

Cassava AI / Liquid Intelligent Technologies

Pilot Collaboration Agreement; testing Cassava AI Factory infrastructure with H200 GPUs; CHPC benchmarked CFD applications.

IBM Research Africa

Access to IBM Quantum systems, complementing advanced computing capability development.

UP, SADiLaR and UFS

Proposed NLP ecosystem consortium for NLP, machine learning, data science, cybersecurity and linguistic resources.

DSTI / National AI Strategy

DSTI validation recognises CSIR AI/data capability; NICIS provides HPC and data infrastructure supporting AI R&D.

CEPI / WHO Africa

NICIS participation in AI pandemic preparedness technical consultation; CHPC presented HPC deployment experience.

Telkom, Vodacom and Discovery

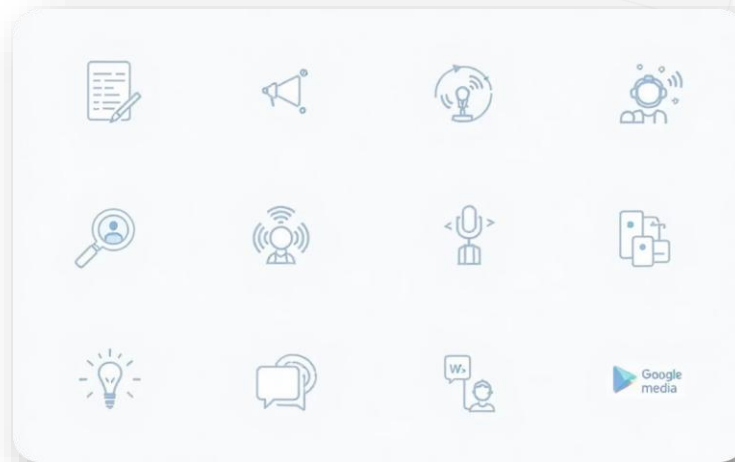
Telkom & Vodacom discussions on advanced NLP and AI Solutions; Discovery discussions on AI-driven risk evaluation of LLM-based solutions.

NGEI Flagship AI Product: Qfrenzy Text-To-Speech



South African Languages

Qfrenzy offers neural text-to-speech voices, covering the 11 official spoken languages of South Africa, facilitating accessibility, communication and localized customer service offerings.



Versatile Applications

Our Qfrenzy product supports accessible solutions in education, telecommunications, and media, reaching diverse communities and promoting digital inclusion. Qfrenzy is available in multiple deployment options (including offline and edge) to meet your individual deployment needs.



Expressive Communication

We generate natural and intelligible audio, enabling the creation of digital content and inclusive communication tailored for diverse audiences. "Bringing voice to every South African language through AI."

AI in Smart Places



Status of AI application, adoption and integration

AI is already inside our delivery work — what is not yet in place is division-wide uptake.

Application

- Water networks, buildings, energy, land
- TRL 3 to TRL 8
- Tested in living labs

Adoption

- Project-led, not division-wide
- Research, coding and tool development in daily use
- No approved-tool list or measurement

Integration

- AI expertise and model choices drawn from NGEI and ICT
- Smart Places specifies requirements and delivers to clients
- AI features would build on existing divisional platforms

Smart Places Division • The next step is division-wide enablement, not more pilots

AI projects, capabilities, platforms and initiatives

In use

TRL 7–8+

- Smart Water Network Management
- Knowledge platforms: uKESA, T4SD

Piloting

TRL 5–6

- Optical PV defect detection
- Predictive building management and digital twins
- Ecotoxicological bioassay tools

In development

TRL 3–4 and concept

- Building maintenance agent
- GeoAI planning support
- Affordable land release model
- Marine and aquatic remote sensing
- AI impact indicators for cities
- SMART Geyser Controllers

Capability initiatives: AI Acceleration Foundry

Strategic opportunities for AI

Where AI creates value for Smart Places and its clients.

Impact

- Simulating affordable land release with UNU and Umeå University
- Indicators tracking AI's effect on African cities
- Ethics guidance to DHS and the Sector Research Forum

Operational effectiveness

- Synthesis, drafting and reporting shortening research cycles
- AI-assisted coding building tools faster
- Curation and summarisation sharpening uKESA and T4SD

Competitiveness

- Evidence-based advice to government clients
- Domain depth in water, buildings, energy and land
- Access to global “AI for good” funding via partners

All three depend on the same enablers: approved tools, institutional licences, skills

AI use cases: divisional RDI and enterprise support

Divisional RDI

- Cited building maintenance answers from manuals and drawings
- Leak detection and demand forecasting on water networks
- Defect detection in PV modules from imagery
- Digital twins forecasting building performance
- Agent-based simulation of affordable land release
- GeoAI planning support for client systems
- AI-assisted coding of divisional analysis tools and prototypes

Portfolio enterprise support

- Project records: work queue, decision gates, activity log
- Progress and governance reports from the record
- Handover briefs when staff or projects change
- Proposal and bid first drafts, human reviewed
- Contract and procurement document checks
- Meeting capture with decisions and actions

One set of enablers serves both: approved tools, institutional licences, data-handling rules

Barriers, risks, gaps and what would fix them

Barriers, risks and gaps

- Pace of change — losing relevance and market share by moving too slowly
- AI agents may make current knowledge curation redundant
- Unreliable findings where AI is used without critical review
- AI engineering skills guarded in the CSIR as a research/business unit, not a support service.
- Licence, POPIA and vendor exposure; staff self-funding tools
- No approved-tool list or usage measurement in the division



Enabling requirements

- Adopt the Guideline's existing lifecycle, not a new one
- Approved tool list and a position on third-party model data
- Institutional licences under a data-processing agreement
- A hosting option for confidential and client project data
- Divisional AI skills development assigned alongside the collaborative AI Champions
- A capacitated & resourced cluster working group and sustained expert dialogue

Smart Places has the domain work and the client base — these enablers let us scale it

AI in Smart Mobility



Transport Data Integrator

A national platform that consolidates fragmented rail, bus, taxi and GIS datasets into one trusted source of truth for transport planning in South Africa.

Forecast

Machine learning predicts transport demand, system performance and emerging trends.

Optimise

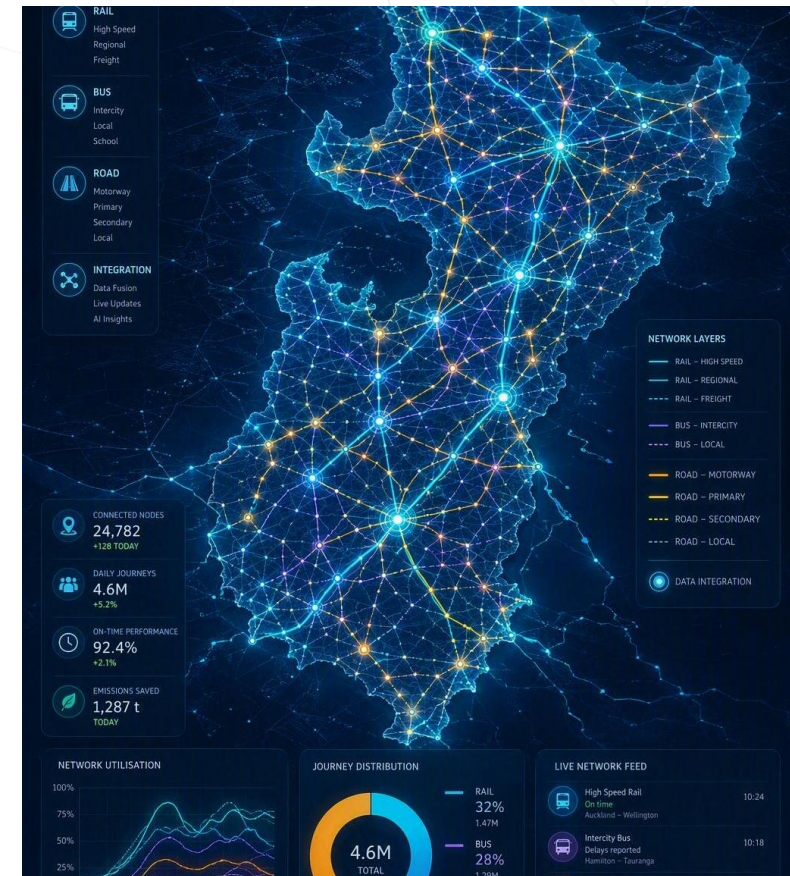
AI supports route optimisation, infrastructure planning and spotting inefficiencies.

Detect patterns

Analytics across modes reveal supply-demand imbalances at system level.

Enable services

Automated KPI dashboards, real-time trip planning and future MaaS capability.



Disruption-Responsive Traffic Performance

An integrated framework to assess, predict and optimise traffic network performance under disrupted conditions.

Simulate

Traffic simulation generates data across a range of disruption scenarios.

Assess risk

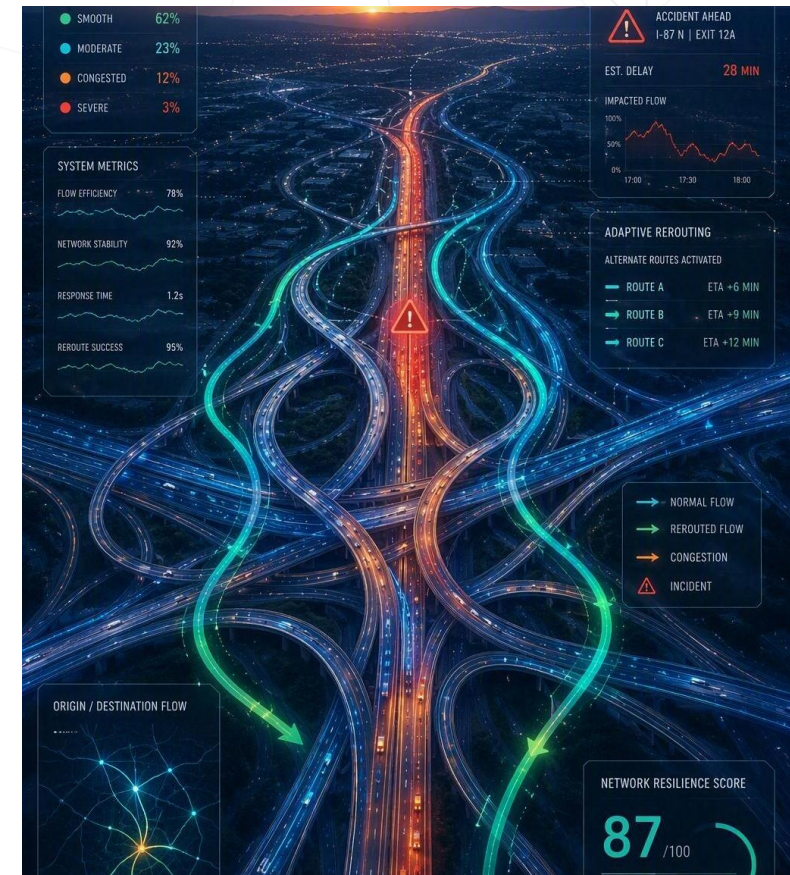
FMECA risk-based analysis quantifies the impact of each disruption.

Predict

ML models trained on simulation data forecast level of service under varying conditions.

Optimise

Identifies strategies that lift network performance and cut congestion during disruption.



Pavement Asset Management and Survey Automation

An intelligent pavement asset management capability that replaces manual condition surveys with automated, data-driven assessment.

Assess

Neural networks analyse condition data and images to calculate indices such as VCI.

Detect defects

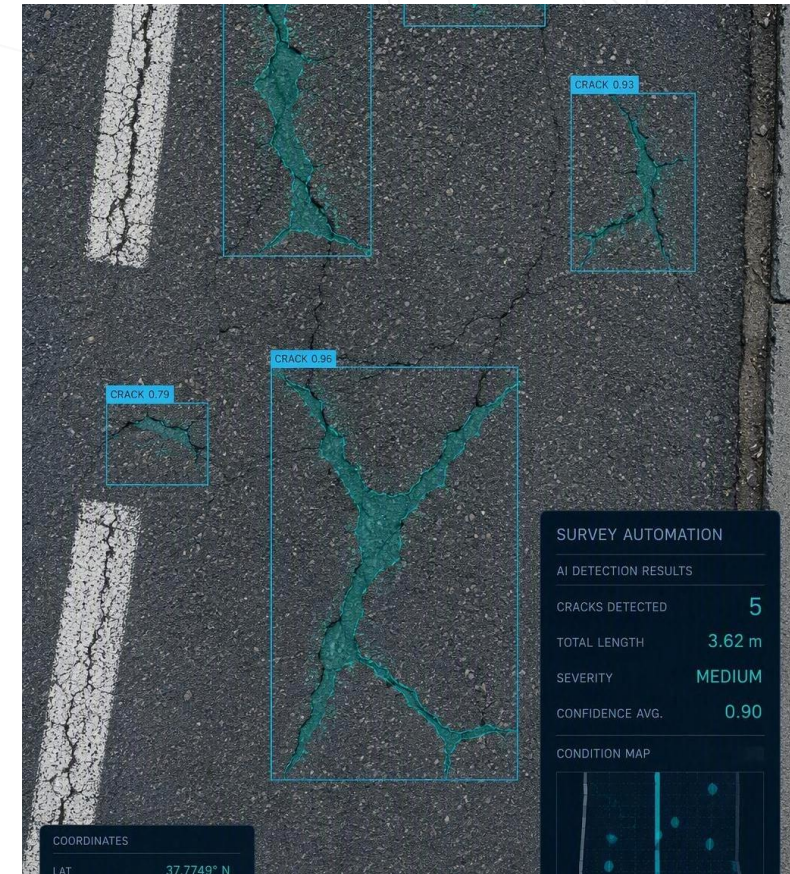
Image models identify cracks and degradation, and classify severity and extent.

Automate surveys

ML embedded in the survey workflow improves accuracy, speed and consistency.

Prioritise

Lifecycle cost analysis and deterioration forecasts guide maintenance planning.



Rail Infrastructure Monitoring

AI-driven monitoring of rail corridors, turning LiDAR and geospatial data into early warning of terrain hazards.

Capture

Drone LiDAR point clouds, satellite imagery and terrain models along the corridor.

Classify

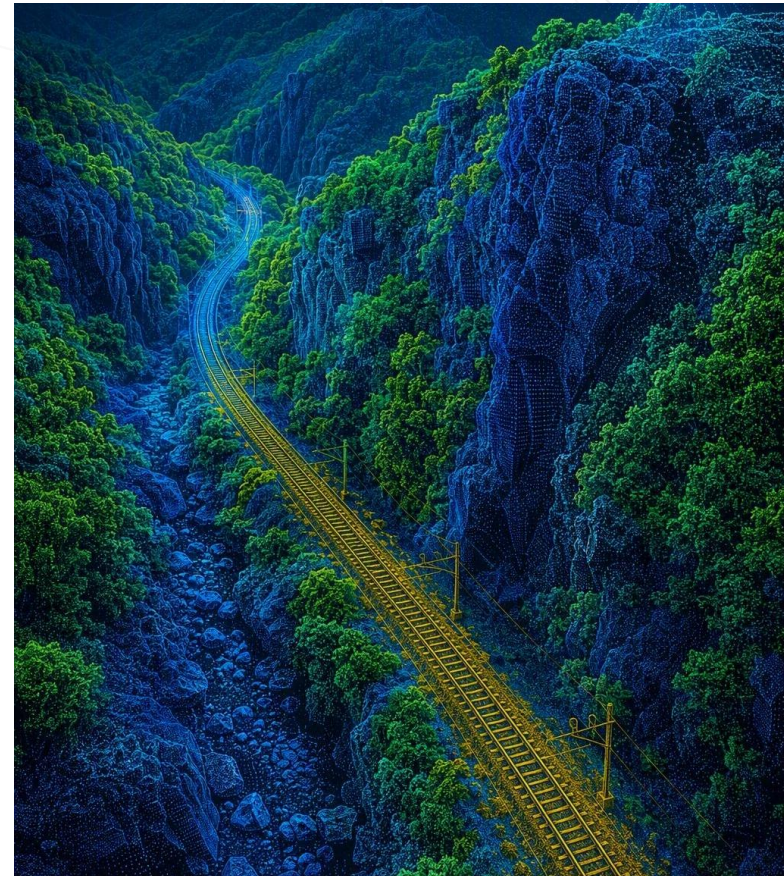
ML segments slopes, vegetation, embankments, ballast, track and structures.

Detect hazards

Rockfalls, erosion, slope instability, encroachment and geometry defects.

Act early

GIS risk maps and dashboards prioritise inspection and predictive maintenance.



Road Materials Laboratory Platform

A national road materials platform linking material source, laboratory results and field performance in one data environment.

Digitise

Laboratory workflows for aggregates, asphalt and soils in a single system.

Connect

Lab, GIS and field performance data joined end to end for full traceability.

Predict

ML models forecast how materials will perform under real-world conditions.

Benchmark

A unified national dataset enables comparison across regions and materials.



Thank You

