

AI Sandboxing for 6G Ecosystems

From Digital Twin to Autonomous Networks

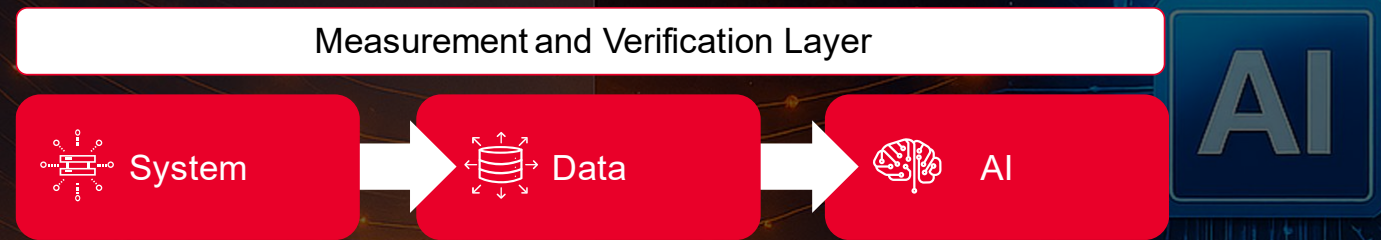
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Keysight Technologies
September 2026



Why Data Matters for AI-native 6G

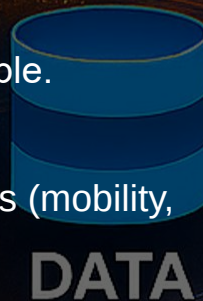
A 6G-native AI system is only as good as the data it receives

To build trustworthy AI models, we must verify not only the AI but also the system generating the data and the data itself. **You need to verify the system, the AI, and the data.**



The three fundamental questions are:

1. **Where do the data come from?**
An AI-native 6G workflow requires multiple complementary data sources. No single source is enough.
2. **How do you ensure this is “good data”?**
“Good data” means accurate, clean, consistent, and usable.
3. **How do you ensure the data is up-to-date?**
AI for 6G must continuously adapt as the network evolves (mobility, load, weather, interference, new deployments).



If not... it may **rain fish!**



Instagram, Nov 6th 2025



← Video posted on Instagram & Youtube on Nov 6th 2025.

AI Mode All News Images Videos More ▾

was in the past AI mistaken this AI phenomenon as true

Yes, search engine AI features and chatbots did mistakenly confirm the fake Georgia fish rain as a real historical event.

When the AI-generated video went viral in November 2025, it created a feedback loop that exposed a common vulnerability in how AI processes information.

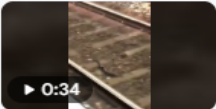
How the AI Got Fooled

The mistake occurred due to a technical flaw in AI data retrieval rather than the AI "believing" the video:

- **Data Saturated by Social Media:** Thousands of users reshared the fake video with captions like *"Fish raining in Georgia!"* AI search crawlers scanned the internet, saw an overwhelming spike in people talking about the event, and indexed it as a trending piece of news. X - NewsX +2
- **Validating with Real Science:** Because "animal rain" is a real, scientifically documented phenomenon caused by waterspouts, AI search summaries cross-referenced the fake Georgia reports with real meteorological science. Instagram +1
- **The Hallucination Loop:** Instead of flagging the video as a hoax, some AI models combined the fake viral rumors with real scientific facts. The AI generated summaries confidently stating that a real fish rain had occurred in Blue Ridge, Georgia due to a storm. Instagram +3

 10 sites

#ViralVideo - Fish swimming on railway...
10 Jul 2026 — THE BREAKTHROUGH DISCOVERY:...

 0:34

 Facebook · I Love Siliguri

Does the video show a rain of fish that occurred in Nice, France?
10 Jan 2026 — It is an extremely realistic digital simulation, but it has no basis in the physical world. The use of AI to...

 Boatos.org

Raining Fish? Be Better | MitchCK
25 Nov 2025 — Alan Shoemaker not yet. Actually the reason why...

 Facebook · MitchCK

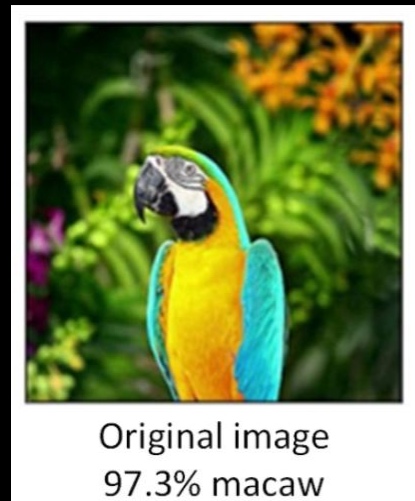
Show all

Gemini AI will finally acknowledge that this is a fake news and explain how the AI get fooled ! Only since July 2026

Data pollution via Adversarial Machine Learning techniques

5G/6G governed by AI... but can we trust the data sets training the models?

- **Deep learning technologies** (DNNs) has enabled high-accuracy AI systems to be widely deployed in real-world applications, but their vulnerability to adversarial attacks poses significant security risks, making robustness a critical challenge.



- Adding small, well-crafted perturbations to the original image leads DNNs into making incorrect predictions, and not by just a bit!

<https://doi.org/10.3390/electronics911195>

What if you train a Neural receiver with incomplete data?

Lack of meaningful training data creates wrong results

- Published paper on 5G Beam selection for a supervised, Multi Class Classification CNN model.
- Dataset was made public as part of the publication.

Actual: There are 61 classes in the labels, but the dataset is imbalanced with the top-1 class occupying 61.25% of the labels in the train set respectively, and the **top-3 classes occupy 80.83%.**

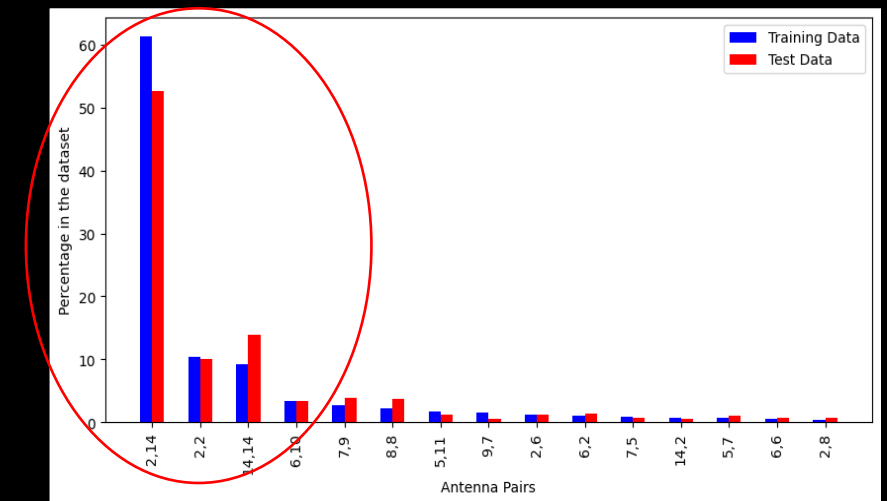
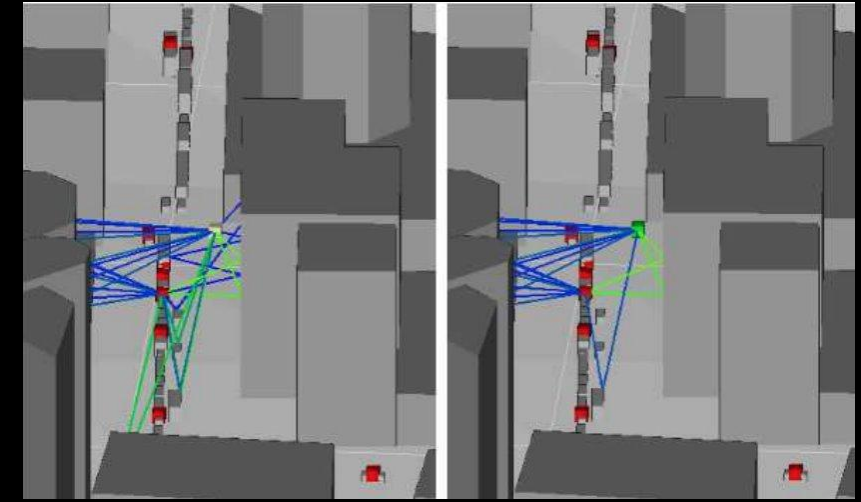
Feedback:

- (1) Collect more data points for classes with less data points.
- (2) Under sample classes with many data points, or over sample classes with less data points.

Takeaway: TEST YOUR AI DATASET!

Klautau, Aldebaro, et al. "5G MIMO data for machine learning: Application to beam-selection using deep learning." *2018 Information Theory and Applications Workshop (ITA)*. IEEE, 2018.

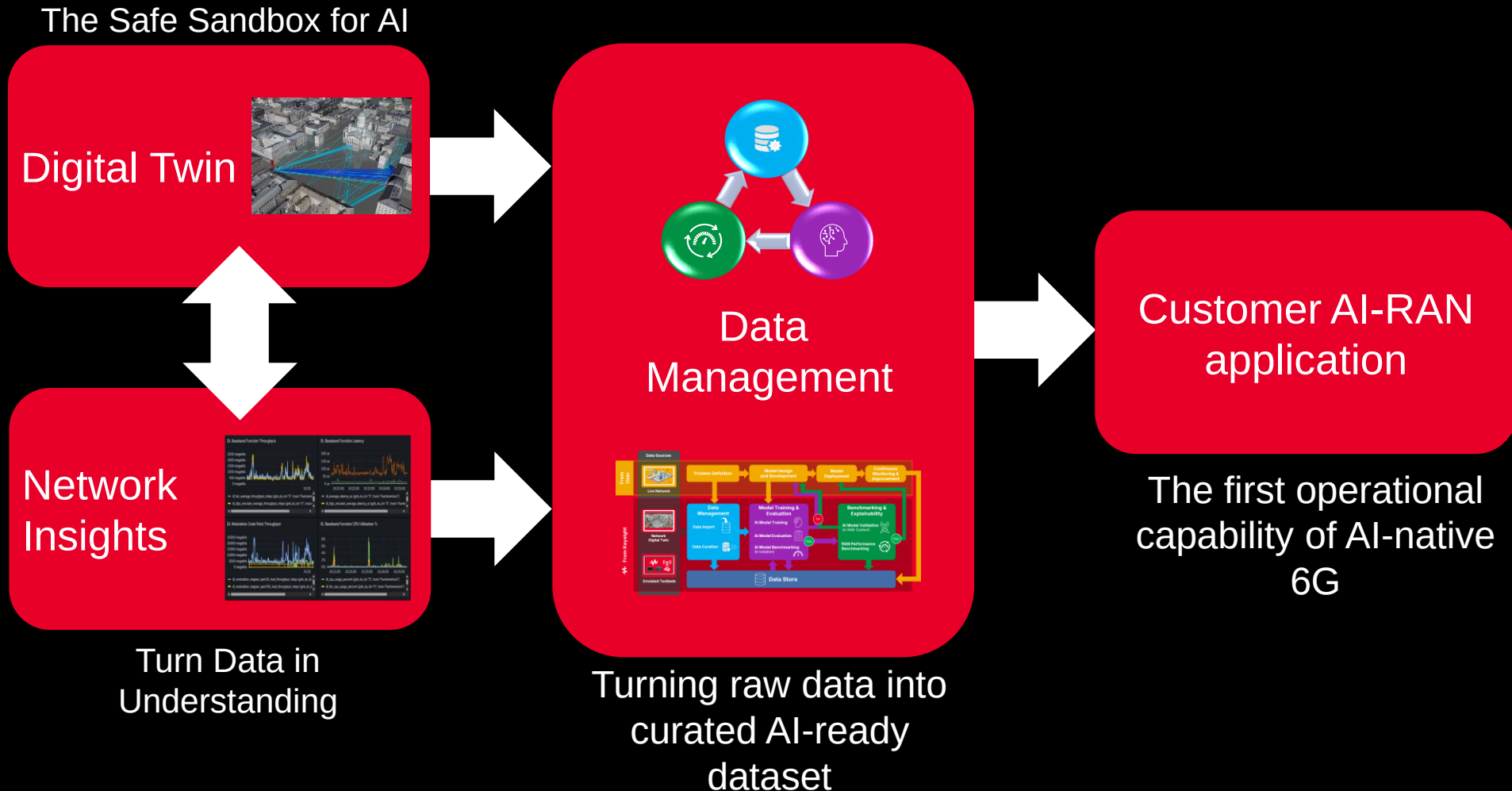
<https://github.com/lasseufpa/5gm-beam-selection/tree/master/classification>



(Transmitter Antenna, Receiver Antenna)

The Four Steps of AI-RAN

Building the Data Pipeline that Powers AI-Native 6G



An aerial view of a dense city, likely Tokyo, with a digital overlay of glowing blue and white arcs and nodes connecting various points across the skyline, symbolizing a digital twin or network infrastructure.

Digital Twin

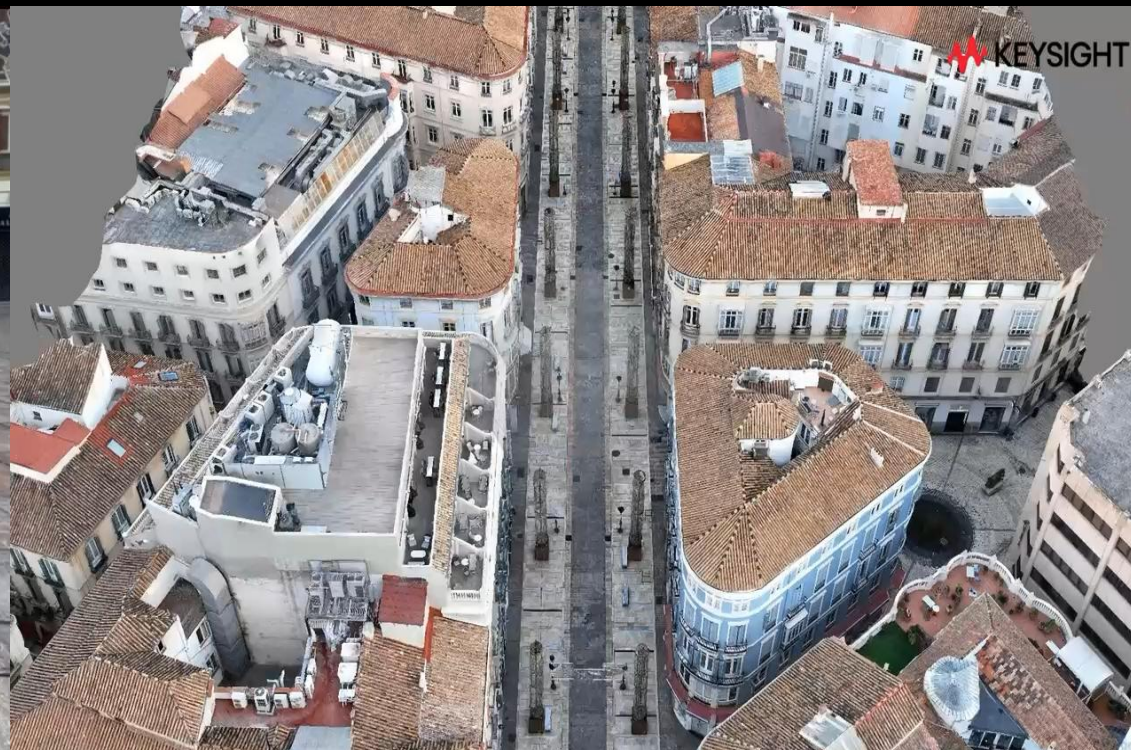
The Safe Sandbox for 6G AI

Digital Twin – The Safe Sandbox for 6G AI

Creation of the wireless environment digital twin



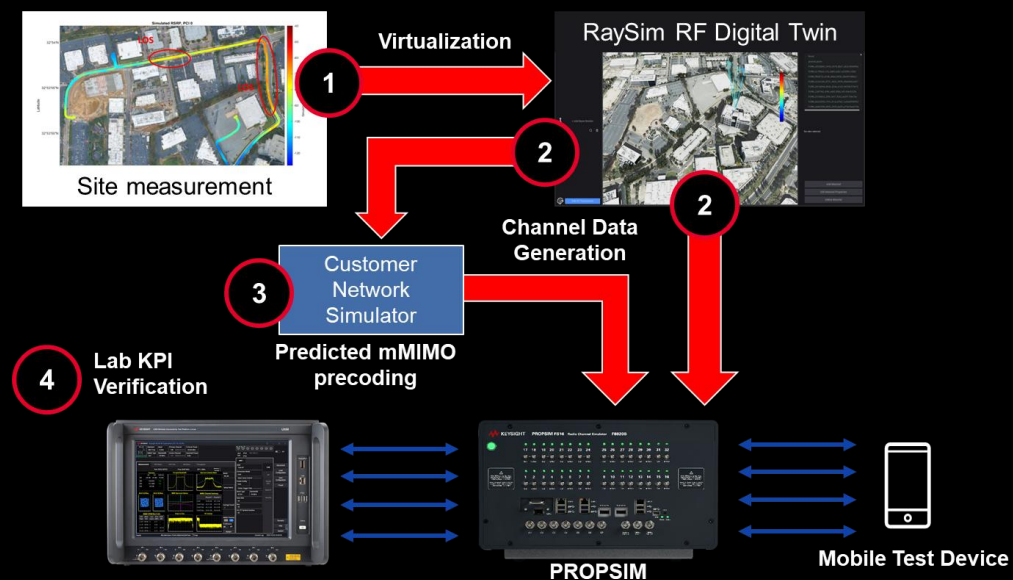
Making of the Digital Twin



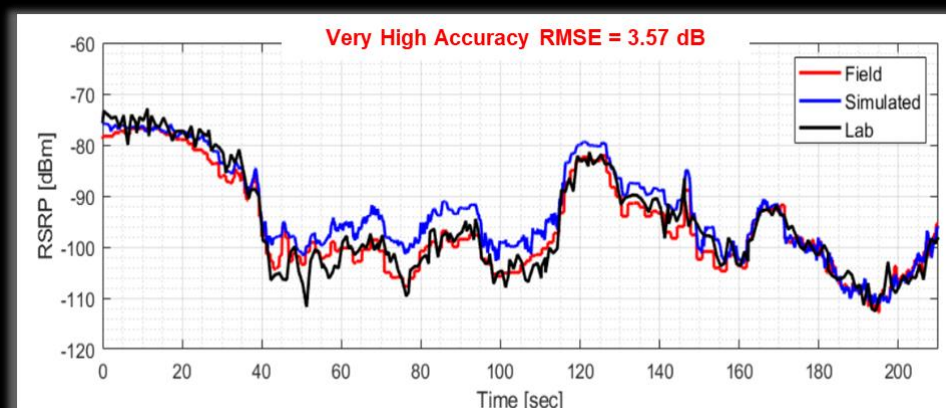
Digital Twin creation

Digital Twin – The Safe Sandbox for 6G AI

Digital Twin Innovation for 6G and AI-Driven mMIMO

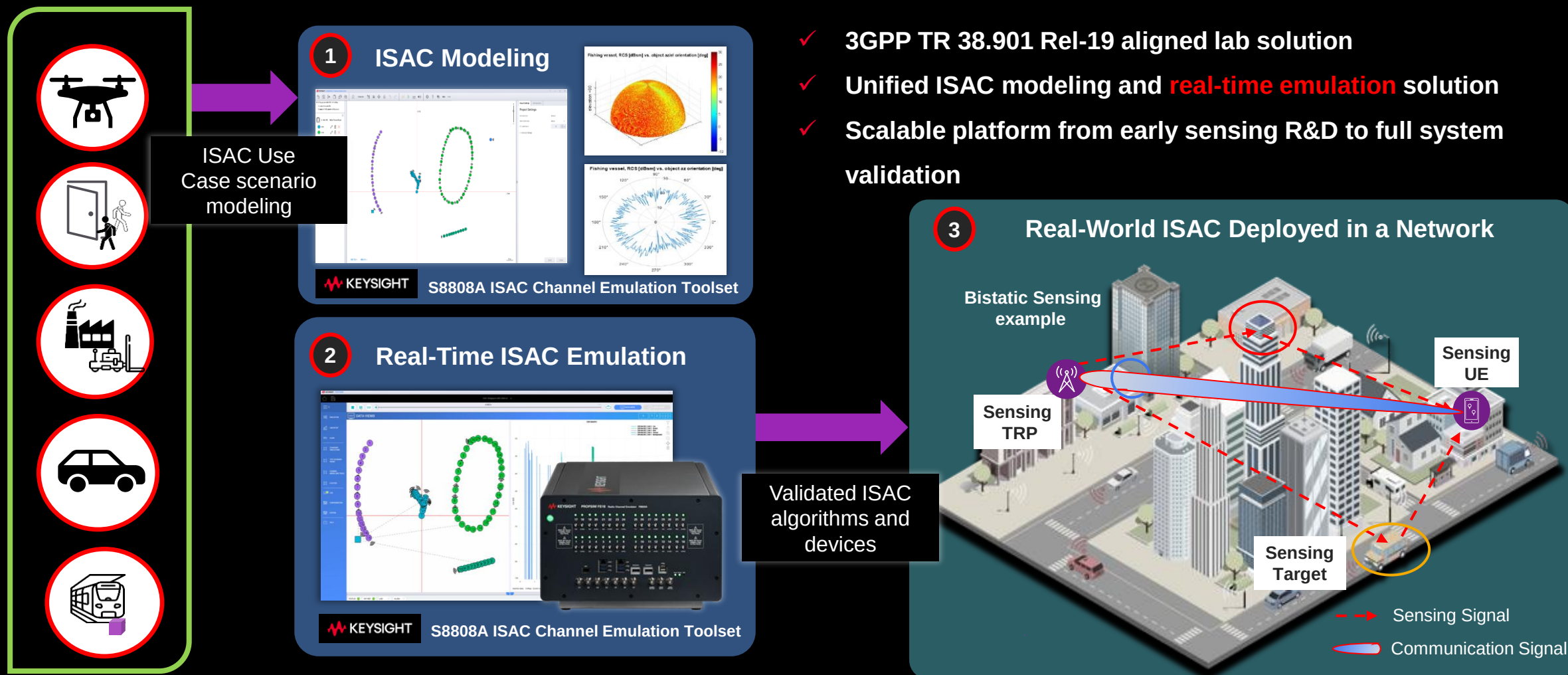


- 1 Virtualization** – Generate a calibrated digital twin from field measurement
- 2 Channel Data Generation** – Generate and export site-specific channel data
- 3 Beamforming prediction** – Predict and optimize the network's beamforming
- 4 KPI Verification** – Compare over-the-air performance with Keysight emulated testbed



Digital Twin – The Safe Sandbox for 6G AI

From Sensing Target and channel modeling to real time emulation



Digital Twin – The Safe Sandbox for 6G AI

ISAC Digital Twin with AI Object Recognition

An aerial view of a dense city skyline, likely Tokyo, with numerous skyscrapers and buildings. Overlaid on the city is a network diagram consisting of glowing blue and white nodes connected by curved lines, representing a digital network or data flow. The overall color palette is a mix of purple, blue, and red, with a gradient effect.

Network Insights

Turning Data+Twin into Understanding

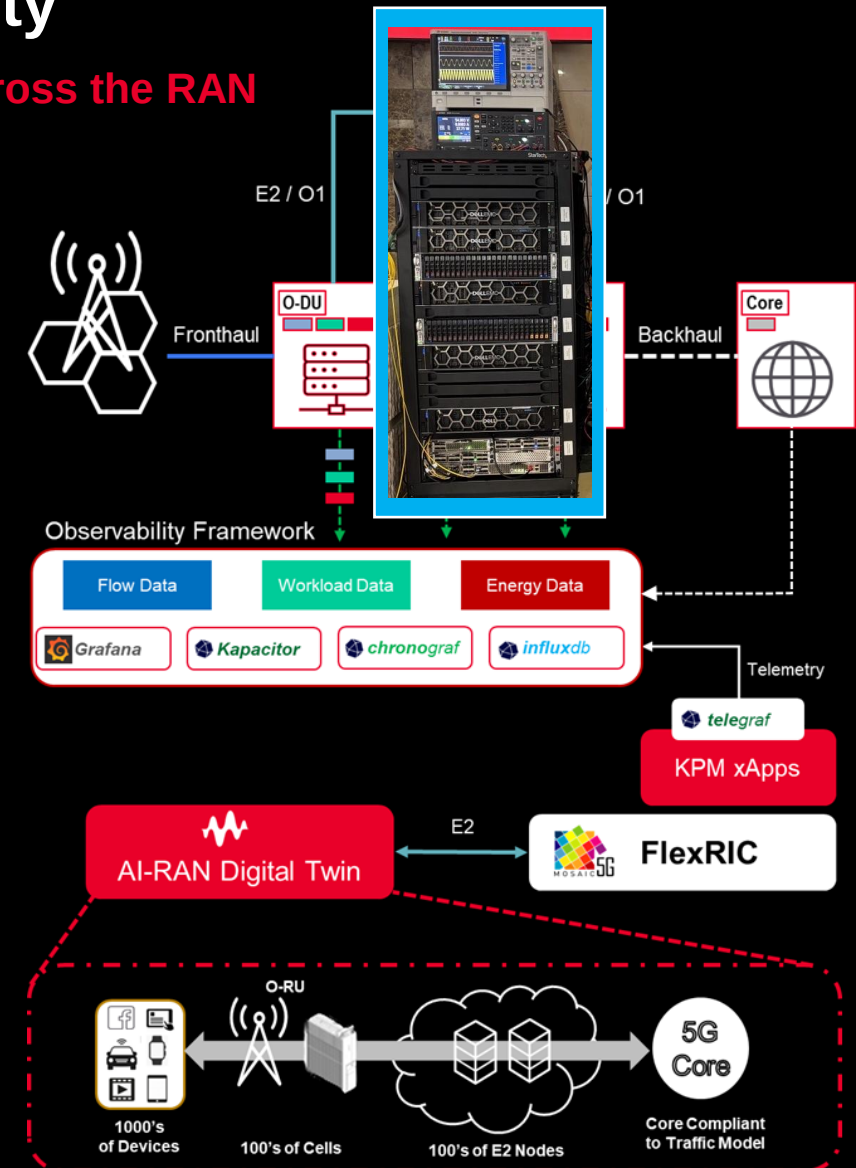
Network Insights – Cloud-Native RAN Observability

Enabling AI RAN, intent driven, intelligent, automated decision-making across the RAN

- **Today's observability tools** are costly, limited, and vendor-locked. Mobile Operator get a report every 5 minutes!
- There are almost no valid datasets available with enough resolution; DT is still only synthetic data! Good but not real!
- **RAN observability remains complex and expensive**, with traditional tools difficult to deploy and manage.
- O-RAN disaggregation and open telemetry enables standardized cloud-native observability.
- Keysight provides the observability framework!

Observability supplies the trusted, real-time data AI requires to detect issues, optimize the network, and prove ROI

Real network



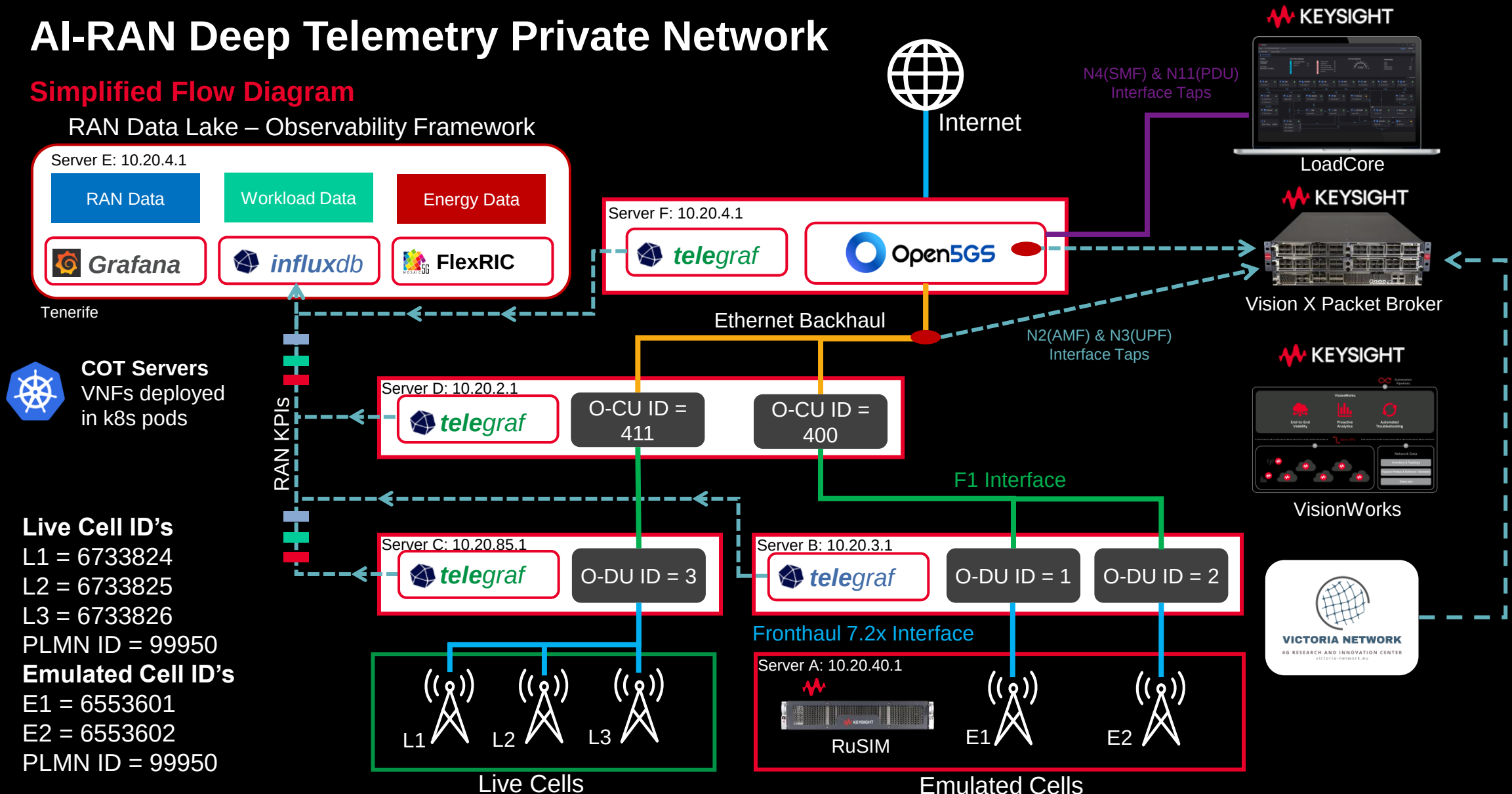
AI-RAN Deep Telemetry Private Network PoC

Demo of a live AI RAN deep telemetry system at EUCNC 2026



AI-RAN Deep Telemetry Private Network

Simplified Flow Diagram



Network KPI Dashboards



USER EQUIPMENT

O-RAN UE KPIs

UE-side service, radio quality, and data-session indicators collected during trials.



RADIO UNIT

Live Network Energy Consumption

O-RU power draw, energy trend, and operational efficiency measurements.



CONTROL UNIT

O-CU RAN KPIs

O-CU counters, control-plane health, and central unit service metrics.



DISTRIBUTED UNIT

O-DU RAN KPIs

O-DU performance, scheduler behavior, and distributed RAN processing signals.



FRONTHAUL

FH S-Plane KPI Dashboard

Timing, synchronization, and S-Plane indicators for the O-RAN fronthaul.



6G-SANDBOX

VisionWorks Dashboard

VisionWorks-powered analytics from Vision X Packet Broker data for the 6G-SANDBOX O-RAN trial network.



PLATFORM

System Workloads

Compute, container, and node workload telemetry for the private 5G platform.



USER EQUIPMENT

Nemo Handy Measurements

Keysight Nemo Handy drive-test measurements: throughput and radio conditions from the field.

O-RAN UE KPIs

UE-side service, radio quality, and data-session indicators collected during trial

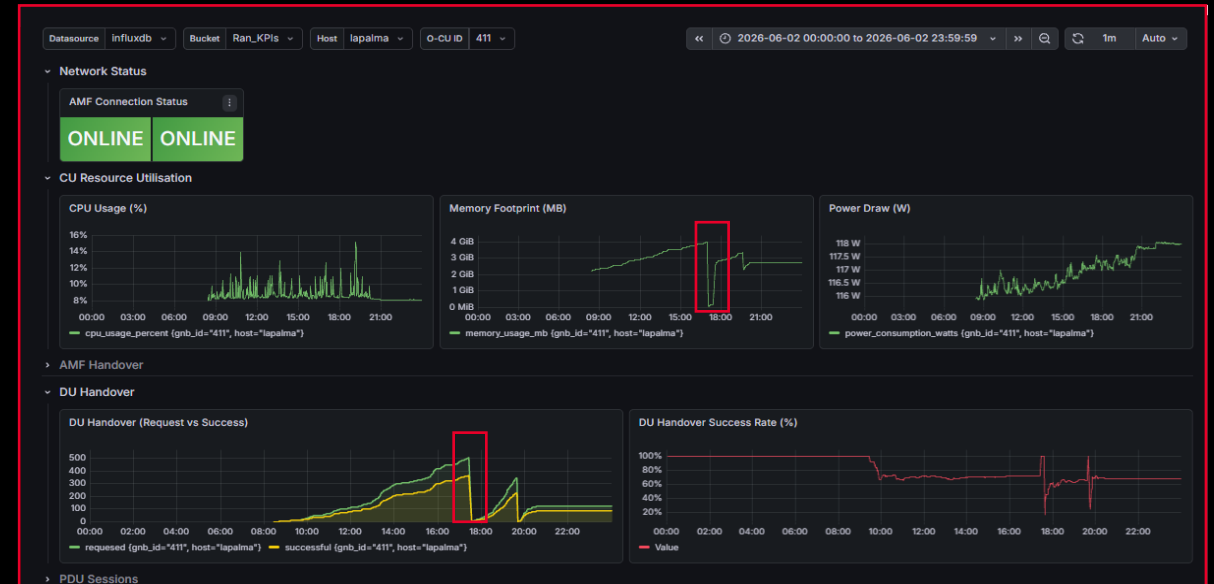


Observed O-RAN Anomalies Under Stress Conditions

Signaling Storms and Handover-Induced O-DU Stress



Signaling Storm Experiment: UEs entered flight mode and later reconnected, resulting in a temporary gap in UE measurement data.

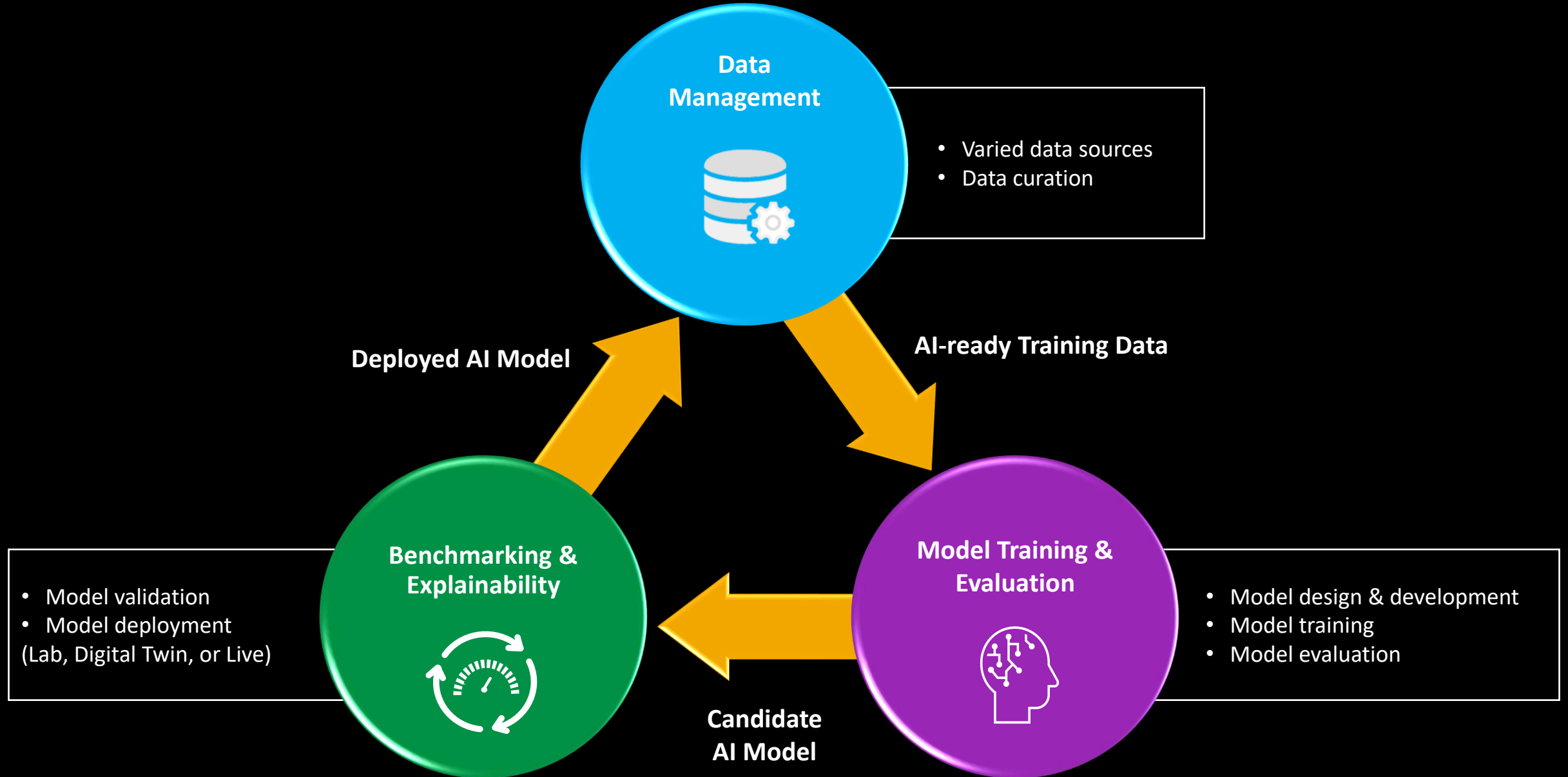


Suspected Memory Leak: Increasing handover activity correlates with growing O-DU memory usage, followed by an apparent O-DU recovery event.

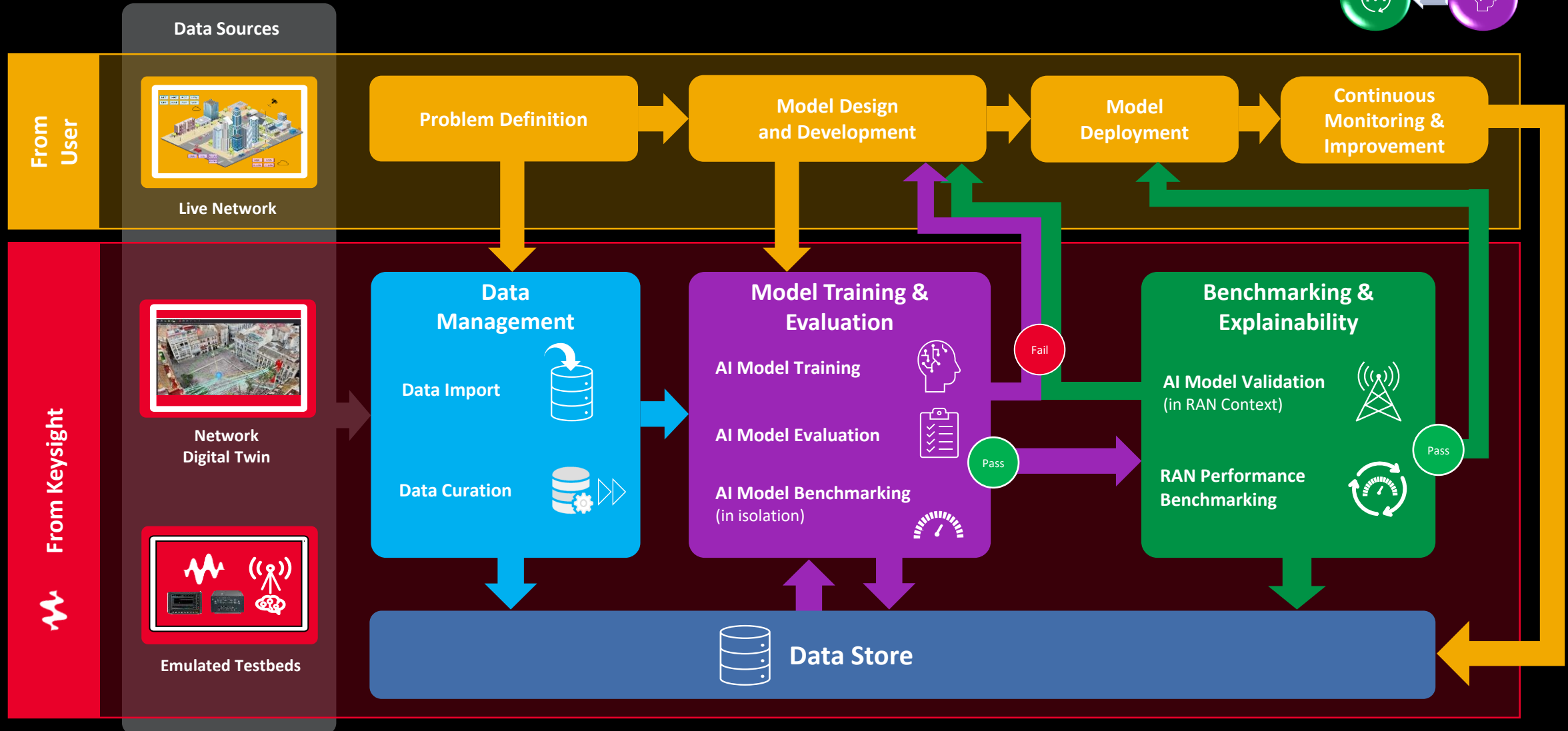
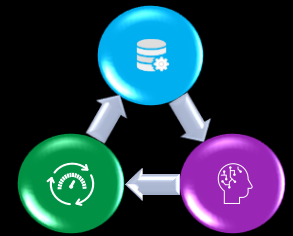
Data Management

Where real, emulated, and synthetic data converge

Data Management: AI RAN Solution Workflow

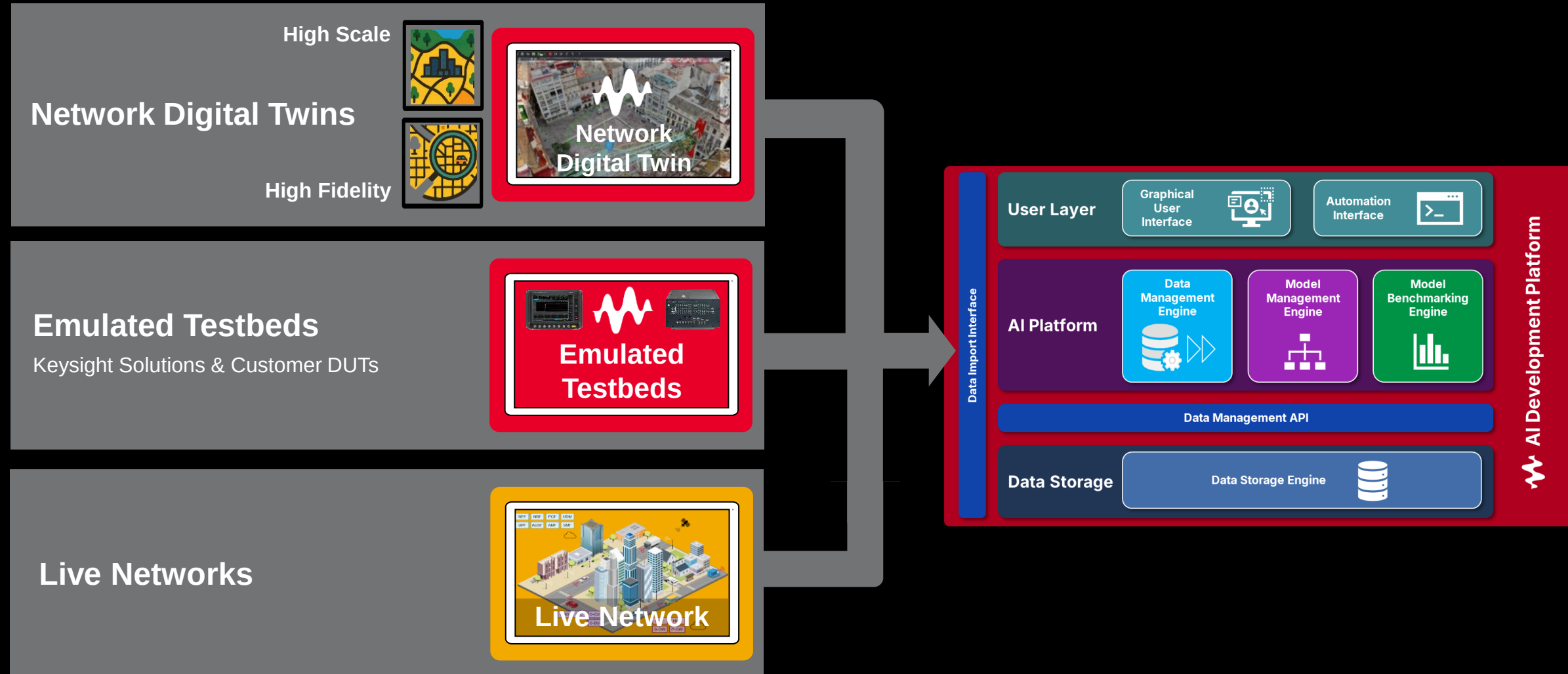


Keysight AI RAN Solution Workflow– Detailed View



Merging Data Sources

Real live data, emulated data, synthetic data



Intelligent Anomaly Detection & Root Cause Analysis

The first real step toward an autonomous 6G network

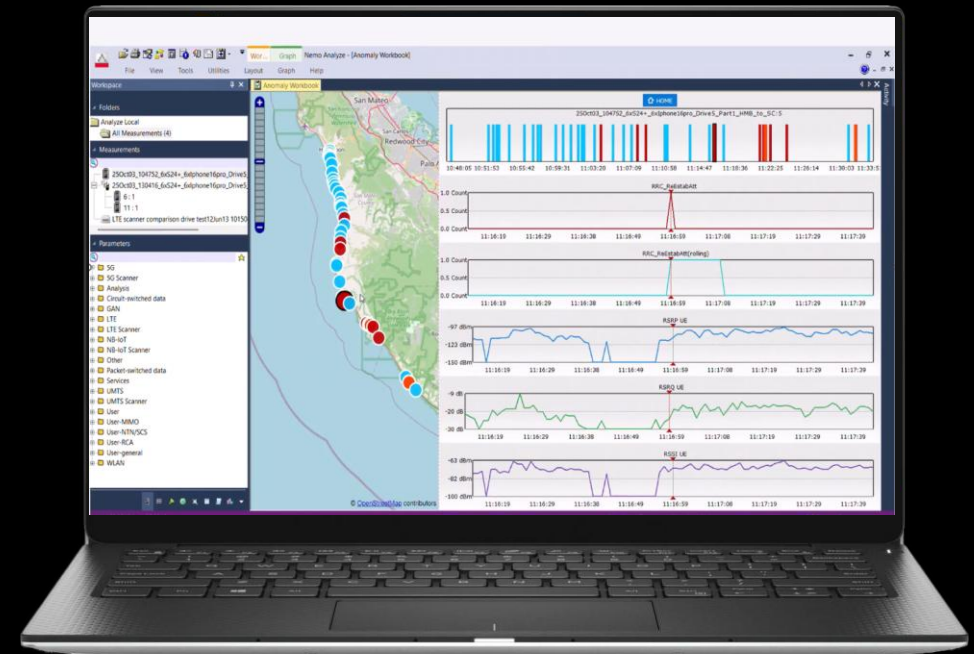
Intelligent Anomaly Detection – First 6G AI Capability

The First Monetizable 6G AI Use Case: Automated RCA

- AI learns “normal behavior” and detects anomalies in RAN & core.
- Digital Twin enables safe training on known faults before deployment.
- Keysight provides:
 - Anomaly modeling
 - Root-cause analysis tools
 - Visualization platforms (UE-centric, geographic views)

Keysight solutions produces Immediate commercial value:
reduces OPEX and improves network reliability

Keysight Automated RCA and Visualization Platform



Intelligent Anomaly Detection – First 6G AI Capability

Demo Video



Conclusions

From Digital Twin to Autonomous 6G: Key Takeaways

- **Digital Twin – Safe Learning & Validation**
High-fidelity digital twins provide risk-free scenario testing, synthetic data generation, and reliable AI model validation — the foundation of trustworthy 6G intelligence.
- **Network Insights – Full Network Visibility**
Cloud-native observability and O-RAN telemetry deliver the visibility needed to understand network behavior and drive data-based optimization.
- **Data Management – AI-Ready Data at Scale**
Combining live, emulated, and synthetic data ensures high-quality, consistent, and scalable datasets for training and improving 6G AI models.
- **Intelligent Anomaly Detection & RCA – First 6G AI Capability**
Learning “normal” behavior enables early anomaly detection, Digital-Twin-based diagnosis, and automated root-cause analysis across RAN, Core, and Cloud.



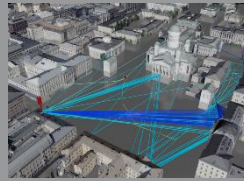
WirelessPro



System Design



AI RAN Simulation
Toolset



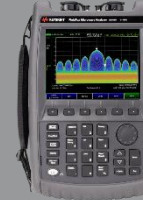
RaySim



MTRX/Propsim



UXM



FieldFox



NEMO

Keysight uniquely spans the **full AI-RAN data generation and validation**, positioning us as the **essential partner for the telecom ecosystem** on their path to **intelligent & autonomous networks**.



X-series SA/SG



UE&RuSIM



AC/DC Power
analyzers



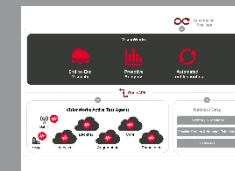
UXA Scope



WaveJudge



Vision X Packet
Broker



VisionWorks



LoadCore

References



6G DevOps: Facilitating AI and
Yielding Systematic Insights in 6G
Evolution



Energy-Efficient Virtualized gNB for
Cloud-Native O-RAN



Efficient Resource Allocation for
NextG O-RAN VNF based on
Systematic Characterization



An O-RAN Digital Twin to Train
AI/ML in Anomaly Detection

Thank you

