eBook

AVA AI and Analytics

The essential Telco Trio - Quality data, Traditional AI, and Generative AI

GenAI needs to be built on a solid data foundation and should work together with traditional AI

Overview

Generative AI (GenAI) is a transformative force in the telco industry, and CSPs should take full advantage of it on their journey towards Autonomous Operations. It not only speeds up knowledge discovery and content generation but can also be applied to a wide range of tasks, such as service assurance, network slice design, and security operations.

However, to fully leverage GenAI and achieve the goal of Level 4 and Level 5 autonomous operations (please see diagram 1), communications service providers (CSPs) will need a solid foundation of curated telco data and traditional, predictive AI capabilities.

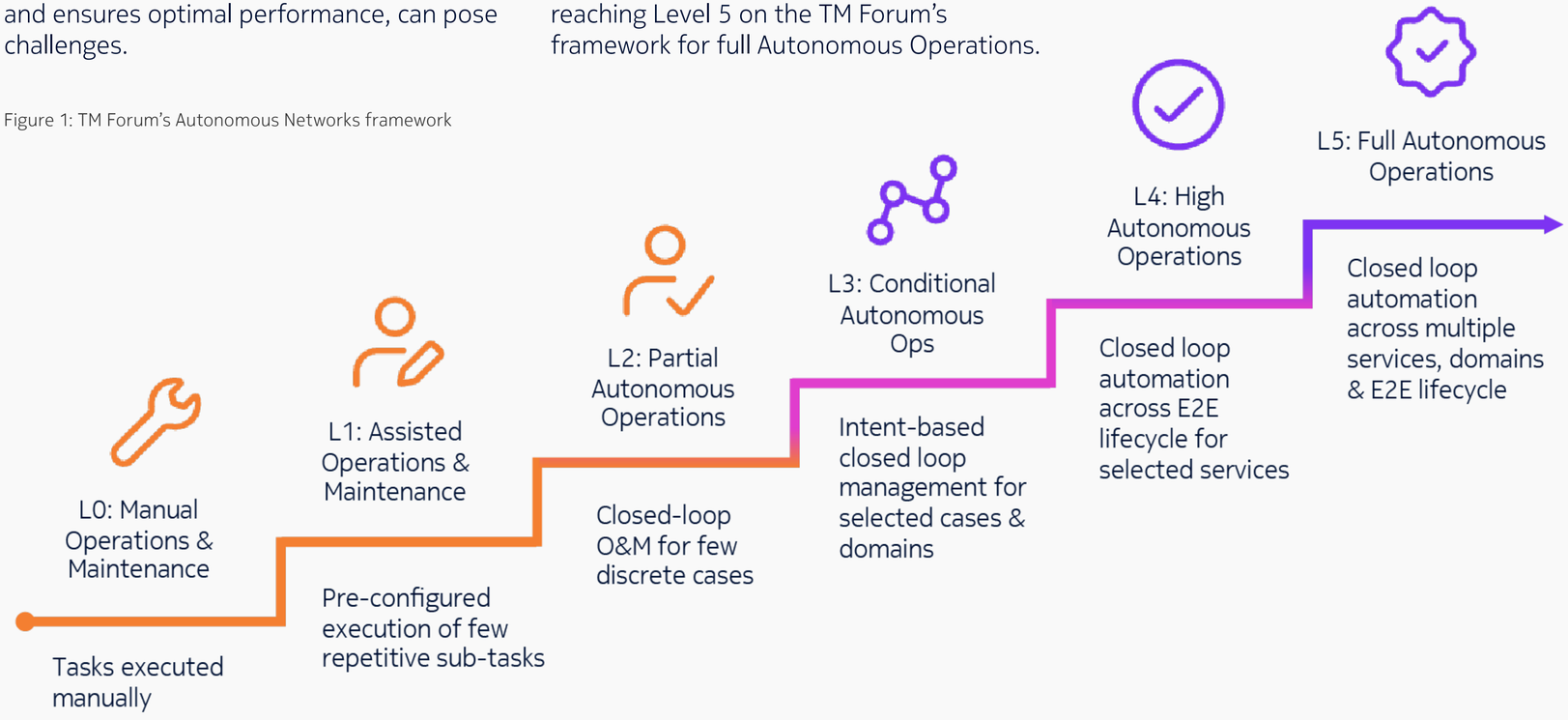
CSPs generate a vast amount of heterogeneous data daily, but gathering and preparing it is a time-consuming and challenging task. Traditional AI, which includes classical supervised, unsupervised machine learning, and reinforcement learning, has proven effective in handling structured telemetry data like time-series and tabular data. It's been successful in use cases such as anomaly detection, delivering highly accurate outcomes. In contrast, GenAI excels in extracting knowledge from a wide range of unstructured data.

Steps towards Autonomous Operations

Embarking on the path to Autonomous Operations, a cutting-edge network that seamlessly senses, orchestrates resources, and ensures optimal performance, can pose challenges.

While achieving this **zero-wait, zero-touch, and zero-trouble network is the goal** for many CSP's, most of them are still far from reaching Level 5 on the TM Forum's framework for full Autonomous Operations.

Figure 1: TM Forum's Autonomous Networks framework



Telco data challenge – missing the solid data foundation

Extracting and managing network data is still a significant headache for CSPs. TM Forum's latest AI Research* states that one of the biggest challenges to deploying AI at scale is access to clean, quality, and usable data. The lack of quality data can also lead to distrust in the outcomes derived from it, resulting in "garbage in, garbage out" scenario during AI use case development. For GenAI use cases it's crucial to infuse relevant telco data into the foundational models and employ prompt engineering and fine-tuning techniques to make sure the responses are correct and don't produce "hallucinations".

Telco data challenge is particularly pronounced when considering the chronic shortage of skilled data scientists (*** TM Forum's AI research** states: only cybersecurity surpasses AI in demand for skilled professionals). Without easy and fast access to data, it will be tough for any operator to deploy AI at scale and head towards autonomous operations.

***Source: Building an AI strategy: telcos put the foundations in place TM Forum**

Here are some essential characteristics of AI-ready data:

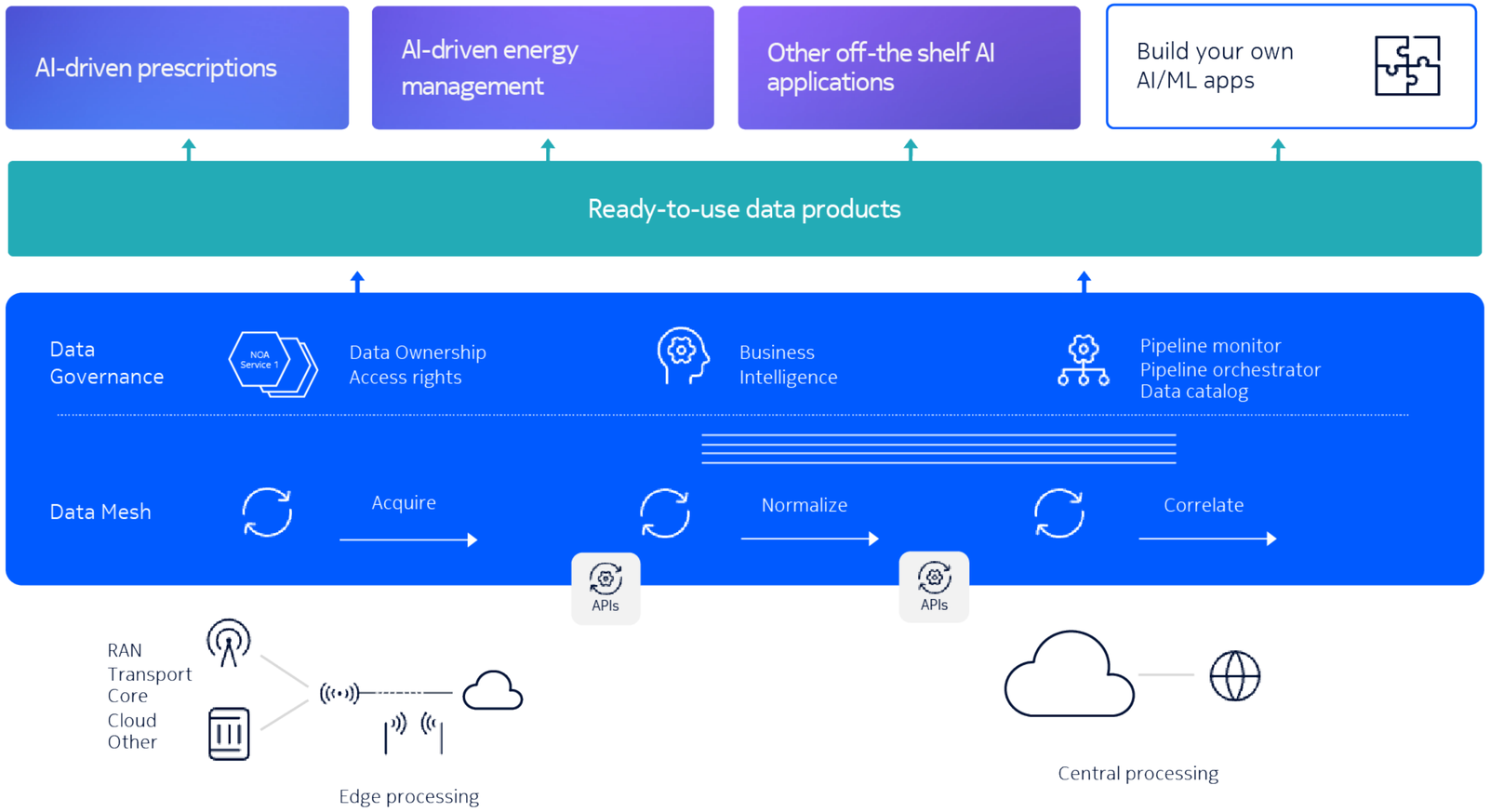
- **Clean, prepared data** – Ensure data cleanliness, consistency, and usability across network and customer experience datasets. Techniques like enrichment, feature engineering, normalization, handling missing values, data labeling, and annotation contribute to data readiness.
- **Sufficient data volume** – AI and machine learning thrive on vast amounts of data for model training. CSPs need diverse domain-specific datasets to ensure unbiased and accurate AI results.
- **Real-time data** – Business critical use cases often demand real-time data.
- **Common data model** – A unified data model is essential for integrating structured and unstructured data from various vendors. It streamlines data processing and facilitates cross-domain insights.
- **Data Governance** – Implementing policies for data quality, access control, privacy and security

To achieve optimal results with the traditional AI and GenAI journey, CSPs need an accurate telco data foundation.

Nokia AVA Data Suite as an answer to the telco data challenge

Figure 2: Nokia AVA Data Suite

Source: GenAI generated synthetic data



To help CSPs with this significant data challenge, Nokia launched the **Nokia AVA Data Suite.** Nokia AVA Data Suite offers a catalog of readily available and proven data products (see diagram 2) specifically designed to expedite MLOps and AI use case creation at scale, so CSPs can move faster towards autonomous operations. These standardized data models eliminate complexity and reduce the time required for data preparation, allowing data scientists to accelerate the development of new AI/ML applications.

The data products are built by ingesting, and correlating data from multiple data sources across multi-vendor, multi-domain networks. This is enabled through multi-vendor adaptors and a library of automated data transformation services. Nokia AVA Data Suite efficiently extracts real-time telco and subscriber data from the network onto a data mesh architecture, ensuring democratized and secure access.

With our reusable data products, CSPs can complete the data preparation process in just 3-4 weeks – **a remarkable 70% faster time-to-value** compared to typical projects, which can take four months or longer to accomplish. This is a major advantage for CSPs strurggling with finding the right data and making it usable – giving the CSPs the telco data foundation they need.

Nokia AVA Data Suite

AVA Data Suite's decentralized, scalable, and efficient data mesh architecture, along with its emphasis on data quality and governance, makes it an important component for the success of utilizing GenAI as well. Foundational models are trained on general training data and lack telco domain knowledge, their responses can be inaccurate and produce "hallucinations". RAG (Retrieval-Augmented Generation) is a useful technique within prompt engineering that searches through a specific database to find relevant content that can help answer with a more accurate answer. Utilizing the correct prompt engineering and model fine-tuning techniques with our data products increases the trustworthiness of the answer and decreases the chance of hallucinations.

Telco data enhanced with synthetic data

Because of GenAI, we are now also able to generate much-needed synthetic test data with ease and efficiency. If we want to mimic a future event in the network, we can, based on historical data, generate even more test data to make the traditional AI's predictions on what would happen in the network even more accurate. GenAI's ability to generate synthetic data that closely mirrors real-world scenarios allows us to create realistic "future events" in the network for testing purposes. This means we can prepare for a wide range of scenarios and ensure our systems are robust enough to handle them.

Nokia's Advanced Consulting Services team's LLMOps expertise together with AVA Data Suite's data foundation gives CSP's the opportunity to also built their own LLM use cases.

Traditional AI applications for meeting business goals

To fully benefit from GenAI, CSPs still need traditional AI applications to meet their business goals. Nokia's AVA portfolio provides a range of cloud-native off-the-self AI applications for CSPs' most crucial business challenges. For instance, our AI-driven prescriptions solution uses machine learning to provide prioritized recommendations to enhance the user experience for CSPs' fixed and mobile subscribers or to minimize power consumption of the network.

Leveraging AVA Data Suite's standardized data models also in our applications, we employ a consistent approach throughout. This involves initially gathering the requisite data tailored to the specific use case, followed by conducting unsupervised anomaly detection and root cause analysis. Subsequently, we provide tailored prescriptions to achieve each use case's defined objectives in real-time, facilitating the move towards autonomous operations.

Example use cases our AI solutions enable:

- **Churn reduction** Strategically minimize churn rates and identify revenue enhancement opportunities by accurately predicting churn instances based on historical data. This proactive approach empowers CSPs to intervene before churn occurs, ensuring sustained customer retention and maximizing Customer Lifetime Value (CLV).
- **Quality of Experience (QoE)** improvements (Voice/Video/Gaming/Streaming): Elevate the QoE for end users across various applications and services. By analyzing app events and metrics, our solution identifies areas for improvement, prescribing the next best actions to enhance QoE and rectify network issues promptly.
- **Expenditure reduction** (preventing network issues or customer care tickets): Employ AI-based analysis to detect recurring patterns and facilitate early intervention on network issues. CSPs can proactively mitigate potential disruptions through incident grouping and root cause identification based on spatial and temporal proximity, thereby reducing operational costs.
- **Energy savings** Through intelligent algorithms embedded in our data products, we minimize power consumption in the RAN, including active elements and passive equipment such as air conditioning units. Rigorous mechanisms continuously monitor network performance and ensure no negative impacts on customer experience. Our software saves energy based on factors such as time, location, configuration, and usage, enabling CSPs' to reduce their carbon footprint by up to 30%.

Quality data, traditional AI and GenAI

Power trio for exceptional results

In our AVA portfolio, we are committed to combining quality telco data, exceptional AI apps, and GenAI—and we have already started the journey.

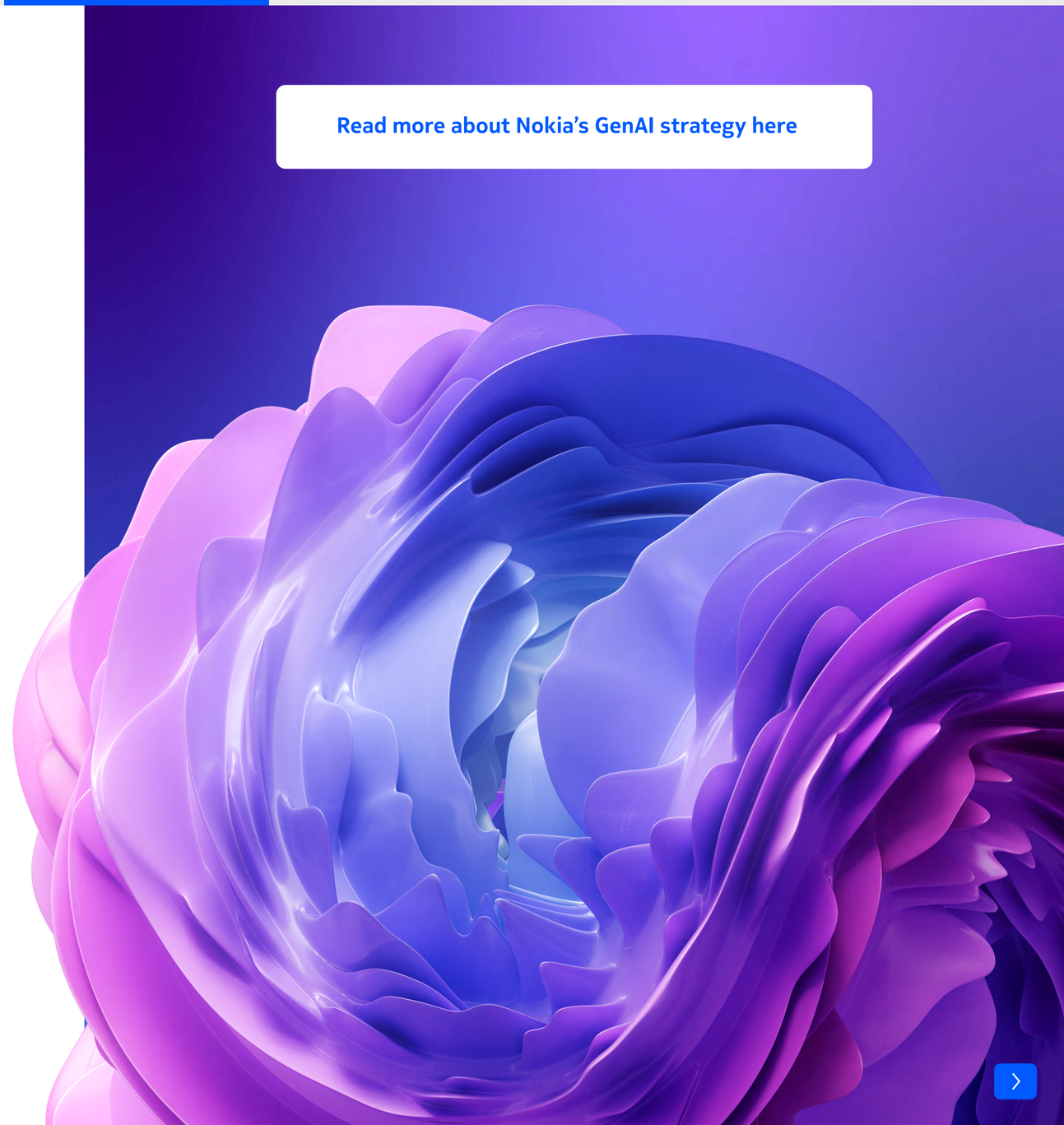
Together with the telco data layer and our traditional AI apps, we can enable GenAI-powered assistants to provide data as a self-service – truly democratizing and fastening the access to insights. This means that even without SQL skills, CSP's employees could communicate with databases simply by asking for insights from the GenAI assistant with natural language. This way, we can cater to different CSP employees, from the VP of Networks to a customer care assistant, by enabling them to ask questions such as "Provide me a dashboard of Quality of Experience lower in Region x" or "What is the predicted churn rate in Region x".

Furthermore, we can enable GenAI-infused "Autonomous Agents" that automatically create network configuration instructions and optimization directives (for anything from QoE improvements to energy optimization) and give solution recommendations in complex operational scenarios, aiming even further towards autonomous operations. This way, we can enable CSP employees to ask GenAI assistants even further questions such as " What is recommended to increase the QoE in Region x, and are there actions being done already? " or "What should we do to prevent the predicted churn in Region x".

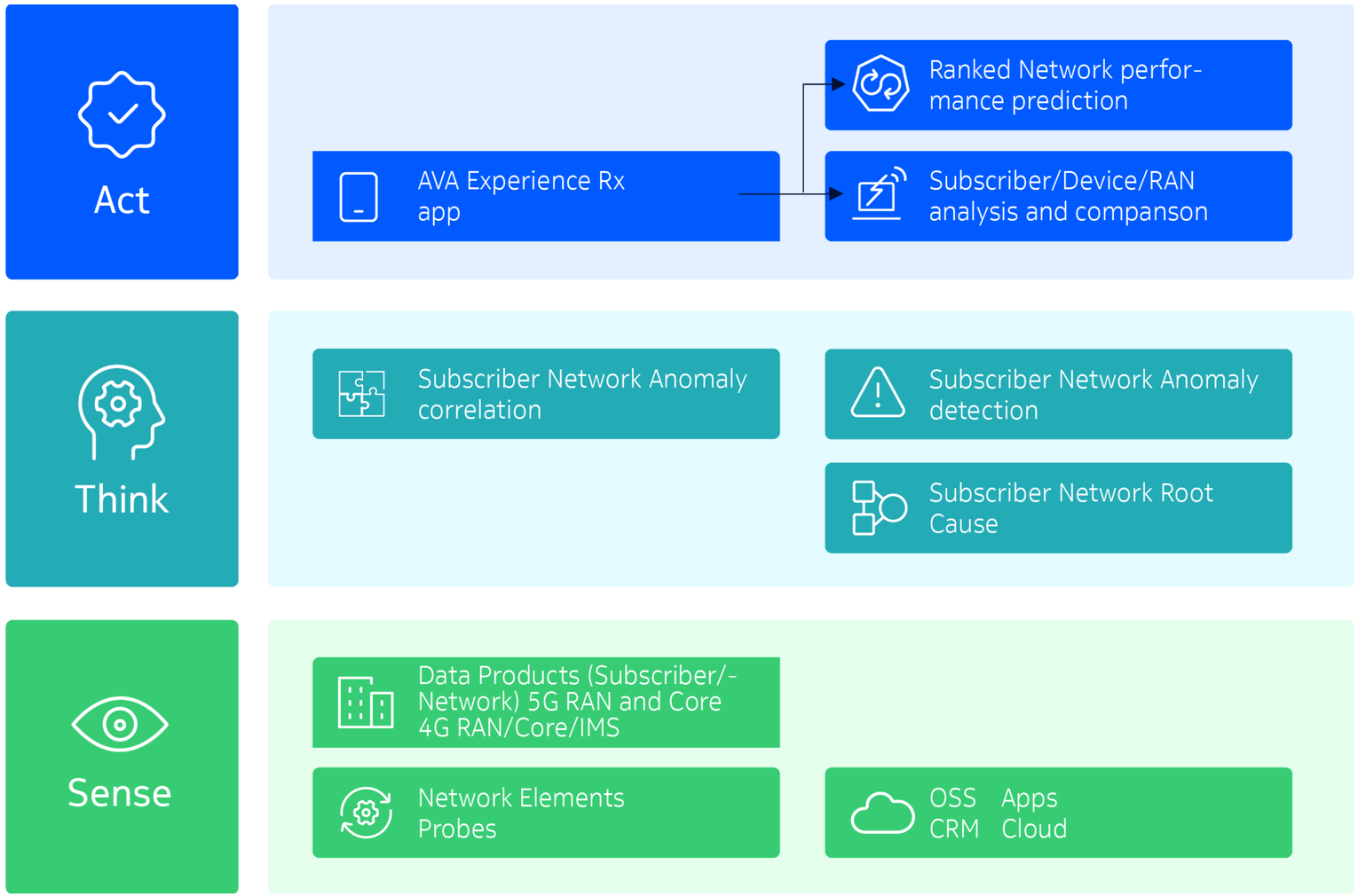
Already in 2022, we partnered with a leading CSP in Asia to develop a GenAI solution designed to achieve significant gains in network and service operations. This partnership has delivered significant impacts already, including an 80% reduction in knowledge acquisition time, a 72% increase in data analysis efficiency, and annual savings of €6.5 Million in network operations. This success has created a blueprint for large-scale automation using GenAI, delving further into high-impact areas like automatic generation of network design configurations and optimization recommendations.

Traditional AI still holds a ton of value in telco use cases but GenAI can boost it forward and make it more understandable and processes even more autonomous. With our extensive knowledge across all network domains, proven AI leadership*, and Bell Labs innovation, Nokia has a federated knowledge source based on 30+ years of experience. Leveraging this domain and AI-modeling expertise, we are connecting today's AI capabilities with GenAI's future potential.

Read more about Nokia's GenAI strategy here



Canadian CSP turns actions from reactive to prescriptive



Customer challenge

- Correlating network events with customer experience
- Ability to detect and resolve customer impacting issues

Business results

60% Less effort for KPI monitoring & RCC	E2E Observability (RAN, Core, IMS)
7 mins Mean Time to Detect	1 hour Mean Time to Resolve

China Mobile enhances Network Autonomous Operations with GenAI

Act

- Domain knowledge Q&A, conversational data self-service, and DevOps code generation
- Autonomous AI agent for E2E orchestration of complex business processes

Think

- Rich built-in prompt templates for seamless integration
- LLM-RAG Architecture
- Multi-LLM, multi-chain, and multi-agent functionalities

Sense

- Open-sourced LLM model
- Localized LLM-driven knowledge centers
- Knowledge libraries

Customer challenge

中国移动 China Mobile

- Long domain knowledge query times
- High cost of daily data analysis
- Inefficient DevOps development lead times

Business results

- **80%** reduction in knowledge acquisition time
- **Multi-Million** annual savings in network operations
- **67%** increase in knowledge coverage
- **72%** increase in data analysis efficiency

Nokia's framework for Telco AI - GenAI and traditional ML

Act

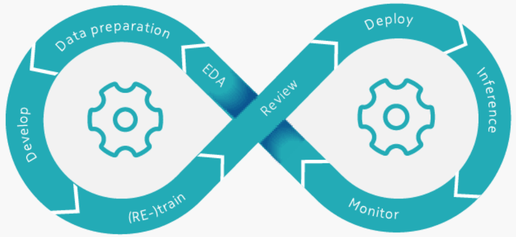
- e.g. generate dashboards & insights via natural language
- e.g. translate business intent into service requirements
- e.g. simulate requirements for new service introduction
- Nokia AI apps
- Build your own AI/GenAI apps
- Digital Twins

Autonomous Agents

via Nokia Orchestration & Assurance

Think

AVA Data Suite



ML & LLM Ops Factory

- LLM farms (open & closed)
- Training & inferencing models
- Prompt/ hallucination mgmt.
- Fine tuning LLM

Sense

- Correlate
- Normalize
- Acquire

Data Governance

Unified Inventory

- Telco data vectorization
- Synthetic data creation

Connect

Access Networks | Transport | Core | Edge

Multi-domain/ technology/ vendor

Conclusion

Nokia AVA solutions deliver exceptional results that address CSPs' most crucial business challenges. Through our readily available data products, we accelerate the AI/ML lifecycle, enabling CSPs to derive actionable insights swiftly, make informed decisions effectively, and build their own AI use cases. Our off-the-shelf AI applications, infused with GenAI, bring our customers closer to their business objectives and the ultimate goal of fully autonomous networks. Partner with us today to realize the full potential of AI in telecom!

Abbreviations:

AI=Artificial intelligence

CSP=Communications service provider

GenAI=Generative AI

LLM=Large language models

ML = Machine Learning

QoE = Quality of Experience

RAN = Radio access network

RAG = Retrieval Augement Generation

"Generative AI is a branch of machine learning (ML) that creates new content (e.g., text, images, and audio) from training data. Generative AI models are based on generative adversarial networks (GANs), variational autoencoders (VAEs), and transformers, with the latter being used in large language models (LLMs). Examples of LLMs that use transformers are Gemini, Bard, and LaMDA from Google and GPT and DALL-E from Open AI."

GenAI Whitepaper

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About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.