Quality data for AI-native networks

How Nokia Data Suite enables trustworthy autonomy on the path to 6G

Executive summary

For telecom operators, AI is no longer confined to analytics and dashboards, it is increasingly embedded in real time decision making, closed loop automation, and intent driven operations across the network.

Yet industry research consistently shows that **data remains the primary constraint**. Access to clean, high quality, usable data is identified as the **single biggest challenge to deploying AI at scale** in telecom networks, particularly as operators evolve toward agentic and autonomous operating models (Analysys Mason; IBM). At the same time, **data fragmentation and weak governance** continue to limit operators' ability to scale AI safely and consistently across Radio, Core, transport, and cloud domains (Analysys Mason).

As network autonomy increases, data becomes the control surface of the network itself -determining how intent is interpreted, how decisions are coordinated across domains, and how actions are governed end to end.

The impact of these challenges is visible across the AI lifecycle. **Up to 70% of MLOps effort** is still consumed by data preparation, slowing the transition from experimentation to production (Analysys Mason). Meanwhile, **41% of telecom providers** already cite agentic AI's biggest impact as autonomous network operations, highlighting how rapidly AI is moving closer to the network control plane (Omdia).

This is why **Nokia Data Suite plays a central role in AI-native autonomous networks on the path to 6G**. It provides an AI ready, governed, telco specific data foundation that enables operators to scale autonomy with trust - delivering intelligent, intent driven operations while maintaining transparency, control and operational reliability.

Biggest challenge

Access to clean, quality, usable data is the single biggest challenge to the deployment of AI at scale

41%

of telecom providers say Agentic AI's biggest impact is on autonomous network operations

70%

MLOps time is due to data preparation

56%

of telecom providers now havea Chief AI Officer

$6.2B

Telco Agentic AI market in 2030

Sources: TM Forum AI research 2024, Analysys Mason consumer survey 2023 * per countries. Gartner 2024, Appledore Agentic AI report 2025. IDC Omdia 25; GSMA Intelligence, Service Assurance Trends in the AI Era; IBM

The industry reality: AI ambition meets data complexity

Telecom operators have spent years modernizing their networks - virtualizing infrastructure, introducing cloud-native functions, and automating individual domains. Yet many organizations are still constrained by data foundations designed for reporting and post event analysis, not for real time, cross domain automation.

Traditional data lakes and warehouses have helped centralize data, but as networks become more complex, multi vendor and multi domain, their limitations become clear. These architectures often lead to:

- Inconsistent data quality
- Repeated rebuilding of data pipelines in different applications
- Limited reuse across domains
- Increasing governance and security risks at scale

As a result, many data lakes evolve into data swamps - technically centralised, but operationally fragmented.

Reflecting this reality, operators are intentionally limiting data platform sprawl. Most run only one or two strategic data platforms, while more than half have begun adopting modern data architectures such as data fabric and data mesh to address fragmentation, quality and governance challenges (Analysys Mason).

At the same time, operators remain pragmatic in how they progress AI. Machine learning analytics and business intelligence continue to deliver the most tangible value today. More advanced AI and autonomous operations are emerging - but only where the data foundation can support them.

The conclusion is straightforward: AI-native autonomy cannot outpace the data foundation beneath it.

Why AI autonomy requires shared meaning and a modern data architecture

As AI moves from generating insights to taking action in live networks, data availability alone is no longer sufficient. What increasingly determines success in AI-native networks is whether data can be understood, trusted and acted upon consistently across domains.

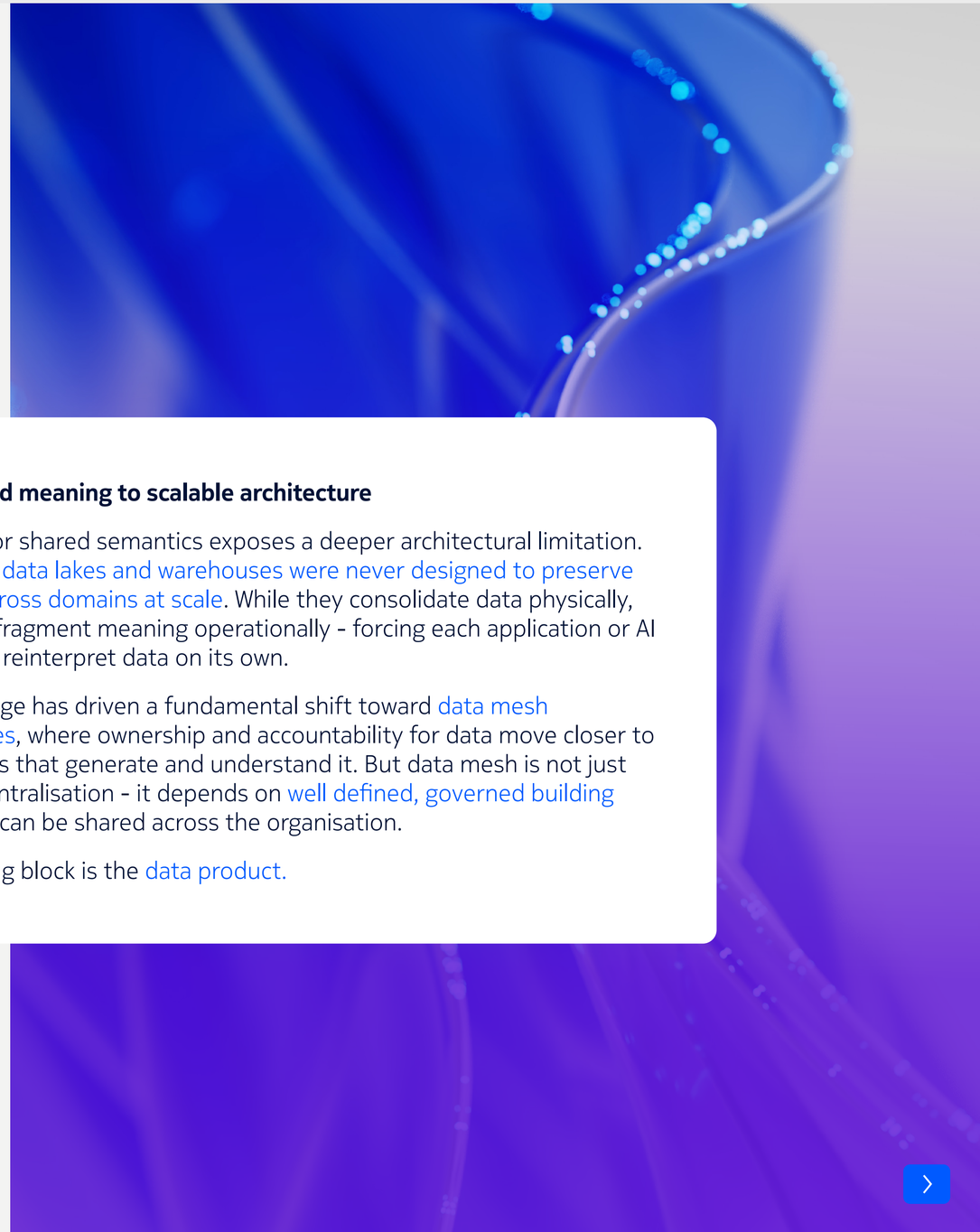
Autonomous systems rely on AI models to interpret intent and trigger actions across Radio, Core, transport, cloud and operations. In this environment, inconsistent definitions, fragmented KPIs or domain specific interpretations of the same events can lead to conflicting or unstable outcomes, even when the underlying data itself is accurate.

This is why shared data semantics and network ontologies are becoming foundational for AI-native networks.

Raw telemetry only becomes actionable for AI when it is:

- Interpreted consistently across domains
- Enriched with context
- Governed through shared definitions
- Aligned to service and business intent

Without a semantic layer, AI systems optimize locally rather than system wide, creating isolated decision loops, unintended interactions between domains, and operational risk. For telecom operators running multi vendor, multi technology networks, this risk grows rapidly as AI moves closer to real time control.



From shared meaning to scalable architecture

The need for shared semantics exposes a deeper architectural limitation. Centralized data lakes and warehouses were never designed to preserve meaning across domains at scale. While they consolidate data physically, they often fragment meaning operationally - forcing each application or AI use case to reinterpret data on its own.

This challenge has driven a fundamental shift toward data mesh architectures, where ownership and accountability for data move closer to the domains that generate and understand it. But data mesh is not just about decentralisation - it depends on well defined, governed building blocks that can be shared across the organisation.

That building block is the data product.

Data products: where data mesh becomes operational

In AI-native networks, **data products become the fundamental unit of data management**. Rather than raw datasets or pipelines, data products are:

- Domain owned and decoupled
- Defined by clear contracts, inputs and outputs
- Governed, observable and auditable
- Designed for reuse across multiple AI, analytics and automation use cases

Crucially for telecom operators, data products embed **semantics, governance and lifecycle control directly into the data itself. This ensures that when AI systems consume data across domains, they operate on shared meaning.**

By structuring data as telco specific data products within a data mesh model, operators can:

- Enforce consistent data quality and trust across domains
- Apply federated governance without central bottlenecks
- Correlate data reliably across Radio, Core, transport and cloud
- Scale AI and automation across the entire network without losing control

As networks evolve toward closed loop and intent based operations, this combination – **telco semantics, data mesh architecture, and governed data products** - becomes essential. It turns data from a passive asset into an **active control layer**, enabling AI-native networks to coordinate decisions, actions and outcomes system wide, safely and at scale.

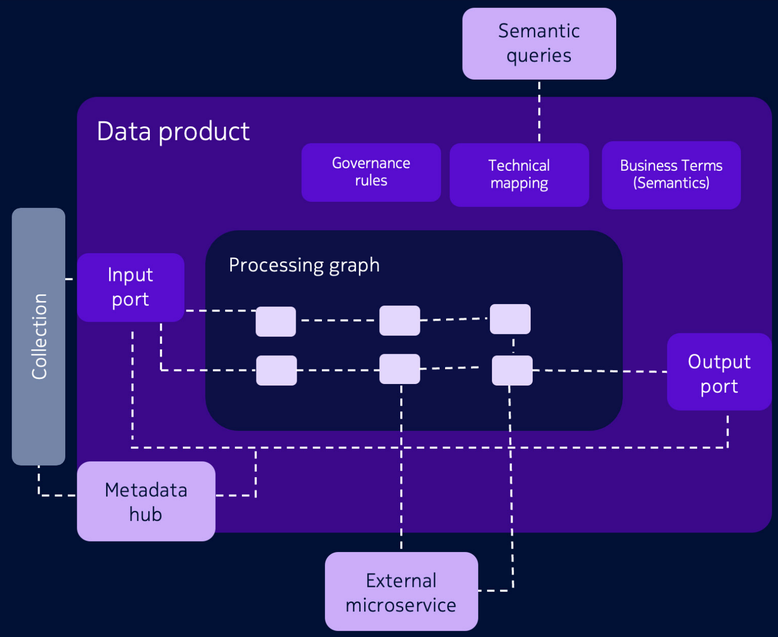
Core construct in **Data Mesh** architectures; decoupled, domain-owned, composable

Fundamental unit of data **governance** and lifecycle control

Defined by **contracts**; in/out ports, processing graphs, annotations, semantic terms

A **“product”** with what that means; deployable, observable, auditable

Composed for **reuse**, unlocking autonomous operations



Nokia Data Suite: the data foundation for AI-native autonomous networks

Nokia Data Suite is designed specifically to address these realities.

As part of Nokia's Autonomous Networks portfolio, Nokia Data Suite transforms complex, multi vendor network data into governed, reusable, telco specific data products - enabling AI systems to act on trusted data rather than raw signals.

What makes Nokia Data Suite different

Telco specific by design

Industry research shows that telecom expertise is the top criterion when operators select data platform vendors (Analysys Mason*). Nokia Data Suite is built on decades of telco data engineering - not adapted from generic IT platforms.

Data products, not pipelines

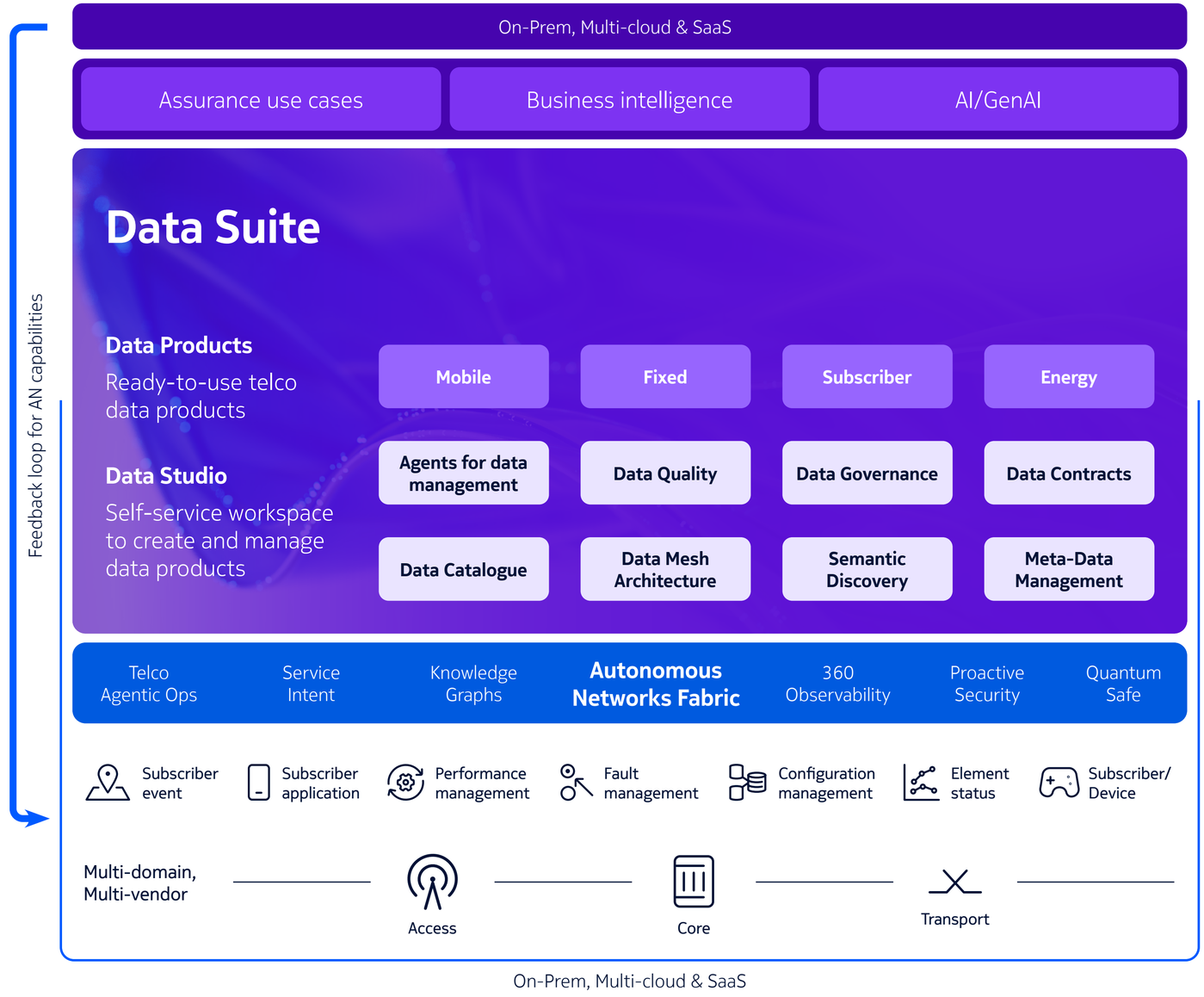
Instead of unmanaged data lakes, Data Suite delivers:

- Domain owned telco data products
- Clearly defined data contracts and semantics, aligned to TM Forum standards
- Built in observability, lineage and governance

Cloud-native and hybrid-ready

Data Suite supports hybrid deployment models, combining on premise processing with public cloud AI workloads - aligned to operators' security, latency and cost requirements.

*Analysys Mason 2026 Data Management survey



Governance as the foundation of trustworthy autonomy

With agentic and closed-loop operations, governance can no longer sit downstream as a compliance layer - it becomes a core operational capability.

In AI-native networks, decisions are increasingly made in real time, across domains, and without human intervention. The key question is no longer whether decisions are automated, but whether they are transparent, explainable, and controllable end-to-end.

This is where governance becomes critical.

From “black box AI” to operational transparency

Traditional AI relies on opaque pipelines and loosely governed datasets - sufficient for offline analytics, but not for live network operations. For telecom operators, opaque AI is not an option.

Autonomous networks require what Nokia describes as glass-box AI:

AI decisions must be explainable, data must be traceable to its origin, and actions must be auditable across domains and time. Without this transparency, autonomy introduces unacceptable operational risk.

Governance at the speed of autonomy

Nokia Data Suite embeds governance directly into the data product lifecycle - ensuring that speed and trust scale together.

Rather than post-process controls, governance is built into how data is created, shared, and consumed. This includes real-time observability, end-to-end lineage, and shared semantics across domains, enabling consistent interpretation of intent and KPIs across Radio, Core, transport, and cloud.

Because governance is intrinsic to data products, operators no longer need to trade off between faster decision-making and operational control - they achieve both simultaneously.

Enabling safe agentic and closed-loop operations

As agentic AI systems begin to interpret intent and execute actions autonomously, governed data products provide the guardrails that keep decisions aligned with business and operational objectives.

With Nokia Data Suite, AI systems operate on trusted, explainable signals, while closed-loop automation remains observable and auditable. Operators retain control even as human intervention decreases.

In this way, governance is not a brake on innovation - it is what enables autonomy to scale with confidence.

From data products to value: enabling AI-native operations in practise

For AI-native Autonomous Networks, data products need to be more than an architectural concept. They become the mechanism through which data is turned into actionable insight, automated decisions, and measurable business value.

Nokia Data Suite structures data products to support this progression, enabling operators to move from visibility to autonomy in a controlled, scalable way.

From trusted observability to proactive insight

Essential data products establish a consistent, governed view of network and service data across domains. By delivering trusted, reusable, telco specific data, they eliminate repeated data preparation and create a shared foundation for analytics, assurance, and AI use cases.

Building on this foundation, advanced data products correlate and enrich data across RAN, Core, transport and services. These cross domain products enable deeper observability of subscriber experience, application performance and service behavior - allowing operators to detect issues earlier, troubleshoot faster, and proactively optimize network performance.

Together, essential and advanced data products shift operations from reactive analysis to predictive insight, improving customer experience while reducing operational effort.

As AI moves closer to the operational control loop, cognitive data products play a critical role. These products embed AI and machine learning directly into the data layer to deliver insights that go beyond what happened reporting.

Cognitive data products enable:

- Anomaly detection across domains, identifying abnormal behavior that traditional thresholds cannot detect
- Subscriber impact detection and explainability, revealing which users are affected, why issues occurred, and how they propagate across the network
- Predictive insights, highlighting emerging risks related to congestion, degradation or failures before customers are impacted

By providing context aware and explainable outputs, cognitive data products support more confident decision making - by humans, AI applications and agentic systems alike.

Essential Data Products

Unified curated domain event data for multi-vendor Mobile and Fixed Network

Advanced Data Products

Correlated, Enriched & Summarized Data x-domain (RAN, Core, Fix) for customer and network insights on experience, performance, qualityand events

Cognitive Data Products

Deep observability cross-domain data using AI/ML to generate actionable insights and drive decisions basedon business objectives including automation, optimization, monetization

Fuel for agentic and closed loop operations

Cognitive data products also act as trusted inputs for agentic AI and closed loop automation. They supply consistent signals, shared semantics and governed context to automation systems, enabling intent based actions without sacrificing transparency, control or reliability.

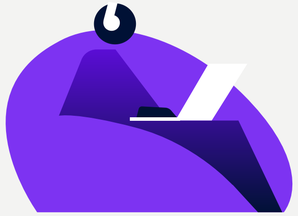
As more use cases consume the same data products, their value compounds:

- Data quality continuously improves
- Semantics are reused across domains
- AI use cases scale faster and operate more safely

This is how data products evolve from enablers of analytics into operational building blocks for autonomy.

Real world results: accelerating AI value today

By standardising data products and reducing repeated data preparation, operators unlock immediate efficiency while building a foundation for agentic and intent based AI.



Data producer

Expose all data sources

Node connections, Datalakes on-prem/ oncloud, NMS

Time saved: 1 month

Data Scientist

Find suitable models & test

Create adhoc running off the model

Reengineer & Redeploy

Time saved: 2 month

Data Engineer

Find a suitable Data feed to use in final dataset

Normalize & consolidate

Time saved: 1-2 months

Apps/Consumers

Create a visualization

Manually monitor the results & lifecycle of the model

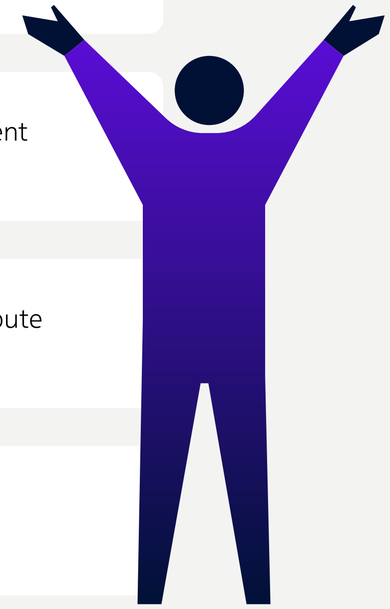
Time saved: 1 month

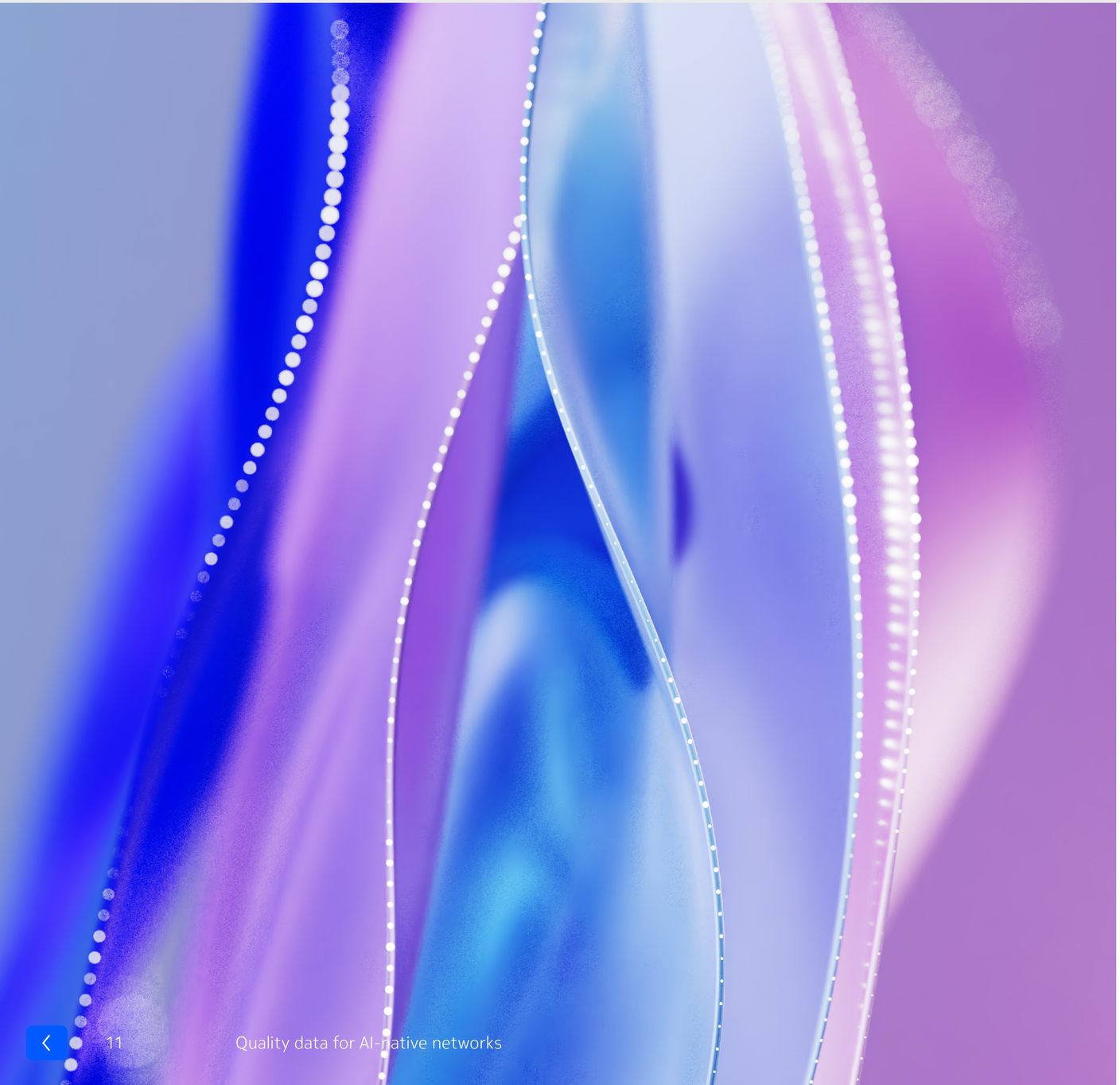
Speed and Accuracy: 70% faster MLOps, Up to 72% increase in data analysis efficiency, increased time-to-market

Cost Savings: Multi-millions saved in data management (Tier 1 NAM CSP)

Operational Efficiency: Up to 50% reduction in compute resources usage,accelerated automation use cases

Scalability: Data preparation at a scale for AI driven Autonomous Networks





Data as a strategic asset on the path to 6G

6G will not be defined by radio technology alone. It will require:

- Real time intelligence
- Autonomous optimization
- Seamless coordination across the network and cloud

AI-native networks on the path to 6G demand data platforms that are:

- Autonomous ready
- Governable and transparent
- Built for scale across domains

Nokia Data Suite turns data into a strategic control asset, enabling trustworthy autonomy as networks evolve toward 6G.

Conclusion

AI-native networks demand more than smarter algorithms.

They demand **data foundations operators can trust.**

With Nokia Data Suite, operators gain:

- A telco grade data platform
- A governed, semantic data product model
- A scalable path from analytics to autonomy

This is how data enables AI-native networks - and how autonomy becomes an advantage, not a risk, on the path to 6G.

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About Nokia

Nokia is a global leader in connectivity for the AI era. With expertise across fixed, mobile, and transport networks, we’re advancing connectivity to secure a brighter world.