

T-Kartor Iris:

GeoGraphAI

Network Intelligence for Complex Infrastructure Systems

Understanding Complex Networks. Powering Smarter Decisions.

Solution Overview

Modern infrastructure operates as a network of interconnected systems. Roads, railways, utilities, logistics chains, and digital infrastructure depend on thousands or millions of assets that must work together in real time.

T-Kartor Iris GeoGraphAI extends the Iris platform with advanced graph analytics and AI capabilities that enable organizations to model, analyze, and understand complex infrastructure networks at scale. By combining geospatial intelligence, graph analytics, and AI-driven data integration, Iris GeoGraphAI allows operators and analysts to visualize relationships across massive datasets, detect bottlenecks, simulate disruptions, and identify optimal paths through complex systems.

The result is a powerful operational capability that transforms fragmented infrastructure data into actionable network intelligence. Whether managing transportation systems, utility infrastructure, logistics operations, or civil defense environments, Iris GeoGraphAI helps organizations understand how systems connect, interact, and respond to real-world events.

The Problem It Solves

Organizations responsible for critical infrastructure face a growing challenge: their operations depend on networks, but their data lives in silos.

Transportation agencies manage road networks, rail systems, sensors, and incident reporting platforms across multiple systems. Utilities operate complex grid infrastructure supported by asset databases, monitoring tools, and maintenance platforms. Logistics organizations manage route networks, traffic conditions, and operational data spread across numerous systems.

These environments generate enormous amounts of information from:

- Operational systems
- Sensors and IoT devices
- Maintenance platforms
- Geographic information systems
- External data sources such as weather, incidents, or traffic

Yet organizations often struggle to answer critical operational questions:

- What is the impact if a key node fails?
- What is the optimal route under current conditions?
- Where are bottlenecks forming across the network?
- Which assets are most critical to operations?

Traditional databases are not designed to model and analyze the complex relationships between millions of interconnected elements. As infrastructure systems grow more complex and data becomes increasingly dynamic, organizations need a new approach to understanding and managing their networks in real time.

How the Solution Works

T-Kartor Iris GeoGraphAI introduces a graph-based analysis environment within the Iris platform that models infrastructure systems as interconnected networks.

In this model:

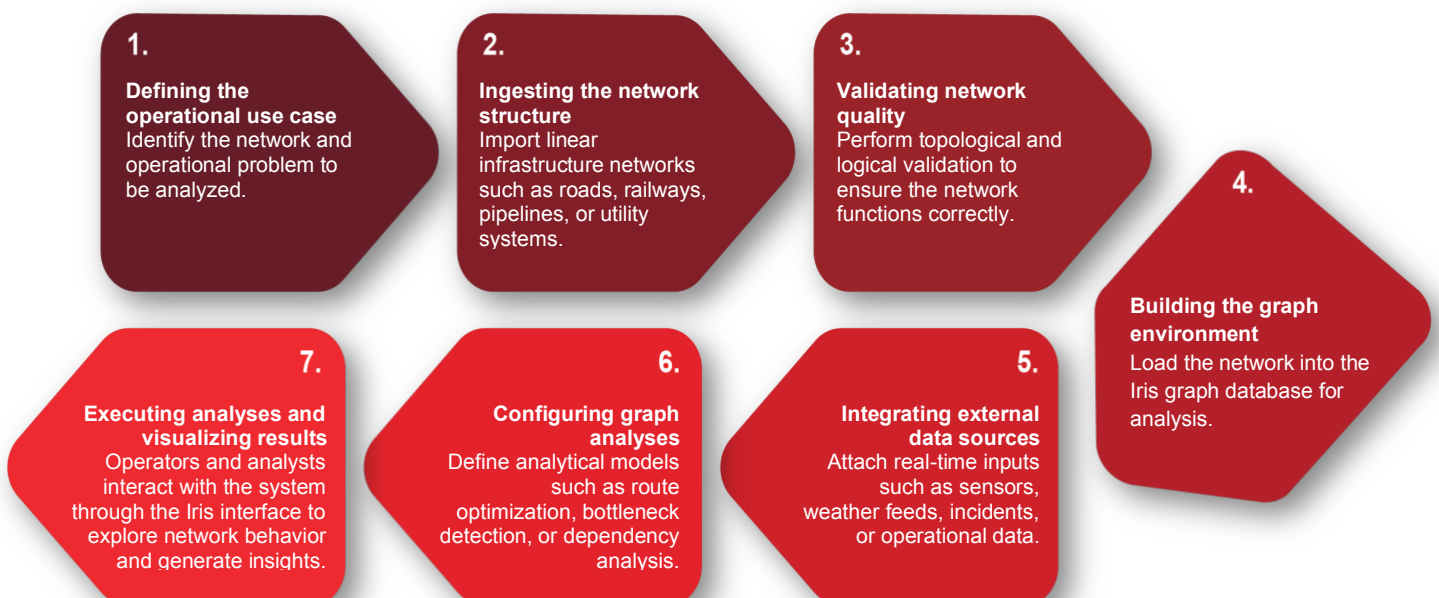
Nodes - Represent assets such as stations, intersections, facilities, or equipment.

Edges - Represent the connections between them, including roads, rail lines, pipelines, or operational dependencies.

Properties - Describe operational conditions such as travel time, capacity, cost, weather conditions, or operational status.

This network model enables Iris to perform advanced analyses that reveal how systems behave under real-world conditions.

A typical workflow includes:



Integrated AI capabilities allow additional data sources to be dynamically connected and analyzed, enabling advanced search, contextual analysis, and real-time operational insight.

Key Capabilities

Large-Scale Network Modeling

Manage and analyze extremely large infrastructure networks using a high-performance in-memory graph environment designed for scalability.

Advanced Path and Dependency Analysis

Calculate optimal routes and relationships across networks using multiple constraints such as time, distance, cost, weather conditions, and operational restrictions.

Bottleneck and Critical Node Detection

Identify infrastructure nodes whose failure would significantly impact operations, enabling improved planning and risk mitigation.

Real-Time Data Integration

Attach live operational data sources such as sensors, incidents, traffic feeds, or IoT data directly to the network model.

AI-Enhanced Data Integration

Leverage integrated AI capabilities including semantic search, LLM support, and advanced data linking to enrich network analysis.

Interactive Graph Exploration

Visualize and explore complex system relationships through an intuitive graph interface within the Iris platform.

Secure Cross-Domain Operations

Operate securely across multiple environments and security domains, supporting sensitive operational use cases including defense and civil preparedness.

Deployment & Integration

T-Kartor Iris GeoGraphAI integrates seamlessly into existing operational environments.

The platform supports deployment across:

- Cloud environments
- On-premises infrastructure
- Hybrid architectures
- Secure or classified environments

Iris uses a modular architecture where system components communicate through internal APIs, many of which are also available as external interfaces for integration with other platforms.

The platform supports widely used geospatial and data standards including:

- GeoJSON
- WMS
- CSW

T-Kartor Iris aligns with relevant **W3C, ISO, and OGC standards**, ensuring compatibility with modern geospatial and data ecosystems.

Security and Compliance

Security is a foundational design principle within the T-Kartor Iris platform. The system uses Role-Based Access Control (RBAC) to manage permissions across all assets, datasets, and processes.

All actions and processes run through an asynchronous task queue that manages:

- Execution
- Authorization
- Logging
- Prioritization

This architecture ensures full traceability of system activity and supports compliance with cybersecurity and regulatory frameworks such as **EU NIS2**.

Operational lineage and system activity can be retained and audited to support incident reporting, monitoring, and governance requirements.

Example Use Cases

Transportation Network Optimization

Transportation agencies can model entire road or rail networks and evaluate multiple routing scenarios. For example, identifying alternative routes between Norway and Sweden while accounting for travel time, capacity constraints, weather impacts, and operational conditions.

Critical Infrastructure Resilience

Civil defense organizations can model infrastructure dependencies to understand how disruptions affect transportation, utilities, and logistics systems, improving emergency preparedness and response planning.

Infrastructure Maintenance Planning

Operational teams can combine maintenance data, sensor inputs, and infrastructure networks to identify critical assets and prioritize preventive maintenance activities.

The Value

T-Kartor Iris GeoGraphAI enables organizations to transform fragmented infrastructure data into **operational network intelligence**.

By combining graph analytics, geospatial intelligence, and AI, the platform helps organizations:

- Make faster operational decisions
- Improve infrastructure resilience
- Optimize routes and logistics
- Identify critical infrastructure dependencies
- Allocate resources more effectively

As infrastructure systems become more interconnected and data-driven, understanding how networks behave in real time is becoming essential. Iris GeoGraphAI gives organizations the ability to move beyond static data and into dynamic network intelligence.