

# Energy - Insight Center powered by Expero & Neo4j

*May 11, 2022*

Mike Welch - Enterprise Account Executive



# Agenda

- Who is Neo4j?
- Who is Expero?
- Brief Demonstration of Insight Center
- Reference Architecture and Tech Stack Behind the Vision
- Wrap-up and Q&A

# Who is Neo4j & Why Might You Care?

The Industry's Largest Dedicated Investment in Graphs



## Industry Leaders use Neo4j

## Anyway You Like It



Creator of the **Property Graph** and **Cypher** language at the core of the **GQL** ISO project

**20/25** Top Financial Firms

On-Prem



**Thousands** of Customers World-Wide

**7/10** Top Retail Firms

In the Cloud



HQ in **Silicon Valley**, offices include **London**, **Munich**, **Paris** & **Malmo**

**7/10** Top Software Vendors

DB-as-a-Service



# What the Analysts Are Saying

**"By 2025, graph technologies will be used in 80% of data and analytics innovations, up from 10% in 2021, facilitating rapid decision making across the enterprise."** *Source: Gartner, Top Trends in Data and Analytics for 2021, Rita Sallam et al., 16 Feb 2021.*



THE FORRESTER WAVE™  
Graph Data Platforms  
Q4 2020



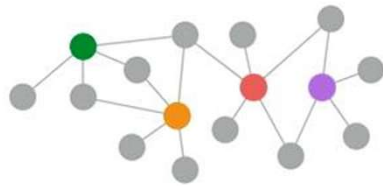
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Source: Forrester Research, Inc. Unauthorized reproduction, citation, or distribution prohibited.

# What Value Does Neo4j Deliver?



Connections in data



Real-Time Connected Insights

## Immediate benefits:

### Speed, speed, and more speed:

- enabling workloads that were thought to be impossible before
- real-time what was batch before

### Hardware savings:

- a few servers replacing dozens/hundreds

### Operational savings:

- easier to run and operate

# Graph Database - Designed for Connected Data

2017+

## Graph Database

**Flexible, scale-out store/retrieve + analytics**

Optimized for data connections, real-time transactions and analytics

**Natively store & query relationships**

Queries run 1000x faster at scale, up to 1000+ hops



Value Based

2010+

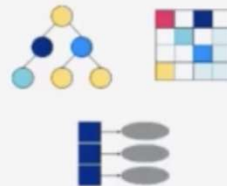
## NoSQL Database

**Scale-out, simple model store/retrieve**

Optimized for application-driven, volume throughput

**Don't handle relationships at all**

No language or structures for handling relationships: joins done through the application



App Based

1980+

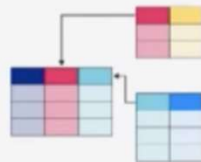
## Relational Database

**Structured, schema-based store/retrieve**

Optimized for real-time transactional processing/reporting

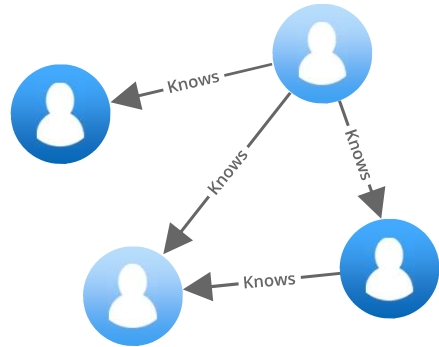
**Don't handle relationships well**

Practically limited to three degrees of separation



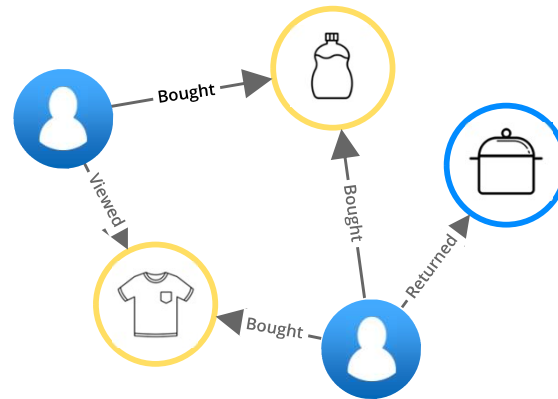
SQL

# Connections in Data are as Valuable as the Data Itself



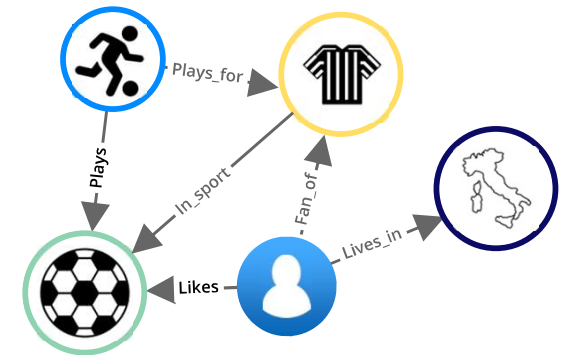
## Networks of People

E.g., Employees, Customers, Suppliers, Partners, Influencers



## Transaction Networks

E.g., Risk management, Supply chain, Payments



## Knowledge Networks

E.g., Enterprise content, Domain specific content, eCommerce content, **Asset tracking**

# Electricity Transmission Networks are Graphs

The image shows a Google search interface for "electricity transmission networks". The search bar is at the top, and below it are several tabs: topology, smart, circuit, smart grid, germany, system, power systems, cascading, and cascading failures. The search results are displayed in a grid of thumbnails, each with a title and a source URL. The thumbnails include:

- transmission-power-grid topology ... sciencedirect.com
- topology of the power tr... researchgate.net
- An example of the smart grid topolo... researchgate.net
- Network topology of the... researchgate.net
- Central Chilean power grid ... nature.com
- modelled electricity network in S... researchgate.net
- Electrical grid - Wikipedia en.wikipedia.org
- Scandinavian power gr... researchgate.net
- Electrical grid - Wikip... en.wikipedia.org
- Power Distribution Network Topology ... arxiv.org
- The Structure of Electric Power Systems ... electrical-engineering-portal.com
- Power Network Topology Control for ... gmd.mste.illinois.edu
- Transmission network diagram showing Gas and Oil, Refinery, Importation, Exportation, Fuel of station, storage, Evacuation to air, Distribution, Domestic and commercial.
- Diagram of a power system showing Generating Station, Transmission Step Up Transformer, Transmission lines (765, 500, 345, 230, and 138 kv), Substation Step Down Transformer, Subtransmission Customer (28kV and 69kV), Primary Customer (130kV and 48kV), and Secondary Customer (120V and 90kV).
- Diagram titled "Power Distribution Systems" showing various components and labeled "Electrical 4 U".



# Who is Expero?

Scott Heath - [scott.heath@expero.com](mailto:scott.heath@expero.com)



# Industry Experience



Supply Chain & Logistics



Power & Network Analytics



Biotech



Agriculture



Real Estate



Healthcare



Retail



Oil & Gas



Financial



Defense & Justice



Education

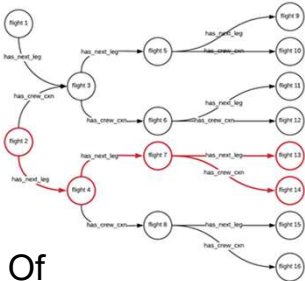
Expero teams have experience taking product building expertise across multiple industries.

# The Energy Industry *IS* a BIG Graph

Core concepts in this domain *are* graphs -- the analysis and visualization is easier to build and understand when working against the right abstractions.

## Dependencies

Nodes  
Assets  
People  
Time

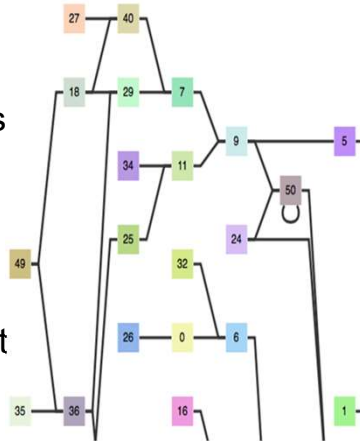


Relationships  
Relationships Of  
Location connections  
Connected To

Analytics  
Alternatives  
Prediction of Need  
Cost Optimization

## Grids

Nodes  
Devices  
Connections  
Distribution Centers

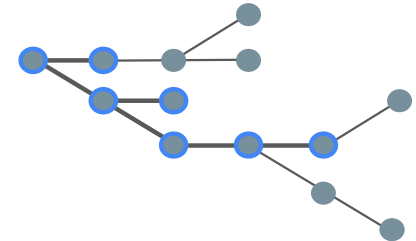


Relationships  
Path Options  
People - Skills  
Maintenance & Cert

Analytics  
Critical Path  
Impact Analysis  
Optimization

## Networks

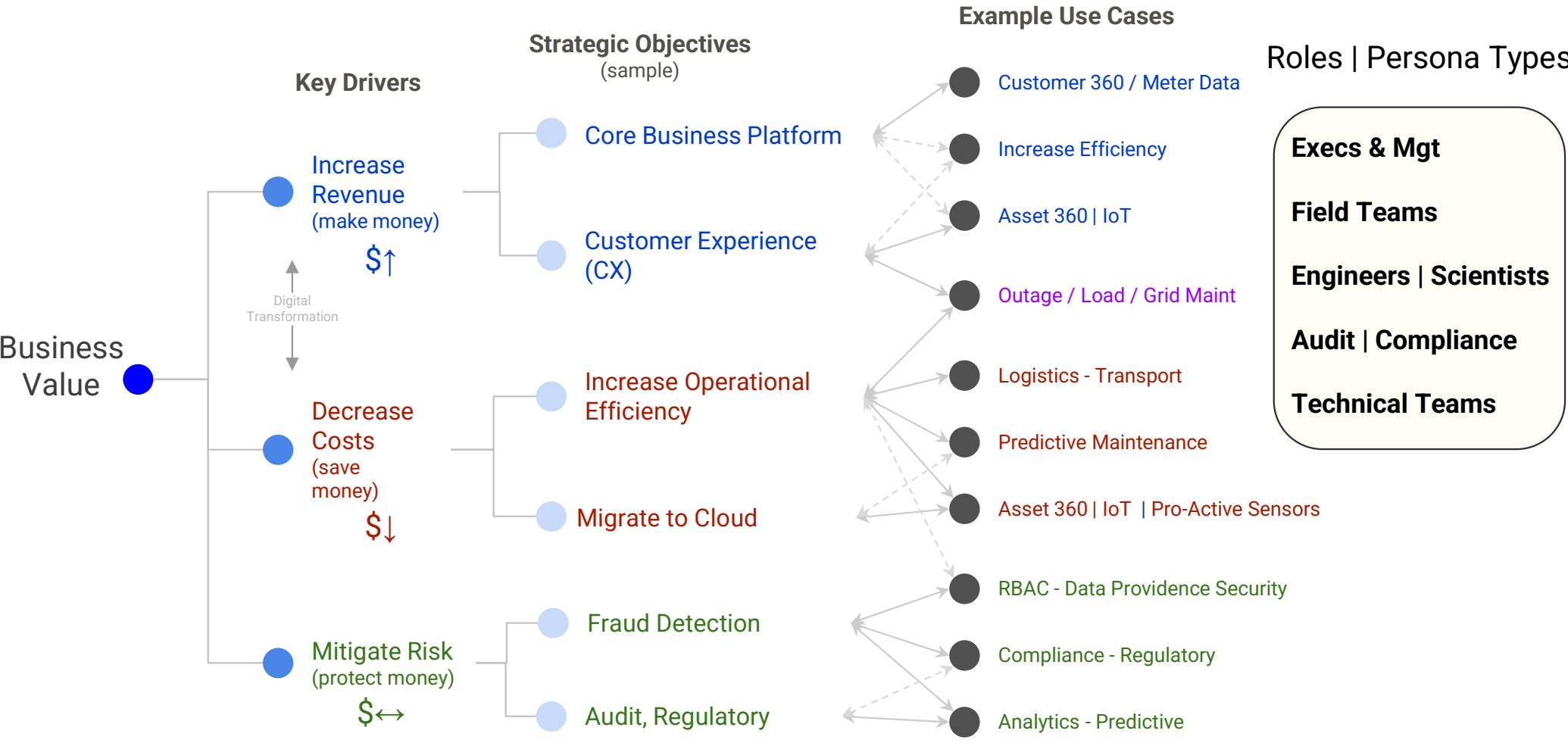
Nodes  
Customers  
Routes  
Alternates



Relationships  
Locations  
Asset & ID's  
Types

Analytics  
Shortest Route  
Best Extensions  
Cost Optimization

# 'Tree of Pain' - Value per Use Case



What?

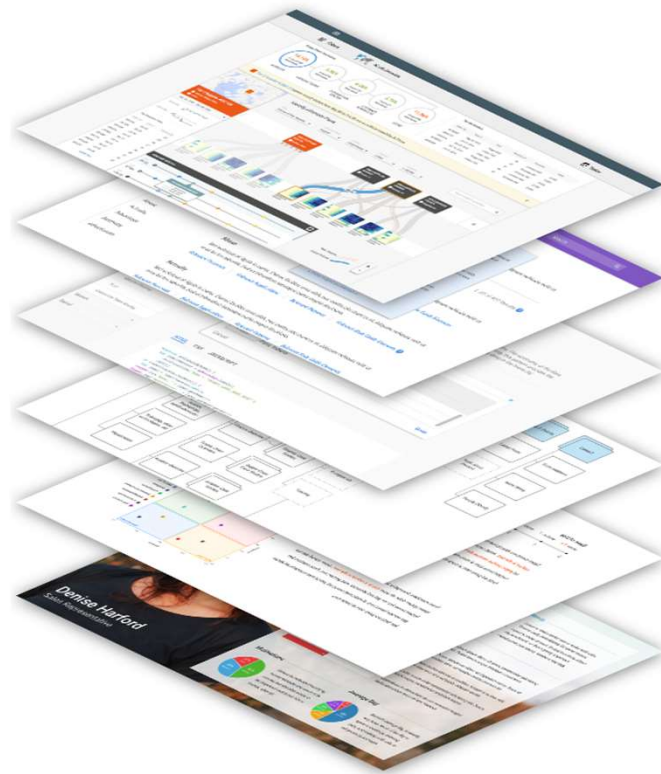
**Usefulness** is as important  
and sometimes MORE  
important than usability  
for domain expert users



# UI/UX - Usefulness vs. 'Pretty' for Complex Apps

Usability

Usefulness



OPTIMAL ENX - PROCESS DESIGN

TECHNICAL DESIGN & LAYOUT

CODE + LOGIC + USER OPTIMIZATION

DATA + NEO4J + CONNECTION -  
ARCHITECTURE

SOURCE DATA, CONFLUENT ARCHITECTURE

NON-VISUAL FUNCTIONALITY

SYSTEM INTERCONNECTIVITY



# Visualization - Functionality by User

WORKBENCH

IT STUDIO



EXECUTIVES

## Dashboards & Reports

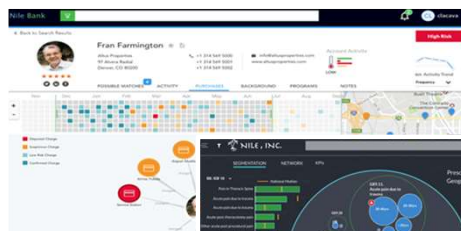
- Macro Trends
- Drill In Elements



LINE OF BUSINESS

## Product Specific Dashboards & Reports

- Customer 360 - Custom Solution
- Supply Chain - Audit & Compliance
- Fraud - Sanctions & Prosecution



CUSTOMER FACING

## C360 Interaction and Communication

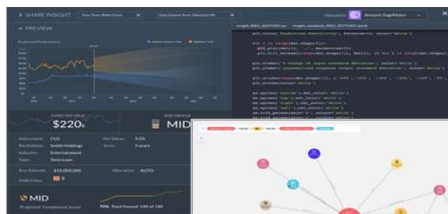
- Visual & Non Visual
- Alerts & Updates



TEAM INVESTIGATION

## Investigation Teams - Workbench

- Investigations & Teams
- Findings & Connectivity
- Exploration



ANALYTICS

## Relationship Diagrams

- ML & Algorithms
- Complex analytics and 'scenarios'



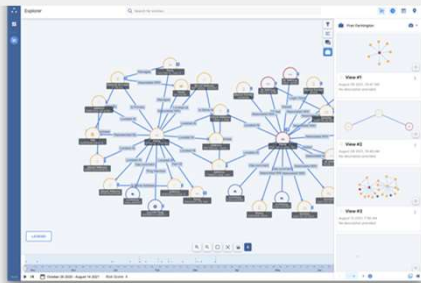
IT | PLATFORM

## Graph & Management

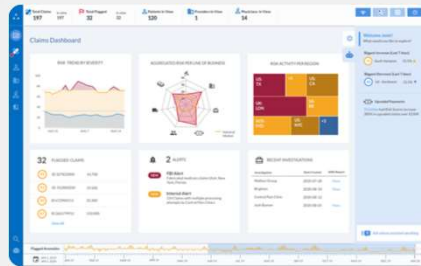
- Data Models
- Graph Ops & Attributes



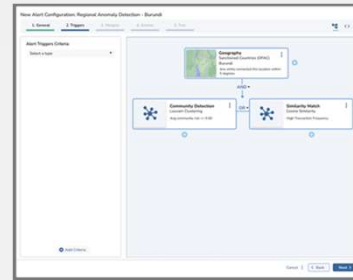
# Modules



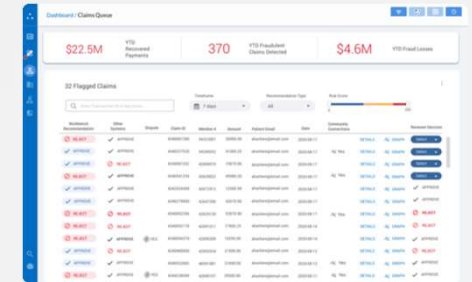
Explorer Workbench



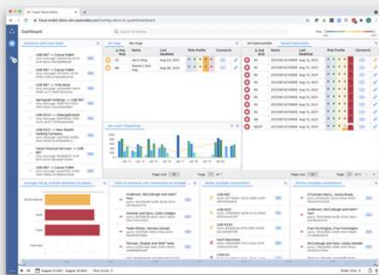
Adaptive Analytics



Alert Management



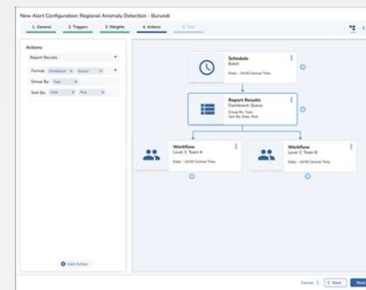
Case Management



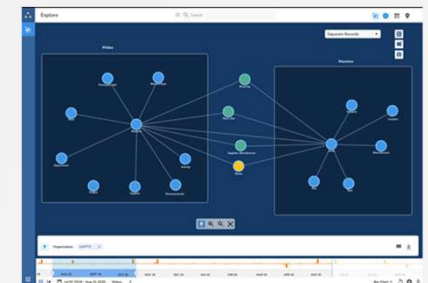
Configurable Dashboard



Collaboration /  
Investigations



User / Workflow  
Management



ER / Data Enrichment





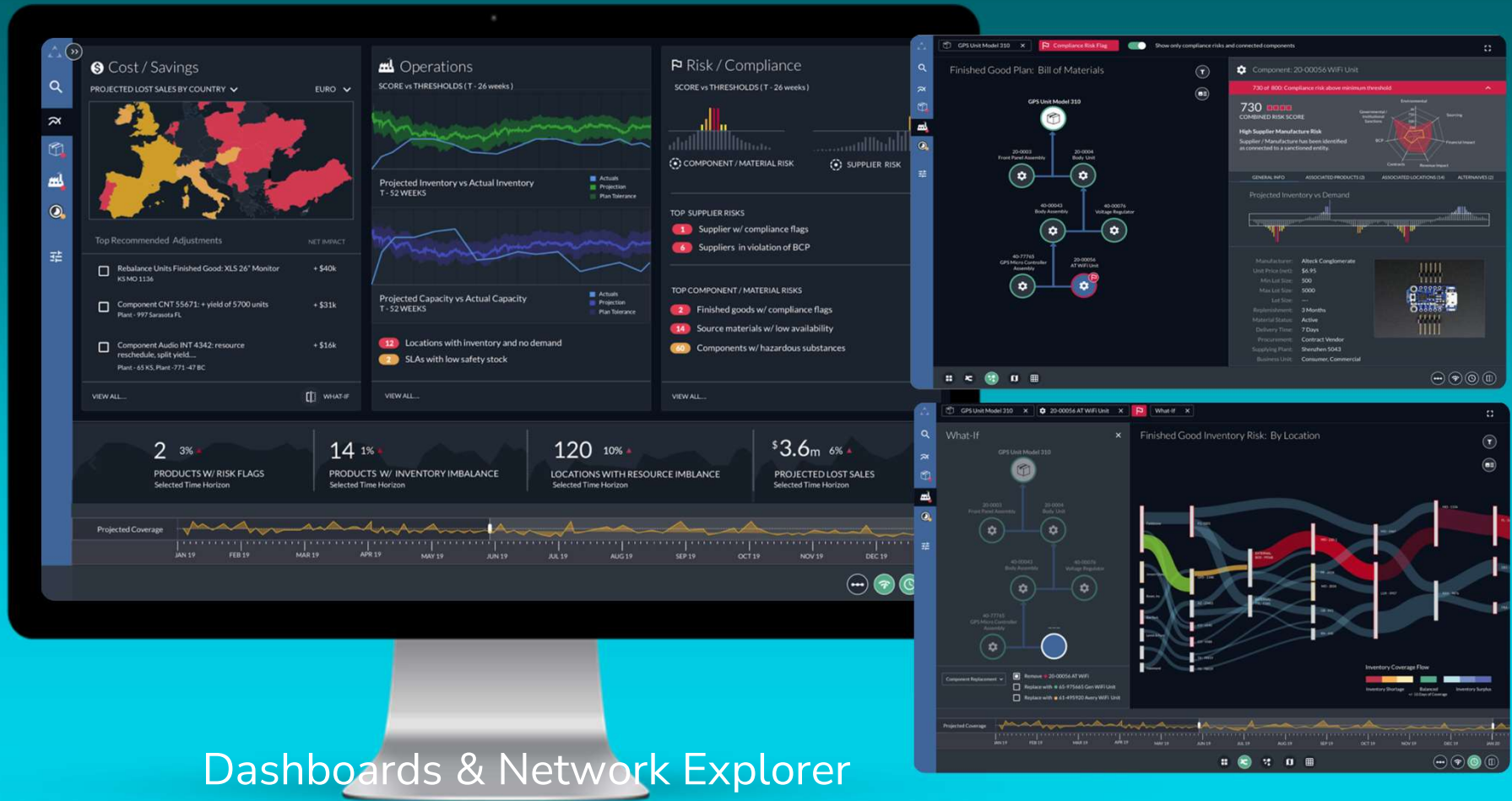
# Real Time - Network Visibility, Trends & Scenarios



Adaptive Analytics



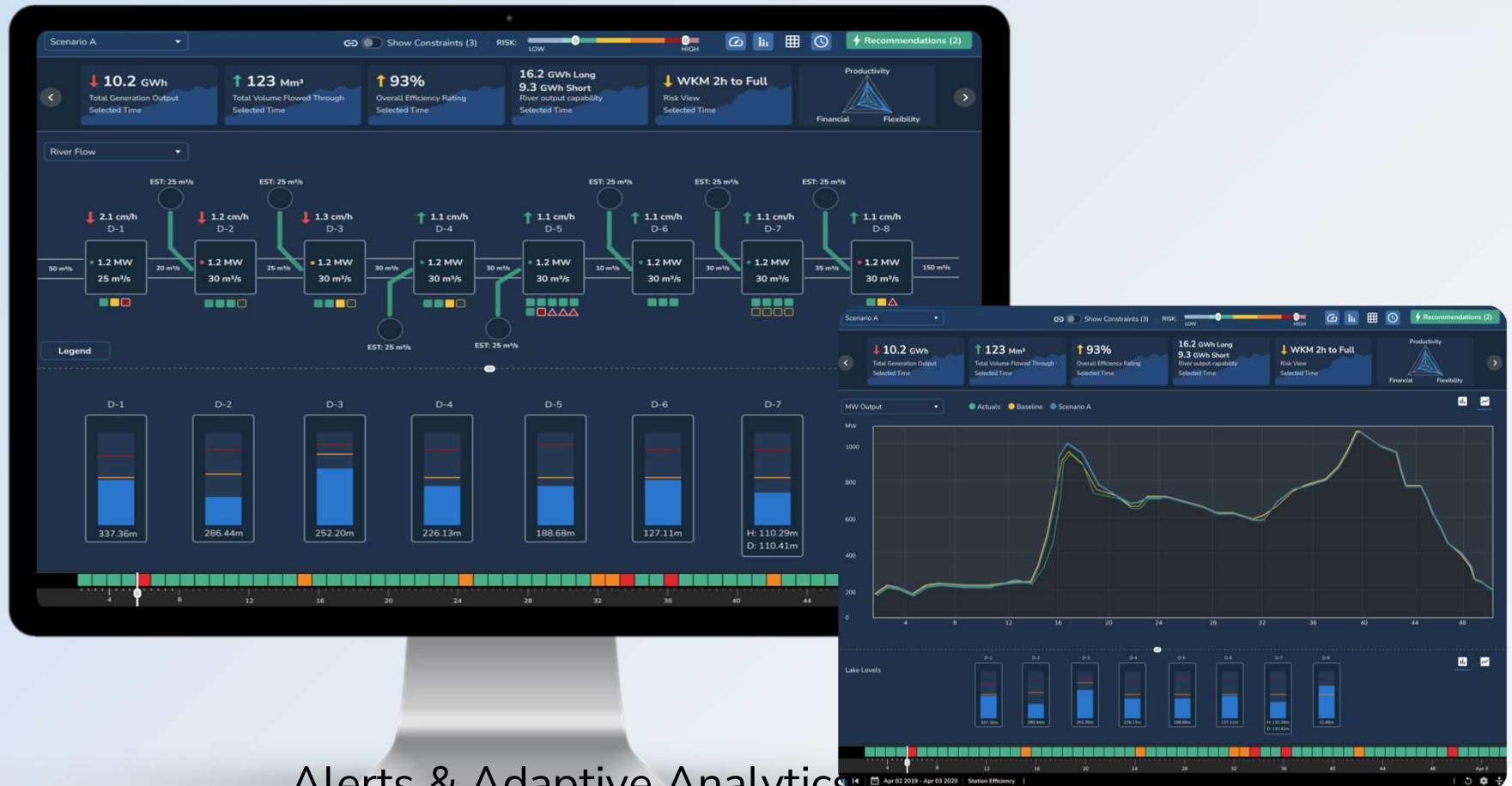
# Planning - Recommendations, Alternative Paths



Dashboards & Network Explorer



# Machine Learning - Alert Prediction, Complex Analytics



Alerts & Adaptive Analytics

# Customer Use Case

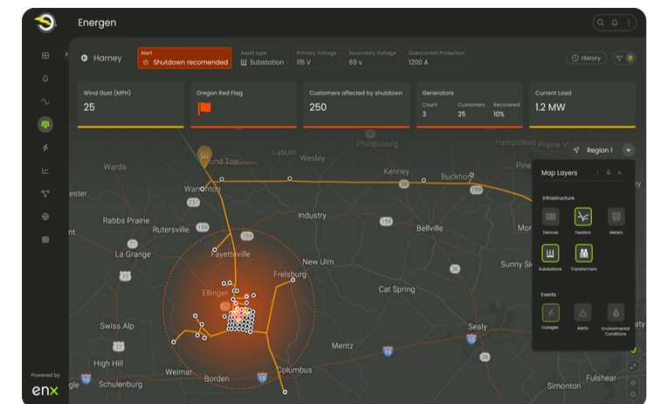
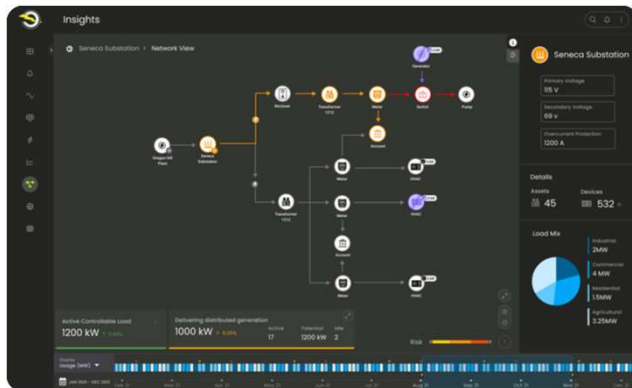
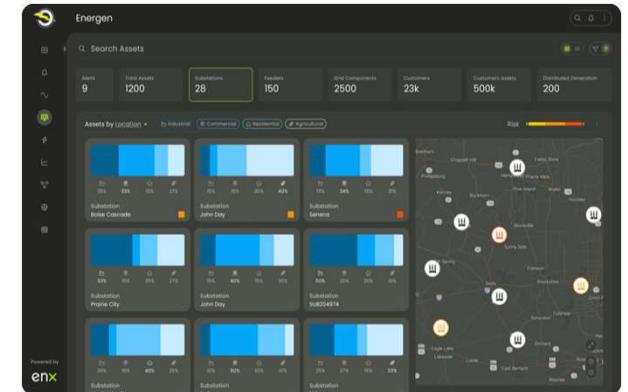


# Ecosystem & Insight Center - 'Bringing it to Life'

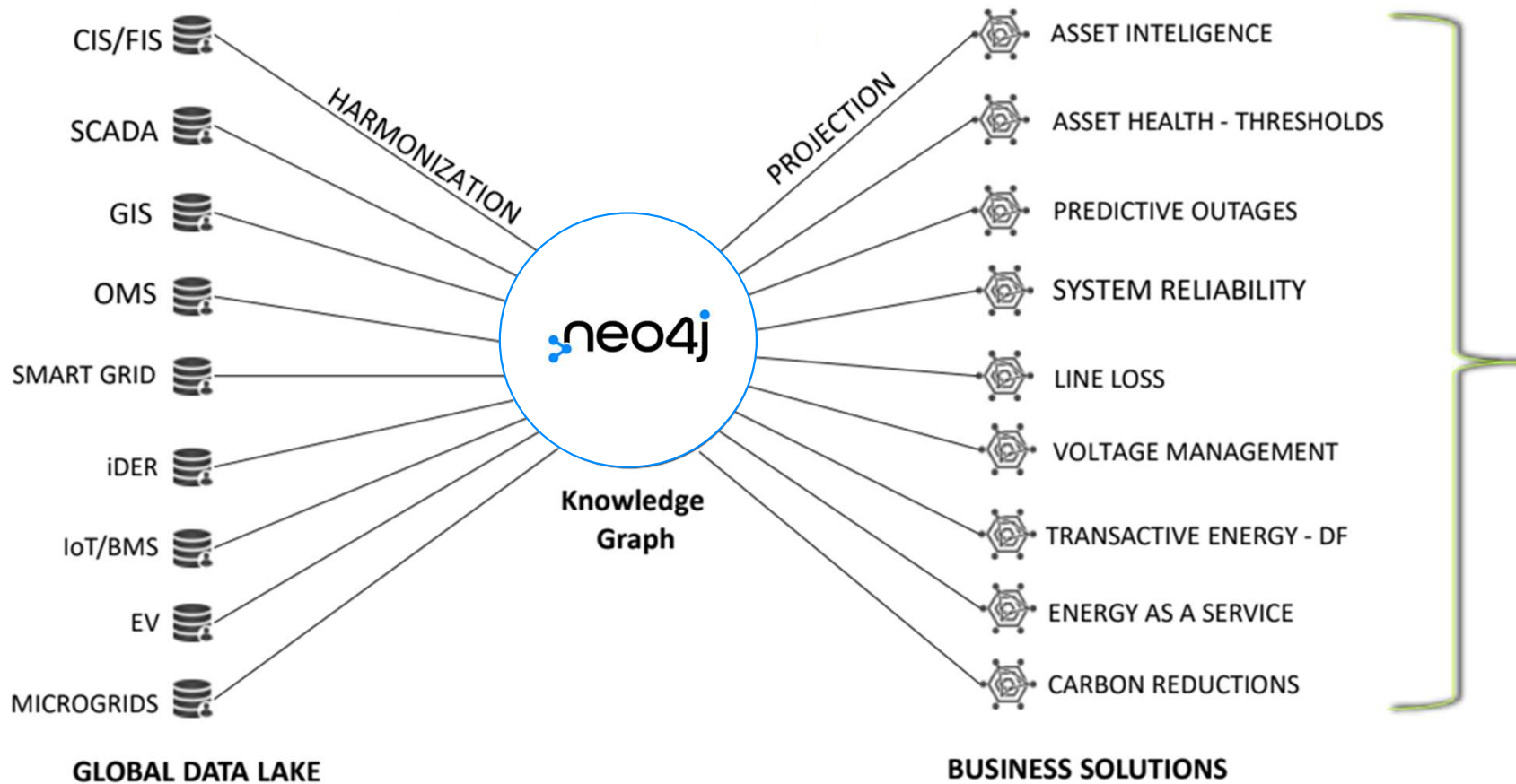


## Enterprise View

- Real Time
- Network Outage
- Prediction
- Decision Analytics

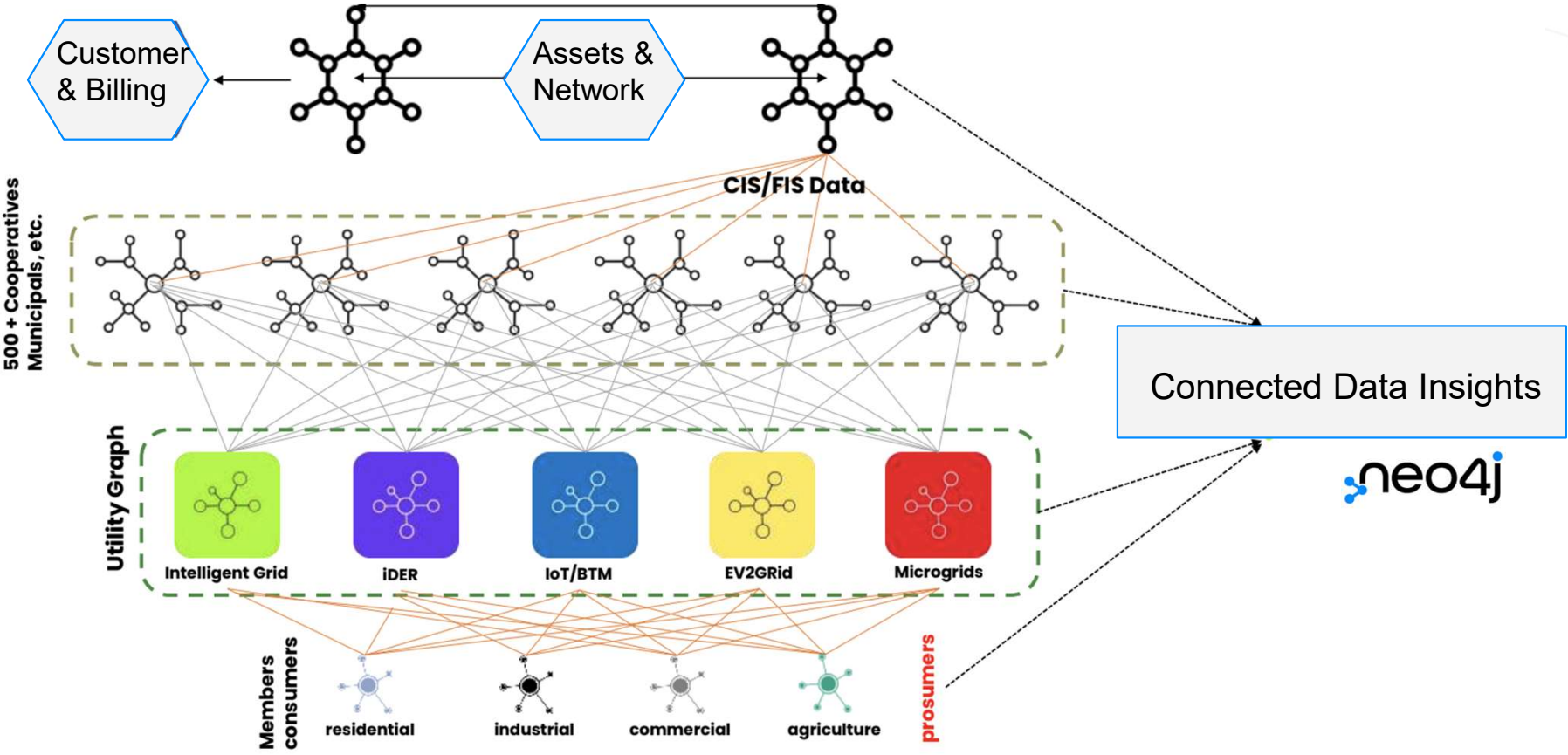


# Utility Graph



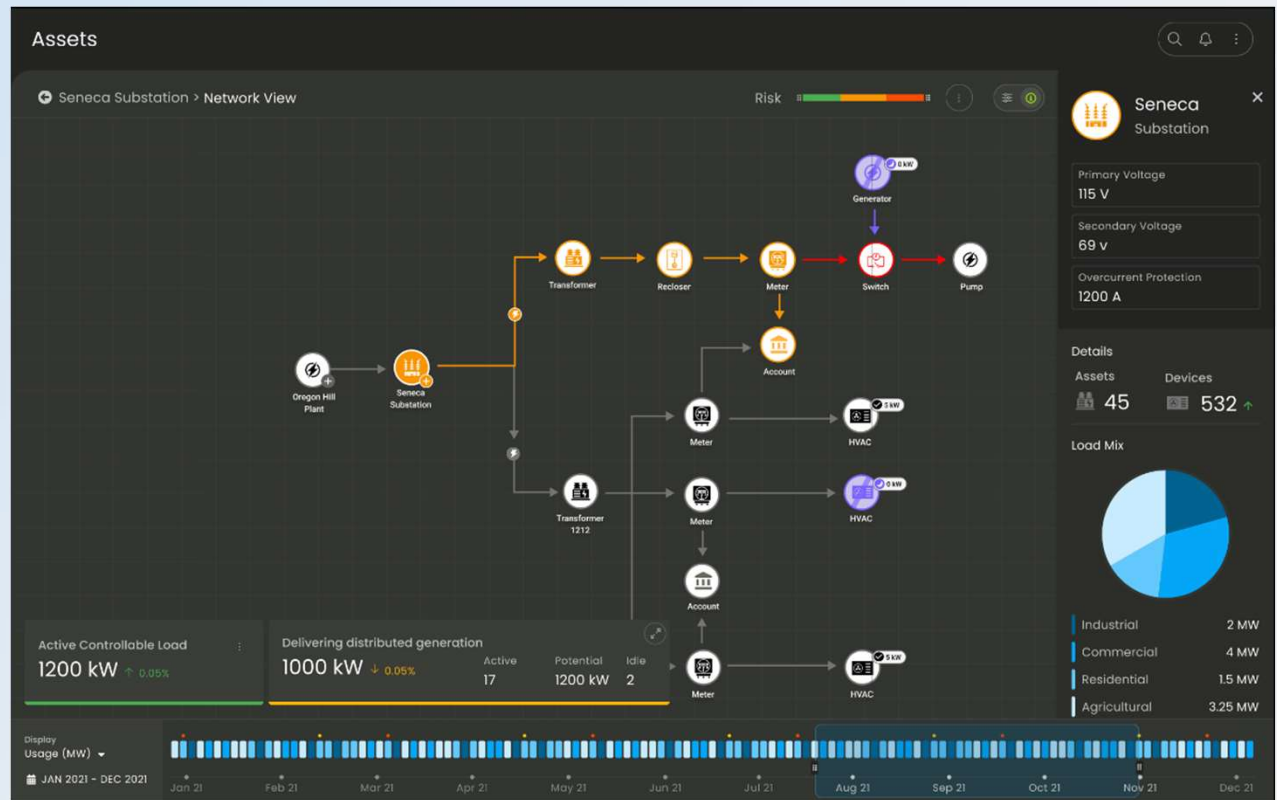
MACHINE LEARNING - ALGORITHMS

# Global Graph Architecture



# Demo

- Rules / Alerts
- Dashboards
- Analytics
- Network Analytics







neo4j | expero

THANK YOU!