



NEARBY  
COMPUTING



**NearbyOne**  
**On the need of orchestration and  
automation platforms for Smart Grids**

**December 2023**

# Motivation



The smart grid paradigm poses **new challenges to communication networks** requiring a flexible and orchestrated network, slicing, and millisecond-level latency.

To transform today's power distribution grids into 'evolved' smart grids that feature online monitoring data and to enable efficient, fast, and secure operation, power distribution companies need **new tools that will allow them to monitor and operate the distribution network and to maintain and increase reliability and Quality of Service (QoS).**



# Real Use Cases: Smart Substations



## BENEFITS

### □ MONITOR AND SECURE SUBSTATIONS

High-resolution 3D sensors combined with AI will support workers during maintenance, avoiding reaching live parts of the power grid.

### □ AUTOMATIC POWER GRID FAULT DETECTION

Monitor the power grid remotely and detect failure locations along lines reducing operation costs.

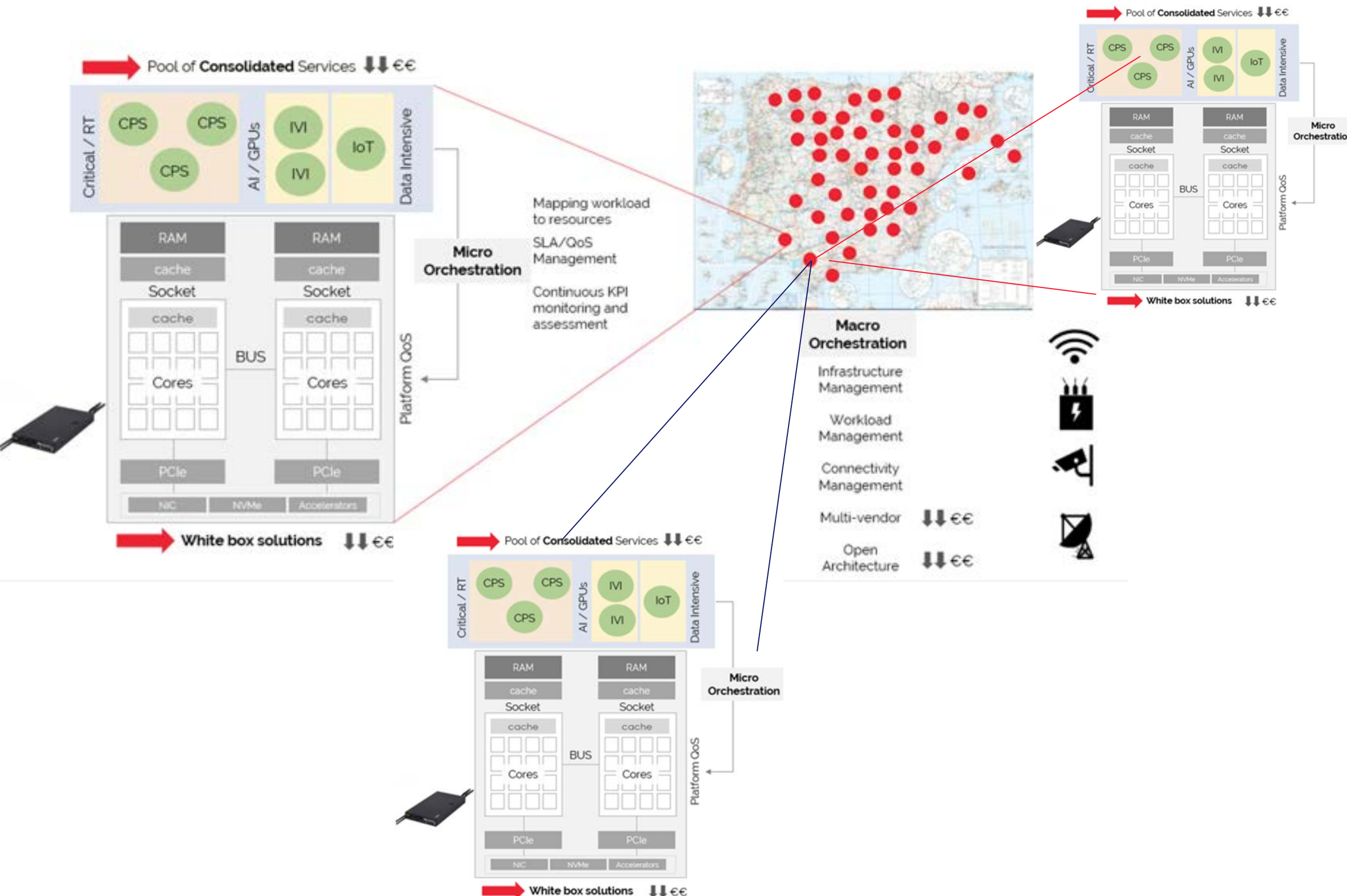
### □ REAL-TIME WIDE AREA MONITORING

Aggregate and control data of 1000s of Medium and High Voltage decentralized Renewable Energy Sources and their inverters.

### □ REAL-TIME WIDE AREA MONITORING

From Distributed Energy Resources at Medium Voltage levels operated by DSOs to High Voltage levels operated by TSOs, as well as inter-TSO cross-border Regional Security Coordination.

# Real Use Cases: Virtualized Substations



## BENEFITS

### CRITICAL LOW-LATENCY (2 ms) PROTECTION AND SCADA SERVICES

Provide guaranteed performance and reproducible QoS to critical protection services thanks to the offered micro-orchestration and custom provisioning profile to set BIOS settings (Hyperthreading, CPU frequencies, caches, etc) and more.

### COLLOCATION WITH ANCILLARY SERVICES

Other services can be deployed without impacting the performance of critical services.

### MICRO&MACRO ORCHESTRATION FROM A SINGLE-PANE OF GLASS

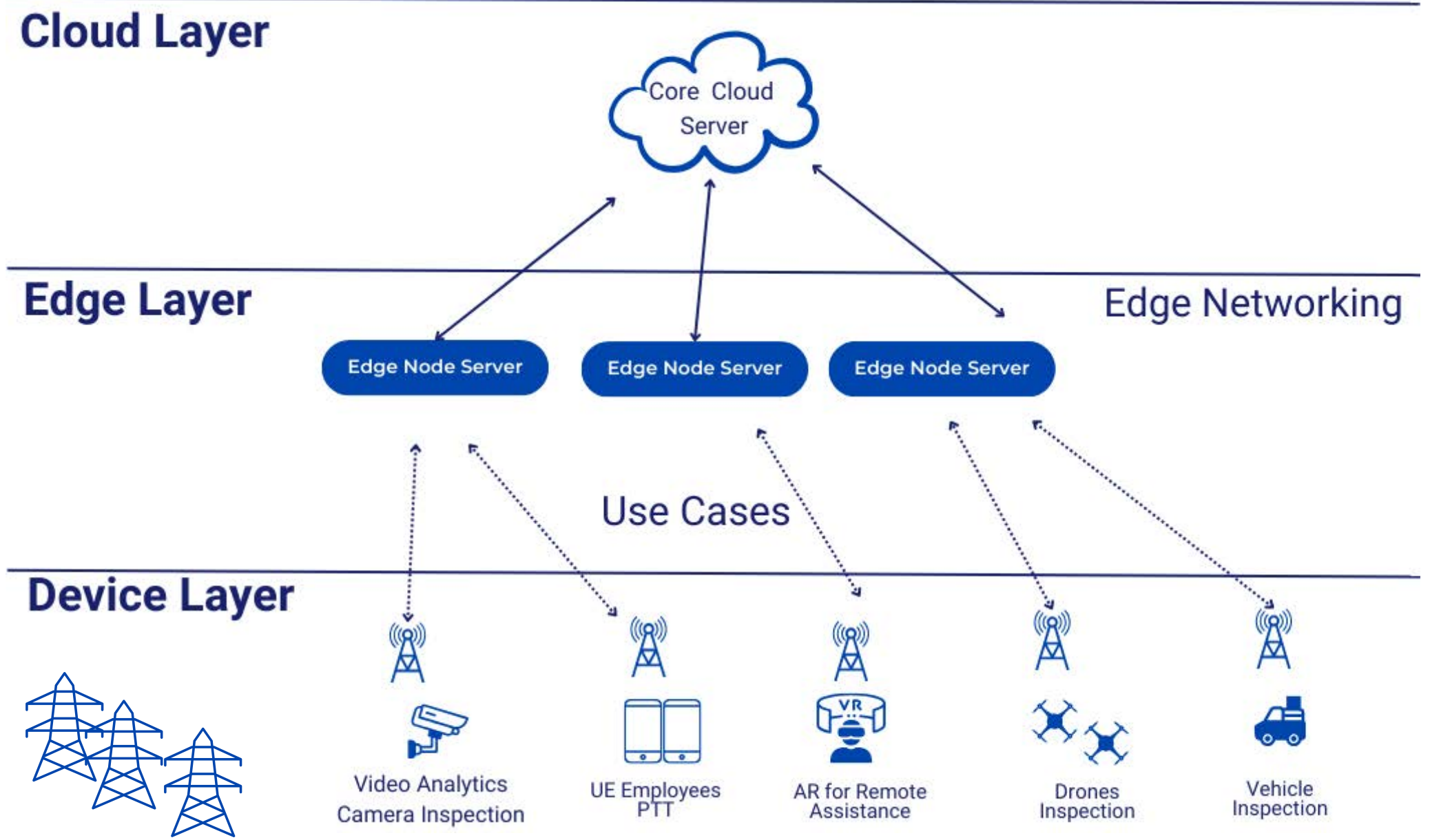
Monitor and manage multiple sites from one remote dashboard. Plan upgrades rollout using blue/green or canary deployments



# 5G and edge fabric for Smart Grids



DIGITAL SUBSTATION



## Benefits

- **TCO reduction:** Lower costs using traditional and modular server and edge computing solutions.
- **Breaking down data silos:** The utility will have one common network model that all departments work from to ensure reliable planning, operation, and protection of the power grid.
- **Inherent Observability:** The Edge Platform provides telemetry on a normalized format to be directly injected into the maintenance system

# NearbyOne brings a new 360° approach

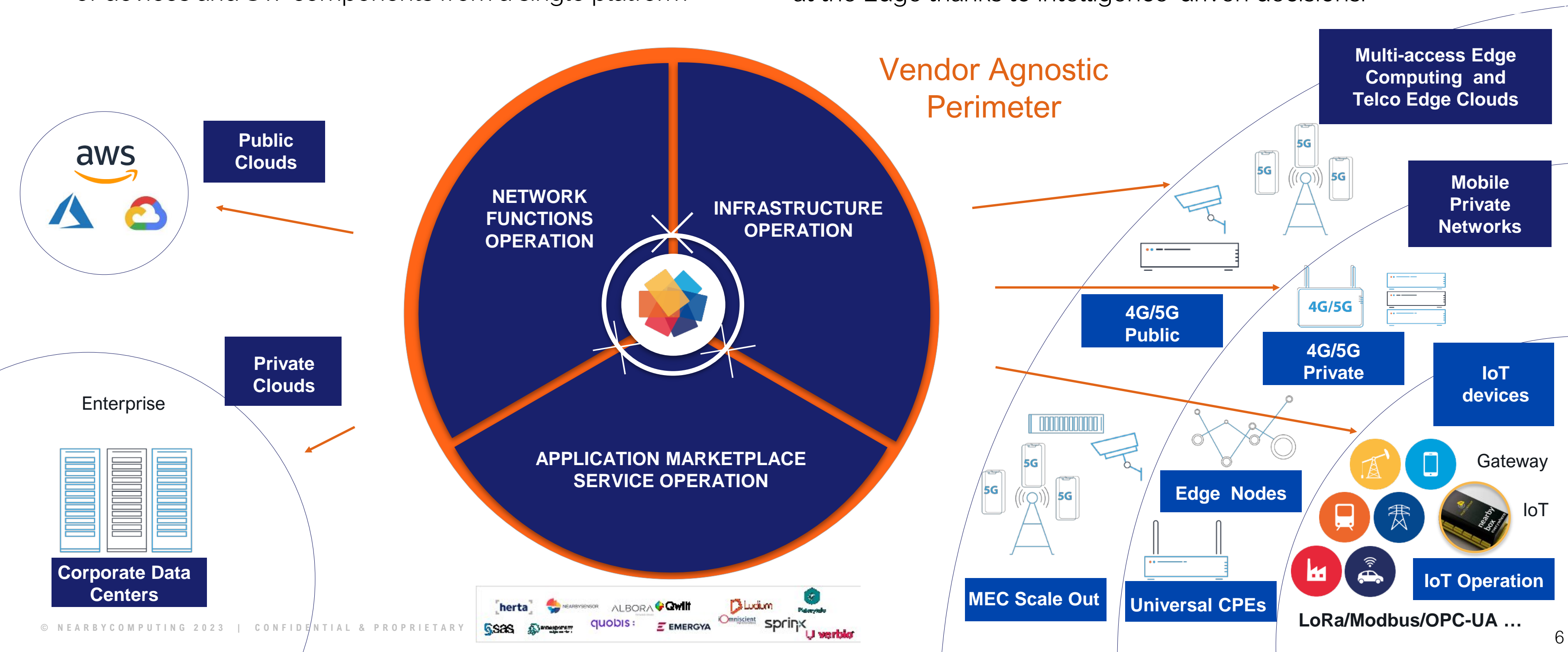


## Holistic

For the frictionless, centralized management of different types of devices and SW components from a single platform

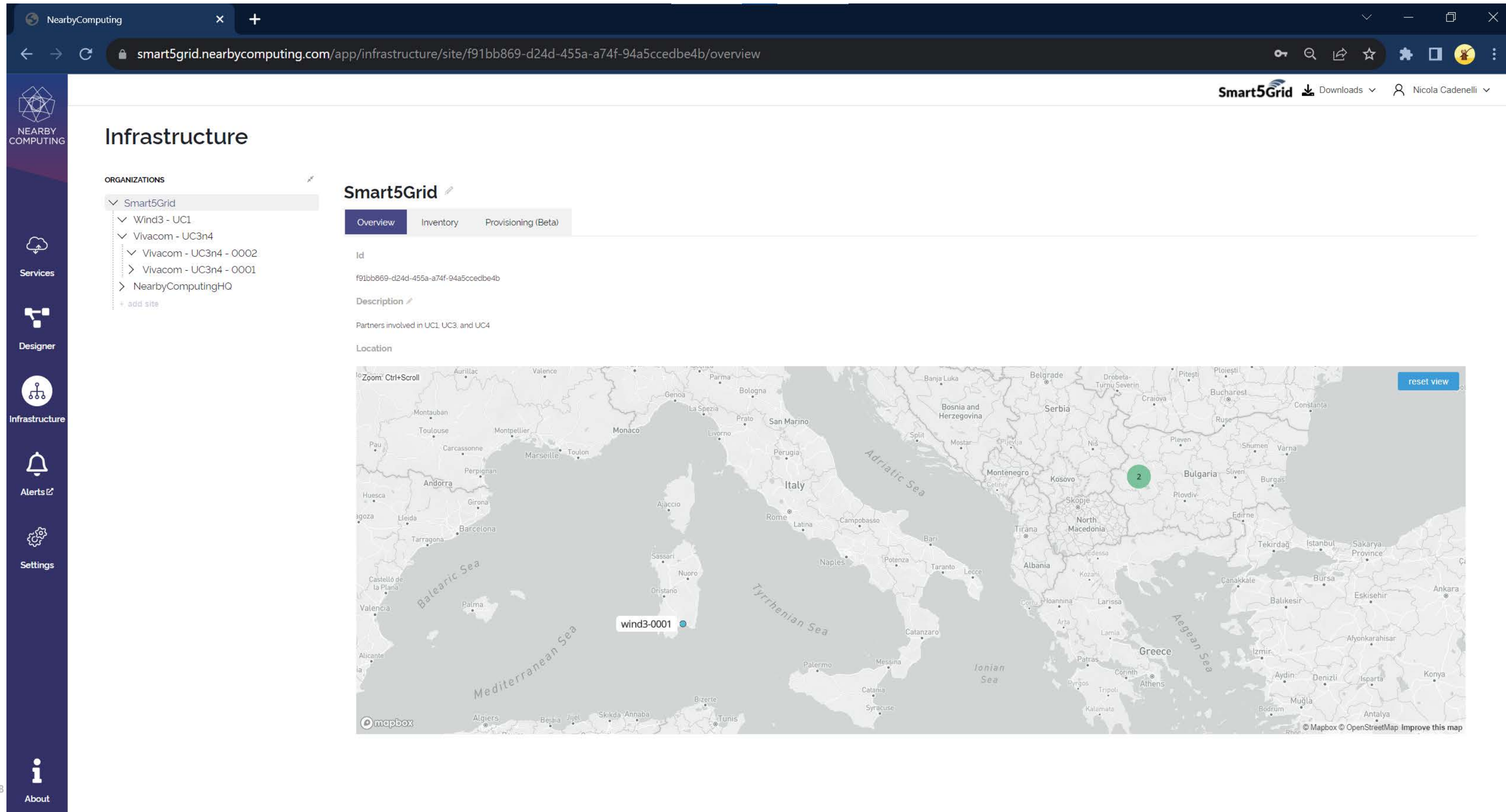
## Adaptive

Automatically adapts to the wide variety of situations that take place at the Edge thanks to intelligence-driven decisions.



# NearbyOne as Smart5Grid Network App Controller

One instance to monitor infra and services in different countries and different partners



The screenshot displays the Smart5Grid web application interface. The browser address bar shows the URL: `smart5grid.nearbycomputing.com/app/infrastructure/site/f91bb869-d24d-455a-a74f-94a5ccedbe4b/overview`. The user is logged in as Nicola Cadenelli.

**Infrastructure**

**ORGANIZATIONS**

- Smart5Grid
  - Wind3 - UC1
  - Vivacom - UC3n4
    - Vivacom - UC3n4 - 0002
    - Vivacom - UC3n4 - 0001
  - NearbyComputingHO
  - + add site


**Smart5Grid**

Overview | Inventory | Provisioning (Beta)

**Id**  
f91bb869-d24d-455a-a74f-94a5ccedbe4b

**Description**  
Partners involved in UCL UC3, and UC4

**Location**



The map shows the location of the site in Italy, with a green circle indicating the site's location. The map includes labels for various countries and cities, such as Italy, Greece, and Turkey. The site's location is marked with a green circle and the label "wind3-0001".

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# NearbyOne as Smart5Grid Network App Controller

One instance to monitor infra and services in different countries and different partners



The screenshot shows a web browser window with the URL `smart5grid.nearbycomputing.com/app/services`. The page title is "Services". On the left, there is a dark sidebar with navigation icons for "Services", "Designer", "Infrastructure", "Alerts", and "Settings". The main content area displays a table of services with columns for Name, Status, Deployed, User, and Actions.

NAME	STATUS	DEPLOYED	USER	ACTIONS
▼ PrometheusMonitoring (service chain)	READY	11/21/2023, 12:11:23 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
▼ UC3 NetApp (service chain)	READY	11/30/2023, 11:05:51 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
▼ UC3 Postgre SQL server (service chain)	READY	11/30/2023, 11:04:20 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
^ UC4 NetApp (service chain)	READY	12/1/2023, 2:51:42 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
^ NetAppUC4	READY	12/1/2023, 2:51:42 PM	9ad75838-d95d-4824-b040-a6f46cfc3551	...
• chart-deployment-advisory-bjc6t kind: ChartRelease	READY			...
• chart-deployment-mqttbrokeradvisory-sgvpl kind: ChartRelease	READY			...
• chart-deployment-vpdc-xtnt9 kind: ChartRelease	READY			...
• chart-deployment-wam-zp8h7 kind: ChartRelease	READY			...
• chart-deployment-advisory kind: ChartDeployment	READY			...
• chart-deployment-mqttbrokeradvisory kind: ChartDeployment	READY			...
• chart-deployment-vpdc kind: ChartDeployment	READY			...
• chart-deployment-wam kind: ChartDeployment	READY			...
▼ ZabbixMonitoring (service chain)	READY	11/28/2023, 7:20:39 PM	ea847d76-a217-4e16-9b51-b4c34a6cf6da	...



# High Level Features

## ❑ Unified Configuration Management

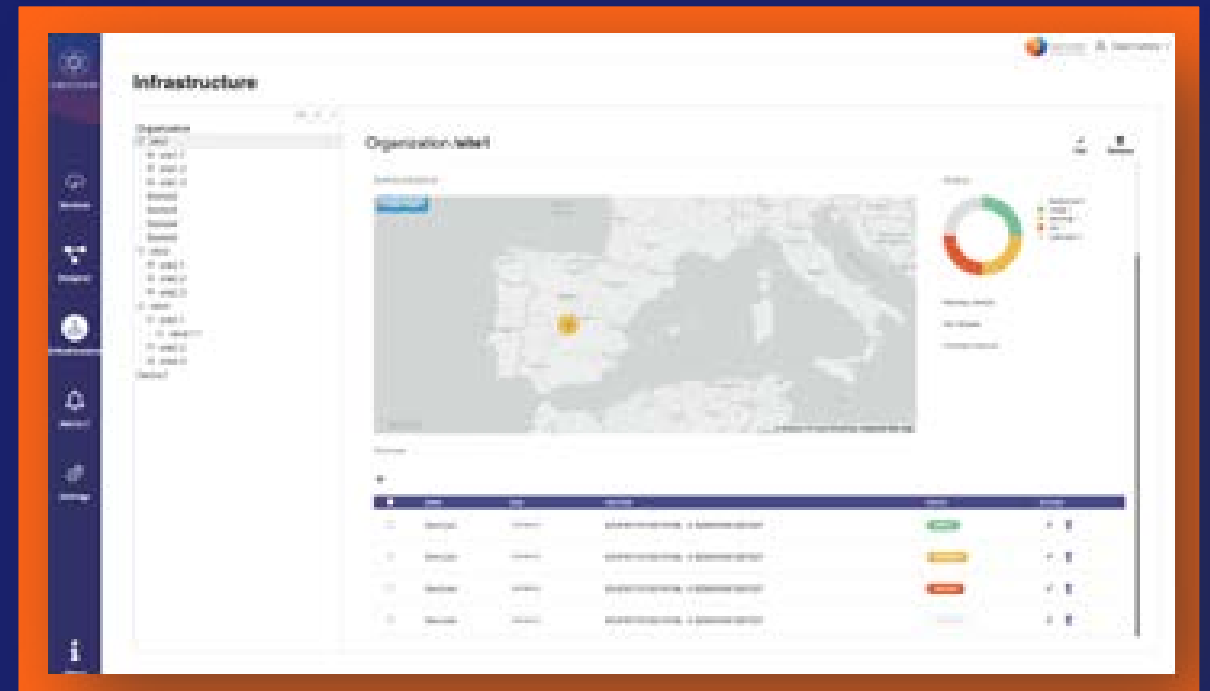
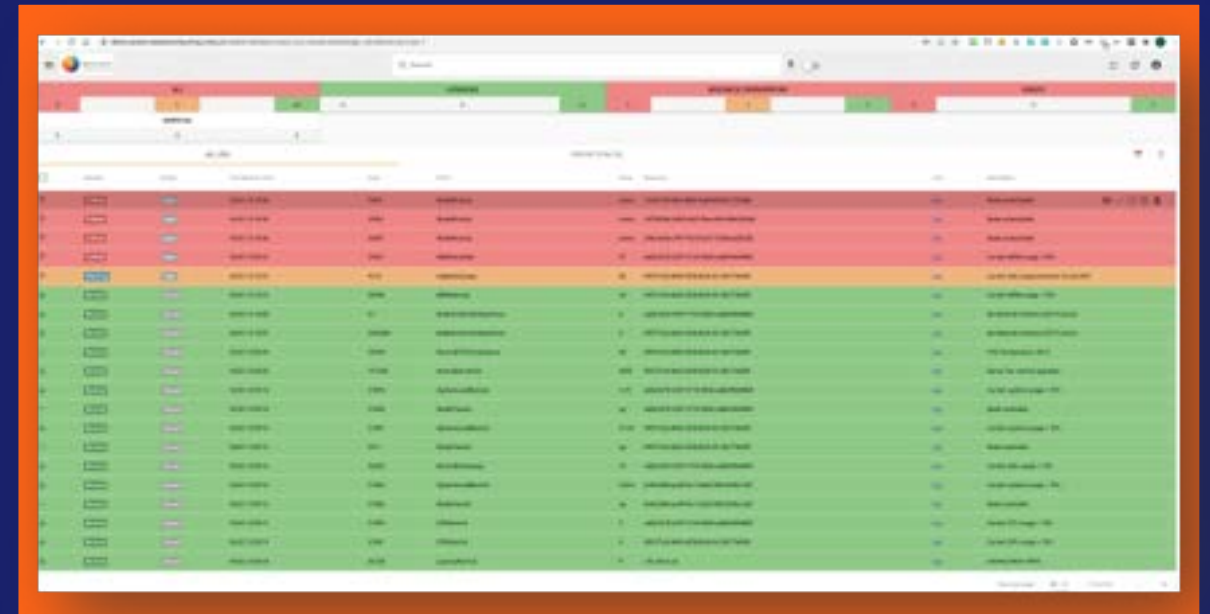
- Friendly configuration of multiple vendor NFs via API or UI
- Deployment of defined configurations across clusters
- Unified management of NFs (CNFs, VNFs), Physical Infrastructure

## ❑ Lifecycle Management

- Rollout and Rollback (automatic or manual) of new software versions
- LCM of software and hardware (may require extensions to support additional OEMs)

## ❑ Observability

- Full Observability Stack as a Service, powered by standard open source components
  - Prometheus/Thanos/Grafana
  - ELK
  - SNMP/AlertManager/WebHooks
  - Jaegger / OpenTelemetry
  - Alerta
- Unified and Extensible Alarming platform

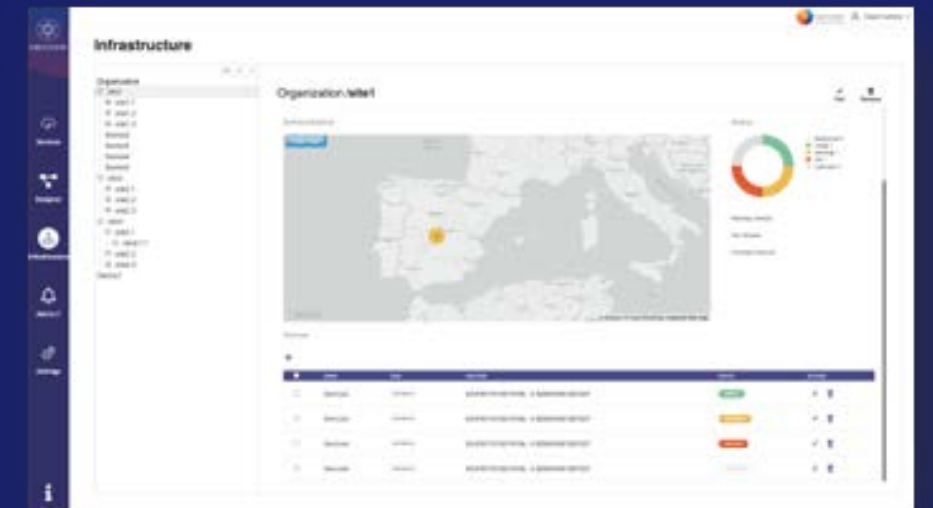


# High Level Features



## RBAC

- Unified RBAC framework (powered by ory.sh)
- Oauth2 to enable authentication to 3rd party dashboards
- Independent Organization Management (for Enterprise customer differentiation)
- User Roles: Super-admin, Org Admin, Org Operator, Org Viewer (can be extended and customized)



## HA mode and Federation supported

- HA configuration mode for cross-region deployment using eventual consistency and raft-based leader election
- Federated Operation mode for large scale deployments with workload distribution and fault tolerance



## State of the Art Engine powered by:



## Tested with:





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Get in touch for more information  
Thank you

Contact

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