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NearbyOne

On the need of orchestration and automation platforms for Smart Grids

December 2023

Motivation

Smart5Grid

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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

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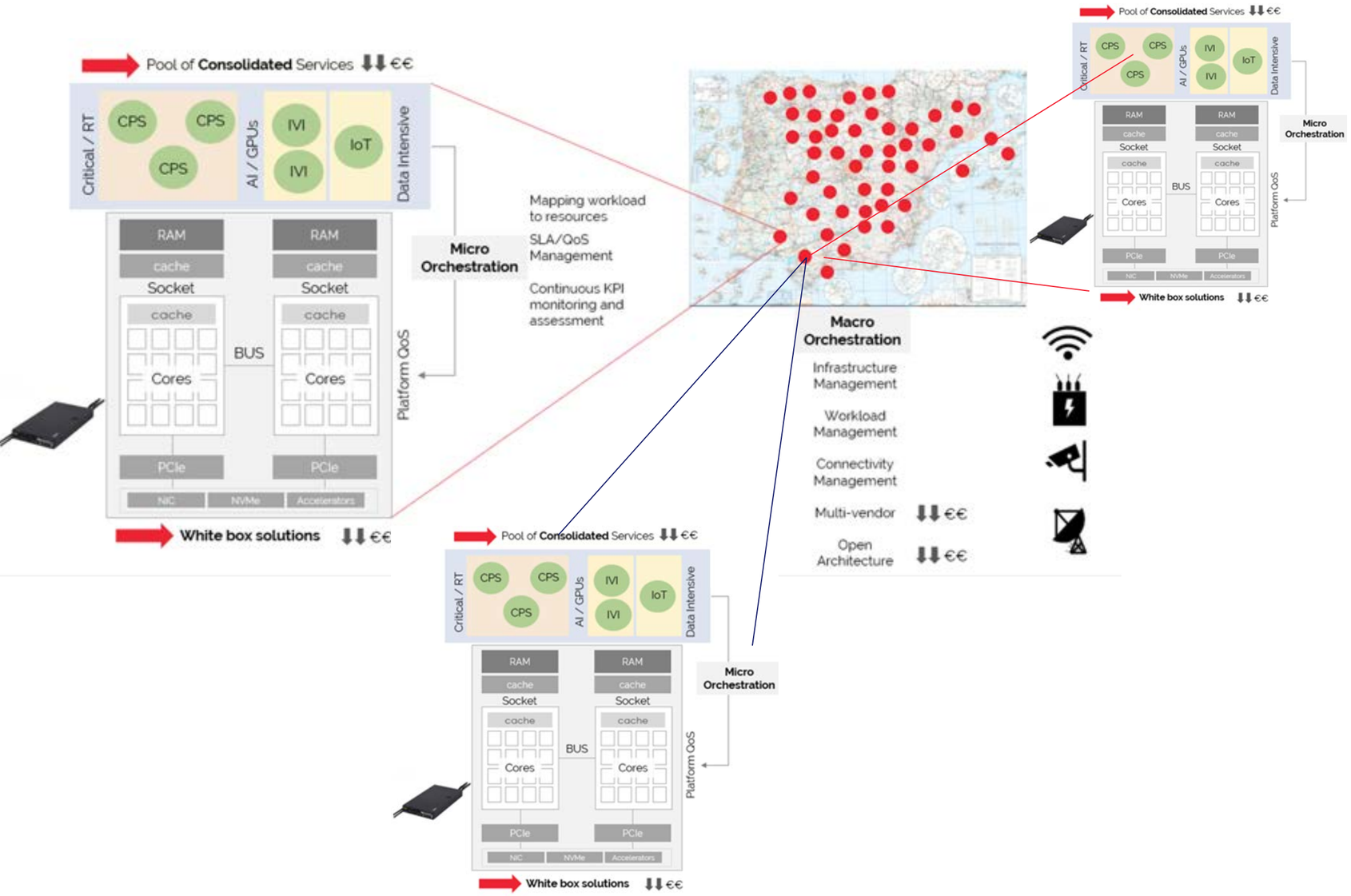

BENEFITS

❑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

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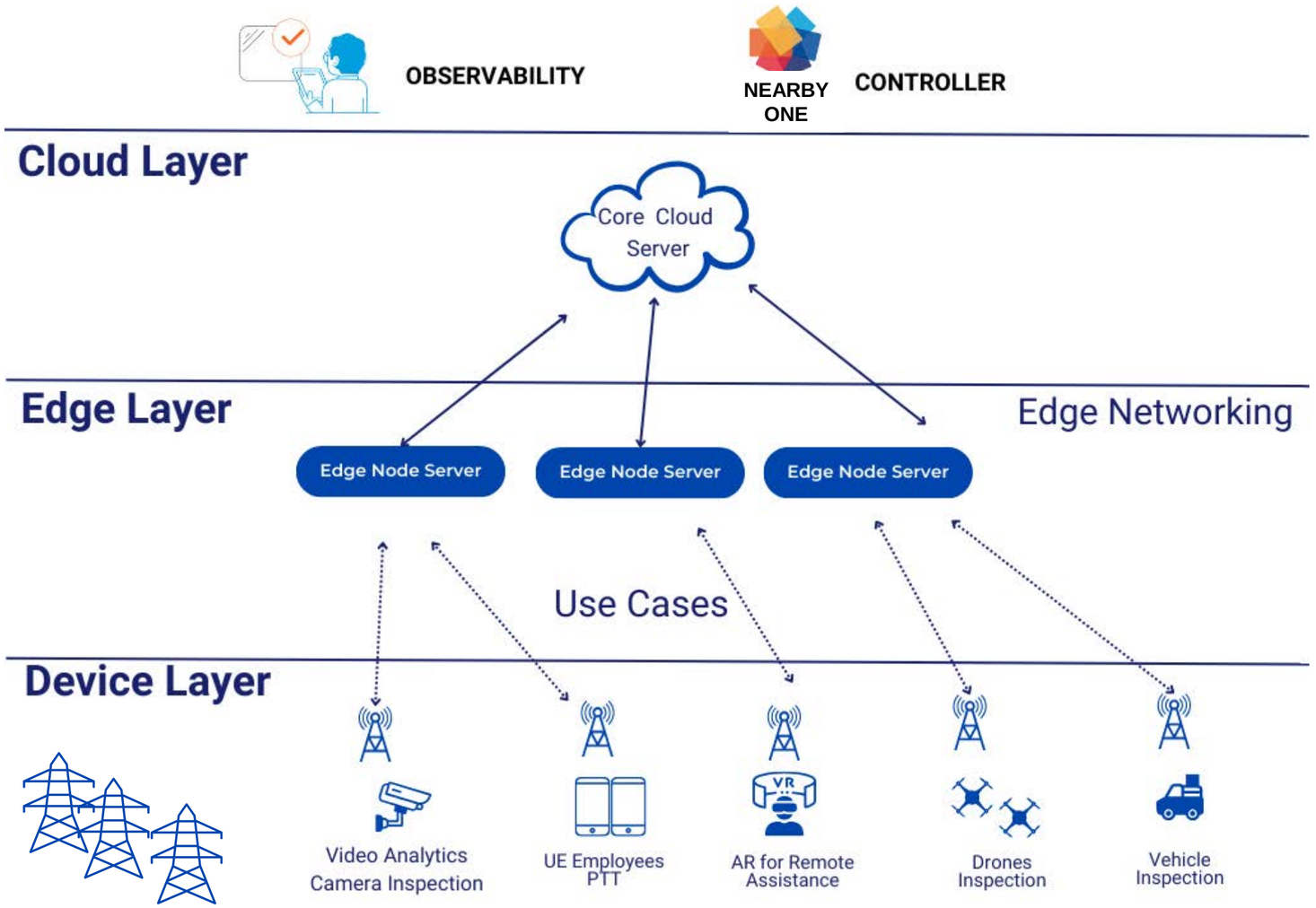
DIGITAL SUBSTATION



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

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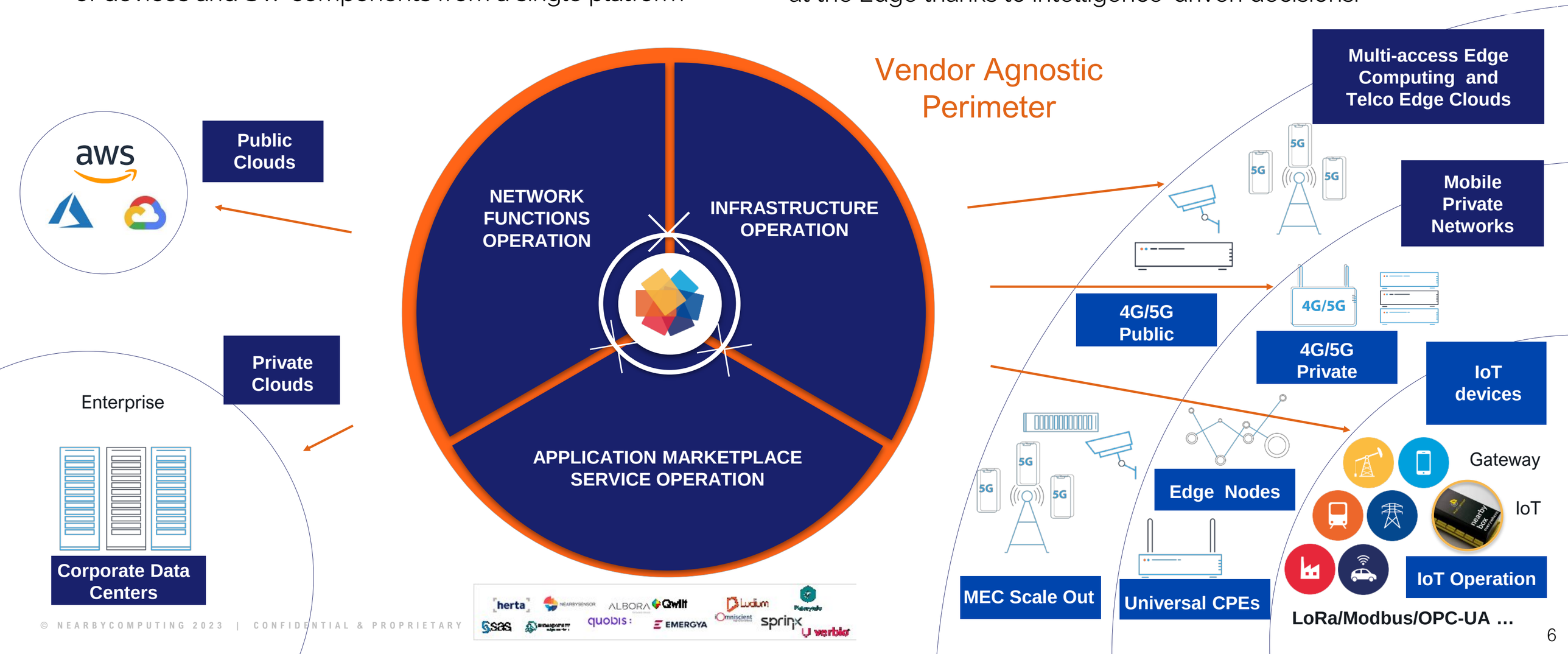
Holistic

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

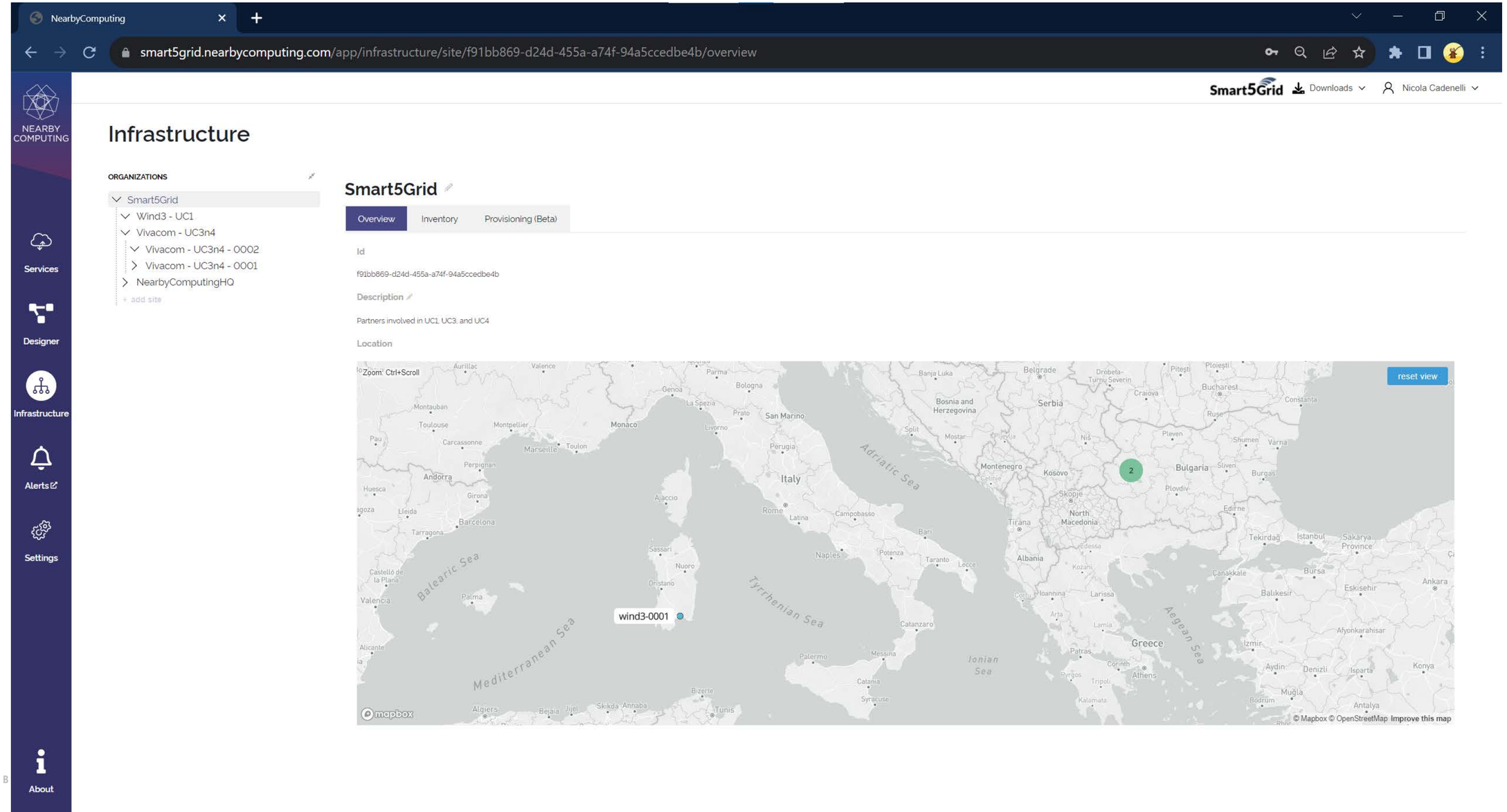
Adaptive

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



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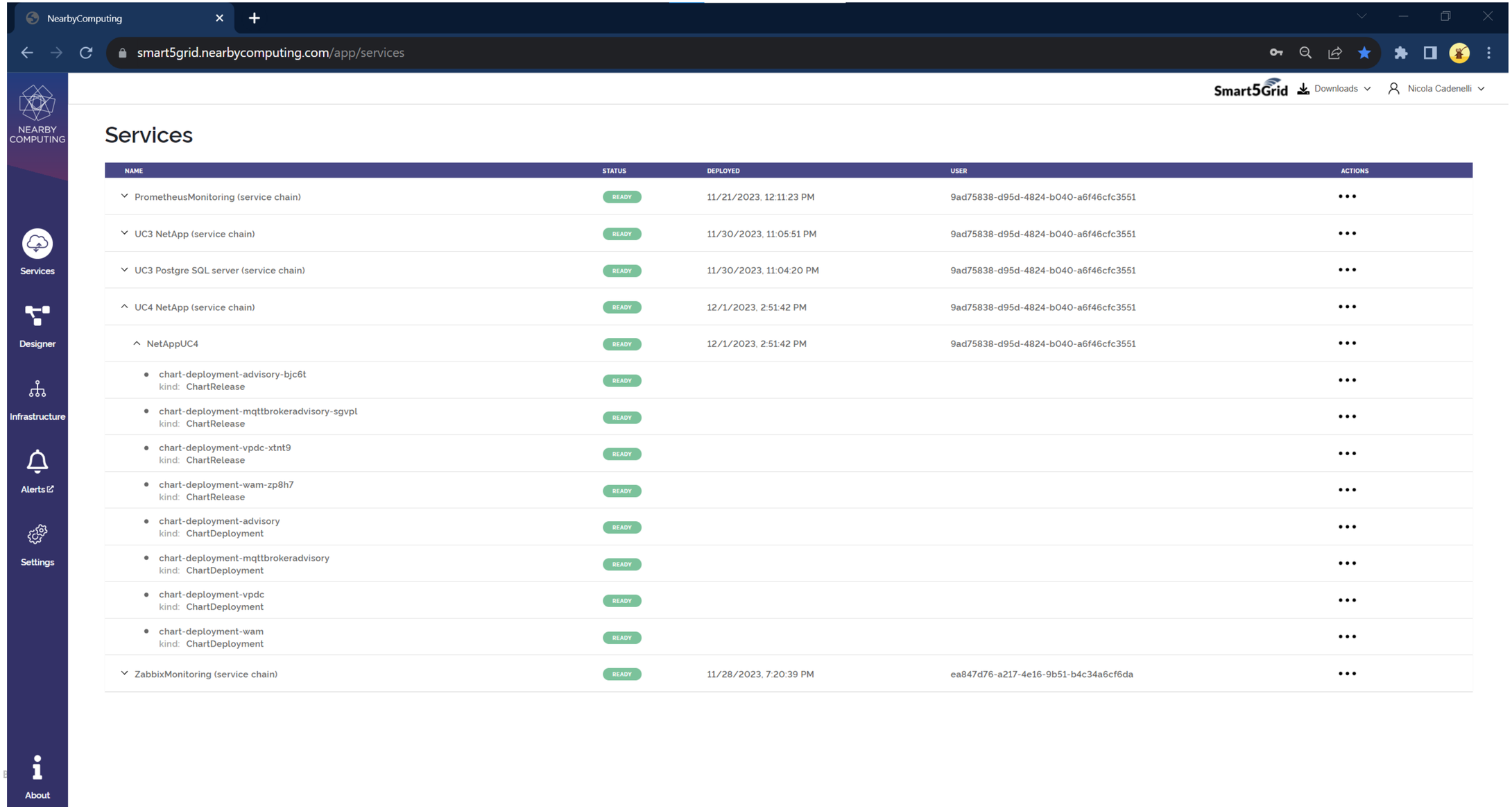

High Level Features

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❑Unified Configuration Management

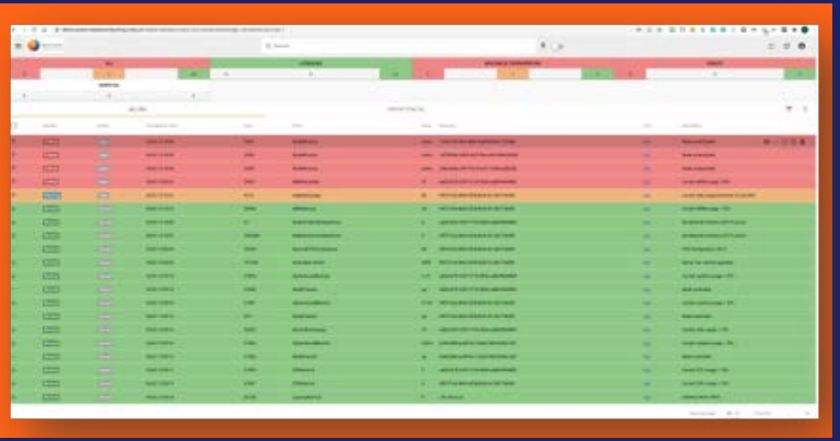
- Friendly configuration of multiple vendor NFs via API or UI
- Deployment of defined configurations across clusters
- Unified management of NFs (CNFs, VNFs), Physical Infrastructure

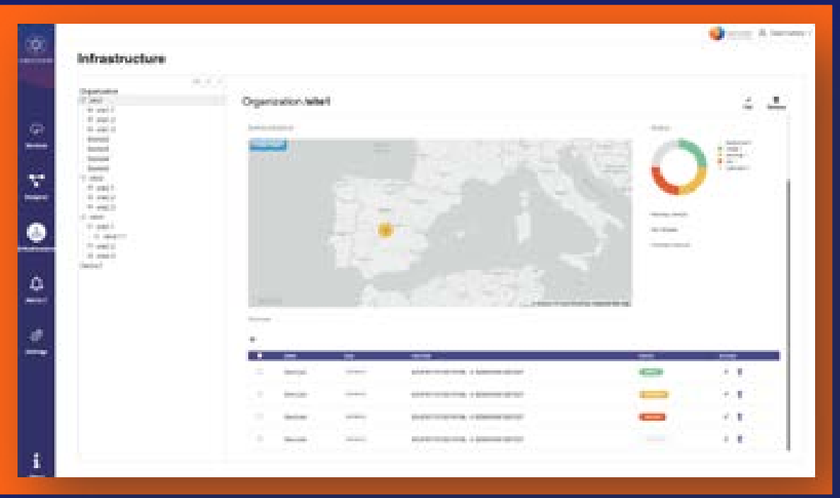
❑Lifecycle Management

- 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

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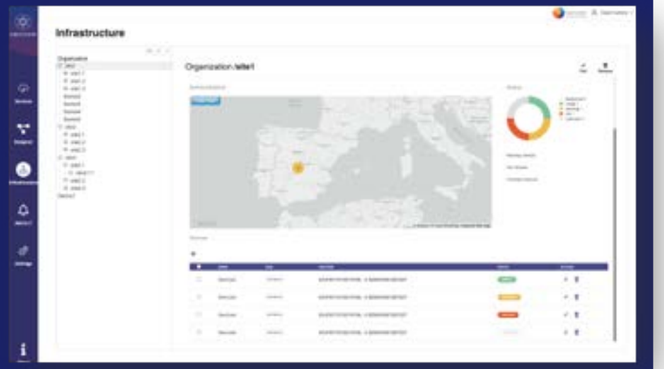
- RBAC
  - Unified RBAC framework (powered by ory.sh)
  - Oauth2 to enable authentication to 3rd party dashboards
  - Independent Organization Management (for Enterprise customer differentiation)
  - User Roles: Super-admin, Org Admin, Org Operator, Org Viewer (can be extended and customized)



- 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:

kubernetes, HELM, Terraform, ANSIBLE, Crossplane, tinkerbell, linuxKit

- Tested with:

RED HAT OPENSHIFT, WNDRVR, RANCHER, Microsoft Azure, aws

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Get in touch for more information

Thank you

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