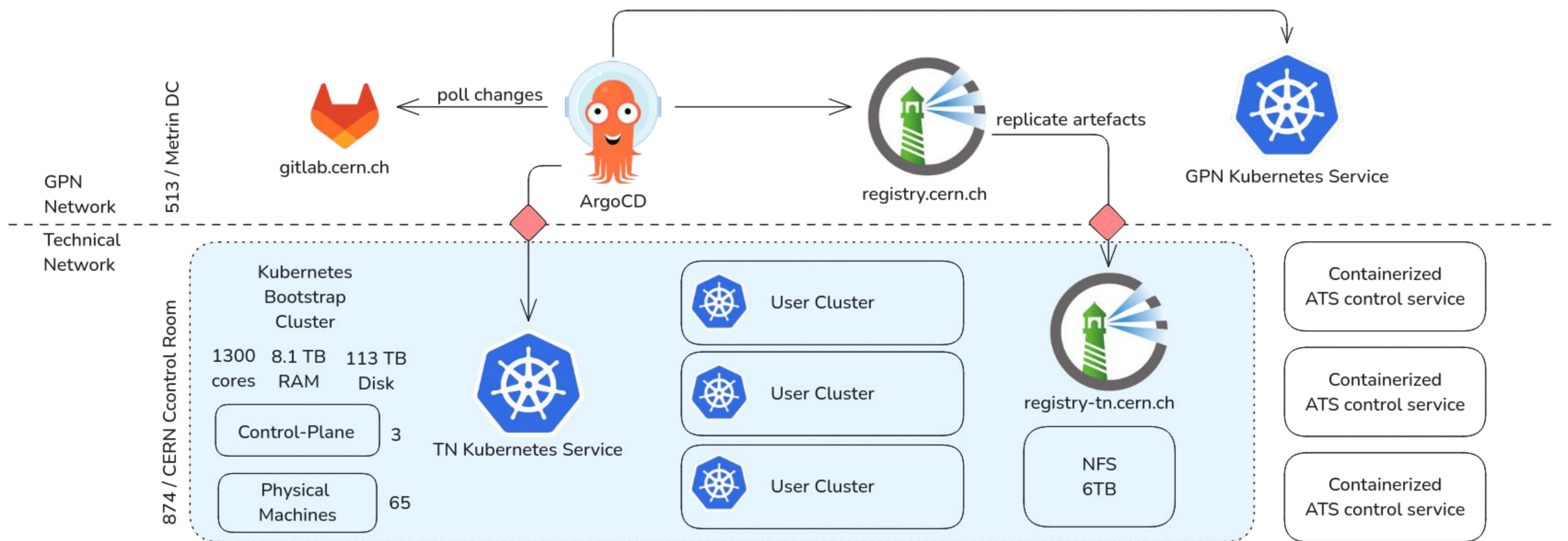# Managing accelerator control systems with Kubernetes at CERN
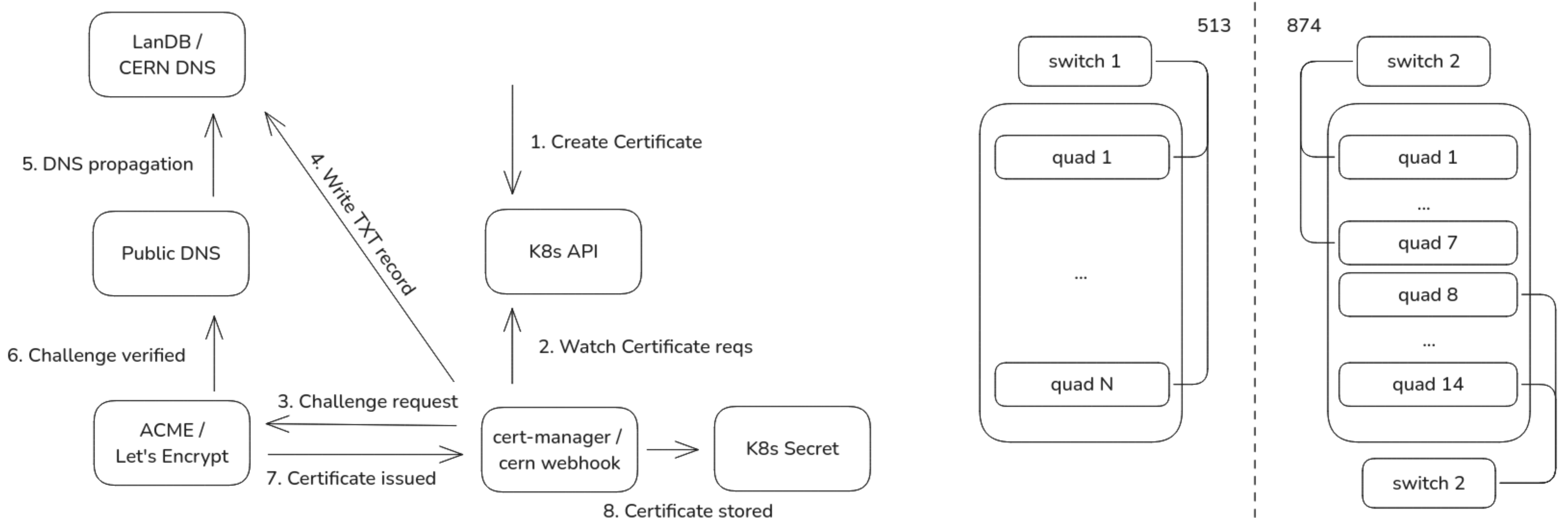## Diana Gaponcic, Ricardo Rocha, Spyridon Trigazis

GPN Network / 513 / Metrin DC

poll changes — gitlab.cern.ch — ArgoCD — registry.cern.ch — replicate artefacts — GPN Kubernetes Service

Technical Network / 874 / CERN Ccontrol Room

Kubernetes Bootstrap Cluster
1300 cores   8.1 TB RAM   113 TB Disk
Control-Plane   3
Physical Machines   65
TN Kubernetes Service

User Cluster (×3)

registry-tn.cern.ch
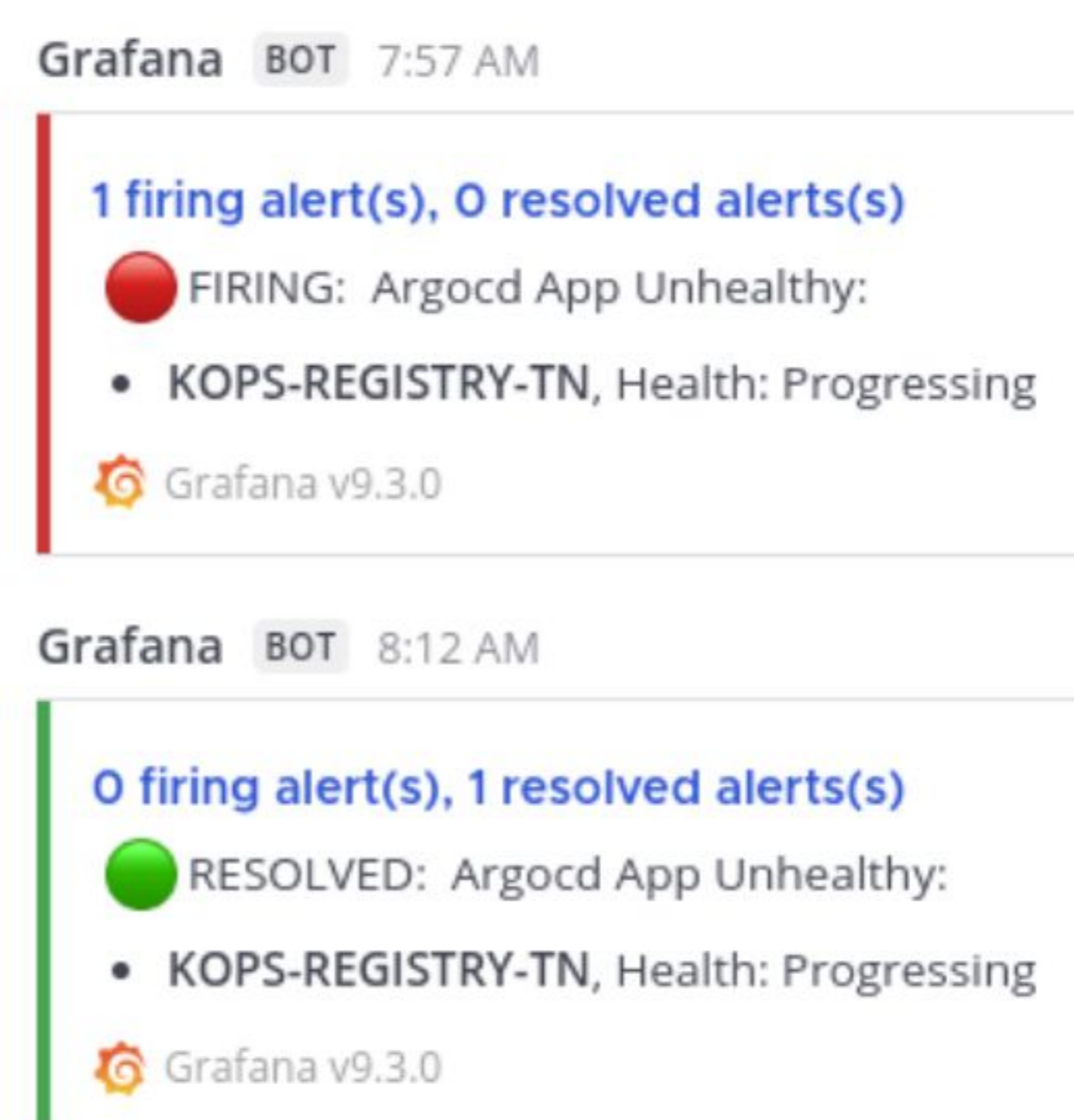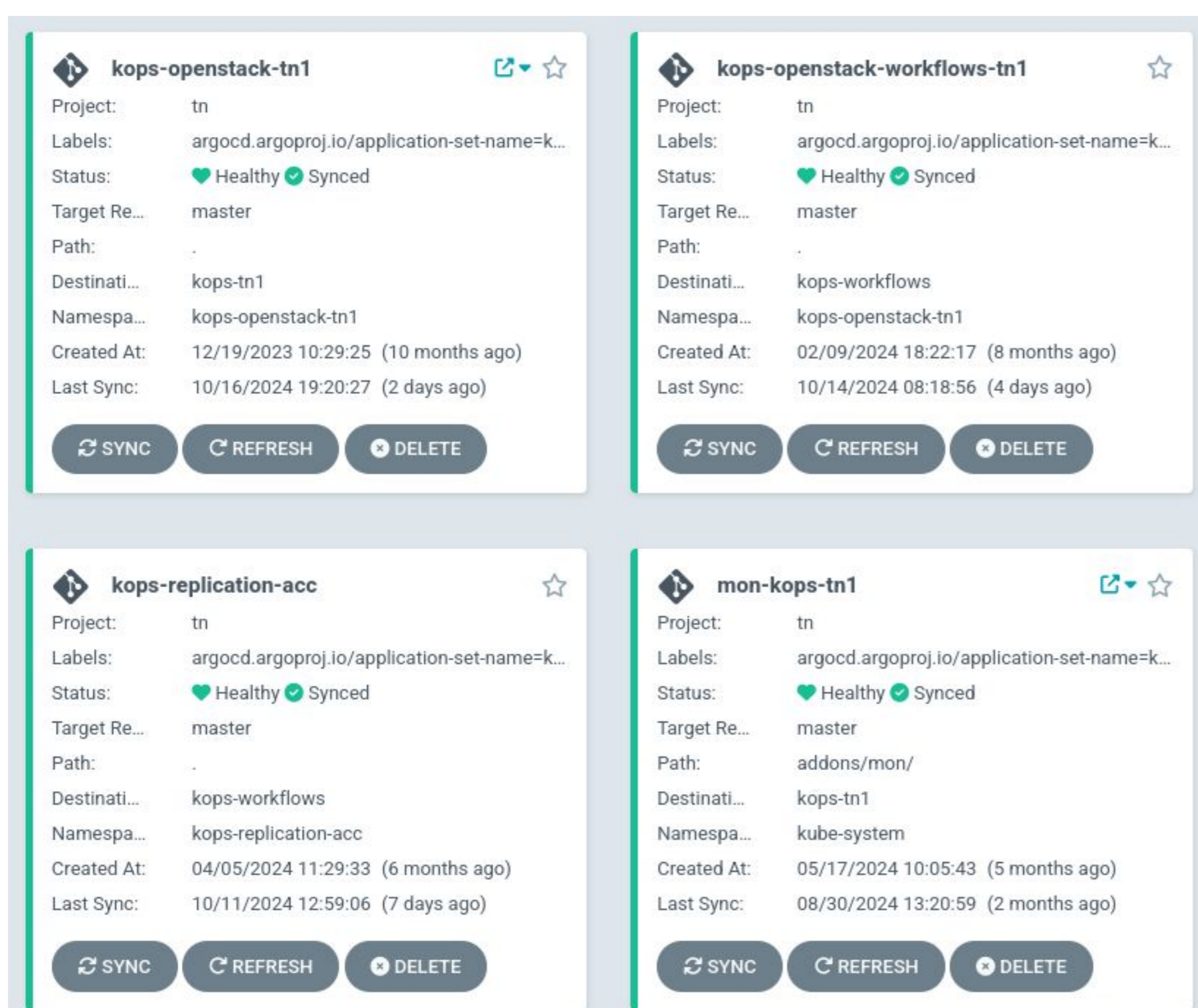NFS 6TB

Containerized ATS control service (×3)

- ATS-IT project since 2022
- Kubernetes platform for control systems
- Container registry in the Technical Network

- Service replicas in the TN
- Common GitOps approach for both GPN and TN
- Shared management with BE-CSS

LanDB / CERN DNS
5. DNS propagation
4. Write TXT record
1. Create Certificate
Public DNS
K8s API
6. Challenge verified
2. Watch Certificate reqs
ACME / Let's Encrypt
3. Challenge request
cert-manager / cern webhook
7. Certificate issued
K8s Secret
8. Certificate stored

513 | 874
switch 1 — quad 1 — ... — quad N
switch 2 — quad 1 — ... — quad 7 — quad 8 — ... — quad 14 — switch 2

- Trusted certificates without client configuration
- Standard ACME protocol with DNS-01 challenge
- Proxy required to access public CAs

- Collect topology information from OpenDCIM
- Scheduling aware of router, switch, rack, quad …
- Spread across failure domains

kops-openstack-tn1 · kops-openstack-workflows-tn1 · kops-replication-acc · mon-kops-tn1

Grafana BOT 7:57 AM
1 firing alert(s), 0 resolved alerts(s)
FIRING: Argocd App Unhealthy:
• KOPS-REGISTRY-TN, Health: Progressing
Grafana v9.3.0

Grafana BOT 8:12 AM
0 firing alert(s), 1 resolved alerts(s)
RESOLVED: Argocd App Unhealthy:
• KOPS-REGISTRY-TN, Health: Progressing
Grafana v9.3.0

Health Status
10/14   10/16   10/18
current
Healthy 57
Unknown 1
Progressing 1
Degraded 1

- Fully automated deployment with ArgoCD
- Configuration and secrets stored as code
- Changes from MR to HW in seconds

- Application health and performance monitoring
- Alerts via Mattermost, Email, SMS
- Central log and metric collection

CERN