



# Virtual Network Operation Center Enabled by the nmaas Platform

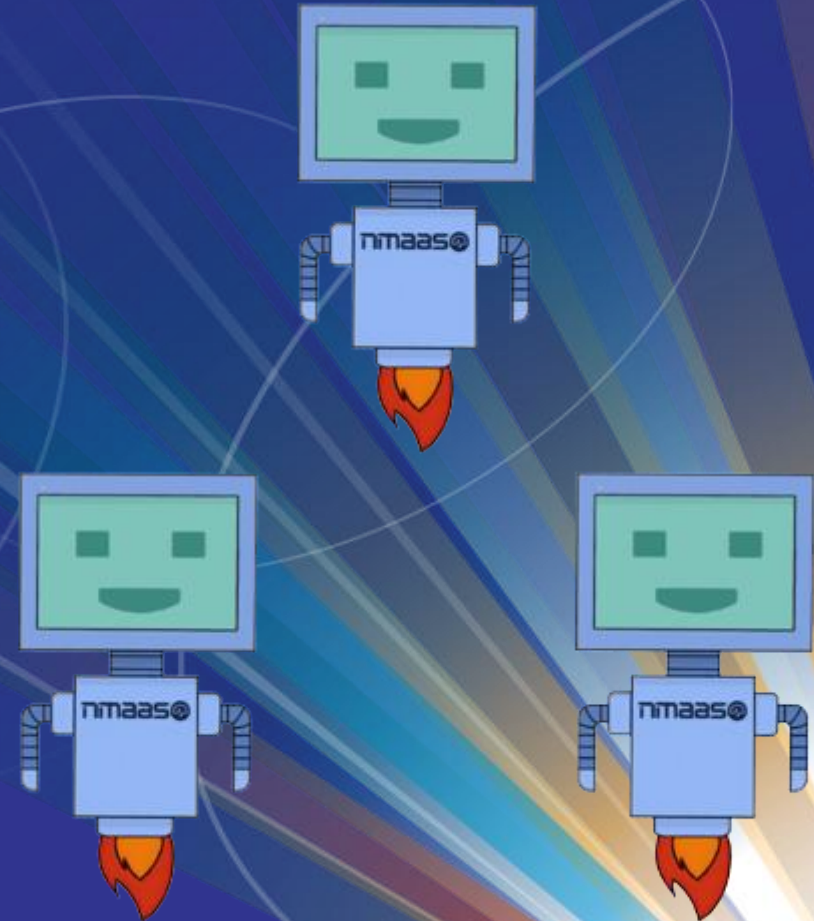
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BalticNOC 2025  
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# Agenda



- Introduction to the nmaas Platform
- Technical Details
- Feature Highlights and Demo
- New Federations Use-Case
- Deployment Options
- Conclusion

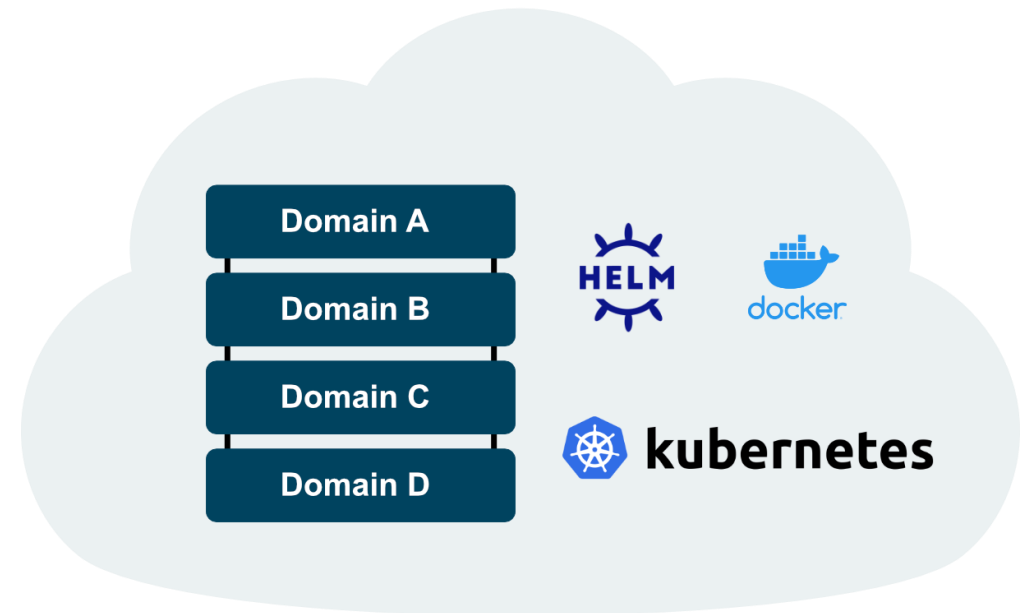


# Introduction to nmaas

*nmaas* is an open-source platform for orchestrated on-demand deployment of applications in a cloud environment

- Kubernetes-based infrastructure
- Multi-tenant architecture
- Simple application deployment and upgrade process
- Wide and easily extendable portfolio of applications
- GitOps approach for application instance configuration management
- Easy troubleshooting via integrated log viewing

**nmaas** 



Source code available at <https://gitlab.software.geant.org/nmaas>

## nmaas Flavors and Existing Use-Cases

- Versatility of nmaas as an open-source orchestration platform
- Support for multiple use-cases by providing relevant software features and deployable applications
- Currently supported use-cases on top a common code base:
  - **nmaas for Virtual NOC** (originally referred to as NMaaS - Network Management as a Service)
  - **nmaas for Virtual Lab** (online hands-on exercises in an education context)



<https://vnoc.nmaas.eu>



<https://vlab.dev.nmaas.eu>

# Why use nmaas for Virtual NOC



## Effortless application deployment and configuration

- Point & click
- Application ready to use in minutes
- Application configuration wizard & GitOps

## Multitenancy – one nmaas instance, many managed infrastructures

- Manage multiple infrastructures from a single instance
- Multiple users can manage/access the same application instances

## No extra hardware required

- Remote infrastructures managed by a central nmaas cloud-based instance

## Do what matters

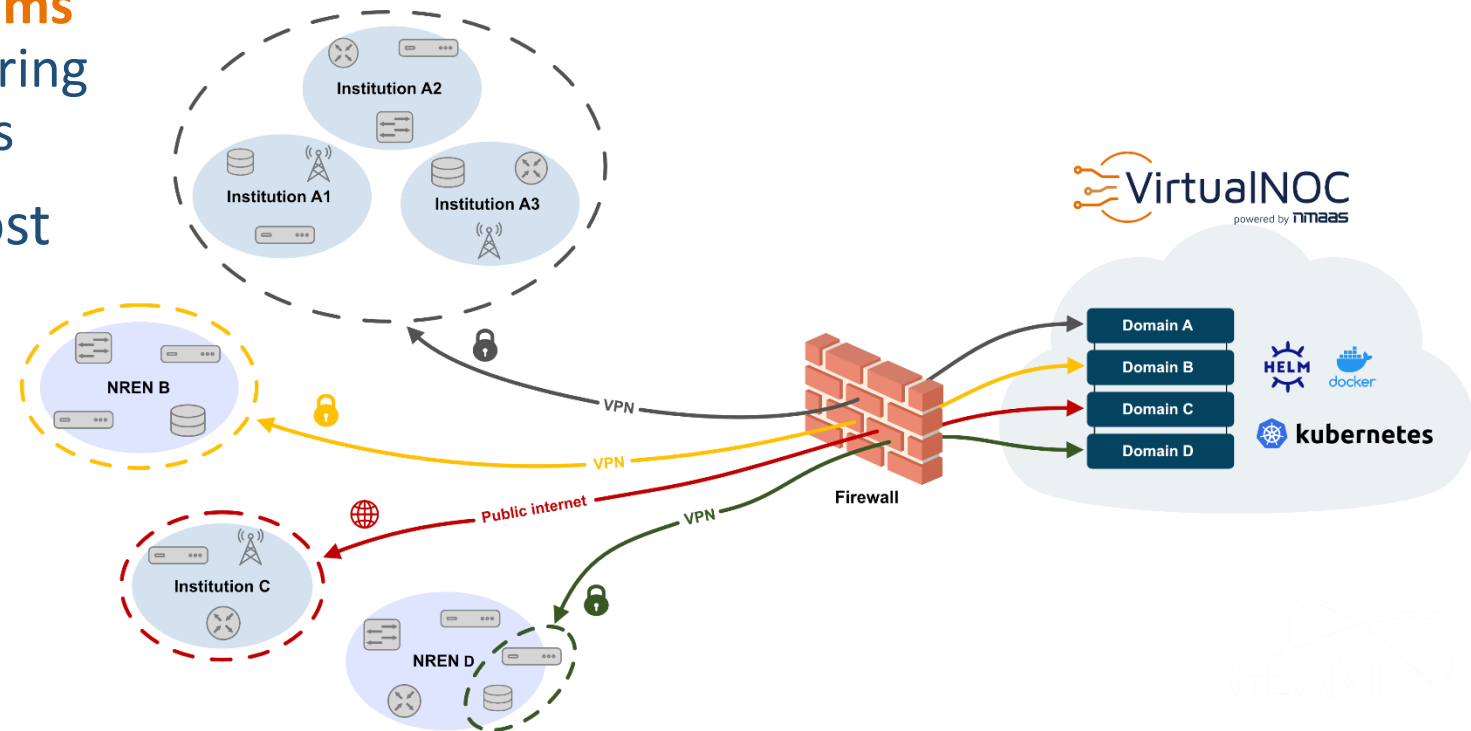
- Focus on managing the underlying infrastructure, not troubleshooting the tools themselves



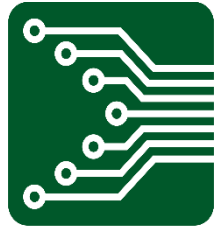
# nmaas for Virtual NOC



- Target groups
  - **NRENs or end institutions** with limited capacity for in-house network management
    - Universities, high schools, primary schools
  - International **research projects** with (distributed) hardware resources
  - **Development/infrastructure teams** requiring external health monitoring and alerting for their applications
- Application catalog containing most popular network management applications
- Continuous improvement



# Virtual NOC Success Stories



IrelandQCI

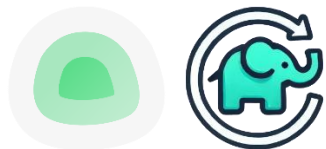
## IRELANDQCI

- National project
- Distributed team



## PCSS projects

- Distributed laboratory Infrastructure
- Software services monitoring and database backups



GP4L

## GP4L

- Global testbed
- Automation of user access



perfSONAR

## perfSONAR

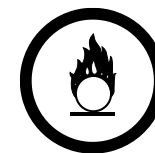
- Public statistics dashboard
- stats.perfsonar.net



## Others

- 20+ domains

ZABBIX



Maat





# How does it work...?

The technical details behind the nmaas Platform

## Application Orchestration Aspects

- Deployed applications running in a **container-based** environment
- **Kubernetes** cluster as the underlying orchestrator
- Each **application** represented by a **Helm chart**
  - Simplifies maintenance and allows for easy reuse of existing applications in a new context (e.g., application bundles)
  - No strict requirements for Helm charts – enables easy integration of new applications using official/community supported charts
- **Application instance customization** during deployment via Helm parameter overriding (web-based wizard)
- Automatic and manual **application upgrades** based on semantic versioning of the charts



Artifact **HUB**

## Networking Aspects

- Two “problems” to be solved:
  - Connectivity between the application instance (running on nmaas) and the remote infrastructure being monitored
  - Remote access to the remote interface of the deployed applications
- **Site-to-site VPN** – access to the remote infrastructure being monitored
  - **Wireguard** site-to-site tunnel(s) between nmaas and customer infrastructure
  - Strict access policies and firewall rules in place
  - Each tenant receives dedicated network ranges
- **Client-Access VPN** – remote access to deployed applications
  - **eduVPN**, fully compatible with both OpenVPN and Wireguard
  - Self-service portal, with options to generate multiple profiles
- **Dual stack support** (IPv4 + IPv6)
- Each tenant receives a **dedicated subdomain** for application deployment
  - E.g., app.domain.nmaas.eu and HTTPS protected



# Multitenancy

- Concept of a **“domain”**
  - Logical grouping of applications
  - Many-to-many relationship with users
- **Applications** deployed in one domain are **isolated** from others
  - Kubernetes namespaces + firewall rules + Kubernetes network policies
- Authentication via **OpenID Connect** or local auth
- Integration with **eduGAIN** possible
  - vnoc.nmaas.eu integrated with eduGAIN via Keycloak acting as a proxy



## Integration with External Systems

- Integration with 3<sup>rd</sup> party systems via **webhooks**
  - Domain creation and removal
  - User addition to and removal from a domain
  - Application provisioning/deprovisioning
- Provides flexibility to use existing services. Examples:
  - **Provision a new VPN profile** when a user is added to a domain
  - **Add** a newly deployed application to an **external HTTP monitoring service**
  - **Assign attributes to an IdP** once a user is added to a domain





# Feature Highlights

...and a short demo

# Extensible application catalog

*27 applications available in the marketplace*

- |                      |                  |
|----------------------|------------------|
| Adminer              | N8n              |
| Apache Airflow       | Jenkins          |
| Bastion + Web Server | Netbox           |
| LibreBooking         | Oxidized         |
| ChangeDetection.io   | PgBackWeb        |
| CheckCle             | PostgreSQL       |
| CodiMD               | Prometheus       |
| Grafana              | Routinator       |
| Healthchecks         | Telegraf         |
| Icinga2              | Uptime Kuma      |
| InfluxDB             | Victoria Metrics |
| LibreNMS             | Zabbix           |

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GP4L Orchestrator



# Features



## Application Deployment Wizard

- Customize application parameters during deploy time



## GitOps Configuration

- Update text-based application configuration via Git



## Application Log Viewing

- Troubleshoot issues and monitor an application directly from the web



## (Automatic) Upgrades

- Automatic or manual application version upgrades



# Prometheus Deployment + GitOps Configuration

Demo

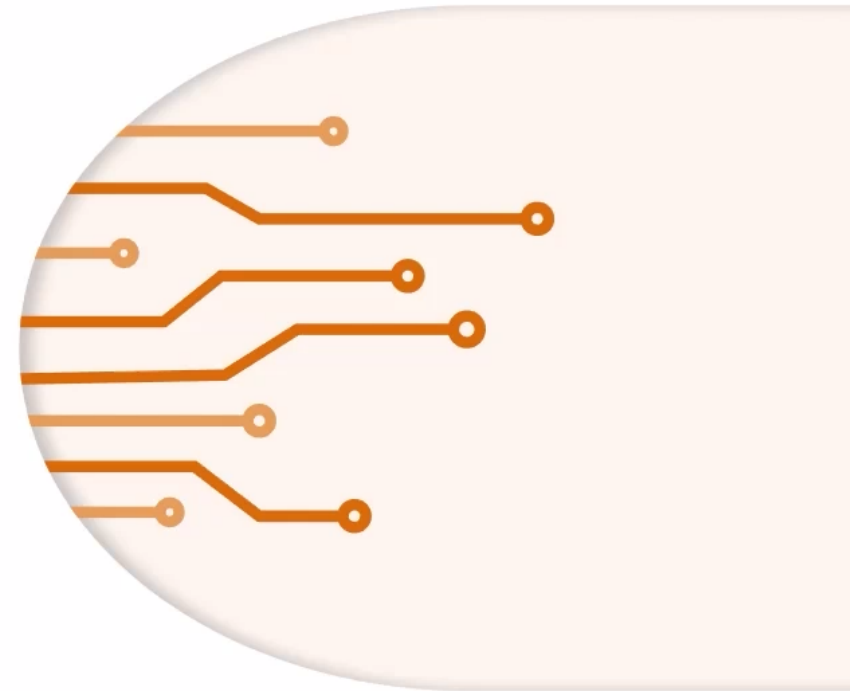


# VirtualNOC

powered by **nmaas**

Run your network monitoring application stack  
in the cloud with the nmaas Platform

[Learn more](#)








# Grafana + Prometheus Integration

Demo

tests ^

 Applications


 Instances

 nmaas Demo

 Admin panel

Tags


Search 

all 



Sort

Name 


Show subscribed only





**Adminer**  
Web Database Management




**Apache Airflow**  
Platform to author, schedule, and monitor workflows





**Bastion Web Server**  
Bastion server coupled with a web server, based on Ubuntu OS



**changedetectionio**  
Web Site Change Detection, Restock monitoring and notifications



**CheckCle**  
CheckCle is an open-source tool for real-time monitoring



**CodiMD**  
Colaborative Markdown Editor





# nmaas Federation Use-Case

Coming soon to an nmaas instance near you...

## Sneak Peak at a new Use-Case: nmaas Federations

- New use-case, under active development
- **Core idea:** a central nmaas instance manages distributed Kubernetes clusters
- Remote Kubernetes cluster(s) associated with existing nmaas domains
- Solves the problem of managing many diverse environments
- nmaas catalog applications deployable on any of the on-boarded clusters
- All features to be part of the base software, which is open-source



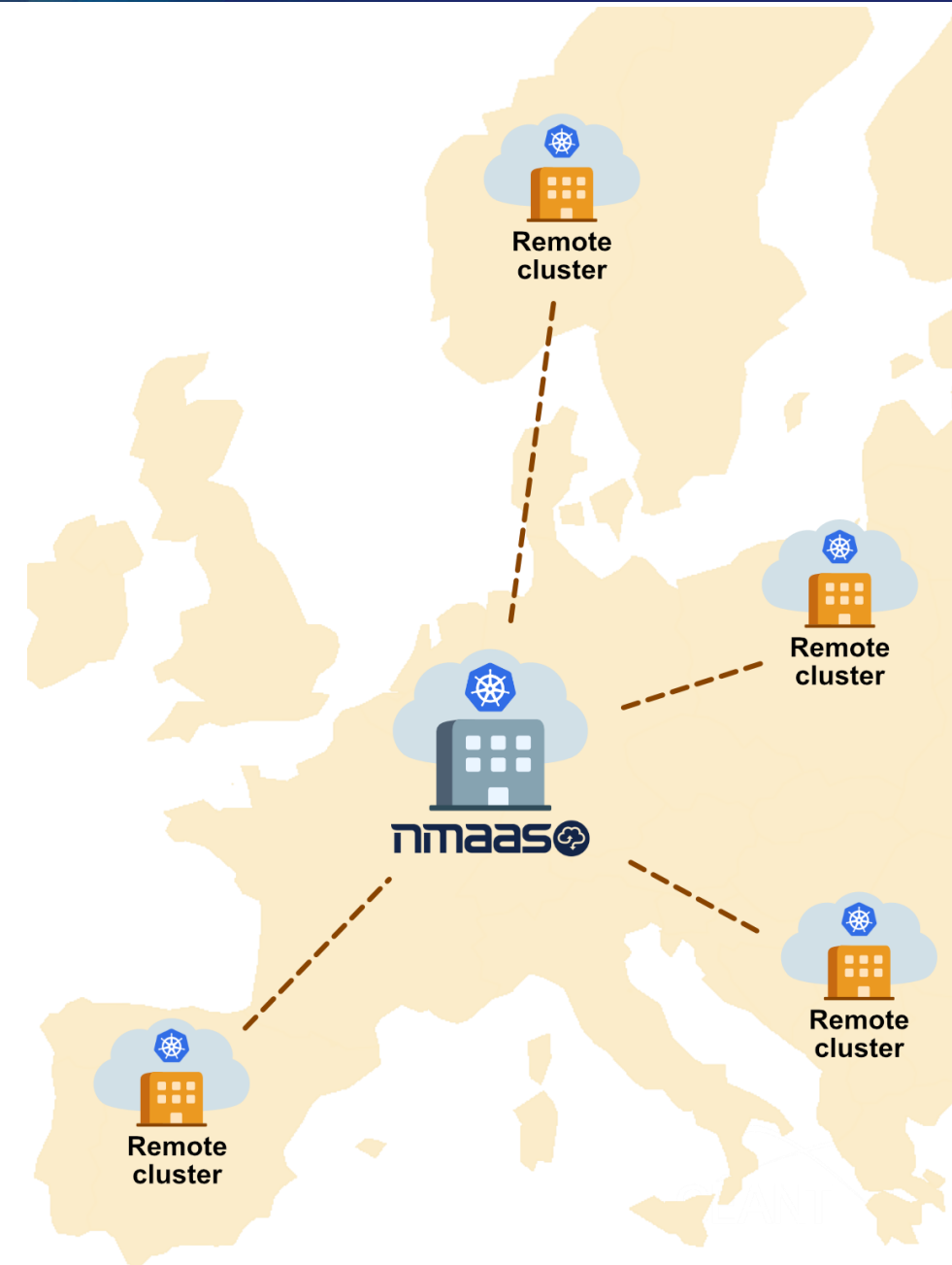
## nmaas Federations: Added Value



- All data is stored locally in the on-premise Kubernetes cluster(s) ensuring regulatory compliance and data privacy
- **Eliminates** the need for **complex site-to-site connectivity** and routing from the customer infrastructure to nmaas and vice versa
  - All applications run locally, within the customer's network
- Flexibility to **choose client-access strategy** for the deployed applications
- **Abstracts away Kubernetes** complexity while still reaping its benefits
  - Goal is to not require Kubernetes knowledge for adding a Kubernetes cluster node to nmaas
- On-board existing Kubernetes clusters to nmaas without impacting existing workloads
  - **BYOI – Bring your own Infrastructure** for vLAB or vNOC use-cases

## nmaas Federations: Example Usage

- Monitoring tools deployed from a **single nmaas** instance across Kubernetes clusters in **multiple locations**
  - Reduced configuration drift and environment entropy, ensuring consistent configuration and easy lifecycle management
- Pooling of distributed scarce resources (GPUs)
  - **nmaas as an enabler for AI workloads**
  - Not limited only to network management
- Next steps: looking into ways for **unattended Kubernetes deployment** and on-boarding





# nmaas Use and Deployment Options

Running vNOC using nmaas on your own infrastructure

# nmaas for Virtual NOC: How you can use vNOC service?



- nmaas can be used either as a **self-hosted or managed** solution
- <https://vnoc.nmaas.eu> is the managed production instance for the Virtual NOC use-case
- User can request their domain and support from our team using the contact section.

## Contact us

Join the mailing list of your interest:

- [nmaas-announce](#) - for nmaas-related announcements sent out by the nmaas Team members,
- [nmaas-users](#) - for discussions and message exchange between nmaas users and the nmaas Team.

Contact form offers an easy way to get in touch with the nmaas team. Choose the type of form that is most suitable for your request.

### Select form type:

New domain request

### Domain name

Domain name

Proposed name for the new domain (up to 30 characters)

### Domain codename

Domain codename

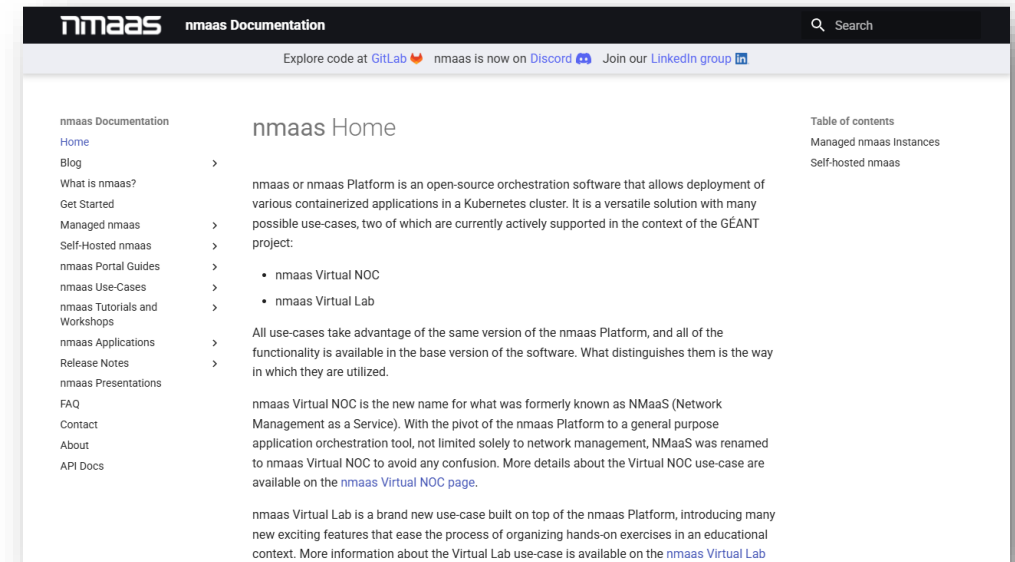
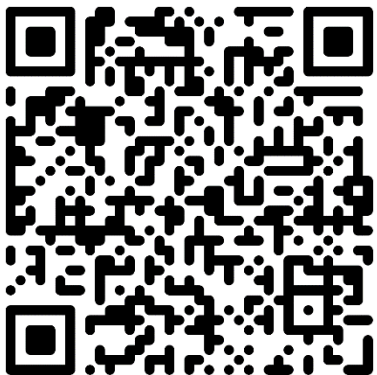
Abbreviated version of the domain name (up to 12 characters)

### Request justification

Brief justification of the request including intended use of the nmaas service

# Running nmaas on your own

- Two options for running a **self hosted instance of nmaas**
  - Local evaluation environment on a single node cluster (non-production workloads only)
  - On an existing full-fledged Kubernetes cluster (suitable for both Virtual NOC and Virtual Lab)
- Complete guide available at <https://docs.nmaas.eu>
- **The nmaas team will provide all required support**



Contact the nmaas Team: [nmaas@lists.geant.org](mailto:nmaas@lists.geant.org)

Subscribe to the nmaas users list: [nmaas-users@lists.geant.org](mailto:nmaas-users@lists.geant.org)

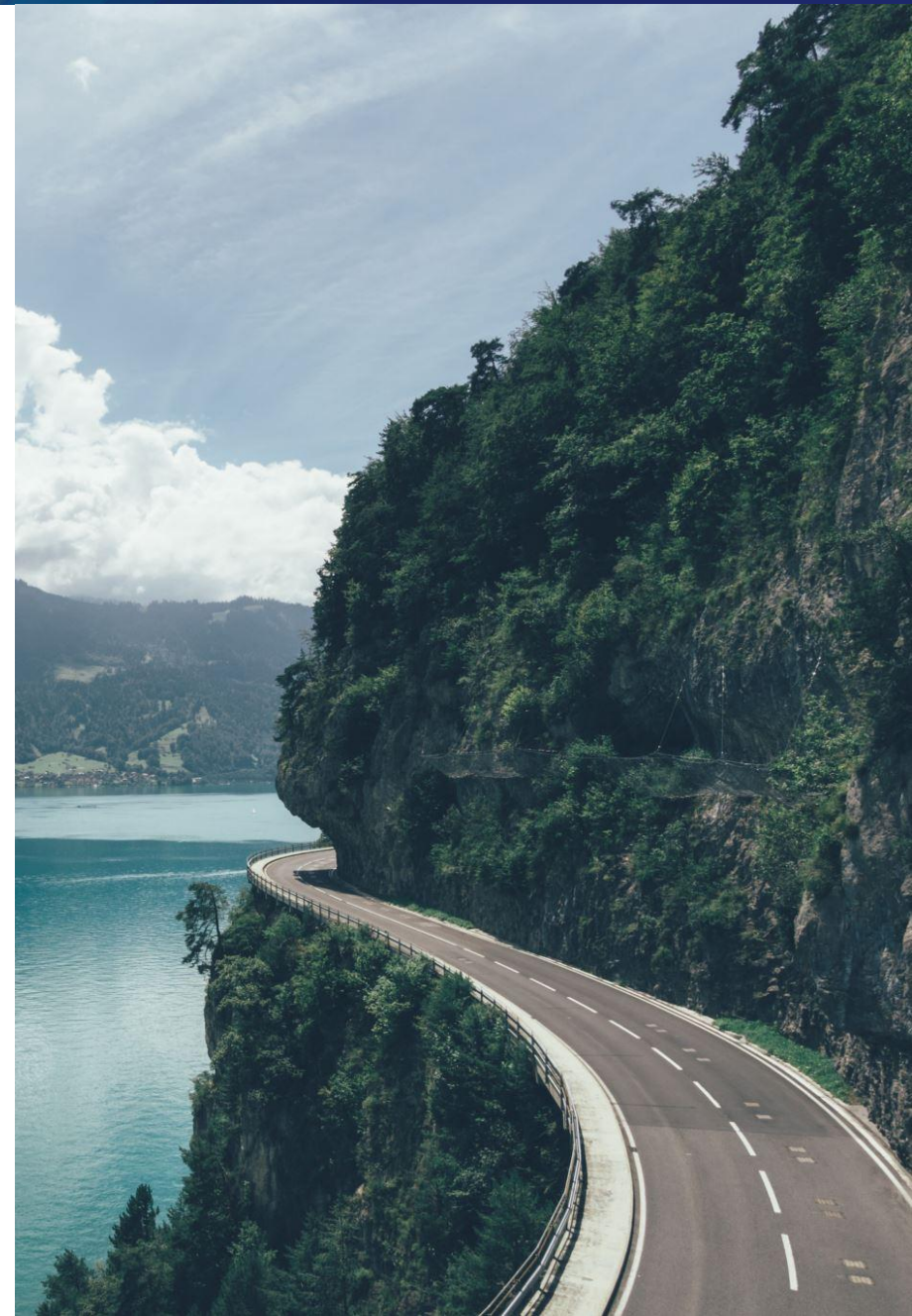




# Conclusion

## On-going Activities and Plans for the Future

- Release 1.8.0
  - Complete **UI redesign**
  - Webhooks support
  - Initial multi-cluster support
- Addition of new applications to the catalog
- Future
  - **New use-cases**
  - Refinements to multi-cluster support



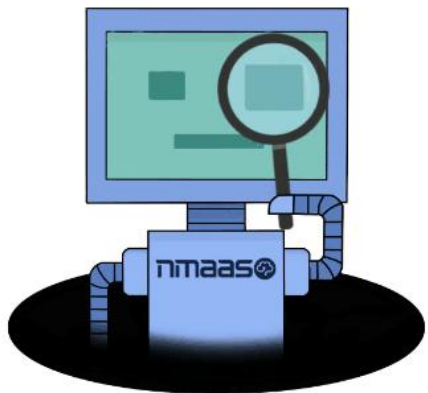
## Conclusion

- nmaas as a versatile orchestration platform
  - Based on popular and well-known technologies
  - Open source (Apache 2.0, <https://gitlab.software.geant.org/nmaas>)
  - **Suitable for running a cloud-based NMS**
- **You are welcome to share ideas and requirements**
  - Missing features or applications
  - Brand new use cases



## Stay informed

- **Discord** server – <https://discord.gg/CZzvZH2TAe>
  - General discussion, announcements, troubleshooting, and help
- **LinkedIn** nmaas user group – <https://linkedin.com/groups/10068131>
  - nmaas related news, events, blog posts
- **Blog** posts – <https://docs.nmaas.eu/blog/>
  - Featuring new catalog applications and tutorials





# Thank You

Documentation  
Contact the nmaas team

*<https://docs.nmaas.eu/>  
[nmaas@lists.geant.org](mailto:nmaas@lists.geant.org)*



[www.geant.org](http://www.geant.org)



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