Network Automation e-Academy

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GN4-3, WP6-T2

ESNOG27

Matadero Medialab

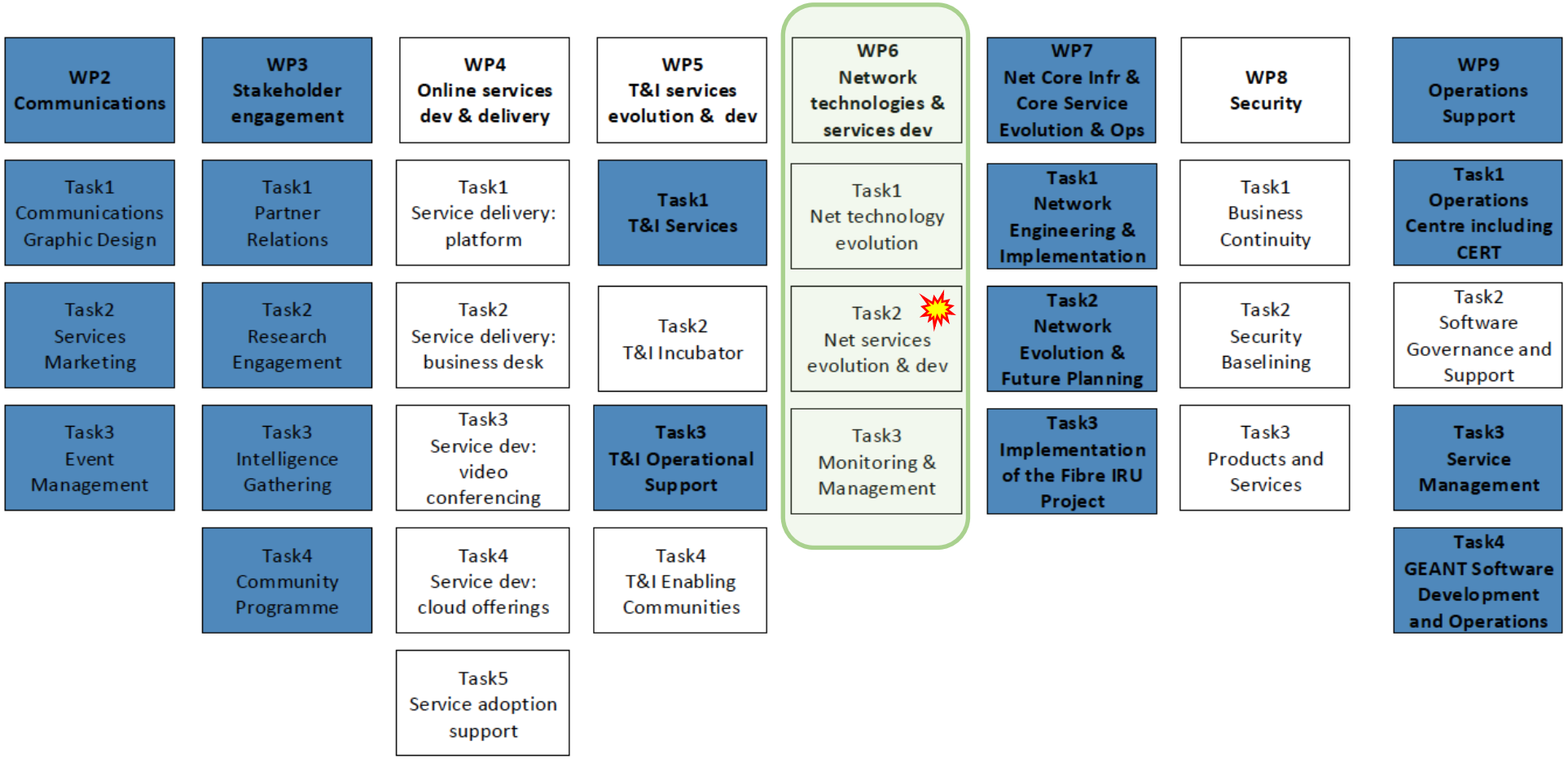
16 Noviembre 2021

www.geant.org

GÉANT Project

- **GÉANT's vision** is to ensure **equal** network **access for all scientists across Europe to** the research **infrastructures and** the **e-infrastructure resources** available to them
- A part of the European Union's Horizon 2020 research and innovation programme
  - GÉANT 2020 Framework Partnership Agreement (FPA)
- 40 partners, 500 contributors
- 50 M users
- GN4-3 started 1 Jan 2019 as a 4 year project

GÉANT Project Structure

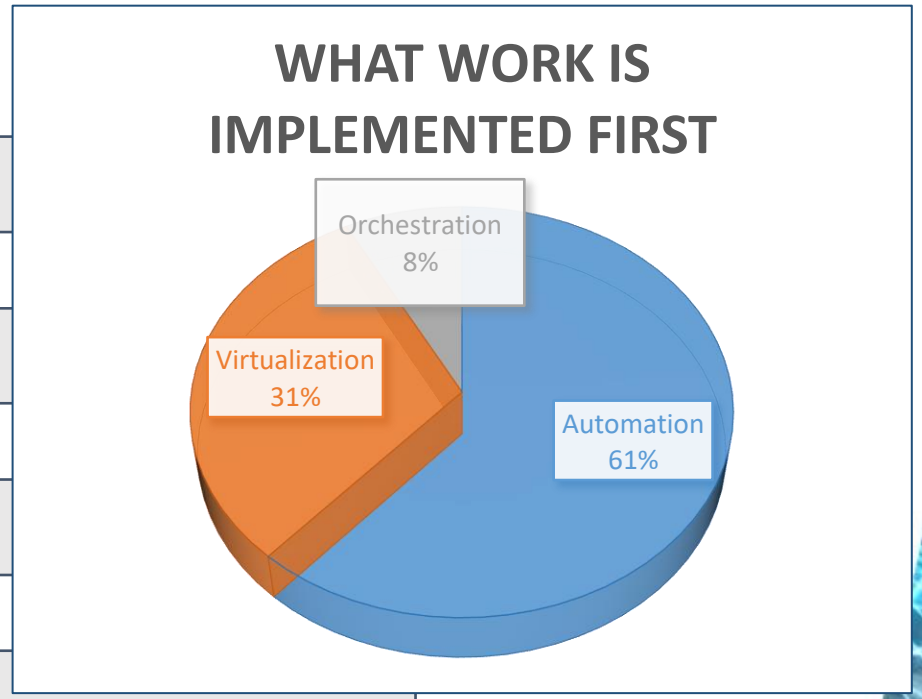


Investigation of OAV in the GÉANT community

- Most of the work known so far is single-domain and domain-specific.
- It was first necessary to understand the current situation for OAV adoption in the community.
- A period of consensus building at the start of GN4-3 was required.
- It started with an **NREN OAV survey** to:
  - Learn about strategy/actions of each NREN related to OAV.
  - Explore if there are common OAV use cases, ideas, and issues.
  - Recognise possible areas of collaboration among NRENs and GÉANT.
  - Determine possible future work in WP6 (or other WPs) that could be of benefit to as many partners as possible for identified use case(s).

OAV Survey (Orchestration, Automation, Virtualisation) - Sections

- Existing Network and Services Support Platforms
- Current OAV Use Cases and Services
- OAV Challenges and Priorities
- Future OAV Use Cases and Services
- How can the GÉANT Community / the GÉANT Project help?



*https://www.geant.org/Projects/GEANT_Project_GN4-3/GN43_deliverables/D6-2_Automation-and-Orchestration-of-Services-in-the-GEANT-Community.pdf

Common pain points

- **Manpower** - number, skill, expertise
- **Brownfield** - existing systems, hard to make changes in production, CI CD
- **Priorities** - existing systems; continuous operations vs. new development
- **Time** - split between the operations and R&D
- **Cost** - additional people, additional software, software replacement
- **Limitations of the proprietary solutions**

NREN consultation clearly showed:

- That there is a diversity of perspectives
- NRENs are at varying stages of OAV concerning implementation / experience

Survey Results: Skills needed for OAV and whether people in NRENs have them

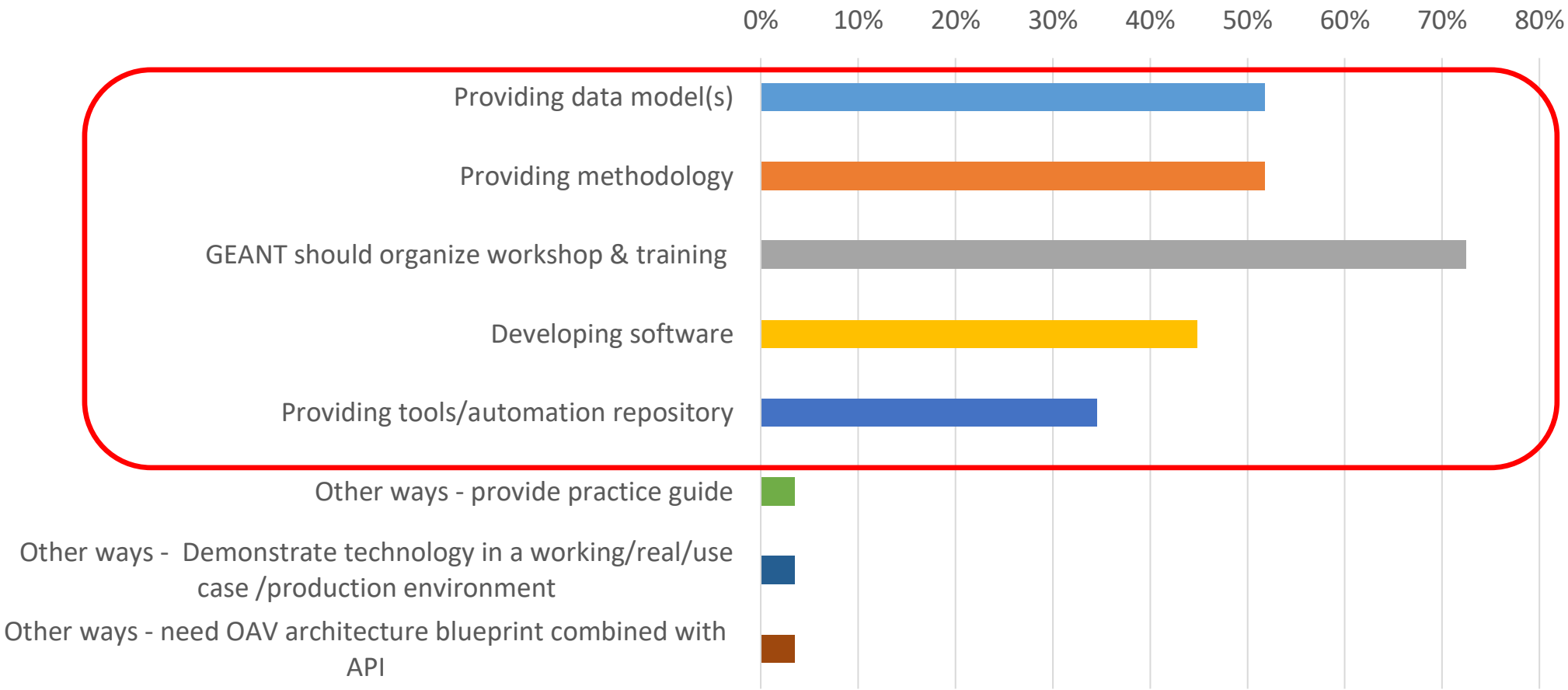
- Software development skills
- Software development and networking skills (unicorns?)
- Additional personnel

Survey Results: Concerns by NOC teams around increased automation

Concerns more widely reported are related to:

- Automating failures due to mistakes / inadequate software / reduced troubleshooting capabilities
- Lack of ability for tailor-made services / lack of flexibility
- Lack of appropriate employee skills / need for training / lots of required effort to setup

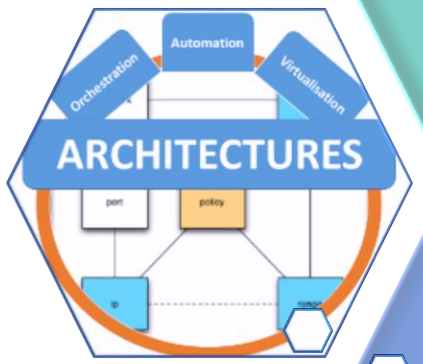
GÉANT Potential Contribution



Collaborative approach to OAV in the GÉANT Community

- Strong need for collaboration and exchange of knowledge and expertise
- Knowledge as a gap
- We speak different languages
- A generally accepted architecture blueprint needed
- NRENs are willing to share experiences and learn from others

Consensus Building – OAV focus groups



Terminology

CNaaS (use case)

Architecture/ Mapping

OAV public wiki

OAV Training

DTN

Terminology

- Need for an agreement on common terminology.
- The idea is to have a common ground of understanding.

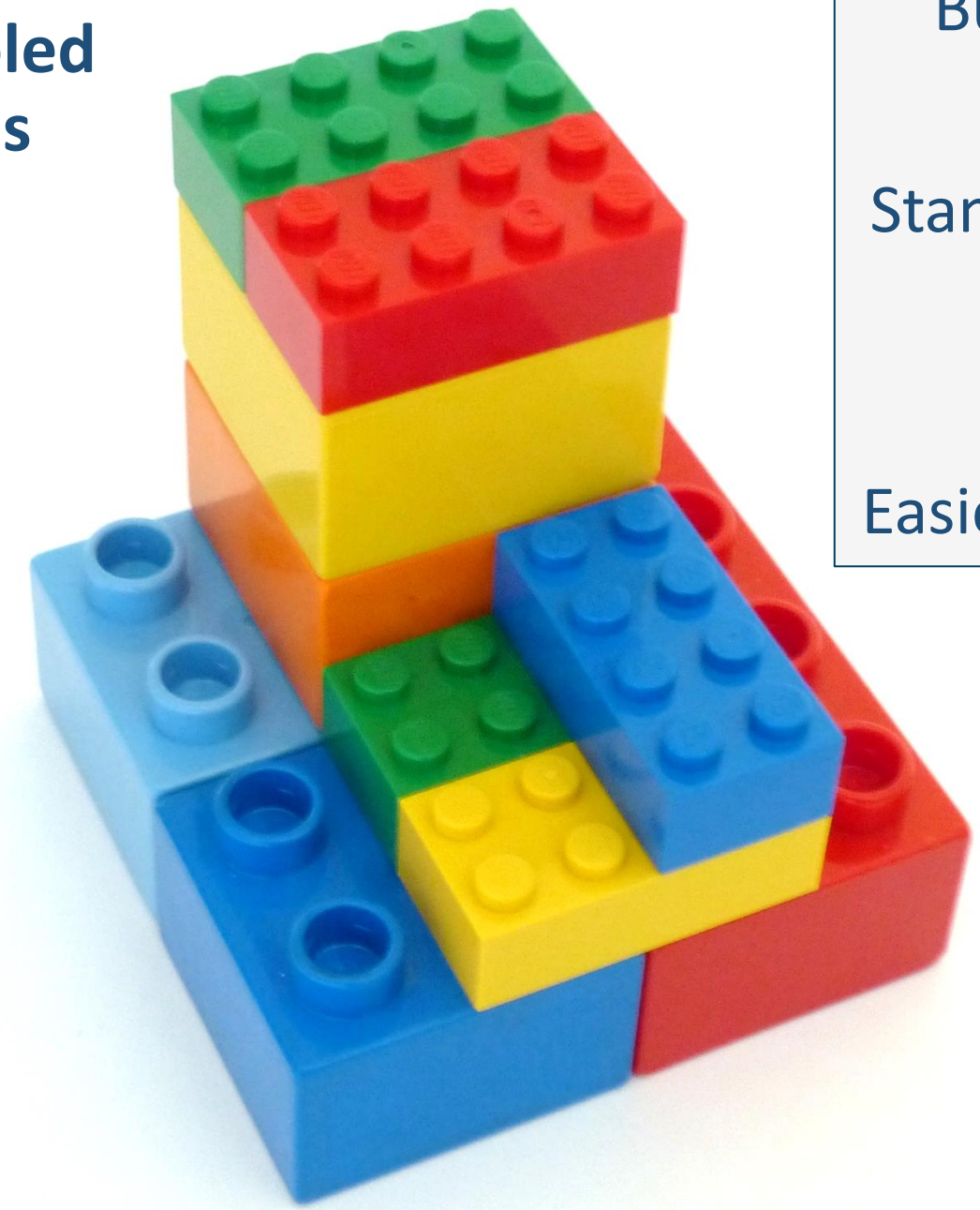
Terminology – Terms and Glossary

GLOSSARY

Abbreviation/ Acronym	Description/Definition
ABE	Aggregate Business Entity
AI	Artificial Intelligence
AMC	Autonomic Management and Control
AWS	Amazon Web Services
BPMN	Business Process Model and Notation
BSS	Business Support System
CBP	Ciena Blue Planet
CDE	Component DEscription
CDN	Content Delivery Network
CNA	Cloud Native Application
CNI	Container Network Interface
CSP	Communications Service Provider
D&I	Decoupling & Integration
DC	Data Centre
DCN	Data Communication Network
DE	Decision Element
DPRA	Digital Platform Reference Architecture
DTN	Data Transfer Node
EACM	Enterprise Architecture Content Metamodel
EGM	Engagement Management
ETSI	European Telecommunications Standards Institute

https://wiki.geant.org/display/NETDEV/OAV+Terminology

Architecture: Decoupled and Modular Systems



Building blocks

+

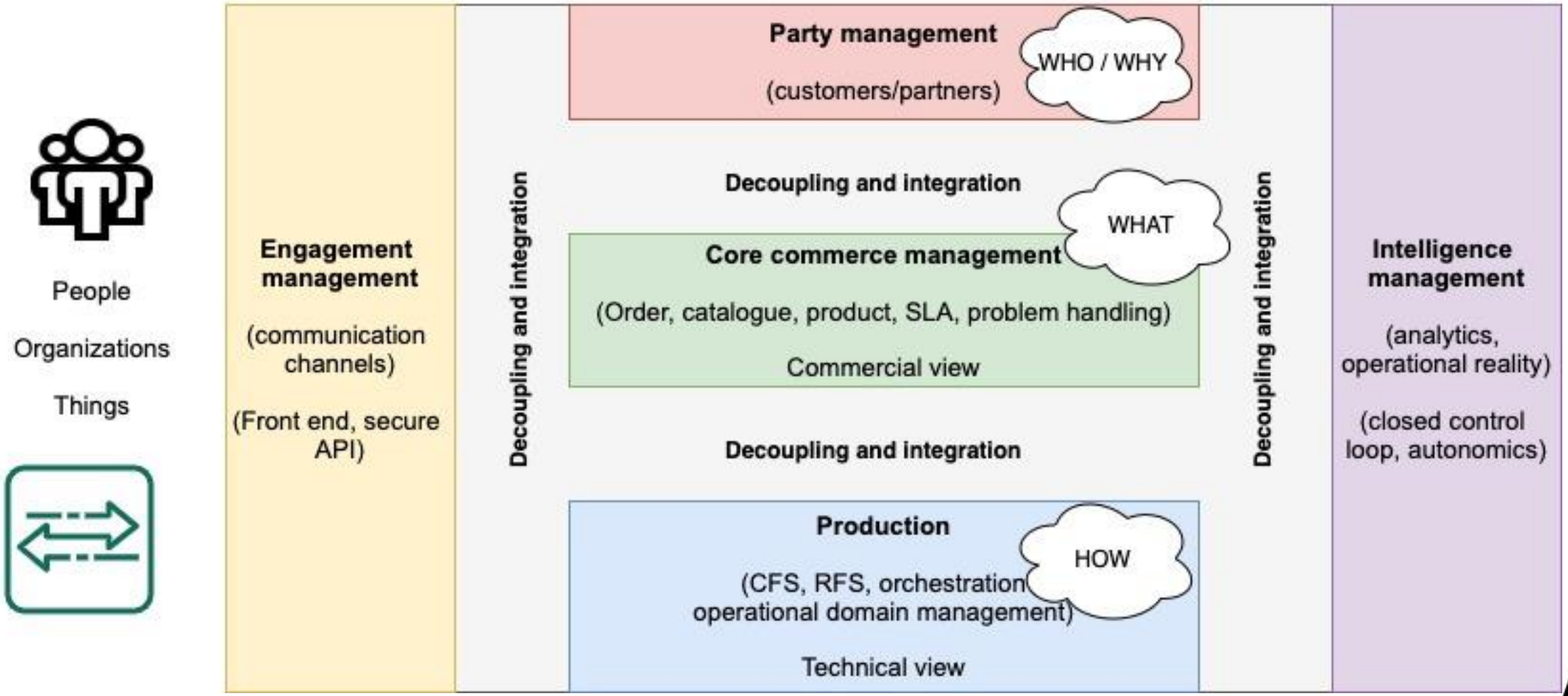
Standard interfaces

↓

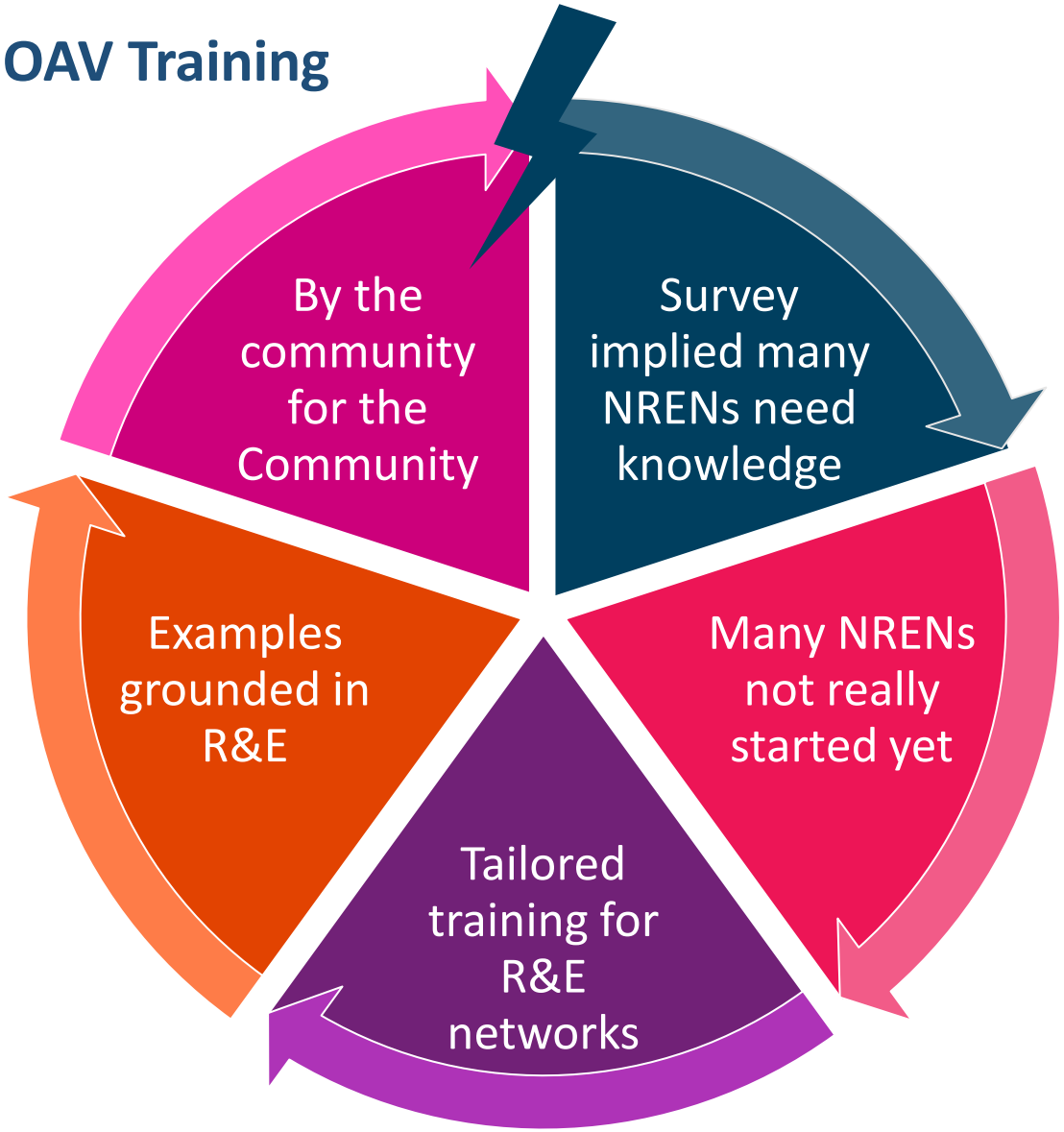
Easier Collaboration

Architecture - The Vegas Rule

Architecture Blueprint: TM Forum Open Digital Architecture



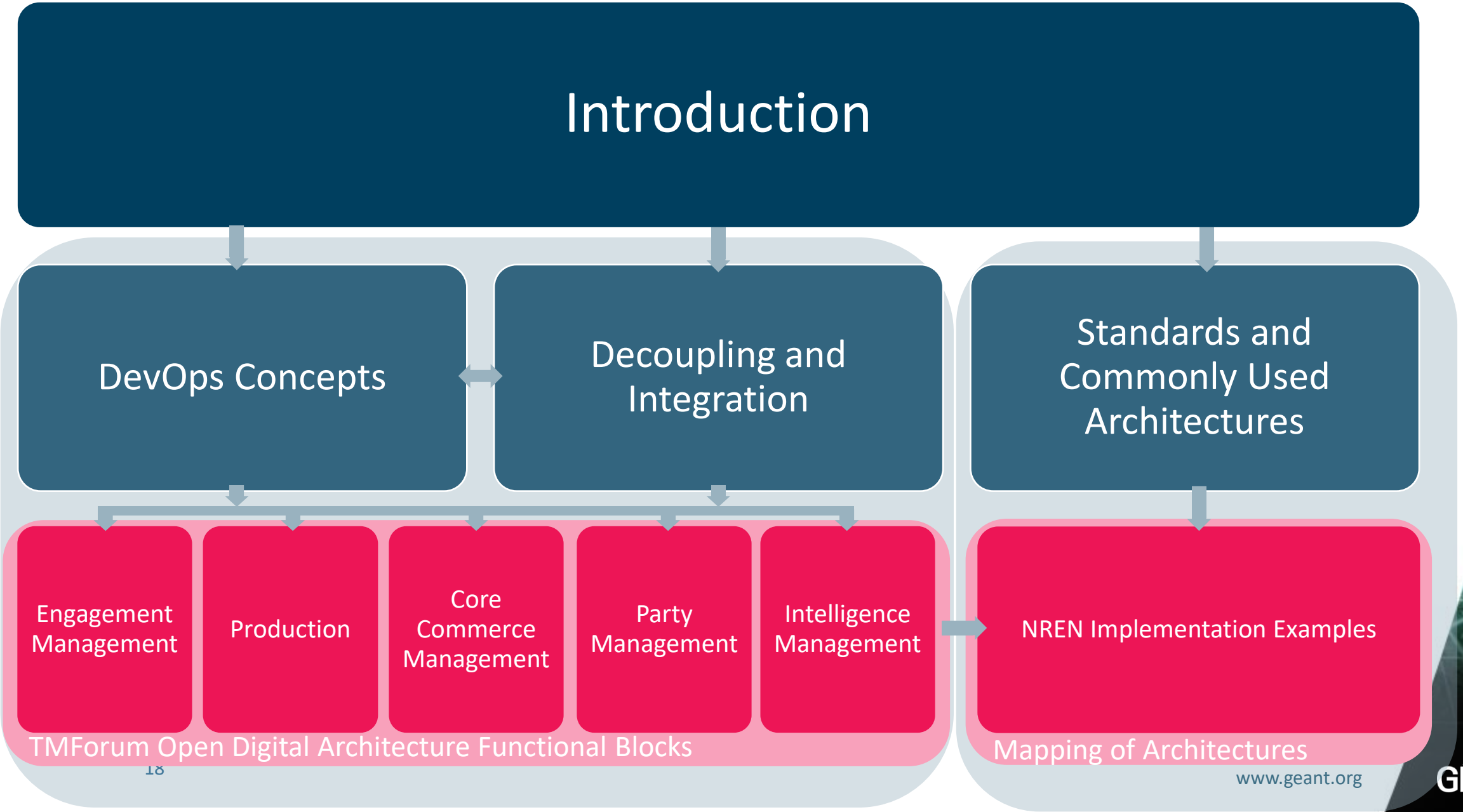
Training:
The Need for OAV Training



Powered by:

GLAD
GÉANT LEARNING & DEVELOPMENT

OAV Training: Knowledge Map



The OAV Training Portal – The Network Automation eAcademy

https://wiki.geant.org/display/NETDEV/OAV+Training+Portal

Espacios | Personas | Calendarios | Blogs | Crear | Buscar

NETDEV

- Páginas
- Blog
- Calendarios

ÁRBOL DE PÁGINAS

- 100g
- Dissemination
- DPP
- DTN
- INT
- Multicast
- OAV
  - CNaaS
  - Highlights
  - OAV Architectures
  - OAV Community Portal
  - OAV Literature
  - OAV Terminology
  - **OAV Training Portal**
  - Standardisation Bodies
- OTFN
- QKD
- SPA
- Timemap
- WB
- WP6 Events

Herramientas de espacio

Panel / NETDEV Home / OAV

Editar | Guardar para más tarde | Siguiendo | Compartir

OAV Training Portal

Creado por Susanne Naegele-Jackson, modificado por última vez hace 2 horas

This Training Portal is offering courses focused on the research and education community, with external references that can be useful for us and examples that can be closer to our use cases. It is training by the community for the community. The portal will have new classes available for you to explore every couple of weeks; all classes are online courses that you can follow and complete at your own pace.

Info | Infoshares ++ Events

- **all upcoming and past events**

Courses in Network Automation eAcademy

Introduction

- **OAV - Introduction**
- **OAV Architecture Requirements for NRENS**
- **The OAV Architecture Blueprint**

DevOps

- **Introduction to CI/CD**

TM Forum Open Digital Architecture

- Decoupling & Integration
  - **Introduction to Data Modelling, Data Formats, and Protocols**
  - **Data Modelling: YANG**
  - **Formats: YAML**
  - **Formats: JSON**
  - **Introduction to API**
- Engagement Management
  - **Introduction to Engagement Management**
- Party Management
  - **Introduction to Party Management**
- Core Commerce Management
  - **Introduction to Core Commerce Management**
- Production
  - **Introduction to Automation**
  - **Introduction to Configuration Management**
- Intelligence Management
  - **Introduction to Intelligence Management**

ADDITIONAL READING

NREN Architecture Mappings

- **CARNET**
- **CYNET**
- **GRNET (coming soon)**
- **HEAnet**
- **SURFNET**

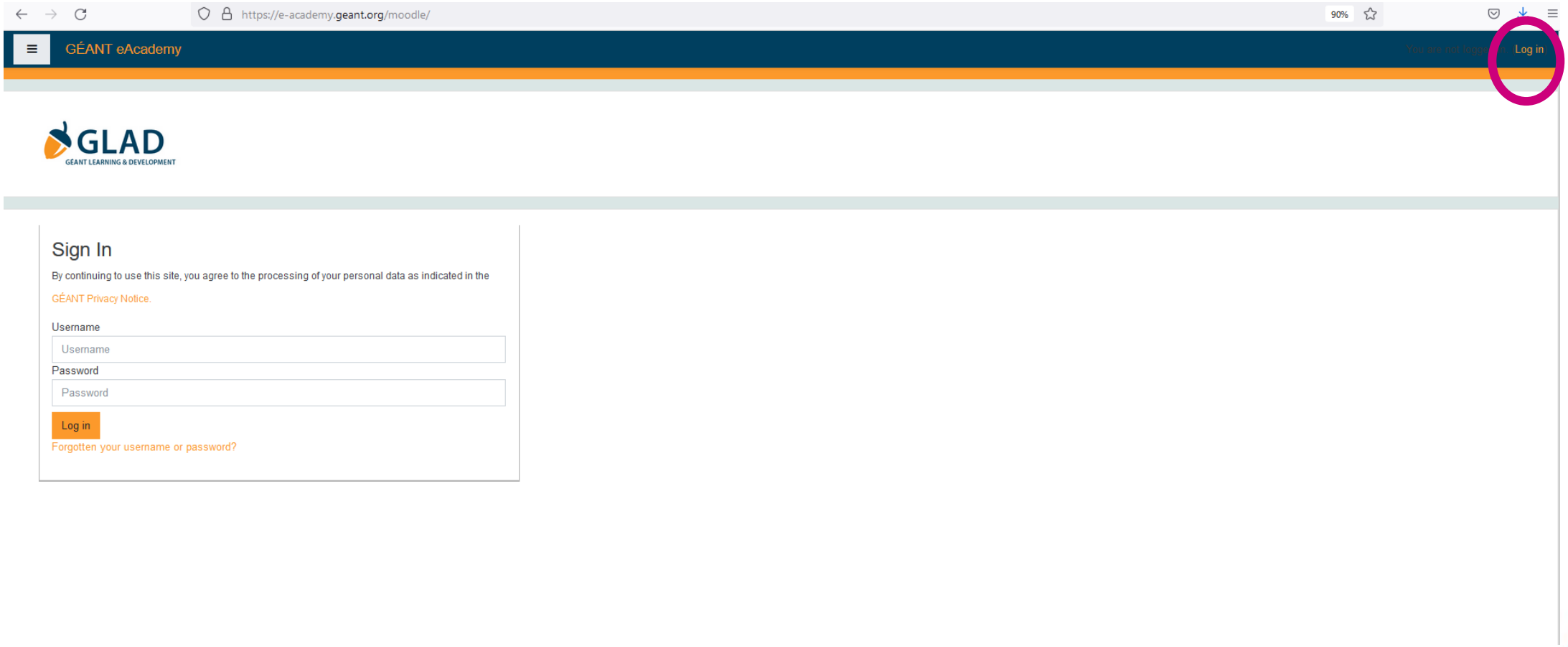
Architectures

- **GVM**
- **SENSE**
- **SPA**

Meet us on the first Tuesday of every month
One hour for questions & answers
Just drop us an email at oav@lists.geant.org and we will send you the link.

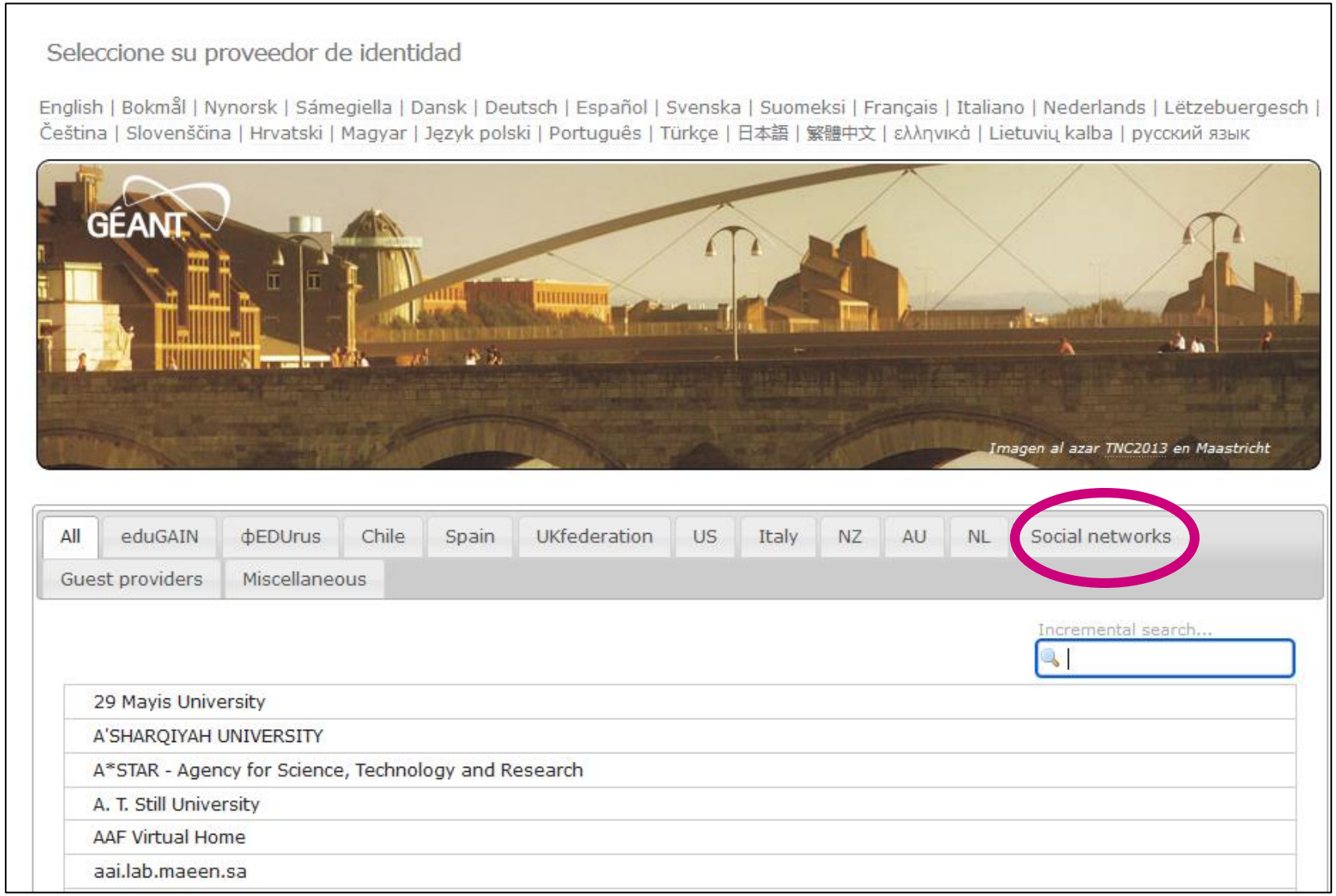
https://wiki.geant.org/display/NETDEV/OAV+Training+Portal

The Network Automation eAcademy



https://e-academy.geant.org/moodle/

The Network Automation eAcademy



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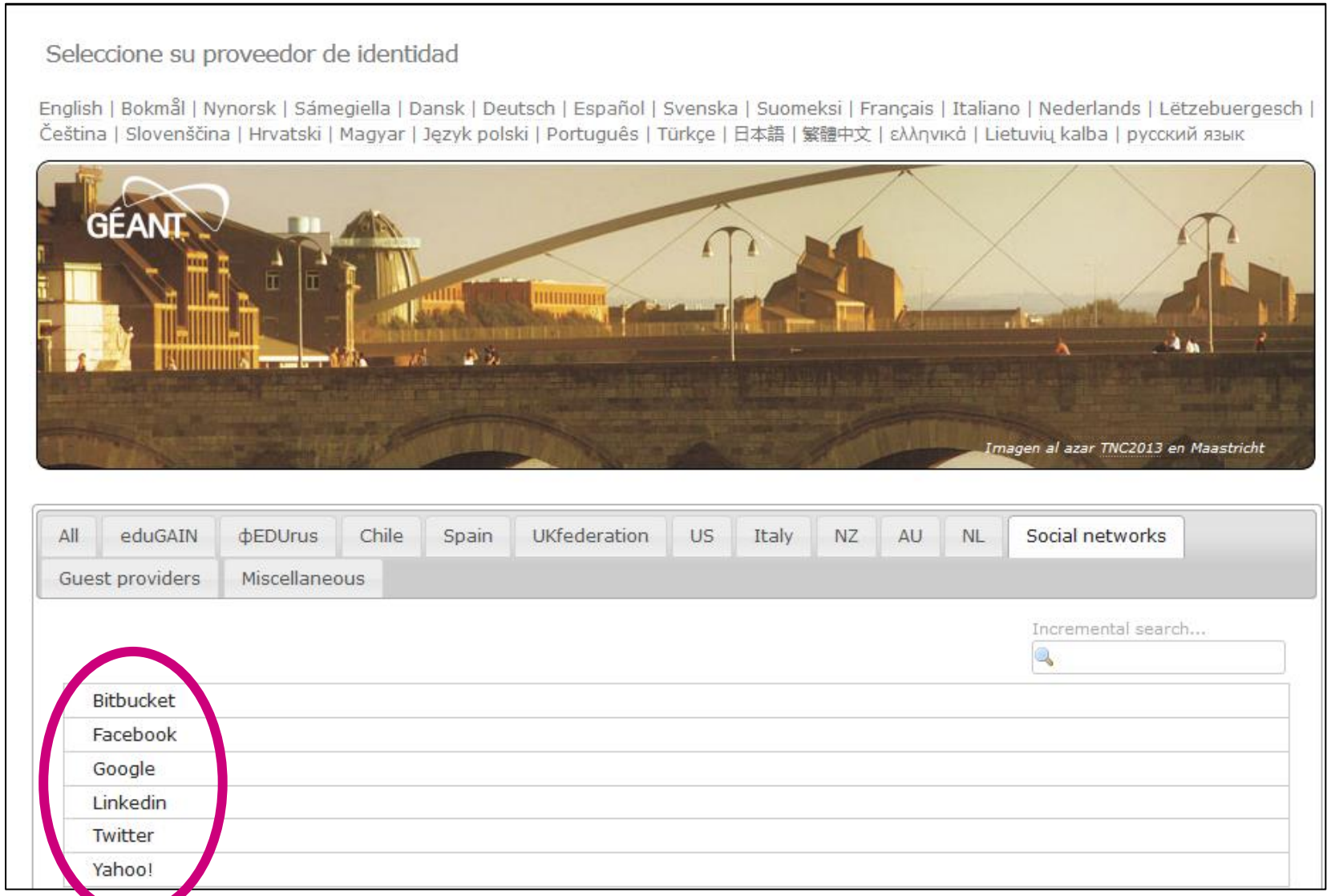
The Network Automation eAcademy



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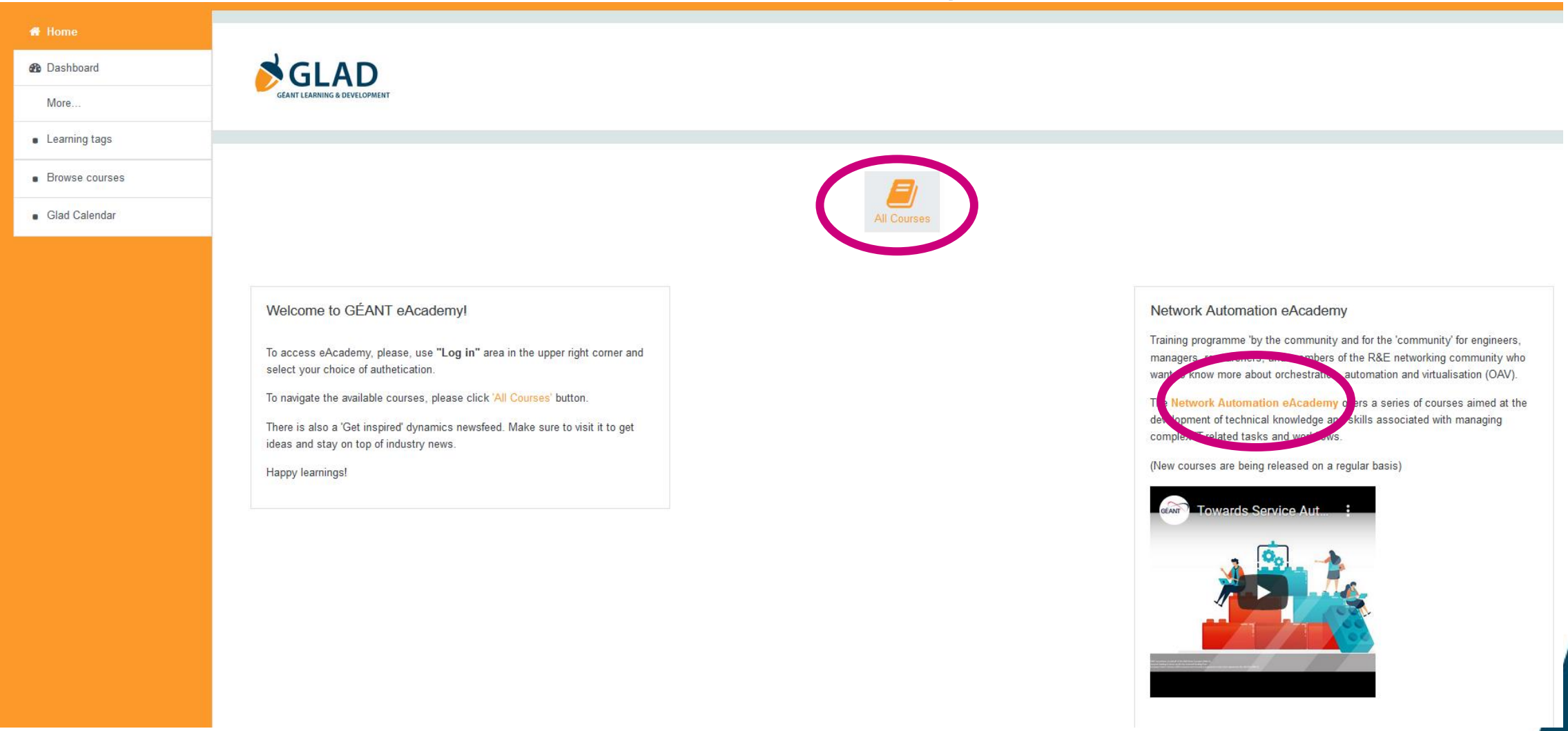
The Network Automation eAcademy



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GÉANT eAcademy

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- Home
- Dashboard
- More...
- Learning tags
- Browse courses
- Glad Calendar

GÉANT eAcademy

Home > My courses > Technical skills > Network > Network Automation eAcademy

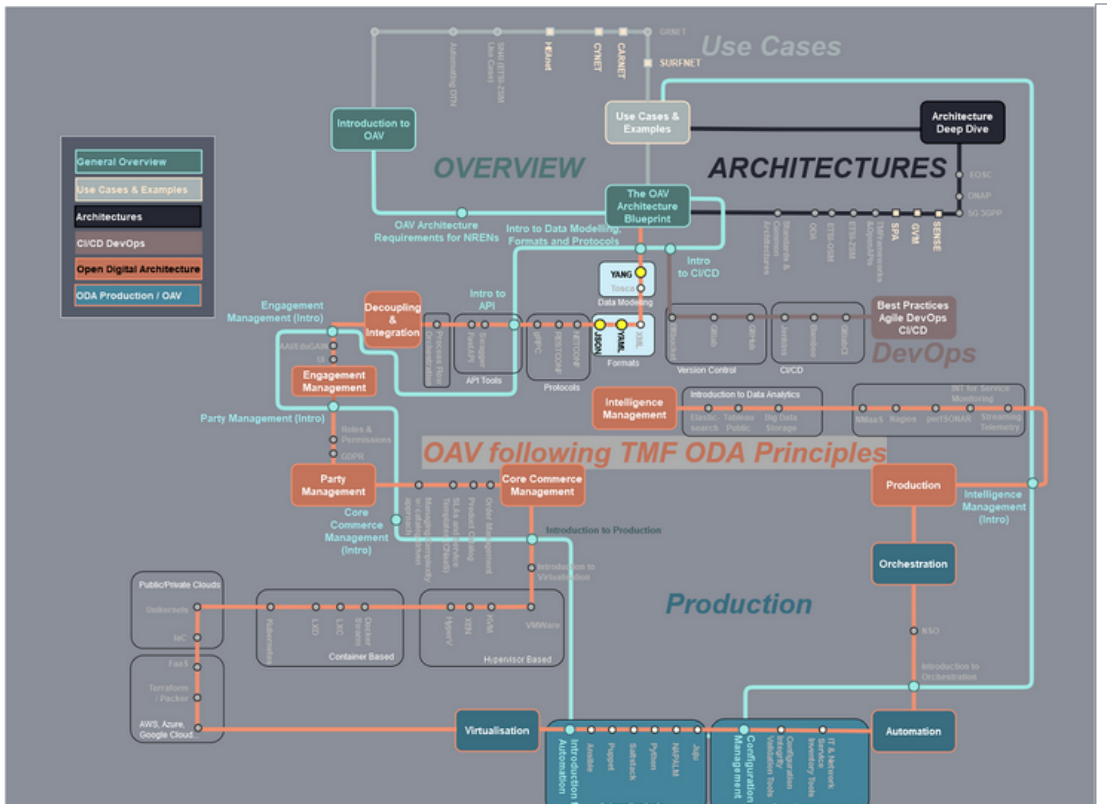
Course categories: Technical skills / Network / Network Automation eAcademy

Network Automation eAcademy

Orchestration, Automation and Virtualisation (OAV) are broad topics with many tools, platforms, programming languages and concepts involved, and it's easy to get lost. The interactive metro map below will help you find your way depending on your areas of interests.

Follow the Metro map!

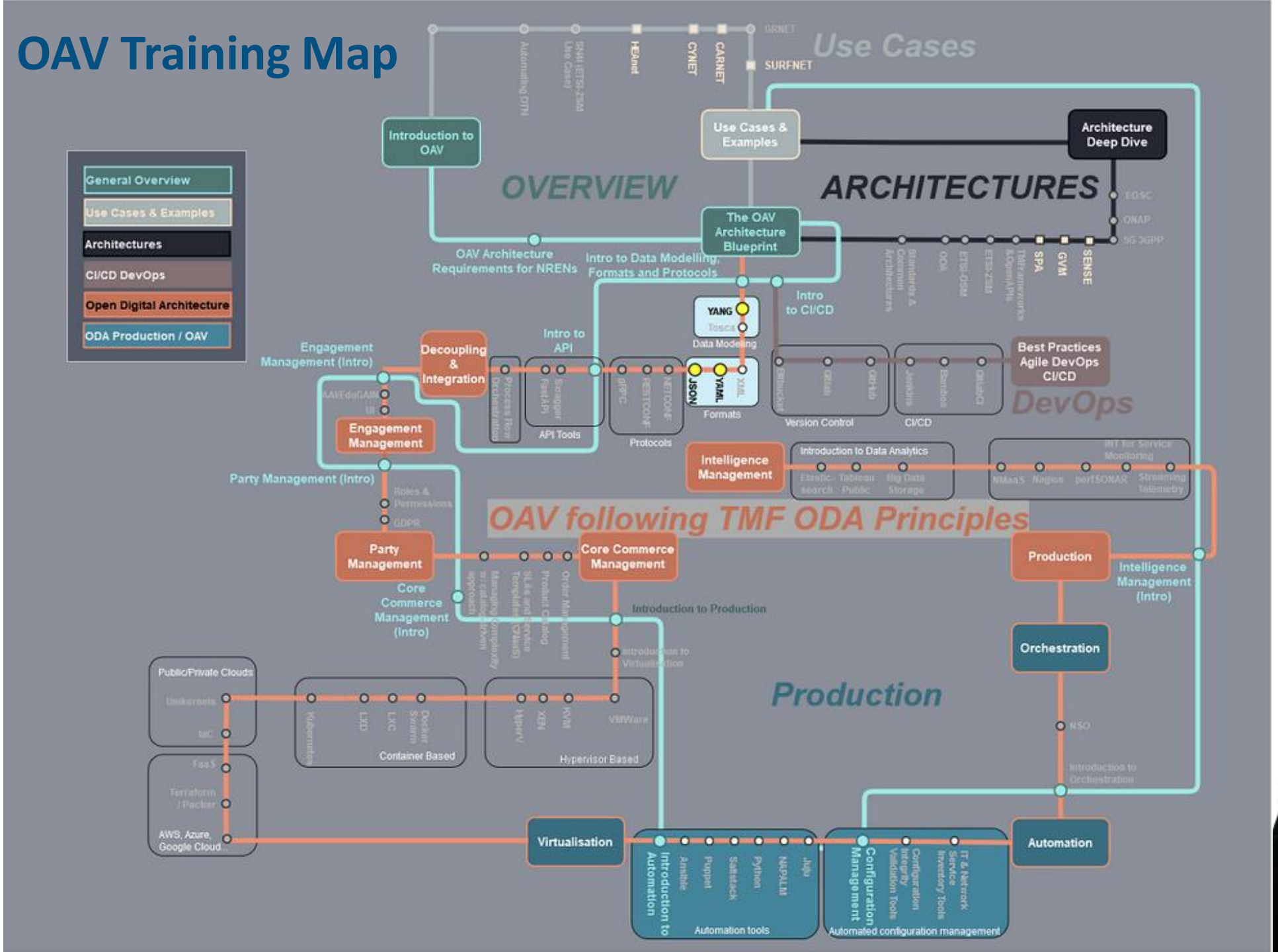
(OAV Interactive Metro map: click on areas of interest to select courses)



Some tips to follow the map:

- A circle in a station means this is a Moodle course in the eAcademy.
- A square means this is a document or an external website where you can get more information on a topic.
- A station with the font highlighted is available.
- A station with the font grayed out means it's not published yet.
- Some stations can belong to more than one line.
- When you arrive to a big station after completing a line, you have gained the knowledge about the topic and mastered the area.
- The green line gives a basic overview of OAV topics and the functional blocks in the TM Forum Open Digital Architecture (ODA) in short learning units (between 5 minutes and 1 hour).
- We recommend that you take at least the first three introductory courses before jumping to another line.
- You can change the line and follow a technical line, or a more theoretical line, or search for use cases.

OAV Training Map

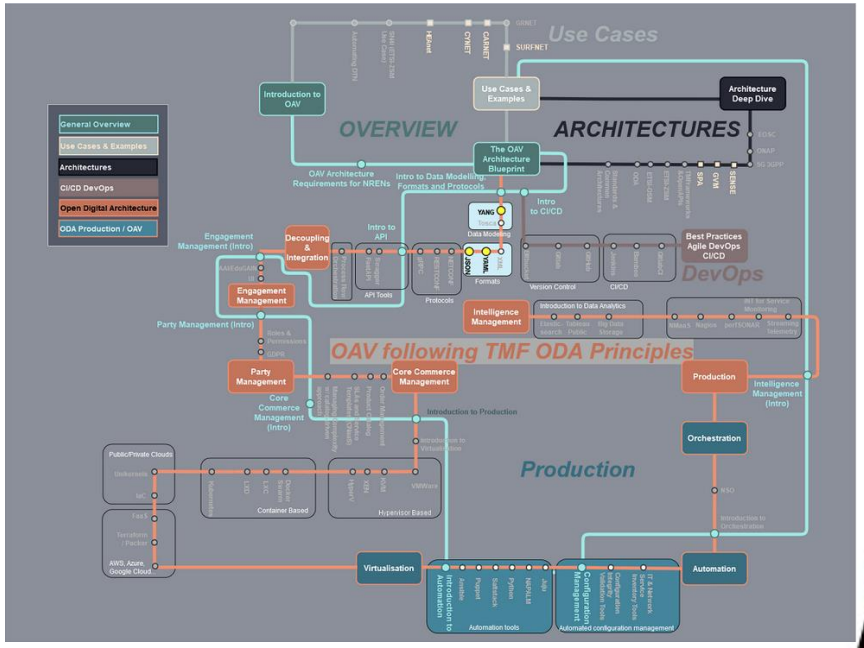


Your Trainers

Jasone Astorga (RedIRIS / UPV/EHU)	Xavier Jeannin (RENATER)
Estela Carmona (RedIRIS / i2CAT)	Hamzeh Khalili (RedIRIS/i2CAT)
Dónal Cunningham (HEAnet)	Roman Łapacz (PSNC)
Yuri Demchenko (SURFnet / UvA)	Anastas Mishev (UKIM/MARNET)
Aleksandra Dedinec (UKIM/MARNET)	Susanne Naegele-Jackson (DFN / FAU)
Martin Dunmore (Jisc)	Simone Spinelli (GÉANT)
Sonja Filiposka (MARNET / USC)	Kostas Stamos (GRNET / CTI)
Maria Isabel Gandia (RedIRIS/CSUC)	Pavle Vuletić (AMRES)
Eduardo Jacob (RedIRIS / UPV/EHU)	
Iacovos Ioannou (CyNet)	

The Introductory Line (General Overview)

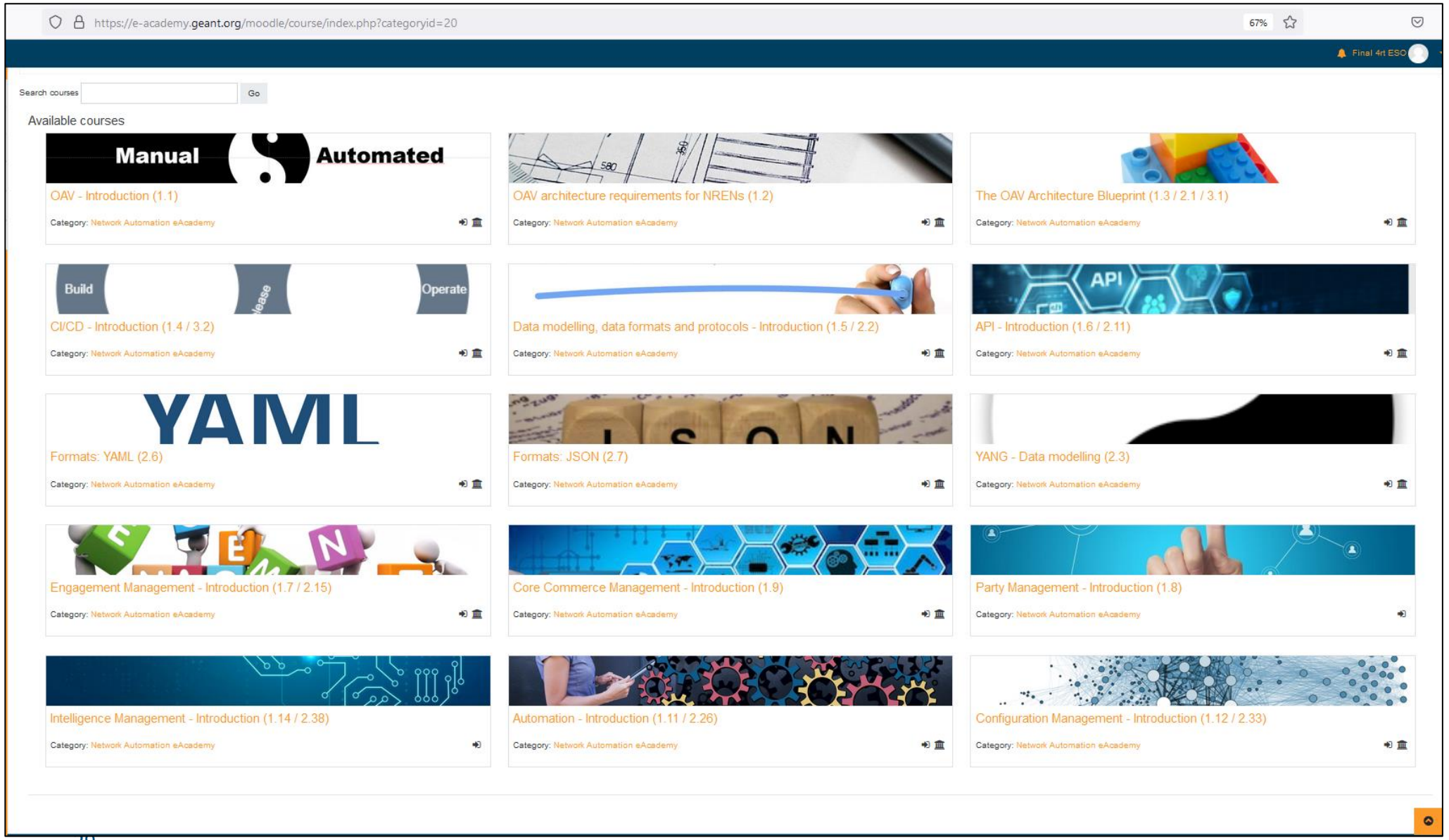
- OAV Introduction
- OAV Architecture Requirements for NRENs
- The OAV Architecture Blueprint
- Introduction to CI/CD
- Introduction to data modelling, data formats and protocols
- Introduction to API
- Introduction to Engagement Management
- Introduction to Party Management
- Introduction to Core Commerce Management
- Introduction to Production
- Introduction to Automation
- Introduction to Configuration Management
- Introduction to Orchestration
- Introduction to Intelligence Management



The Open Digital Architecture “Introductory Pack”

- OAV Architecture Requirements for NRENs
- The OAV Architecture Blueprint
- Introduction to Engagement Management
- Introduction to Party Management
- Introduction to Core Commerce Management
- Introduction to Production
- Introduction to Intelligence Management

Cherry-pick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Search courses
Go
Available courses
Manual
Automated
OAV - Introduction (1.1)
Category: Network Automation eAcademy
OAV architecture requirements for NRENs (1.2)
Category: Network Automation eAcademy
The OAV Architecture Blueprint (1.3 / 2.1 / 3.1)
Category: Network Automation eAcademy
Build
Release
Operate
CI/CD - Introduction (1.4 / 3.2)
Category: Network Automation eAcademy
Data modelling, data formats and protocols - Introduction (1.5 / 2.2)
Category: Network Automation eAcademy
API
API - Introduction (1.6 / 2.11)
Category: Network Automation eAcademy
YAML
Formats: YAML (2.6)
Category: Network Automation eAcademy
Formats: JSON (2.7)
Category: Network Automation eAcademy
YANG - Data modelling (2.3)
Category: Network Automation eAcademy
Engagement Management - Introduction (1.7 / 2.15)
Category: Network Automation eAcademy
Core Commerce Management - Introduction (1.9)
Category: Network Automation eAcademy
Party Management - Introduction (1.8)
Category: Network Automation eAcademy
Intelligence Management - Introduction (1.14 / 2.38)
Category: Network Automation eAcademy
Automation - Introduction (1.11 / 2.26)
Category: Network Automation eAcademy
Configuration Management - Introduction (1.12 / 2.33)
Category: Network Automation eAcademy

Example – Formats: YAML

Formats: YAML (2.6)

Home > My courses > Technical skills > Network > Network Automation eAcademy > Formats: YAML

OVERVIEW | Main Goals | Formats: YAML | Useful Links | Quiz | Feedback & Certificate

Welcome to the Course: Formats: YAML

YAML

YAML Ain't a Markup Language

DATA

COURSE DATE:	DURATION:	COMMITMENT:
From September 2021	20 min	30 min

REQUIREMENT:	COURSE TYPE:	CREDENTIAL:
No requirements	Selfpaced	Certificate of completion

Learning path:	OAV Training Portal
Preceded by:	Data Modelling: YANG
Followed by:	Formats: JSON

Course summary

YAML is a human-friendly data serialisation standard broadly used in Orchestrat
useful tips and references and a quiz.

Example – Formats: YAML

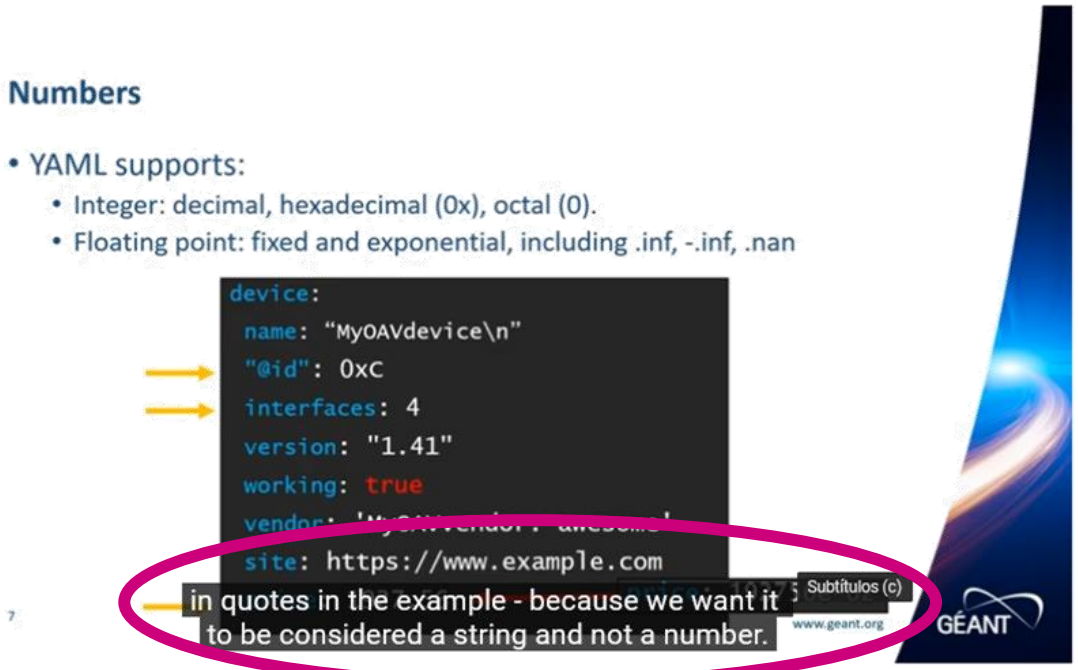
Formats: YAML (2.6)

Home > My courses > Technical skills > Network > Network Automation eAcademy > Formats: YAML > Formats: YAML

OVERVIEW | Main Goals | Formats: YAML | Useful Links | Quiz | Feedback & Certificate

Please watch the video below to learn about YAML and see several examples of usage in OAV.

(In case you want to turn on the auto-generated subtitles, press the "CC" icon in the bottom of the image while you are reproducing the video. For a more accurate text reading, you can also download the PDF with the n



Formats: YAML

Example – Formats: YAML

Formats: YAML (2.6)

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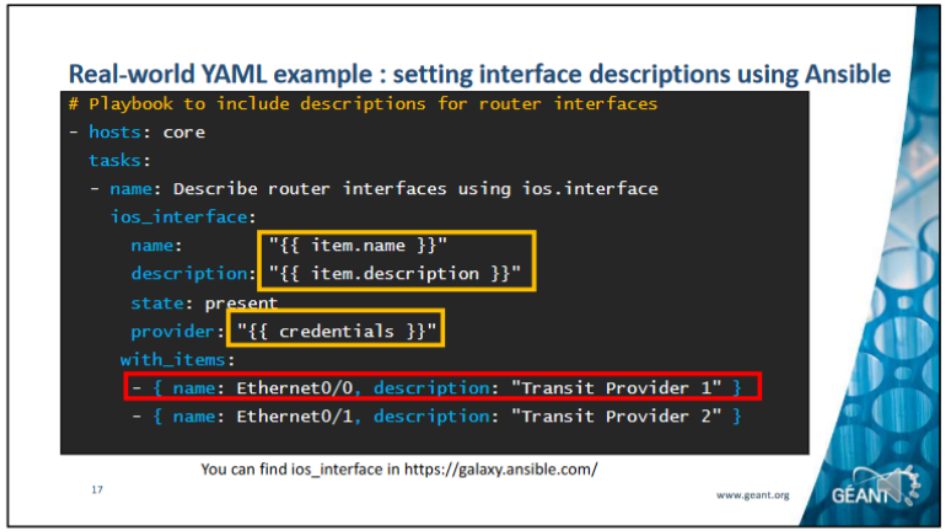
Formats: YAML

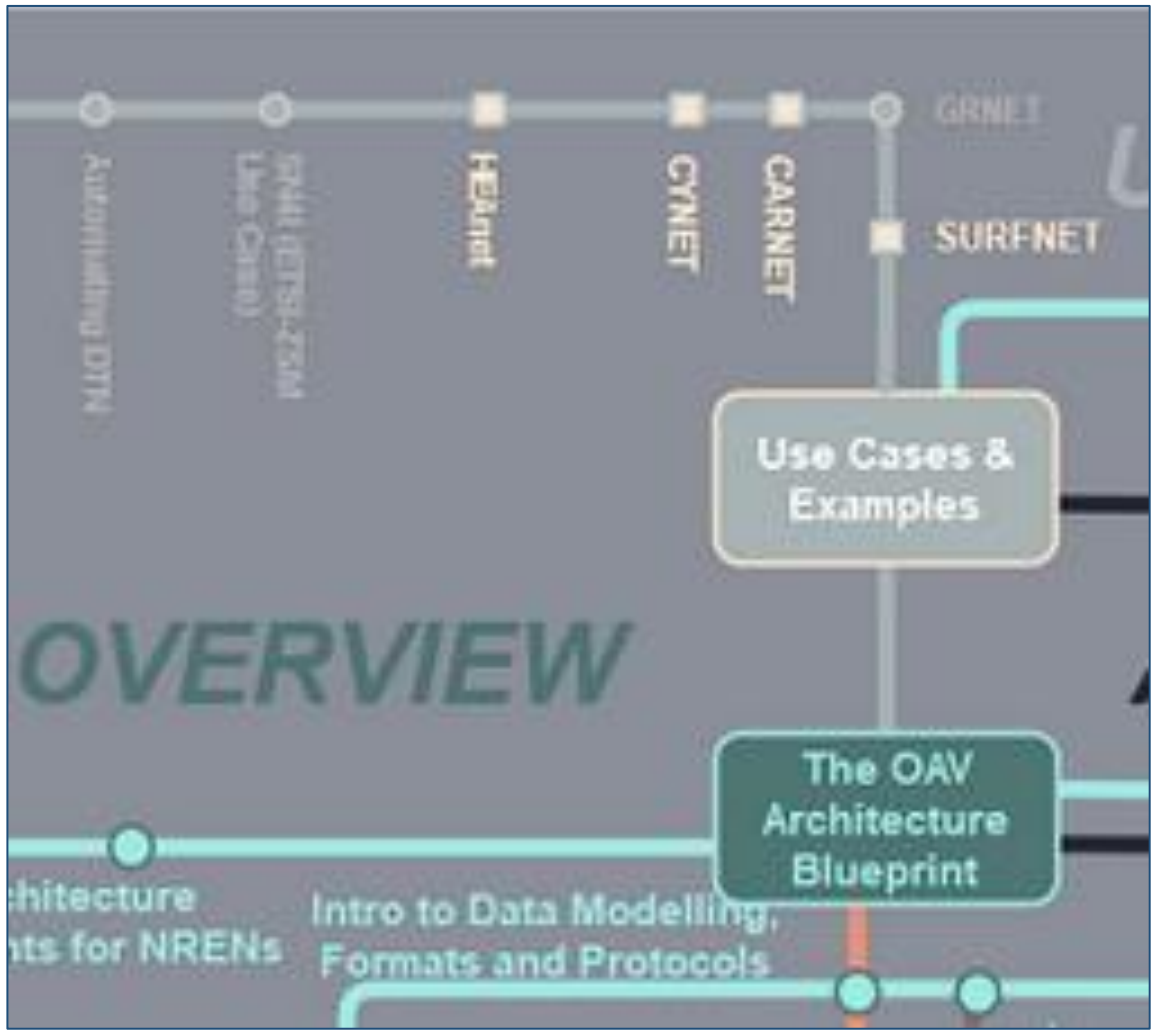
18 de 20 — Tamaño automático



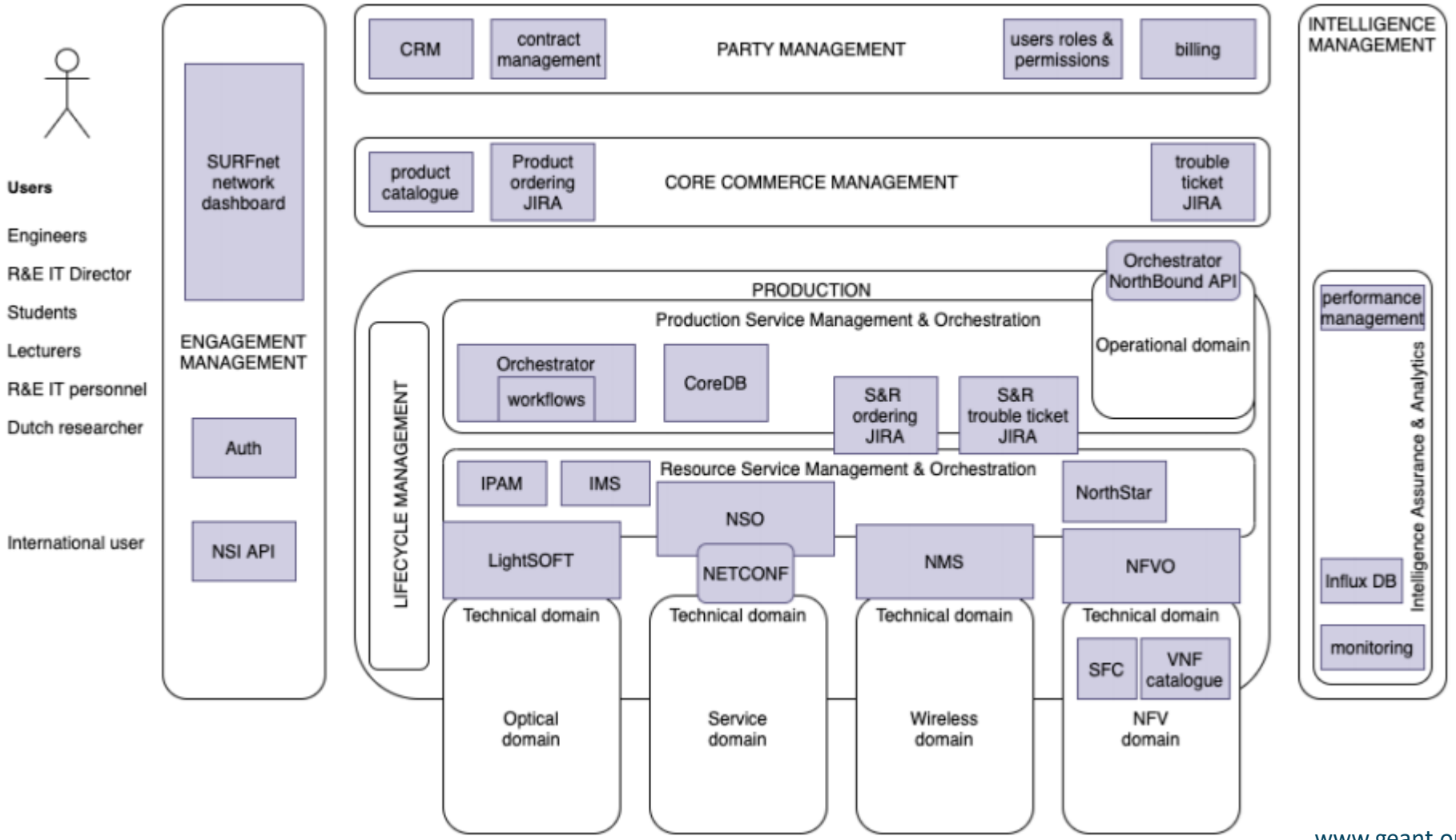
Let's take an example from an Ansible playbook that can be used to set descriptions for the interfaces of a Cisco router running IOS.
This playbook would be used with the module ios_interface that you can find in Ansible Galaxy.
You can learn more about modules, inventories and playbooks in the Ansible learning unit.
Let's start with the content marked in red. Here, we have the first item of a sequence

Example – Formats: YAML

Use Cases: Mapping Architectures to the Blueprint

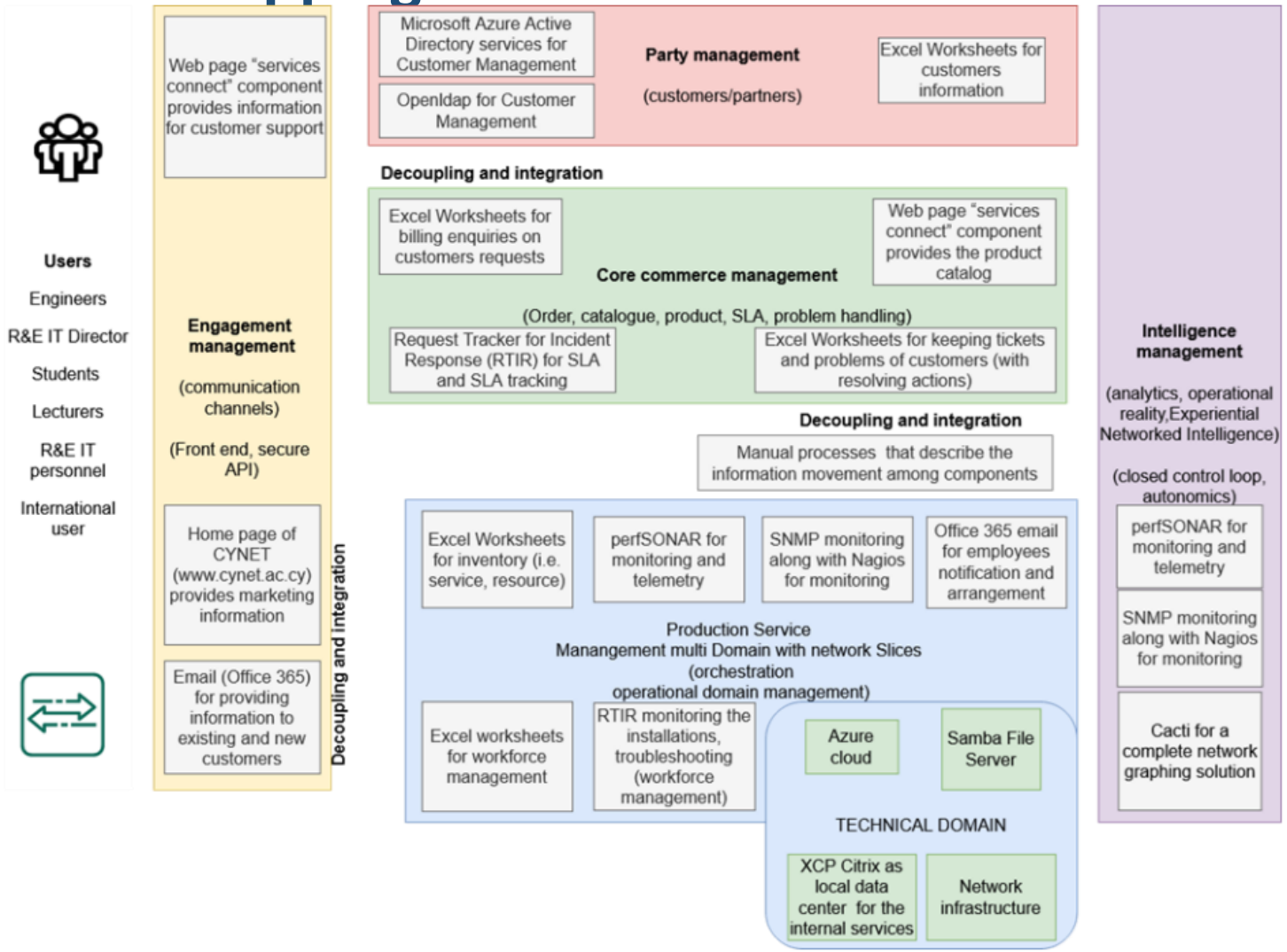


Architecture Mappings: SURF



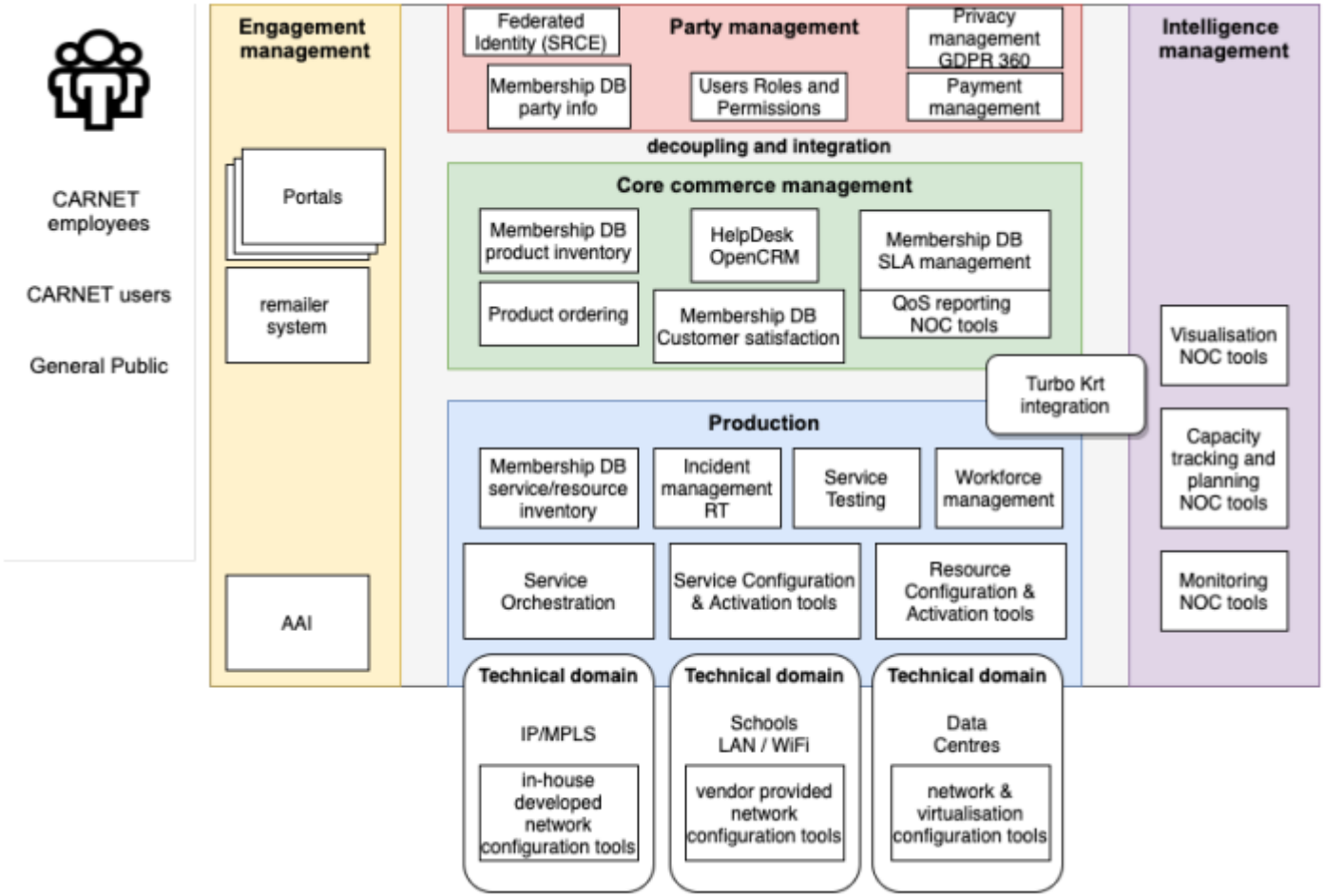
https://www.geant.org/Resources/Documents/GN4-3_White-Paper_SURFnet-OAV-Architecture-Analysis.pdf

Architecture Mappings: CYNET



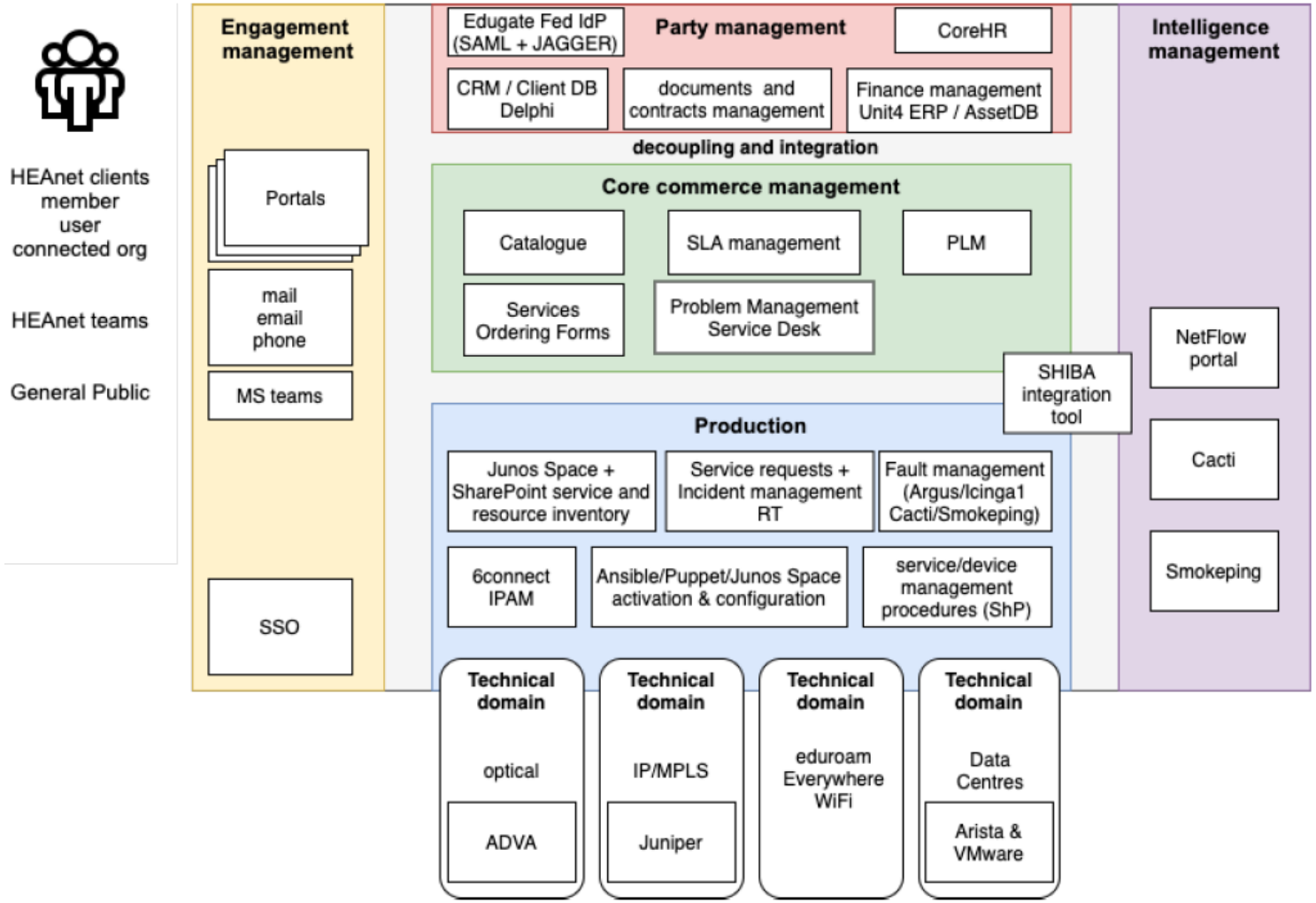
https://www.geant.org/Resources/Documents/GN4-3_White-Paper_CYNET_OAV_Architecture_Analysis.pdf

Architecture Mappings: CARNET



https://www.geant.org/Resources/Documents/GN4-3_White-Paper_CARnet-OAV-Architecture-Analysis.pdf

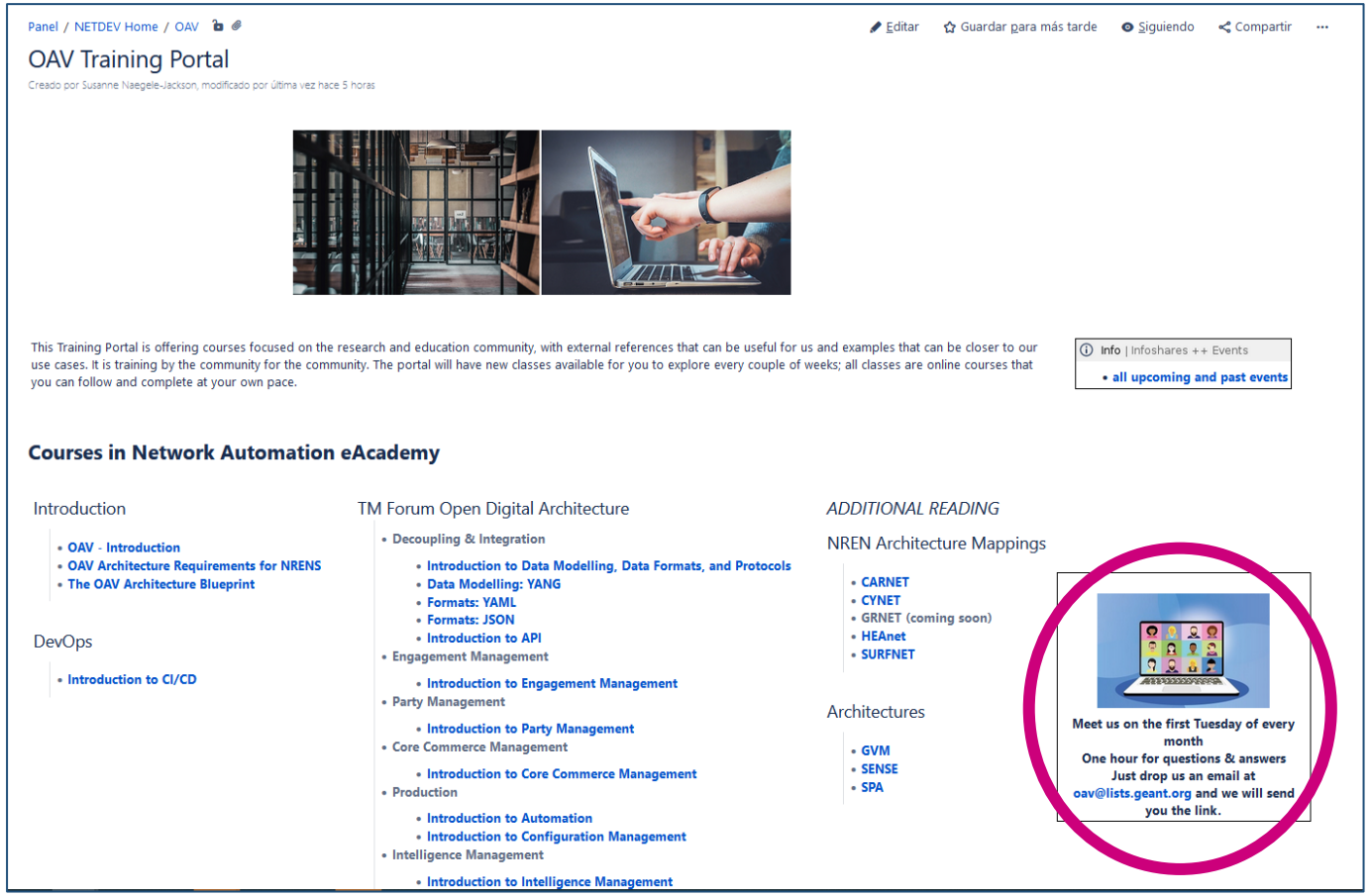
Architecture Mappings: HEAnet



https://www.geant.org/Resources/Documents/GN4-3_White-Paper_HEAnet-OAV-Architecture-Analysis.pdf

Open Window to the Trainers

- By video conference on the first Tuesday every month.



https://wiki.geant.org/display/NETDEV/OAV+Training+Portal

Thank you

Any questions?

Or email us:

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www.geant.org

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