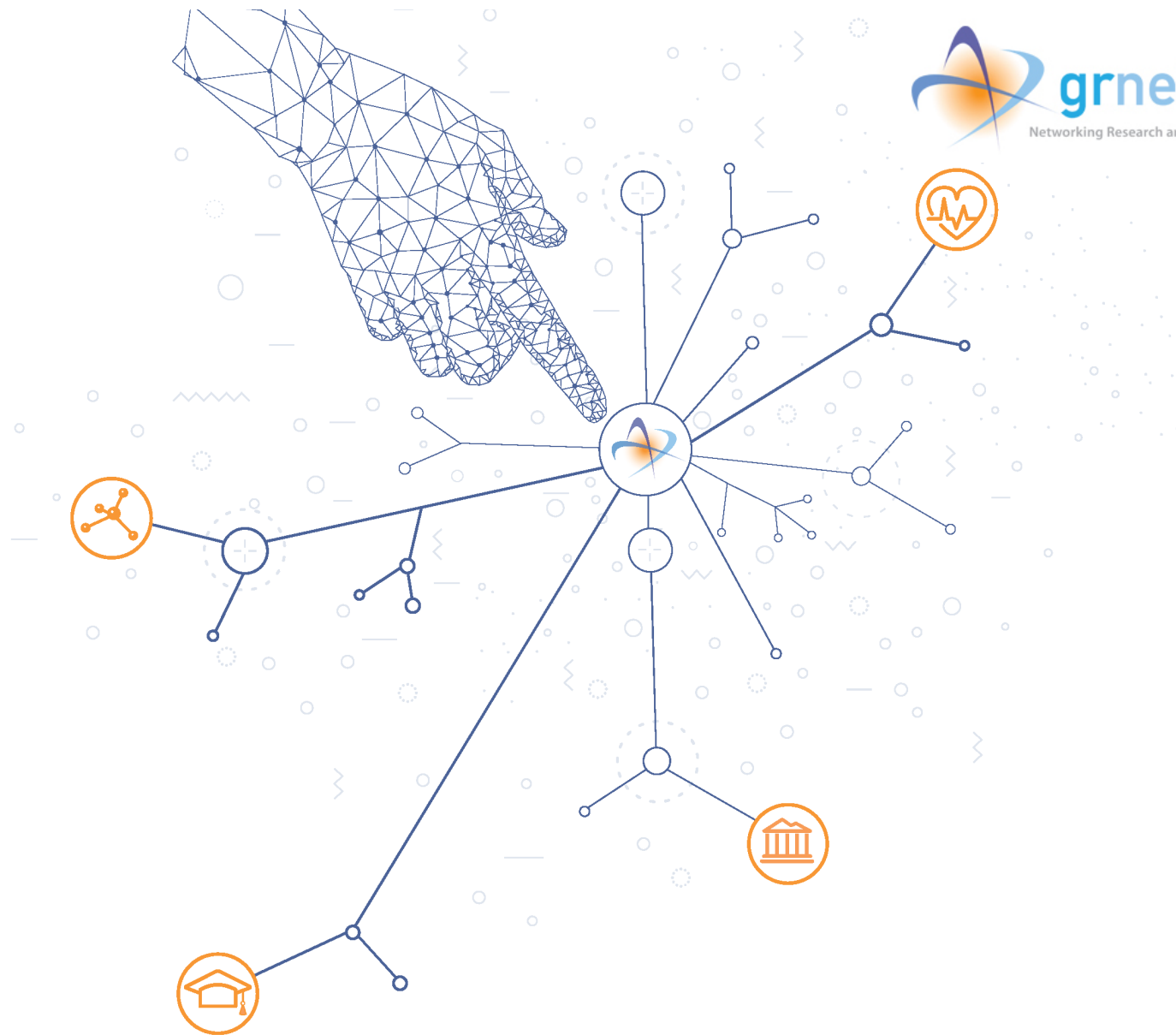# Orchestrating service delivery @GRNET

Afrodite Sevasti, CTO, GRNET
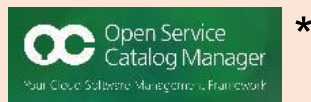
A platform for orchestration

# Terms of play

**grnet**

## Orchestrated/automated Service Delivery

**Business systems**

Jira

SUITE CRM

KEYCLOAK

servicenow. *

Open Service Catalog Manager *

**Operations systems**

CMDB

Jira

ANSIBLE

puppet

OBSERVIUM
network management and monitoring

StackStorm *

**Integration & orchestration**

\* Under consideration or revision

# Orchestration

Service recipes for BPMN execution engine in ONAP* Service Orchestration

- **Business Process Engine** using **BPMN** to model processes

- **Orchestrates** the end-to-end workflow and the interactions between systems that take part in a service offering scenario (e.g. L2VPN).

- Provides the ability to include **user tasks** as part of the workflow.

- Provides a single point to **monitor the state** of a process instance

*ONAP belongs to THE LINUX FOUNDATION PROJECTS
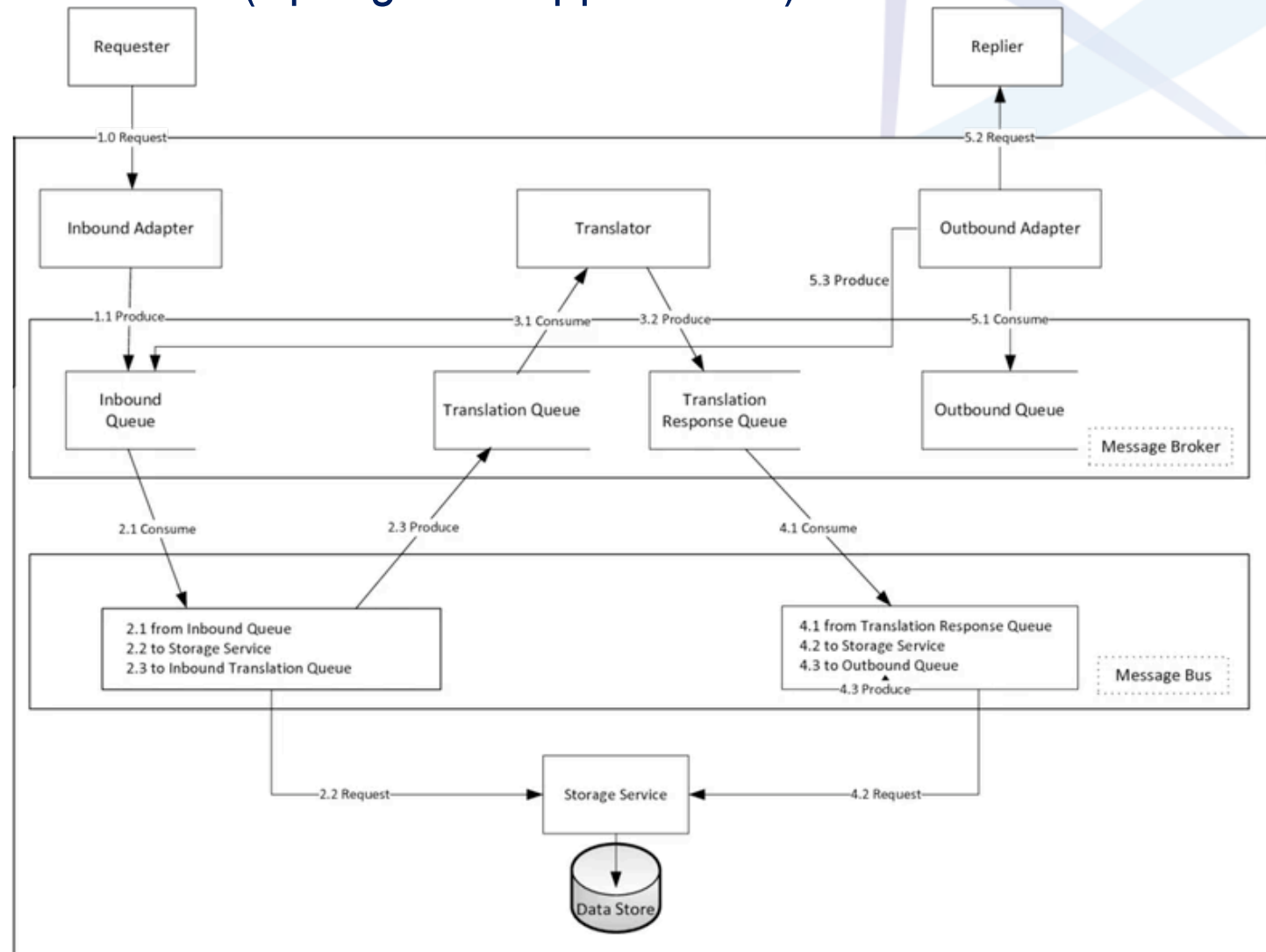
# Integration

- A **microservices architecture** (Spring Boot applications)

- Building blocks:
  - **Adapter** microservices
  - **Translator** microservices
  - **Message Broker**
  - **Message Bus**
  - **Storage microservice**

- Microservices **can be containerized**, deployed in a cluster, replicated etc.
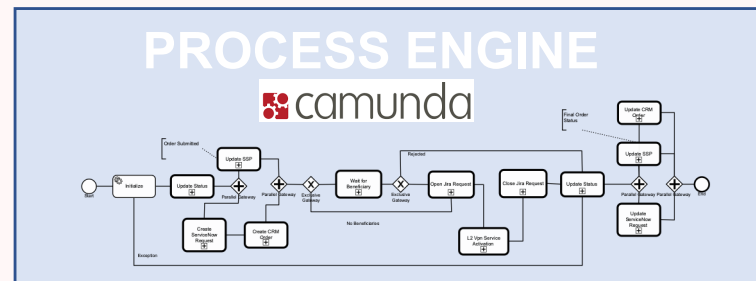
# Integration framework components' outline

- **Adapter microservices** defined per external system
    - Conversion of system interfaces to the common integration interface of the Message Bus

- **Translator microservices** defined per external system
    - Data model translation between the native data model of the external system and the common data model of the Message Bus (TMForum SID)

- **Message Broker** is implemented using Apache ActiveMQ
    - Guaranteed and exactly-once delivery semantics, durable and persistent

- **Message Bus** routes messages based on their headers (Requester, Action, Resource etc.) using the Apache Camel framework
    - It **ensures persistence** by synchronously contacting the Storage Service
    - **Everything is configuration based** and no system interaction is hardcoded

- **Storage microservice**
    - Persistence layer with generic API for storing/retrieving interaction details
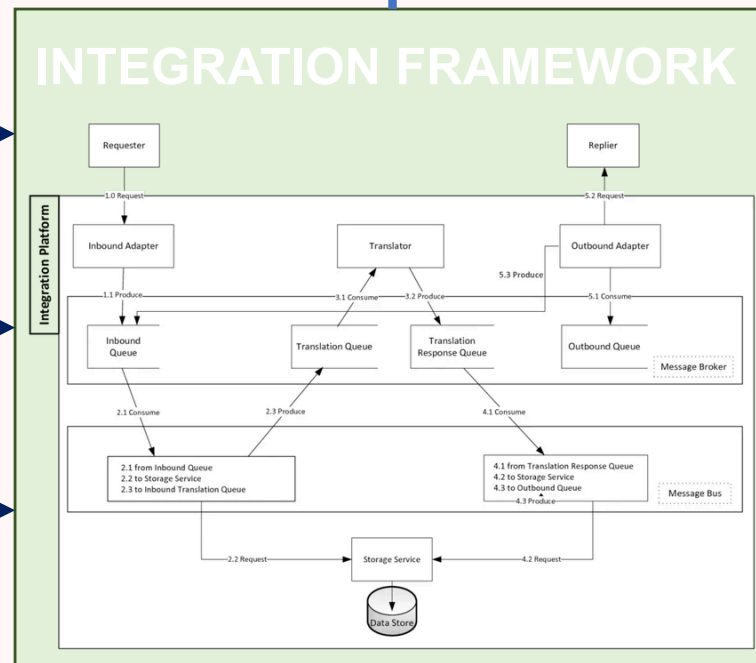
# The big picture

Data modelling across the platform
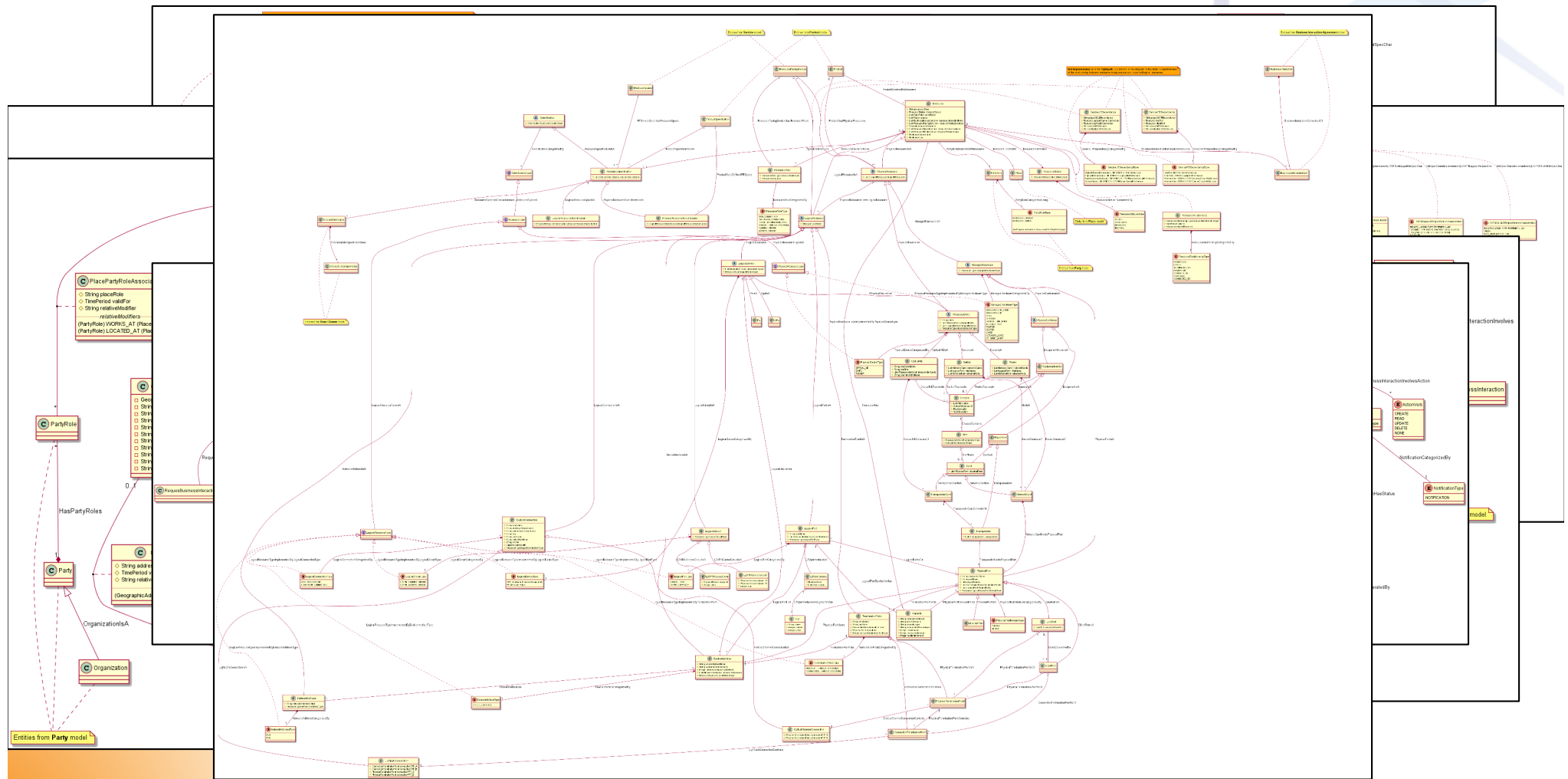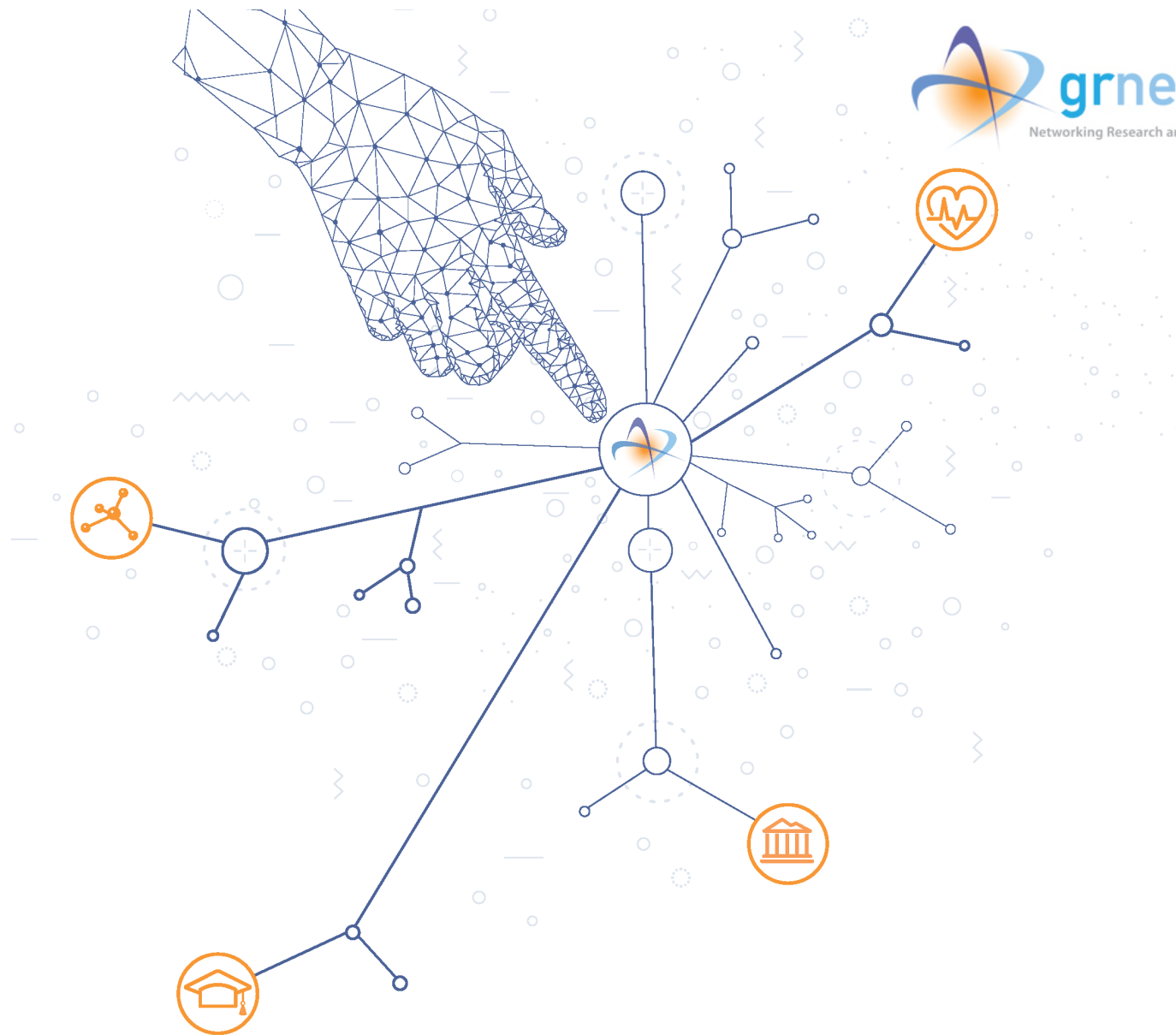
# Which data model: Business layer

Product // Service // Party // Place //
Business Interaction-Agreement // Resource

tm**forum**

**Information Framework (SID)**

# Which data model: Operations layer

- **Physical Resources**
  - PhysicalDevice (SID extended)
  - PhysicalDeviceType (SID extended)
  - Router & Switch
    - both extend SID PhysicalDevice
  - Chassis (SID extended)
  - Slot (SID extended)
  - Card (extends SID Equipment)
  - NetworkCard (extends SID Card)
  - EthernetPort (extends SID PhysicalPort)
  - ManagedHardwareType (SID extended)
  - PhysicalPortMediumType

- **Logical Resources**
  - LogicalDeviceType
  - LogicalCircuitType
  - CPE & PE
    - both extend SID LogicalDevice
  - PE (extends SID LogicalDevice)
  - ResourceRoleType (SID extended)
  - LogicalCircuit (extends SID LogicalResource)
  - L2VPNCarrierCircuit & L2VPNAccessCircuit
    - both extend SID LogicalCircuit
  - L2VpnInterface (extends SID LogicalPort)
  - LogicalPortType

# Which data model: Best of both worlds
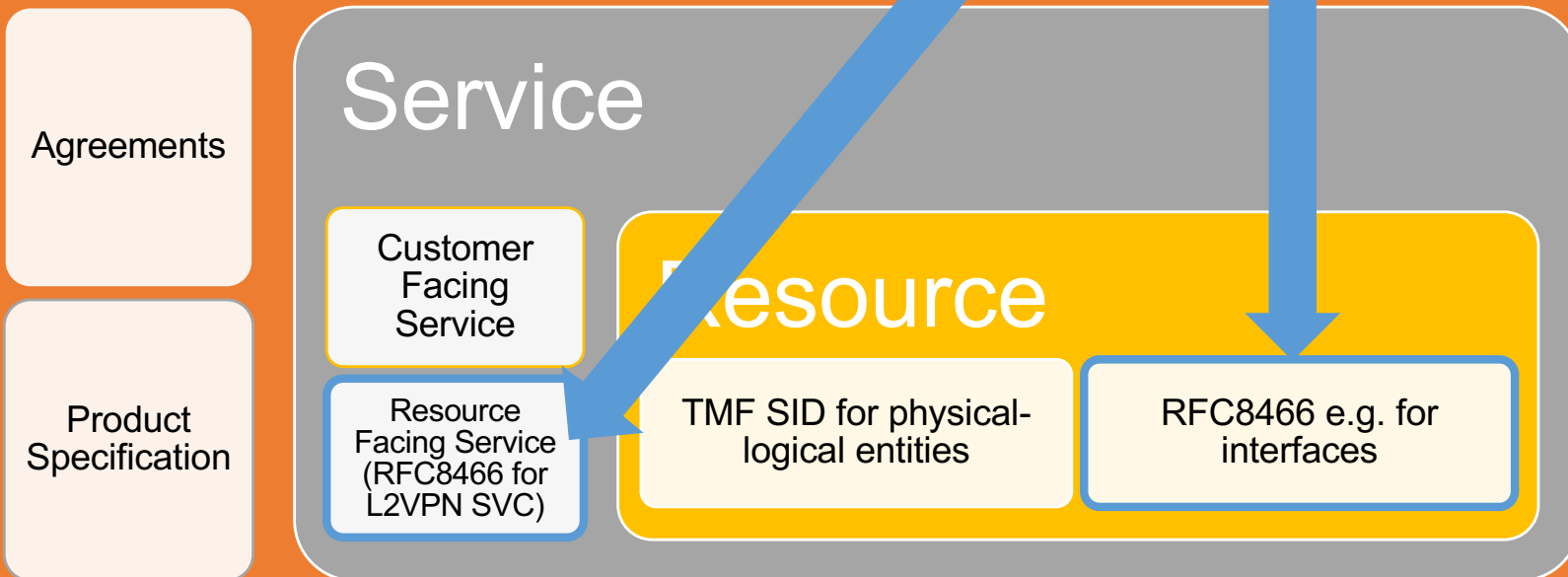


tmforum
Information Framework (SID)

RFC 8466

Internet Engineering Task Force (IETF)                          B. Wen
Request for Comments: 8466                                     Comcast
Category: Standards Track                              G. Fioccola, Ed.
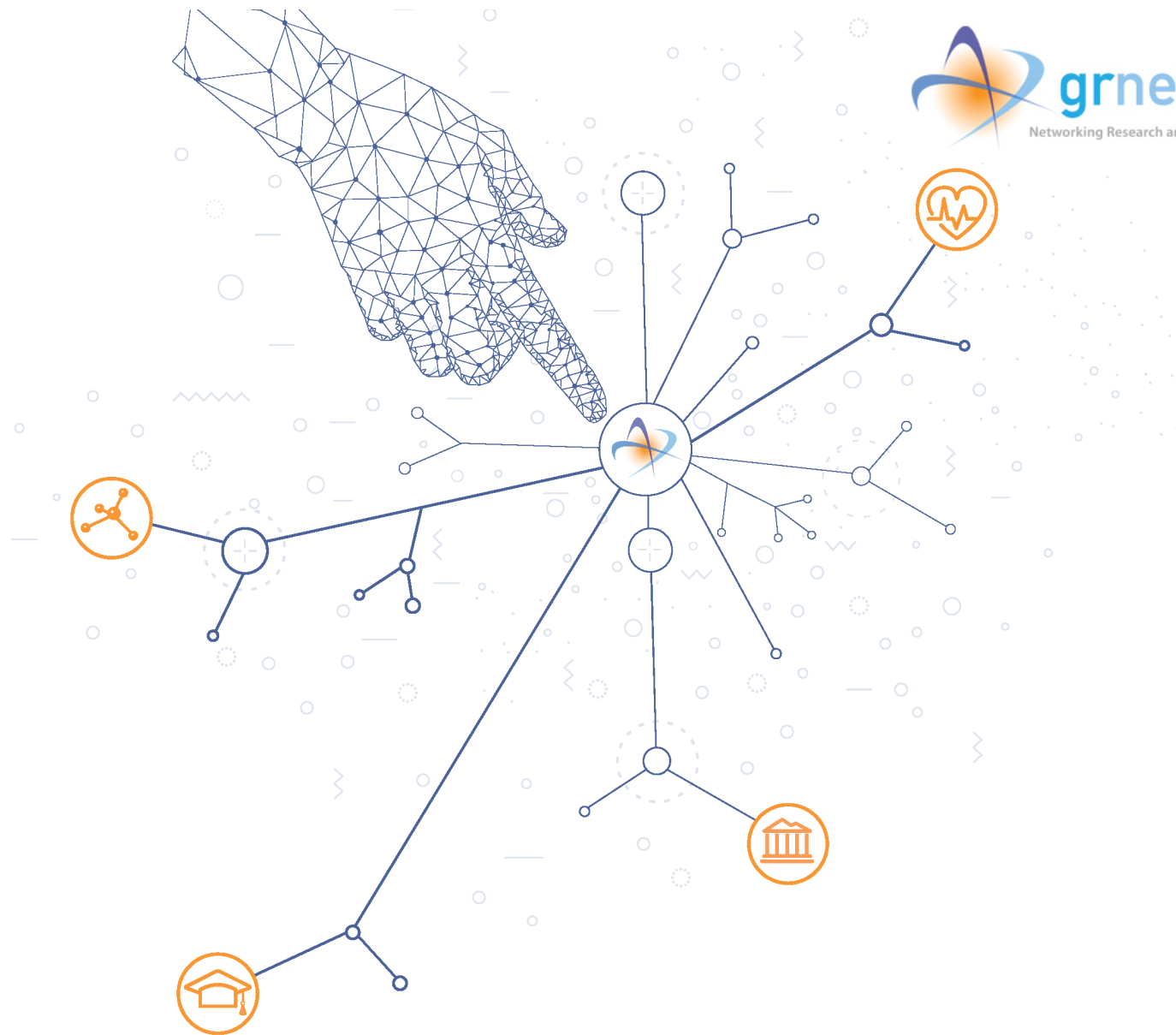ISSN: 2070-1721                                        Telecom Italia
                                                              C. Xie
                                                        China Telecom
                                                            L. Jalil
                                                             Verizon
                                                        October 2018

A YANG Data Model for
Layer 2 Virtual Private Network (L2VPN) Service Delivery

## Business Interactions - Product

### Service

| Agreements |
| Product Specification |

Customer Facing Service

Resource Facing Service (RFC8466 for L2VPN SVC)

### Resource

TMF SID for physical-logical entities

RFC8466 e.g. for interfaces

APIs and authZ/authN

# Which APIs



Portals, catalogues etc.

| APIs | Description | |
|------|-------------|---|
| Party management | Information usually found in an organization's CRM | ✓ |
| Agreement management | Managing information about business agreements in a structured format | |
| Service catalogue | Managing information about customer and resource facing service offerings (to be shared with partners), usually found in an ITSM system | ✓ |
| Product catalogue | Information about product offerings-to be shared with customers/users, usually found in an ITSM system | |
| Order management | Managing information about orders, usually found in an ITSM system | ✓ |
| Configuration & Activation | Used to retrieve, create, update, delete Services (also via asynchronous requests) or Resources. | ✓ |
| Resource inventory management | Consistent/standardized mechanism to query and manipulate the Resource inventory. | |

# IdP and CRM authZ/authN



SSP User Authentication & Login / User Creation
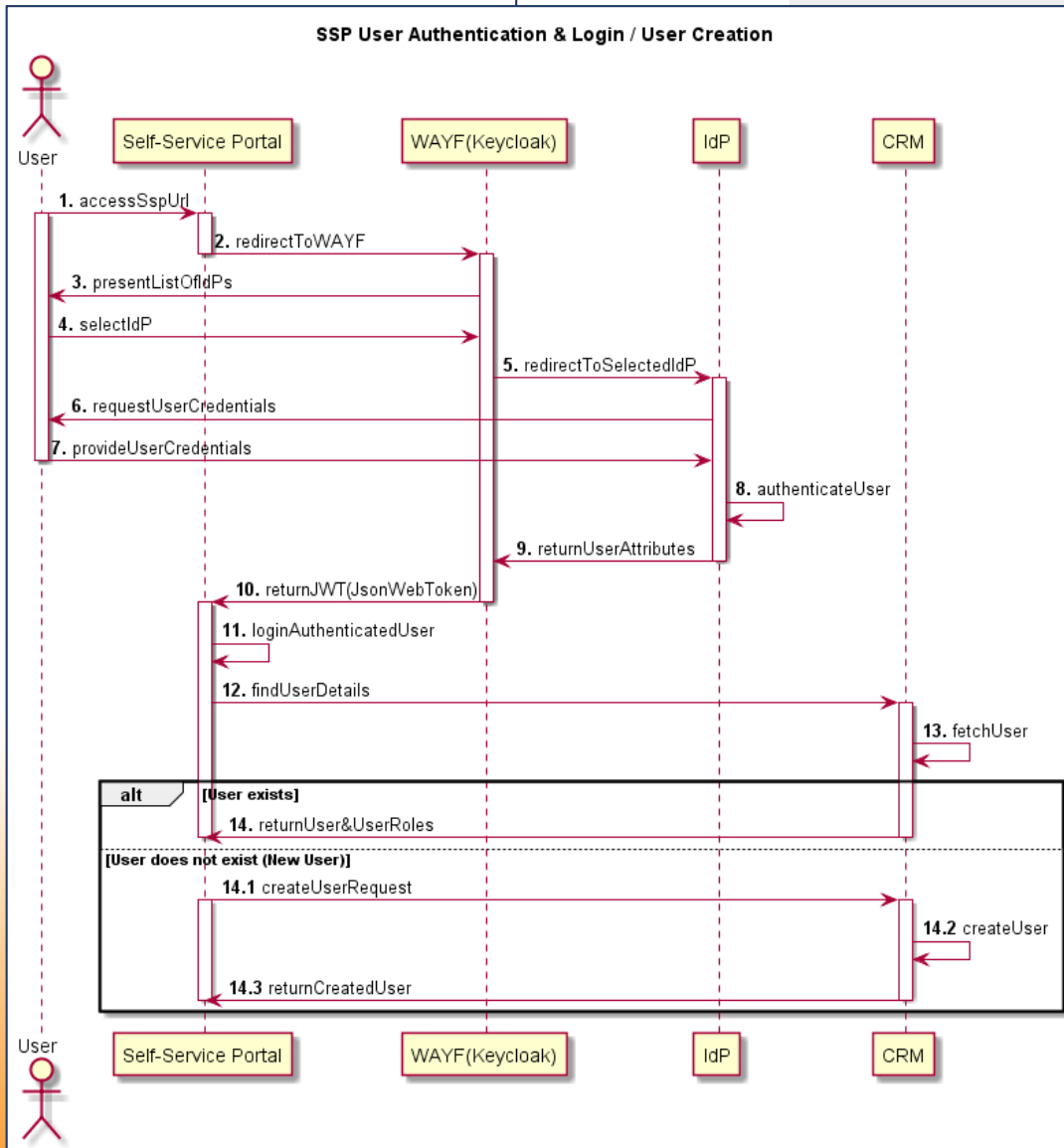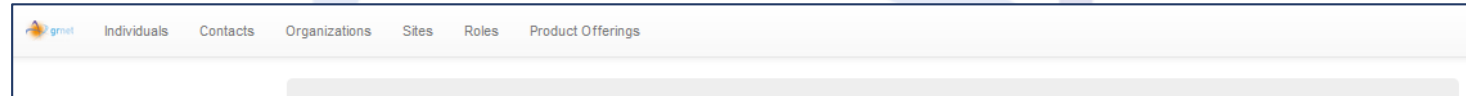
Different contexts – same user

Afrodite Sevasti

Identifiers +
- SHIBBOLETH: 7524c779-cde2-42bc-aa63-07ddc2661c03
- CRM: 5d0240e9b834740008b59b0e

Organization
- Εθνικό Δίκτυο Έρευνας και Τεχνολογίας

Contacts +
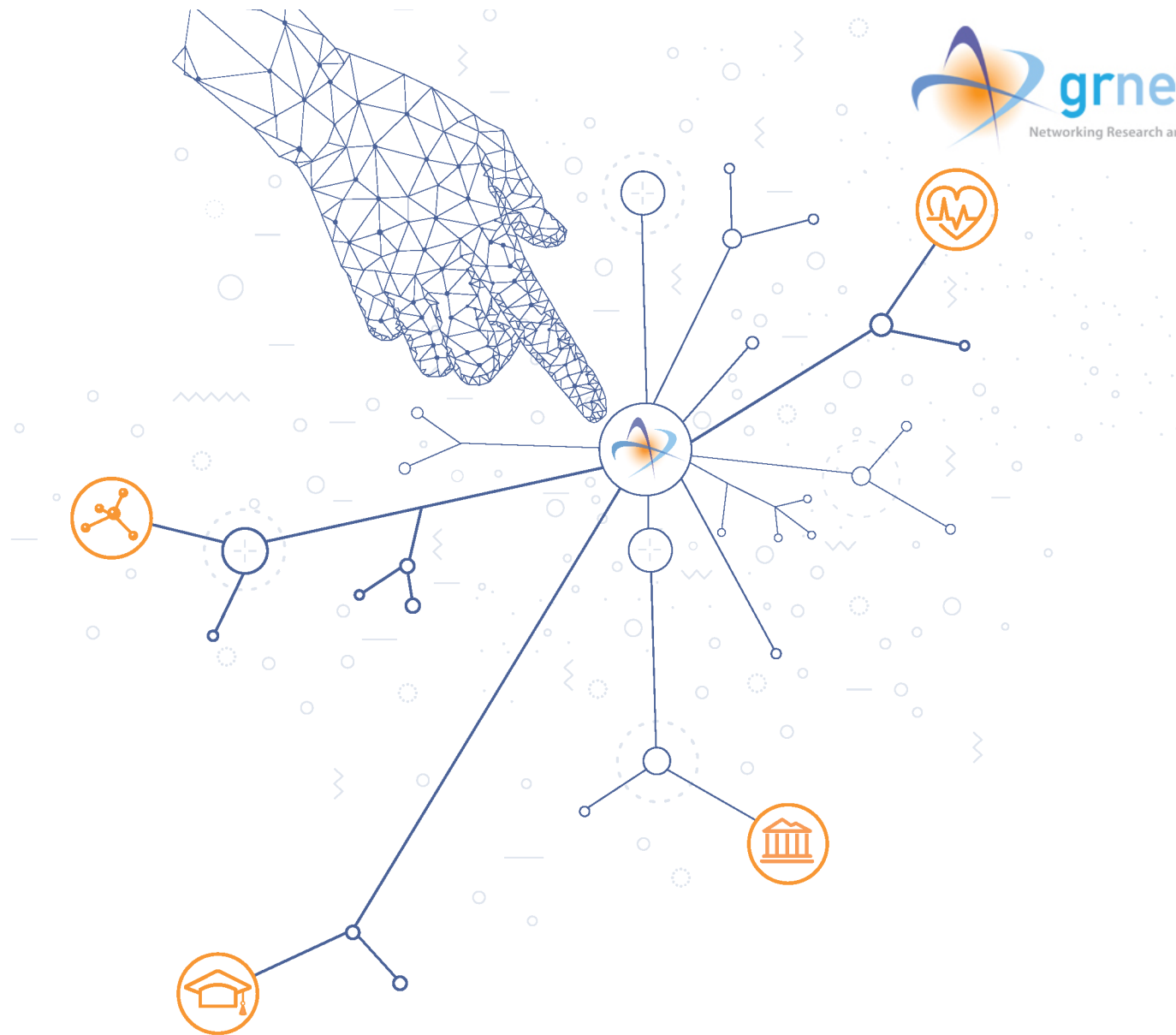- Contact 5d0240e9b834740008b59b0f
  - sevasti@dummy.gr

Roles +
- L2VPN
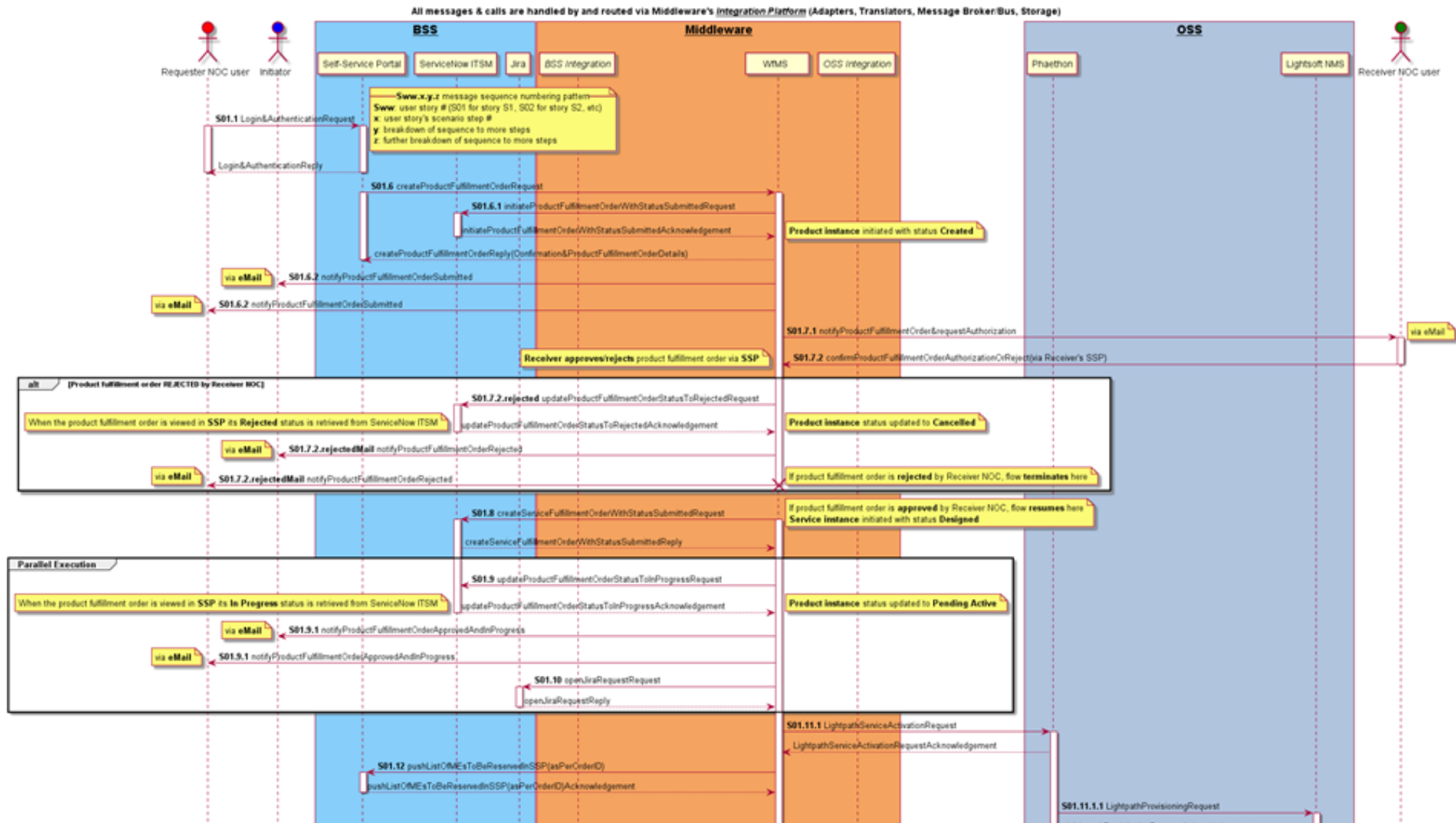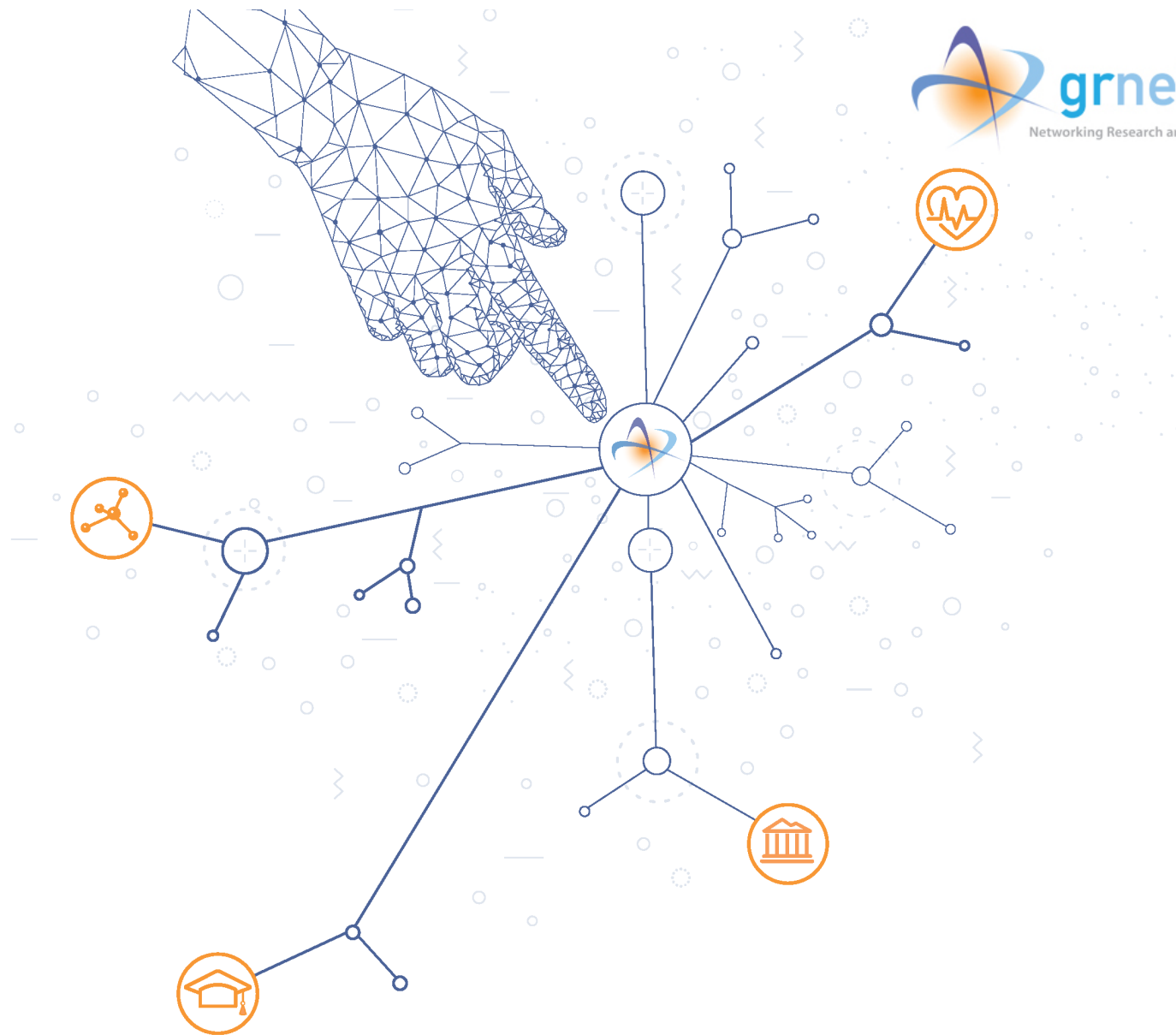  - Service User
- Lightpath
  - Service User
  - Institution NOC user

Roles per service

Orchestrated delivery sneak peek

# Orchestrated delivery: what does it look like

OSS and below

# Automation
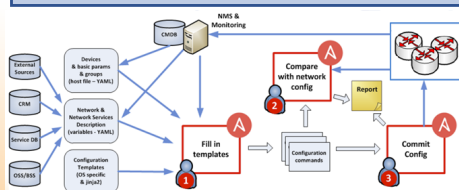


Configuration
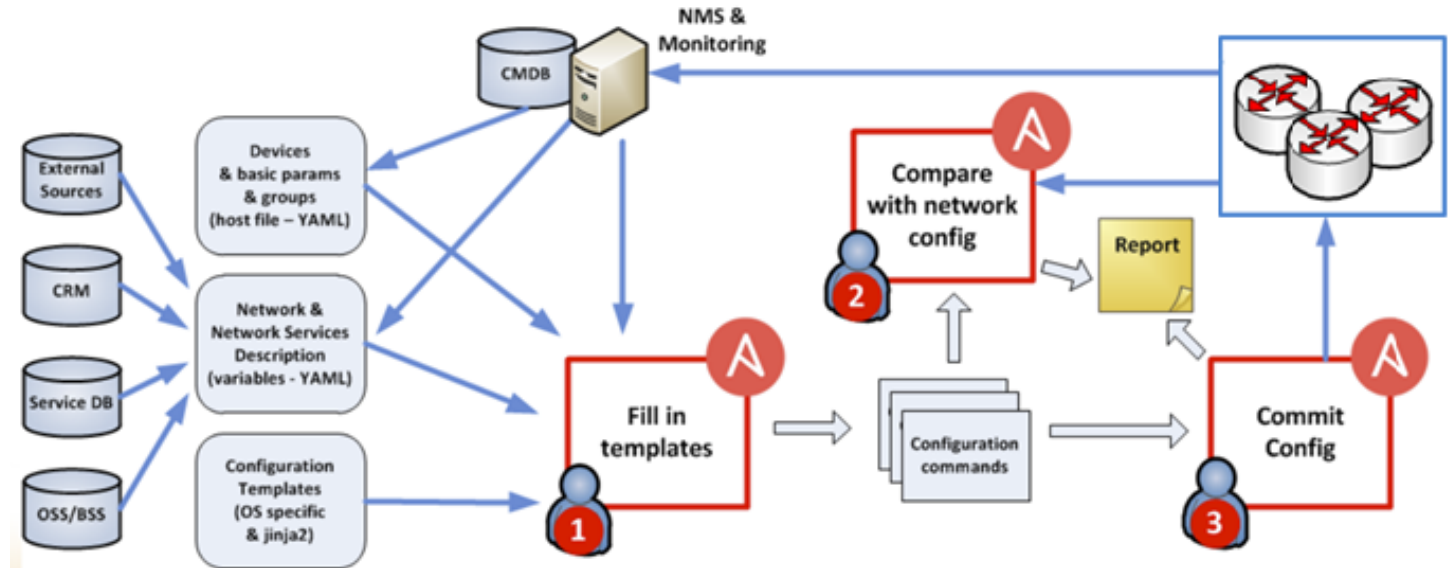
Reconciliation
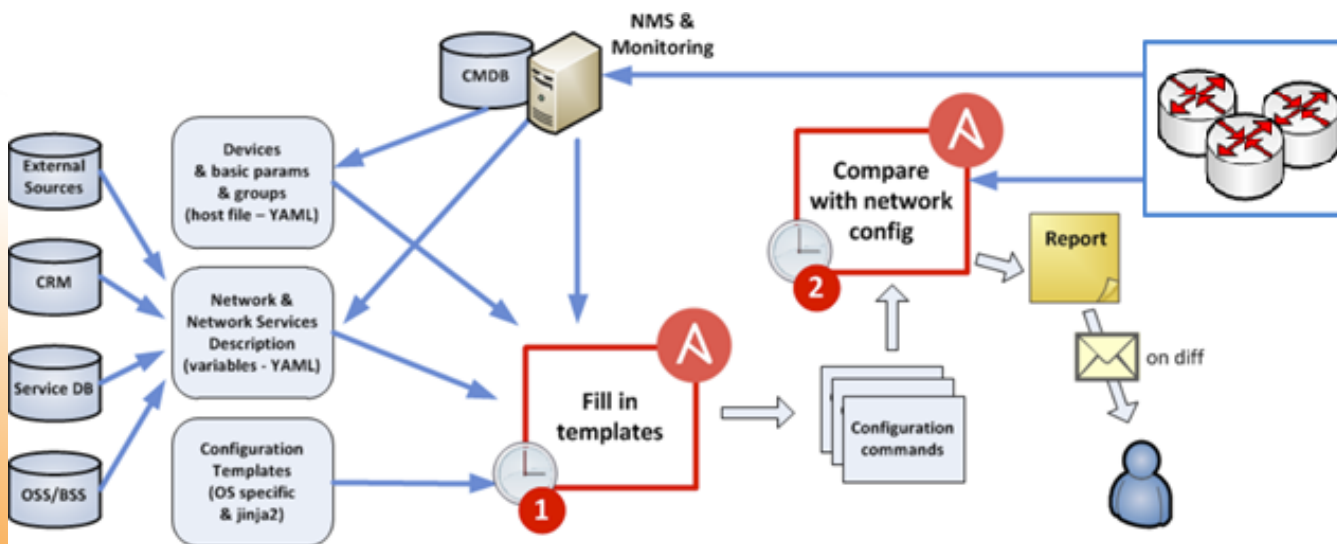
# L2 VPN OSS

Rest of
OSS/BSS stack

L2 VPN OSS



Ansible-powered
automation

- Consume and implement **Activation and Configuration API** requests arriving from the orchestrator (process engine).

- **Configuration templating** and automation in the NREN infrastructure for L2VPN service delivery
  - GRNET delivers L2VPN services using MPLS technologies over its carrier network.
  - Using **Ansible** playbooks combined with **Jinja2** templates
  - A **playbook identifies the edge devices** across the GRNET backbone where configuration is required.
  - The playbook that **builds the configuration runs and generates the VPN configuration** only, based on predefined templates.
  - **Roles** ensure that the **orchestrator-invoked operations** can only trigger specific/a selected **subset of automation tasks**.
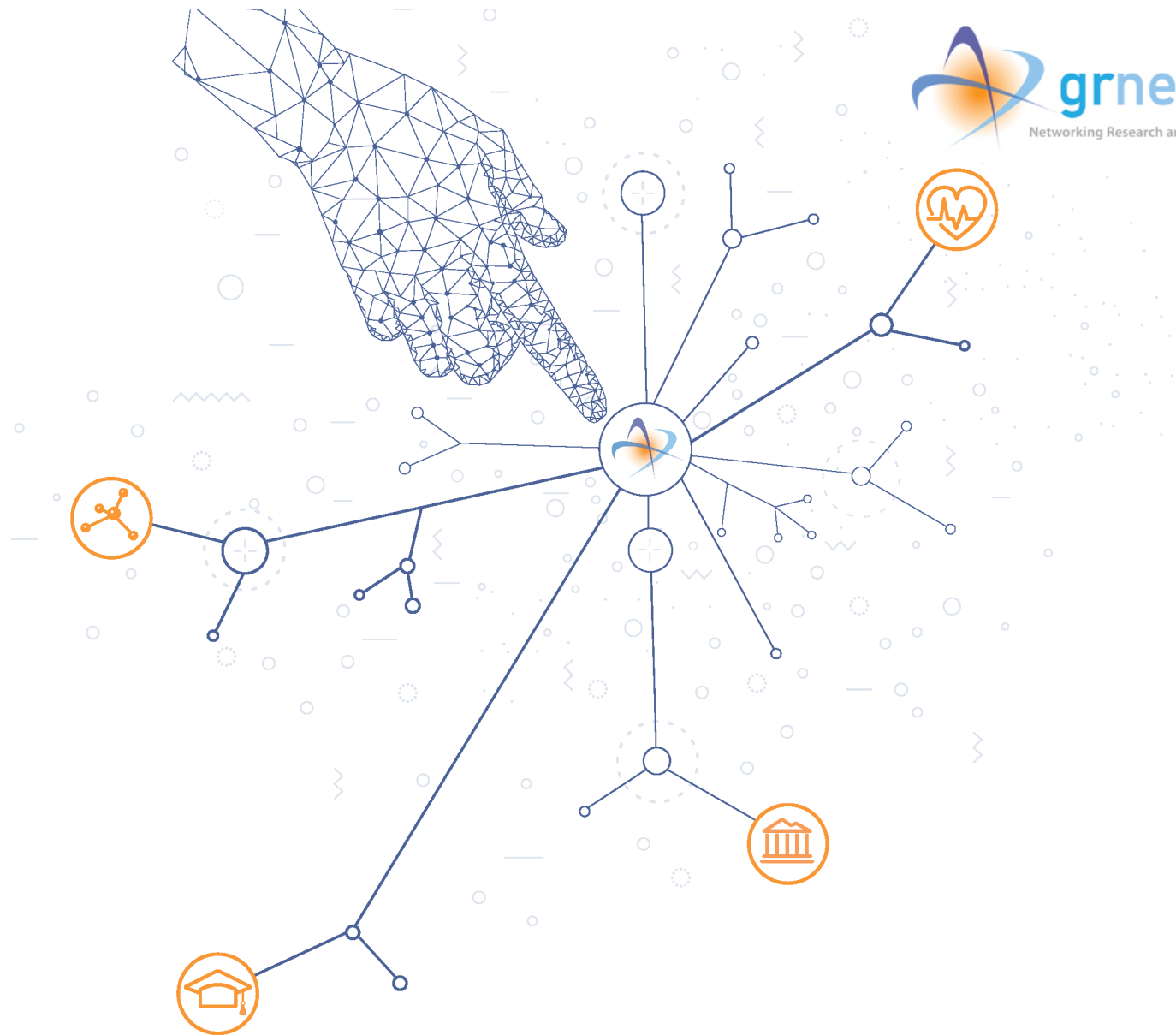
# Lightpath OSS SBI & NMS NBI

| Phaethon Service Class | Phaethon Service Endpoint | LightSoft NBI Utilization (Corba, TMF814) |
|---|---|---|
| ConnectionControlHttp | /connectionControl /checkValidSubnetworkConnection | Ph_MultiLayerSubnetworkMgr.checkValidSNC() |
| | /connectionControl /createAndActivateSubnetworkConnection | Ph_MultiLayerSubnetworkMgr.createAndActivateSNC() |
| | /connectionControl /deactivateAndDeleteSubnetworkConnection | Ph_MultiLayerSubnetworkMgr.deactivateAndDeleteSNC() |
| | /connectionControl /createAndActivateSubnetworkConnectionAtOnce | Ph_MultiLayerSubnetworkMgr.createAndActivateSNCAtOnce() |
| | /connectionControl /deactivateAndDeleteSubnetworkConnectionAtOnce | Ph_MultiLayerSubnetworkMgr.deactivateAndDeleteSNCAtOnce() |
| ConnectionRetrievalHttp | /connectionRetrieval/getAllSubnetworkConnections | MultiLayerSubnetworkMgr_I.getAllSubnetworkConnections() |
| | /connectionRetrieval /getAllSubnetworkConnectionsWithTp | MultiLayerSubnetworkMgr_I.getAllSubnetworkConnectionsWithTP |
| | /connectionRetrieval/getRoute | Ph_MultiLayerSubnetworkMgr.getRoute() |
| | /connectionRetrieval/getSubnetworkConnection | MultiLayerSubnetworkMgr_I.getSNC() |
| EquipmentInventoryRetrievalHttp | /equipmentInventory/getAllEquipment | EquipmentInventoryMgr_I.getAllEquipment() |
| | /equipmentInventory/getAllSupportingEquipment | EquipmentInventoryMgr_I.getAllSupportingEquipment() |
| | /equipmentInventory/getEquipment | EquipmentInventoryMgr_I.getEquipment() |
| ManagedElementRetrievalHttp | /managedElement/getAllManagedElements | ManagedElementMgr_I.getAllManagedElements() |
| | /managedElement/getManagedElement | ManagedElementMgr_I.getManagedElement() |

Rest of OSS/BSS stack

Activation and Configuration API

Phaethon (Lightpath OSS)

ECI THE ELASTIC NETWORK

LightSOFT®

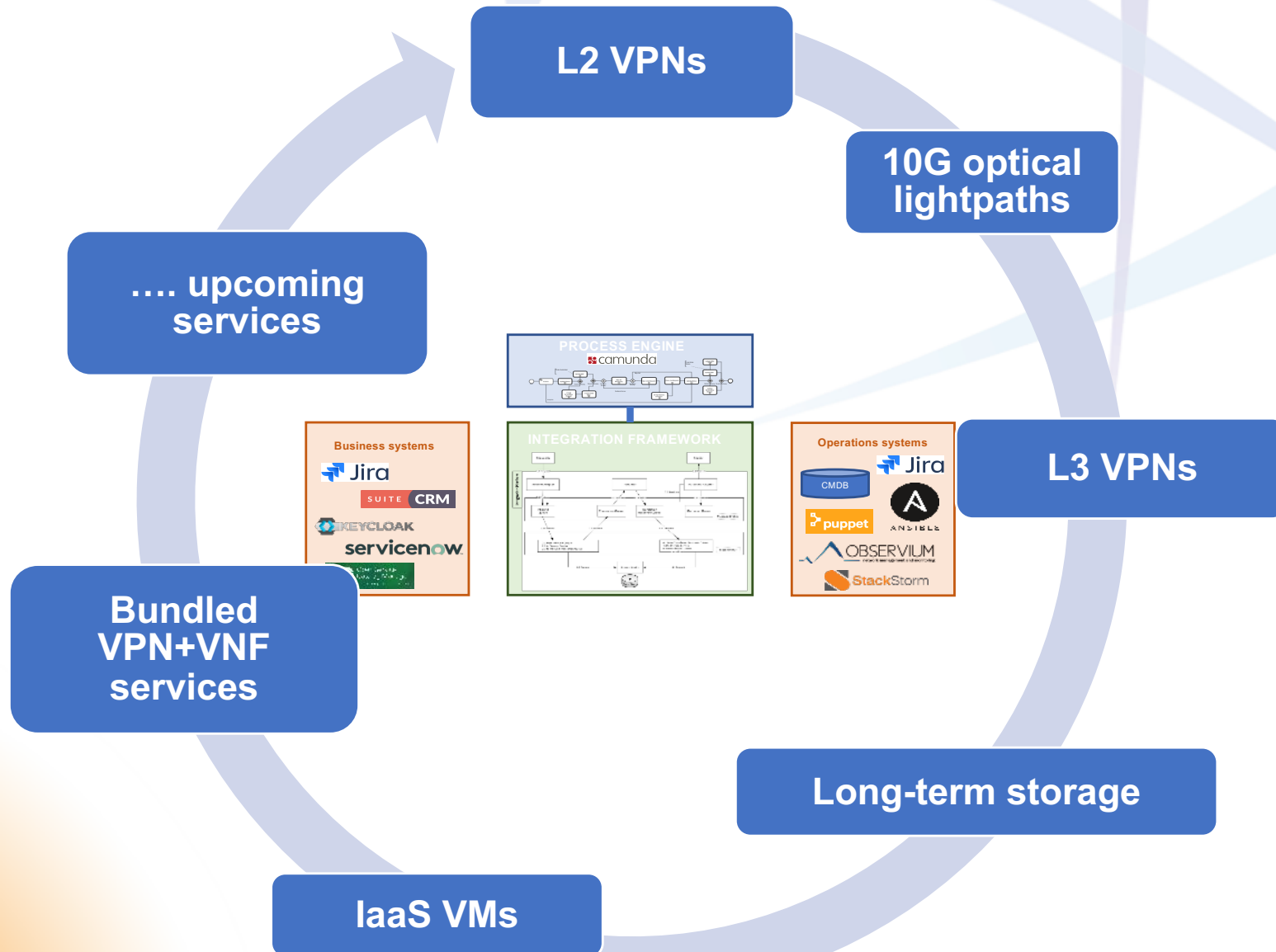A service example

# Software-provisioned lightpaths

# Here comes the lightpath!
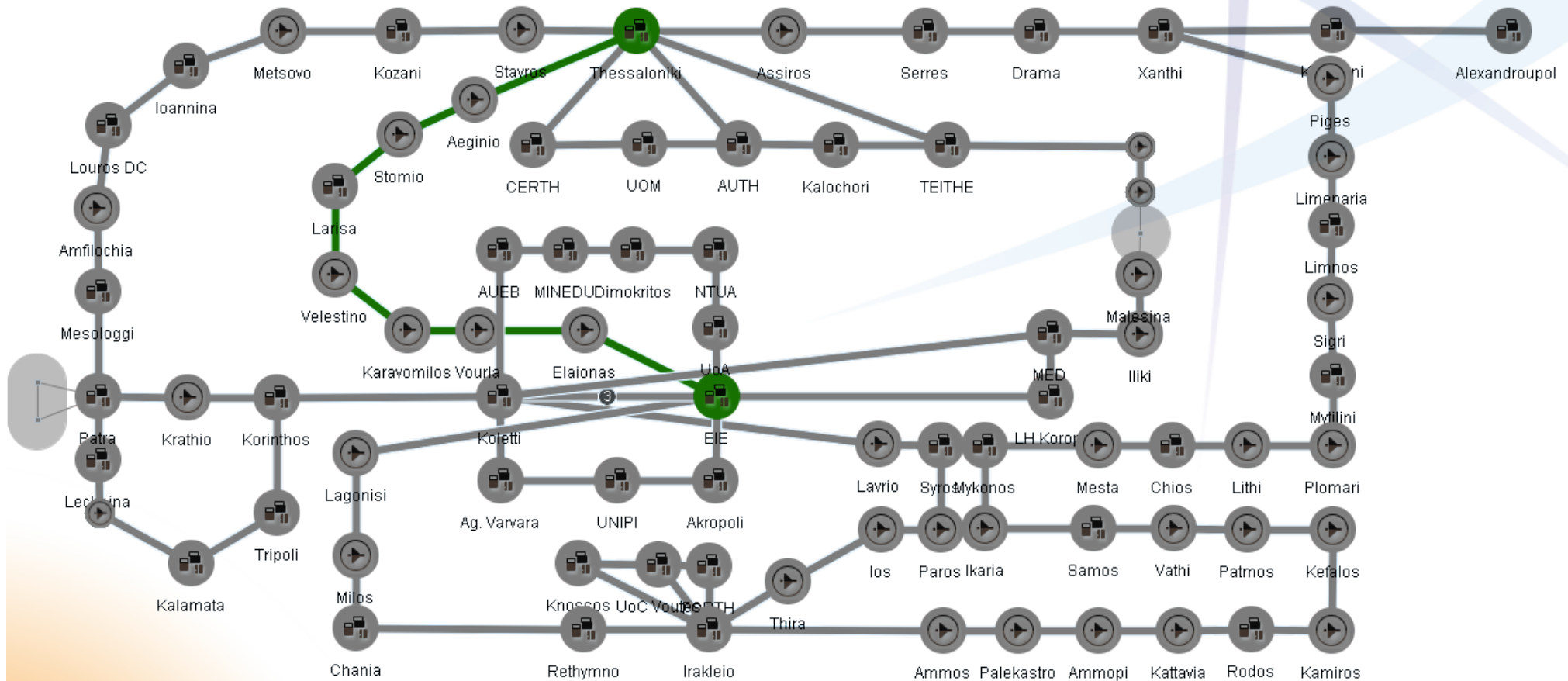
Looking into the future

# What comes next

**Greek Research and Technology Network**

# Thank you!
# sevasti@grnet.gr

grnet
Networking Research and Education