SliceNet Webinar

"Cross-Plane Orchestration and Use Cases Prototyping"

WEBINAR HOST: JOSÉ CABAÇA, ALTICE LABS

DATE: 21 APRIL 2020

TIME: 11H CET

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General Instructions

- Please mute your microphone
- During the presentation send your questions via chat
- The session is being recorded

Introduction

- **Webinar Purpose**
  - Disseminations of SliceNet Technical Achievements and Innovations with focus on the **Orchestration Plane**

- **Presenter**
  - José Cabaça, Altice Labs

Webinar Agenda

- Introduction
- SliceNet Business Roles vs 3GPP and ITU-T Business Roles
- SliceNet Architecture and Orchestration Plane (NSP and DSP views)
- Challenges & Requirements
- DSP end-to-end Service and Slice Orchestration
- NSP Network Slice and Network Resource Orchestration
- Network Slice Information Model
- Technical Achievements/Prototyping
- DSP end-to-end Network Slice Orchestration (Vertical subscribes a service)
- Summary of innovations
- Q&A

Introduction

SliceNet Project

End-to-End Cognitive Network Slicing and Slice Management Framework in Virtualized Multi-Domain, Multi-Tenant 5G Networks

SliceNet is a second phase 5G infrastructure PPP project, which is part of the **European Horizon 2020 programme** for research and innovation.

SliceNet focuses on management of **network slicing** by use of **cognitive** techniques.

Project Partners

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Creative Systems Engineering
NEXTWORKS ENGINEERING FORWARD
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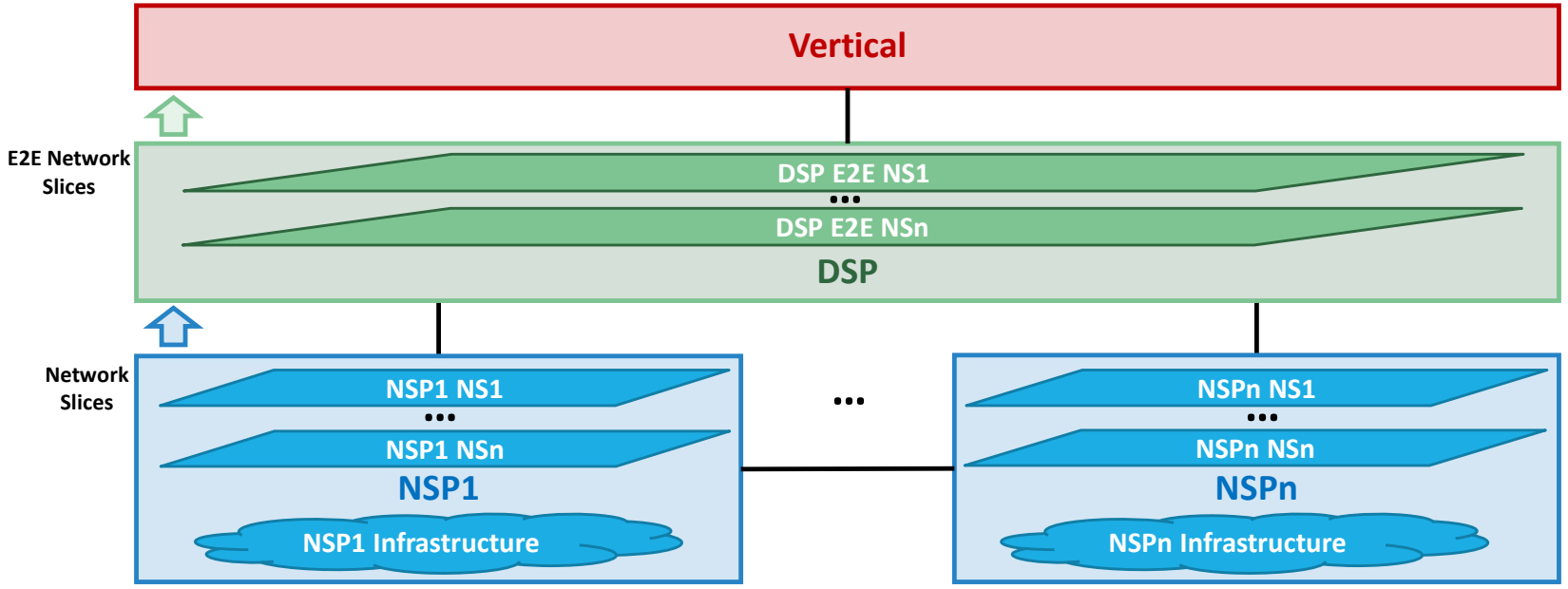
SliceNet Business Roles



DSP – Digital Services Provider

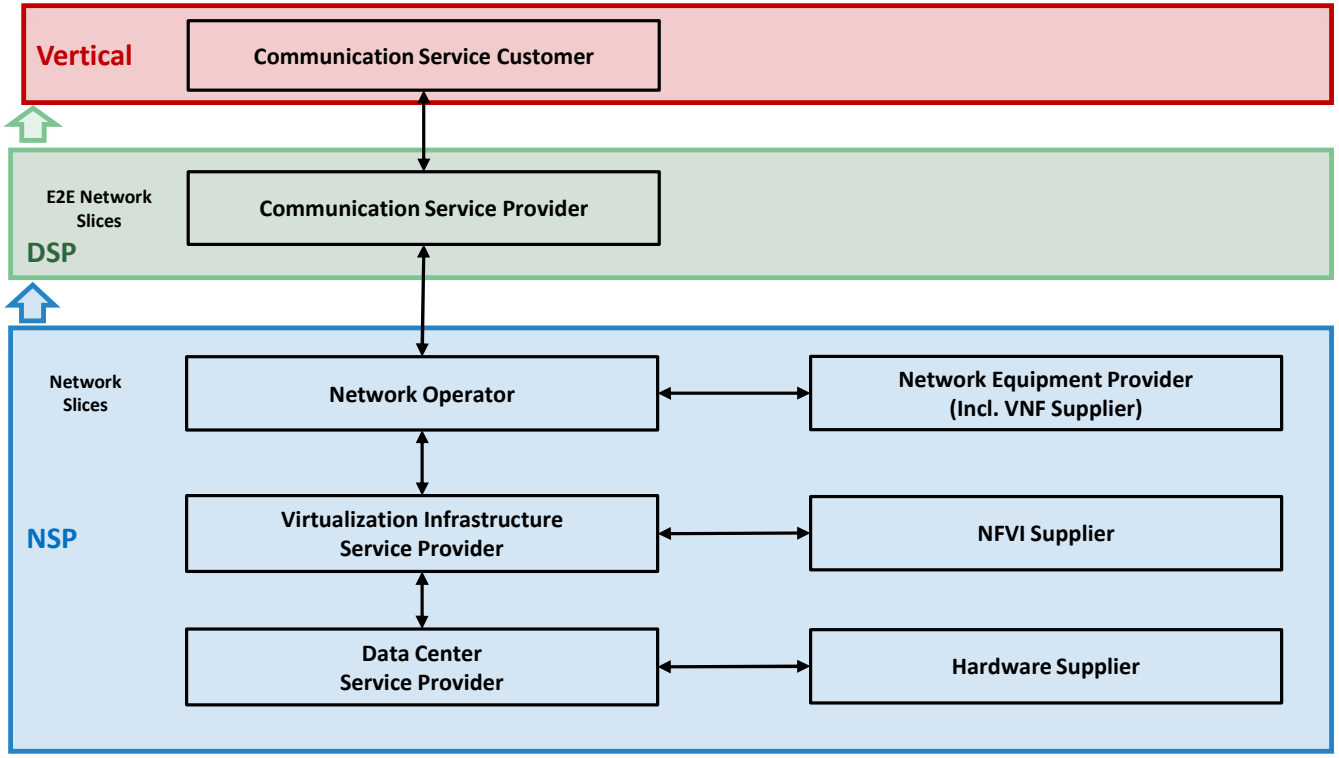
E2E NS – End-to-End Network Slice

NSP – Network Services Provider

NS – Network Slice

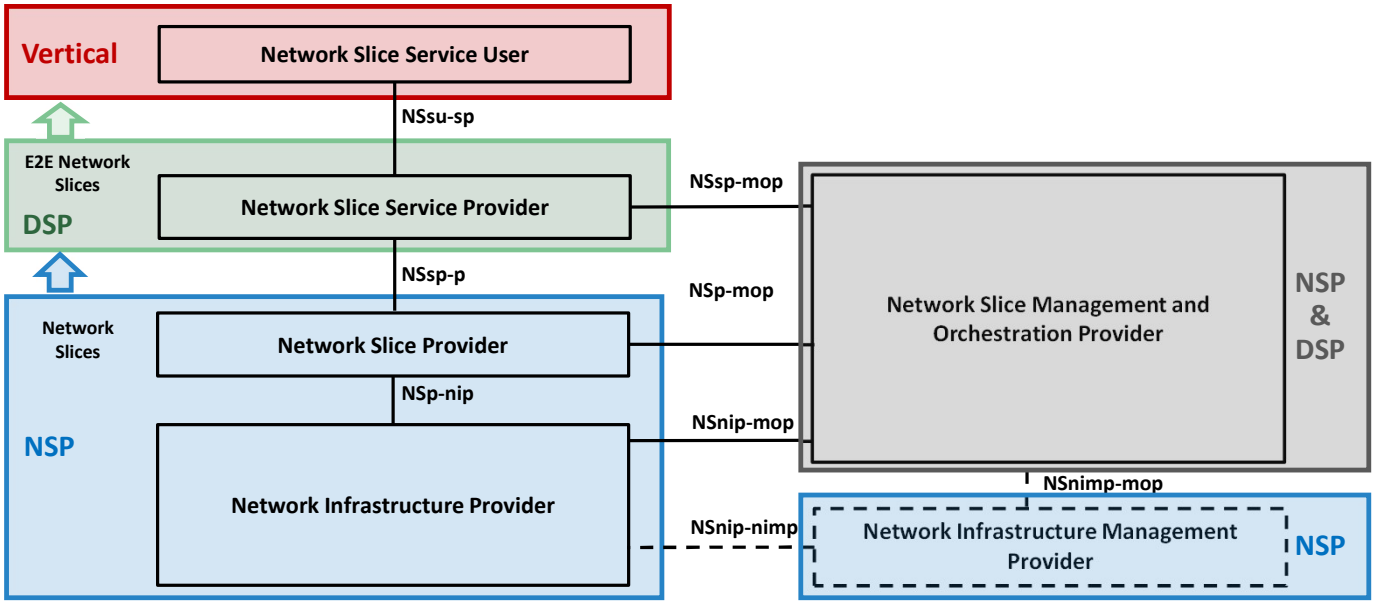
3GPP vs SliceNet Business Roles

3GPP TR 28.801 makes recommendations on management and orchestration for network slicing. In this technical report the high-level model of business roles are also addressed. SliceNet are very aligned with 3GPP as can be seen in the figure.



ITU-T vs SliceNet Business Roles

Rec ITU-T Y.3103 (09/2018) defines the business roles from the network slicing perspective. The figure maps the ITU-T and SliceNet business roles and shows that the two architectures are compatible.



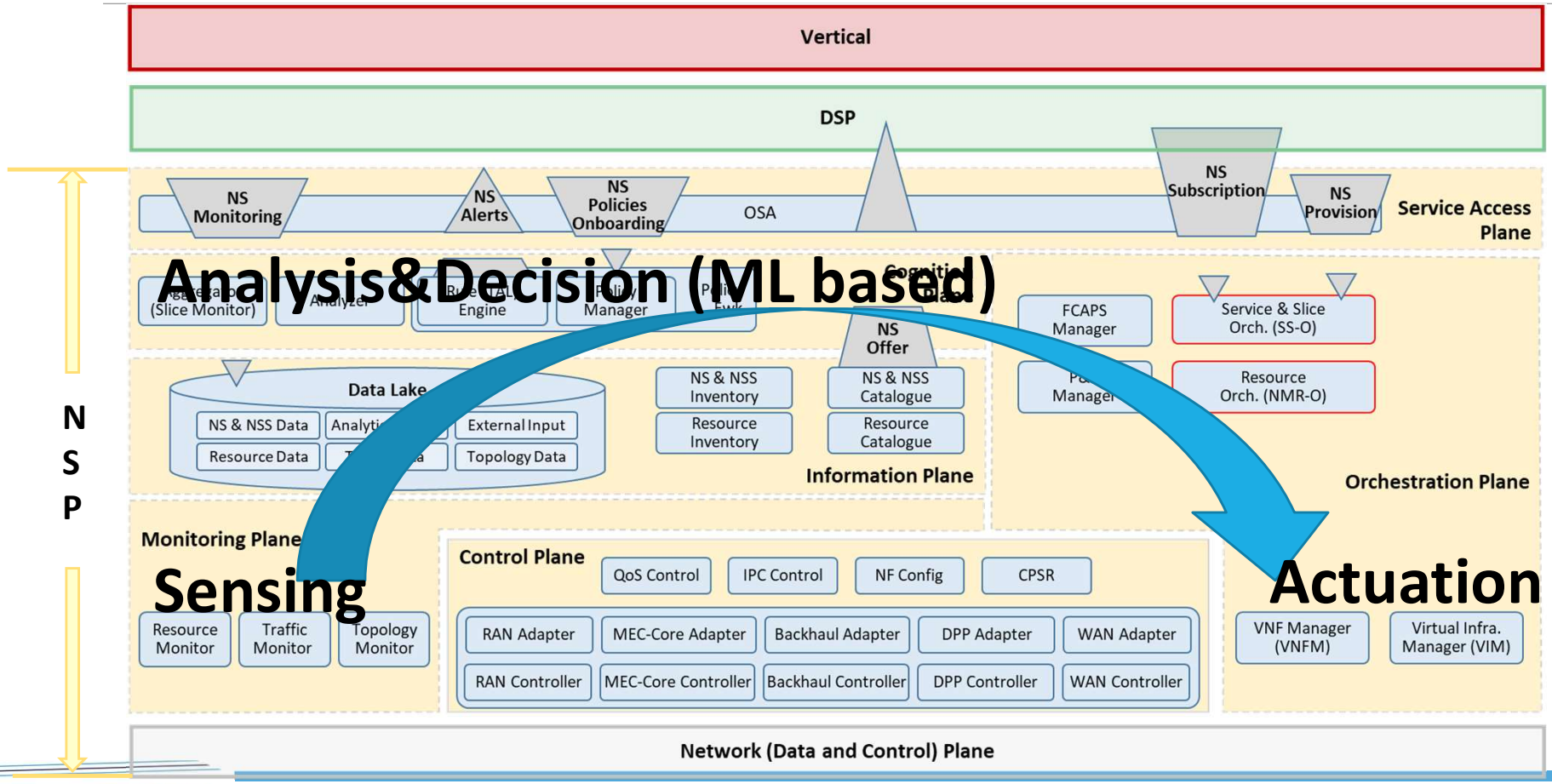
NSsu – Network Slice Service User

NSp – Network Slice Provider

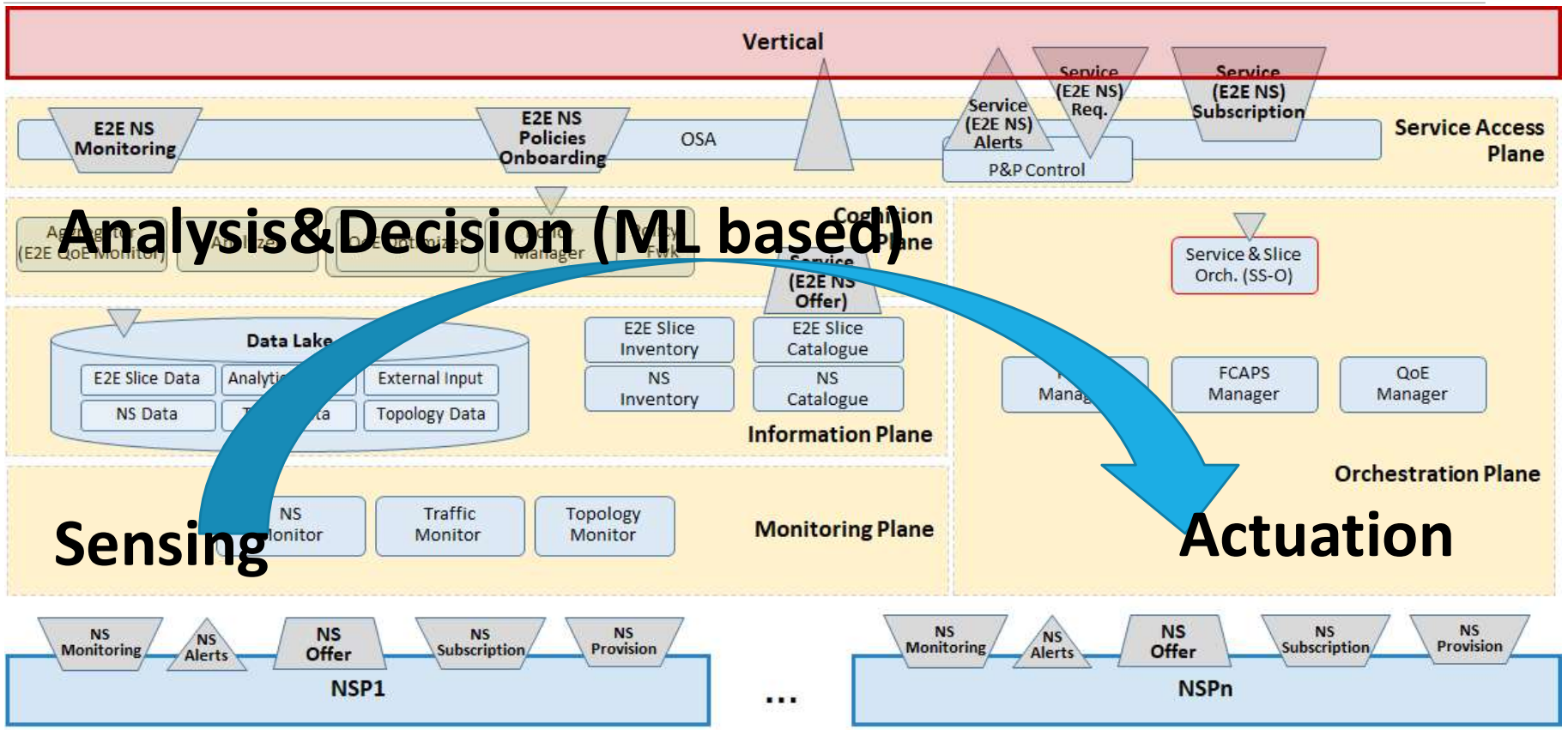
NSsp – Network Slice Service Provider

NIP – Network Infrastructure Provider

SliceNet Architecture & NSP Orchestration Plane



SliceNet Architecture & DSP Orchestration Plane



D S P

Challenges

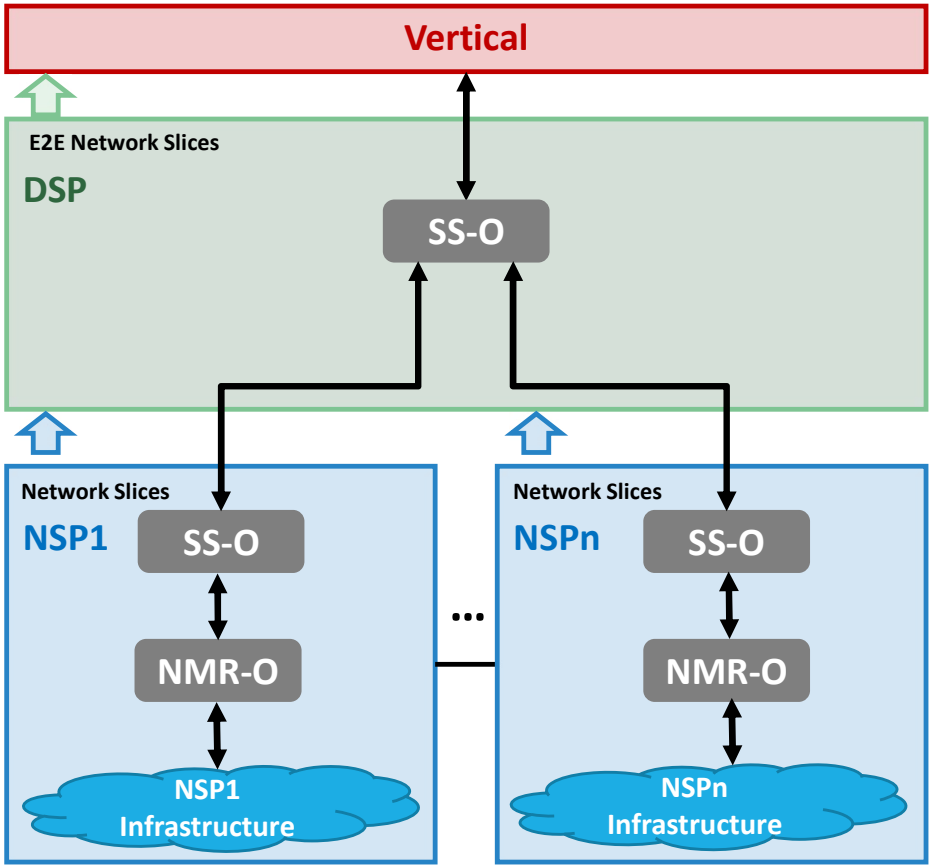
- The DSP ability to provide services to the vertical, which are mapped in end-to-end Network Slices, with **dynamic orchestration**, configuration and customization for both single and multiple administrative domains (NSPs)
- The NSP ability to provide Network Slices to the DSP, with **dynamic orchestration**, configuration and customization
- The **interoperability** between the DSP Service and Slice Orchestrator (SS-O) and the NSP SS-O
- The **interoperability** between the NSP SS-O and the NFV MEC RAN Orchestrator (NMR-O)
- Orchestration contribution to **closed-control loop automation** networks, driven by ML models, enabling the service providers (NSP and DSP) to guarantee the SLA without human intervention

Requirements

❖ For the **DSP SS-O Vertical Service Lifecycle**, **NSP SS-O Network Slice Lifecycle** and **NSP NMR-O Resource Lifecycle**, we have 4 phases:

	Discovery phase	Fulfilment phase	Assurance phase	Decommissioning phase
DSP SSO	• Vertical Service Offers exposure • Network Slice Offers collection • VSBs and VSDs Onboarding and Instantiation	• Expose CRUD operations on Vertical Services • Expose CRUD operations on E2E NSs • Translation of Vertical Services into Network Slices	• Vertical Service management isolation • Vertical Service monitoring • E2E NS monitoring	• Network Slices termination • Monitoring deactivation • Vertical Service termination notification
NSP SSO	• Network Slice Offers exposure • Network Slice Descriptor Instantiation and Onboarding	• Expose CRUD operations for NSs • Translation of NSs into NFV, MEC, RAN services/configurations • Provisioning/configuration of NSs • NSs QoS configuration	• NS management isolation • NS monitoring	• Network Services and NS resource decommissioning • Monitoring deactivation • NS termination notification
NSP NMRO	• Network Service Offers exposure • Network Services Descriptors and Resources association	• Expose CRUD operations for Network Services • Provisioning/configuration of the virtual network infrastructure associated to the Network Slice	• Network Service management isolation • Network Service and Resources monitoring	• Network functions and applications decommissioning • Monitoring deactivation • Network Service termination notification

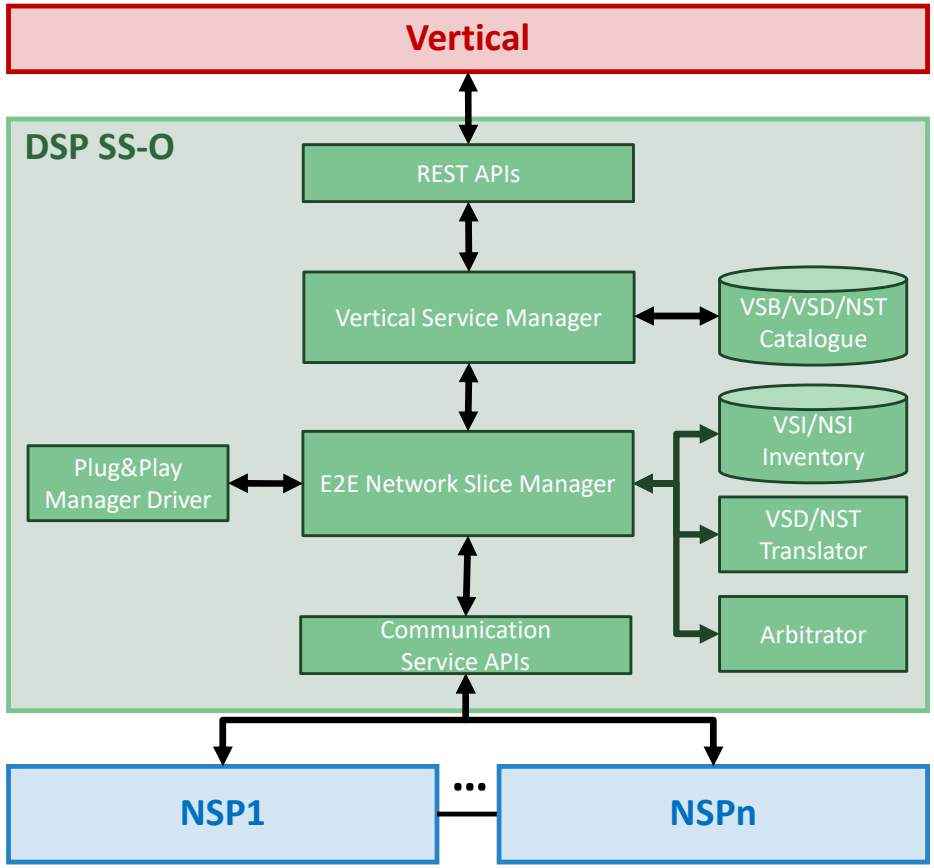
SliceNet Orchestration Approach



DSP end-to-end Service and Slice Orchestration

❖ SliceNet **DSP SS-O** provides the following functionalities:

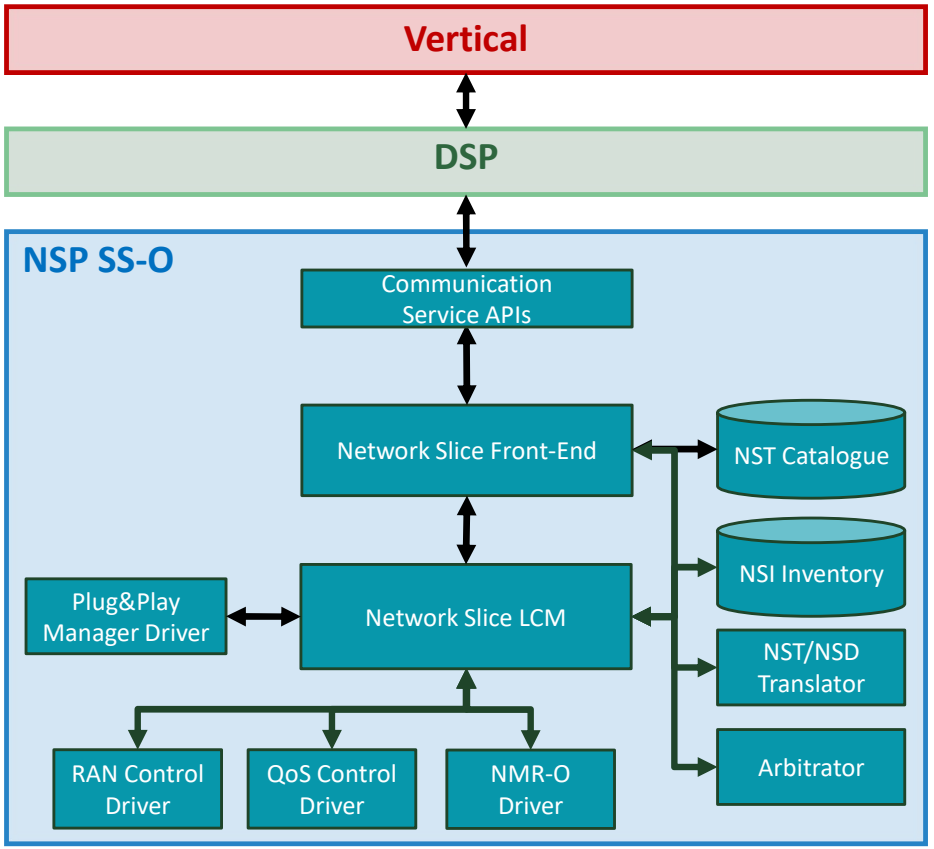
- ❑ Interaction with Verticals for Service offer exposure and customization
- ❑ Onboarding and maintenance of VSBs and VSDs in the Catalogue
- ❑ Onboarding and maintenance of VSIs and E2E NSIs status in the Inventory
- ❑ Collect Network Slice offers from NSPs, in the form of NSTs
- ❑ Lifecycle management of Vertical Services which are mapped into E2E Network Slices
- ❑ Coordination of multi-domain actuation operations for runtime modification and optimization of E2E Network Slices
- ❑ Coordination of Plug & Play control instances deployment to expose to verticals the customized runtime control functions as requested in their vertical service request



NSP Network Slice Orchestration

❖ SliceNet **NSP SS-O** provides the following functionalities:

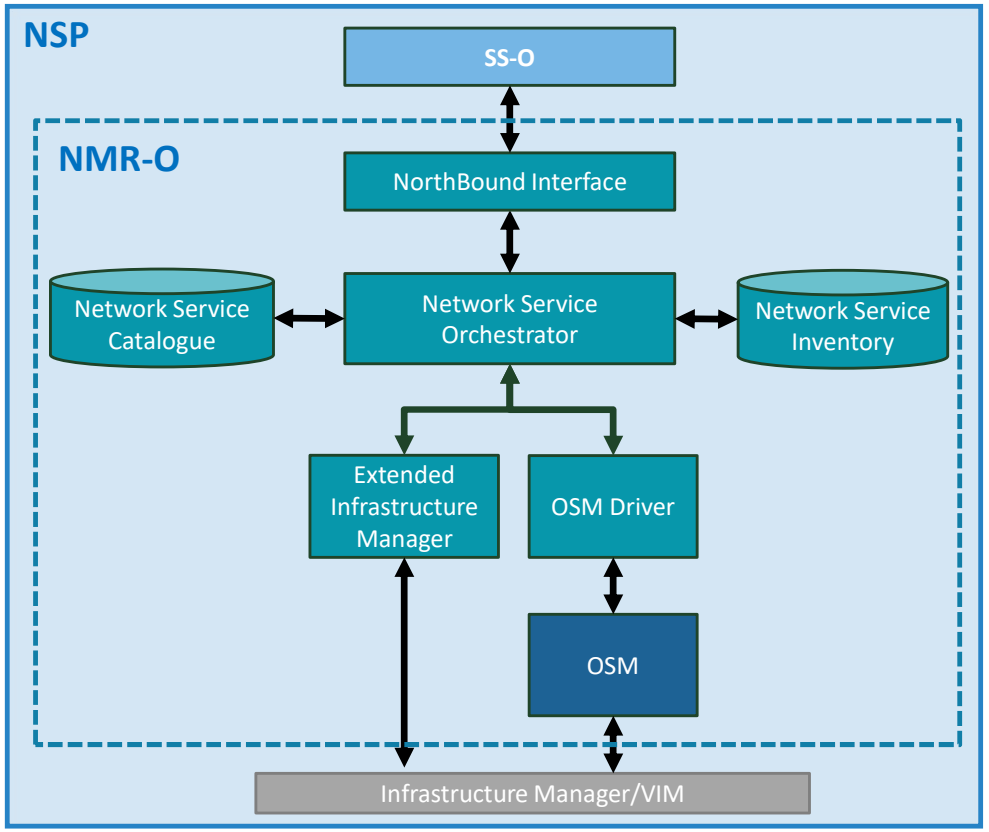
- ❑ Interaction with DSPs for Network Slice offer exposure
- ❑ Onboarding and maintenance of NSTs in the Catalogue
- ❑ Lifecycle management of NSIs, including mapping and translation of network slice requirements into resource provisioning constraints and operations
- ❑ Onboarding and maintenance of up-to-date NSIs status and characteristics in the Inventory
- ❑ Coordination of actuation operations for runtime modification and optimization of Network Slices, by interacting with SliceNet CPSs and NMR-O for applying the actuations at the resource level
- ❑ Coordination of Plug & Play control instances deployment to allocate per-slice control and management functions



NSP Network Resource Orchestration

❖ SliceNet **NSP NMR-O** provides the following functionalities:

- ❑ Exposure of Network Service offers to the NSP SSO
- ❑ Onboarding and maintenance of Network Service Descriptors and VNF Descriptors in the Catalogue
- ❑ Lifecycle management of the Network Service Instances and their associated VNFs.
- ❑ Onboarding and maintenance of Network Service Instances and their associated VNFs status and characteristics in the Inventory
- ❑ Enabling network service instances monitoring.



Network Slice Information Model

- Defined in compliance with the 3GPP Network Resource Model (TS 28.541)
  - It matches Network Slice Instance (NSI) and Network Slice Subnet Instance (NSSI) definitions

- The SliceNet model is built around four main components:
  - Network Slice Template (NST)
  - Network Slice Subnet Template (NSST)
  - Network Slice Instance (NSI)
  - Network Slice Subnet Instance (NSSI)

*managed by the **NSP Network Slice Orchestrator** in its catalogue functions, and exposed to the DSP to fulfil the end-to-end network slice lifecycle management*

- End-to-end services and slices modelled as “Vertical Services”
  - Vertical Service Blueprint (VSB)
  - Vertical Service Descriptor (VSD)

*managed by the **DSP Service Orchestrator** in its catalogue and inventory functions, and exposed to the verticals*

Technical Achievements/Prototyping

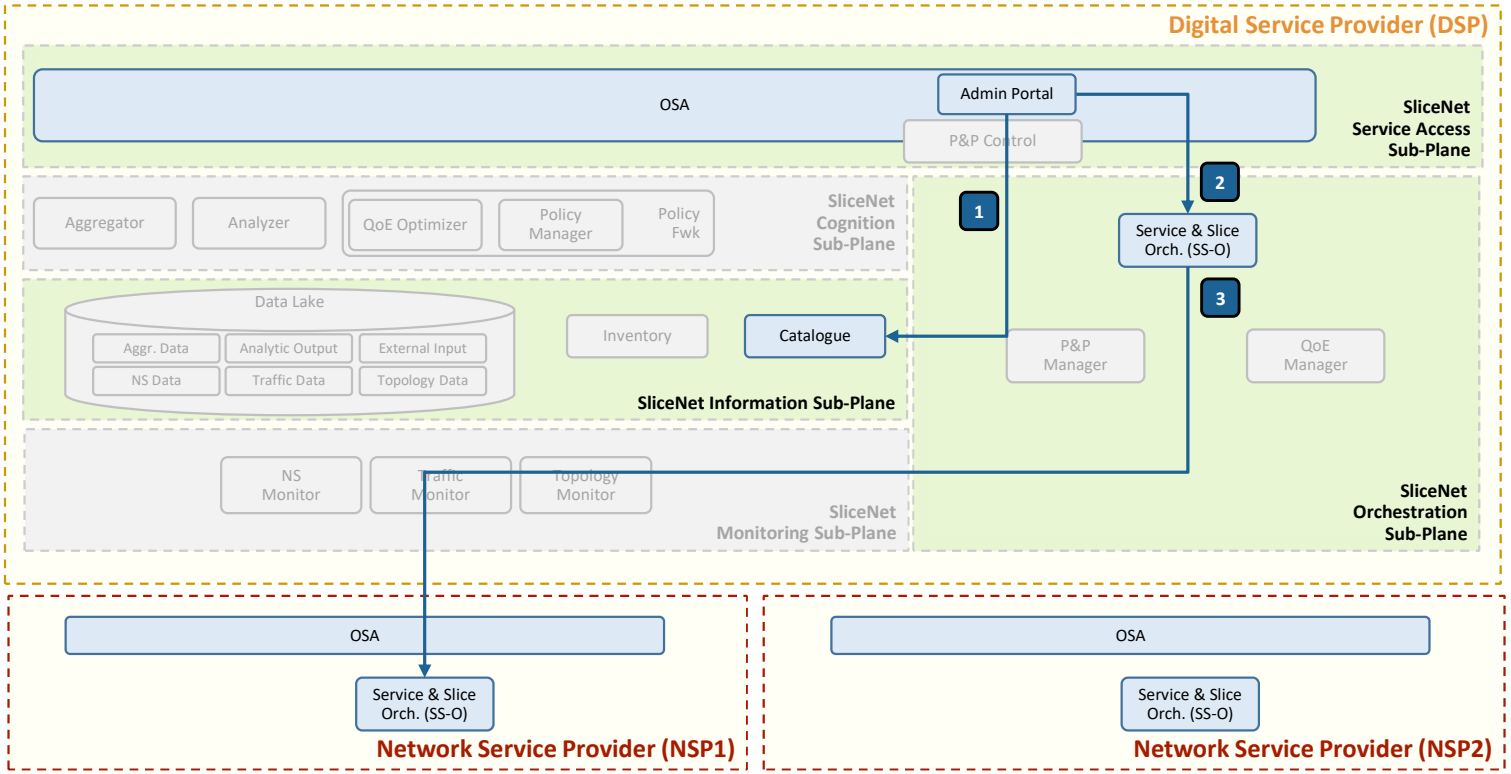
- **SliceNet SS-O** is based on **developments and enhancements** of the **Vertical Slicer** open source software. This is a SliceNet partner (Nextworks) application developed under the 5G-Transformer project:
  - **Vertical Slicer** available on the Nextworks public github at: https://github.com/nextworks-it/slicer

- **SliceNet NMR-O** implemented with Open Source MANO (OSM) with SliceNet software modules developments:
  - **OSM** available at: https://osm.etsi.org/gitweb
  - **SliceNet NMR-O wrapping modules** available at: https://gitlab.com/SliceNet/nmro
  - **SliceNet QoE REST Client Library** available at: https://gitlab.com/SliceNet/qoe-rest-client

- **Standardization Contribution to the ITU-T FG 5GML**:
  - Proposal of a new recommendation: “Machine learning based end-to-end network slice management and orchestration” (ML5G-I-230)
  - Proposal of a new recommendation: “Vertical-assisted Network Slicing Based on a Cognitive Framework” (ML5G-I-231)

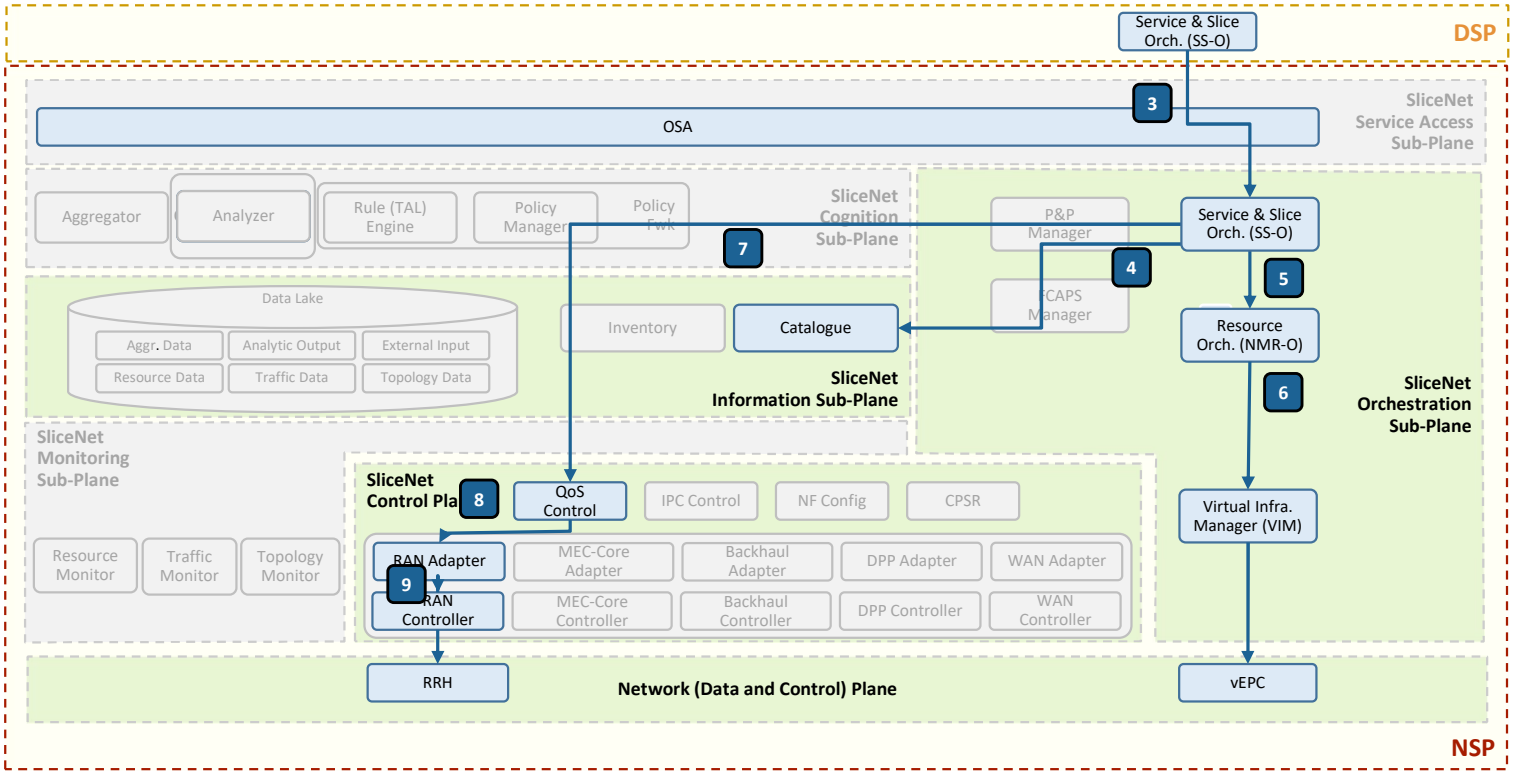
DSP end-to-end Network Slice Orchestration

Vertical subscribes a service – Step 1 - DSP actions



DSP end-to-end Network Slice Orchestration

Vertical subscribes a service – Step 2 - NSP actions



Summary of innovation

- DSP **E2E Network Slices Orchestration** exploring the network slicing **multi-domain** aspects, through the **Vertical Slicer**

- NSP **Network Slices and Resources Orchestration**, through the **Vertical Slicer** and **OSM**

Thank You!

Website: https://slicenet.eu/

Email: contact@slicenet.eu

Further information: https://slicenet.eu/publications/

SliceNet Open source contributions:
https://slicenet.eu/software-contributions/

Questions

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