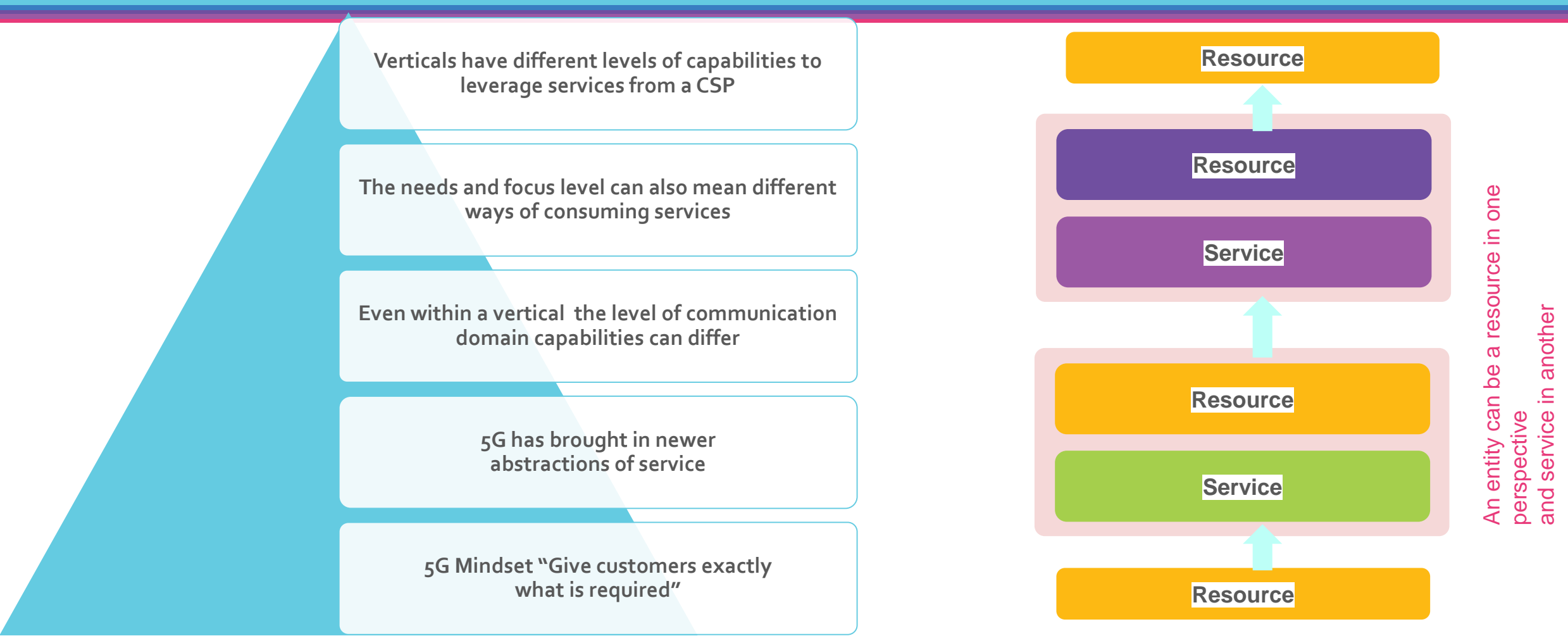# Extending TMF APIs into OSM MANO

Principal Architect – Joe Issac
(joe.issac@wipro.com), CTO Office, Wipro Technologies

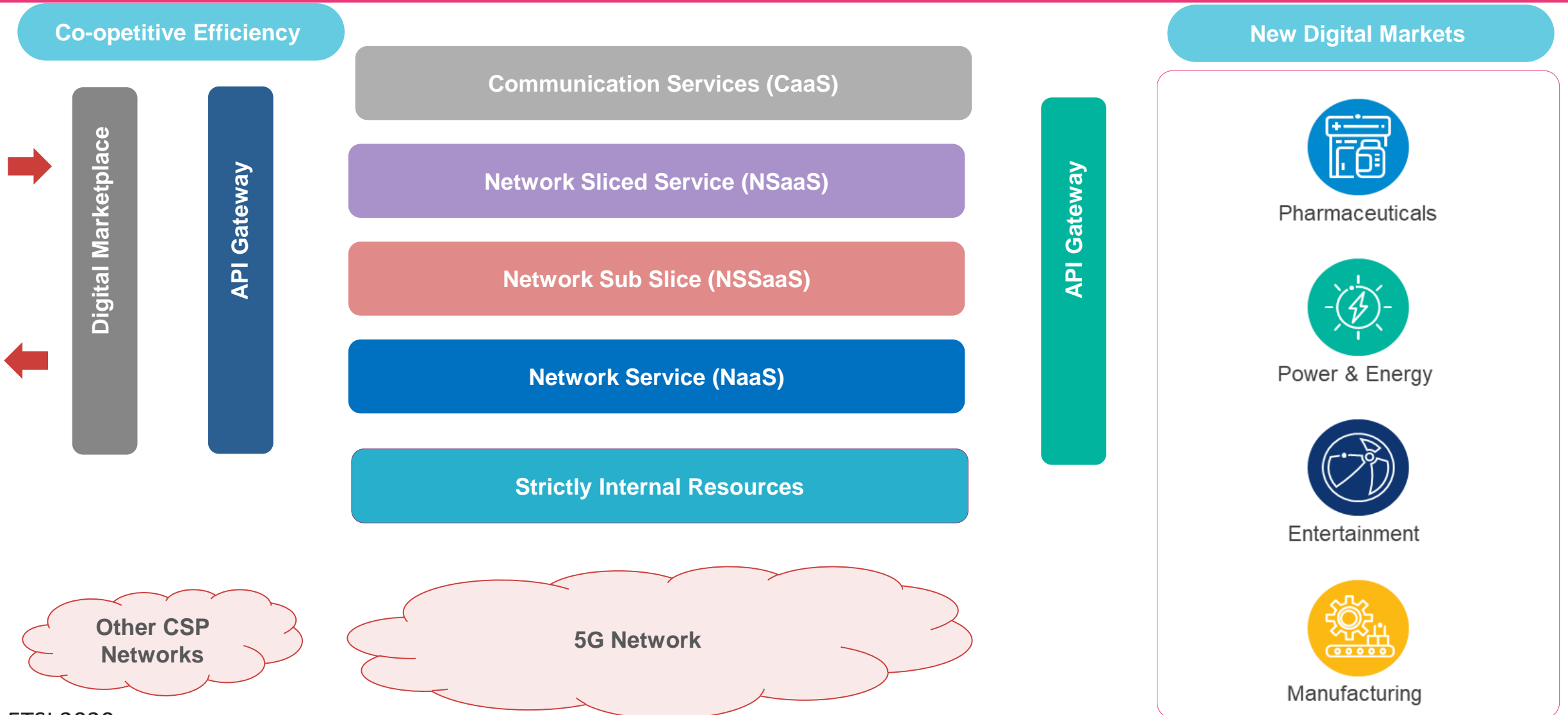# Providing Communication Services to manage Complex Vertical Markets

Verticals have different levels of capabilities to leverage services from a CSP

The needs and focus level can also mean different ways of consuming services

Even within a vertical the level of communication domain capabilities can differ

5G has brought in newer abstractions of service

5G Mindset "Give customers exactly what is required"

Resource

Resource

Service

Resource

Service

Resource

An entity can be a resource in one perspective and service in another
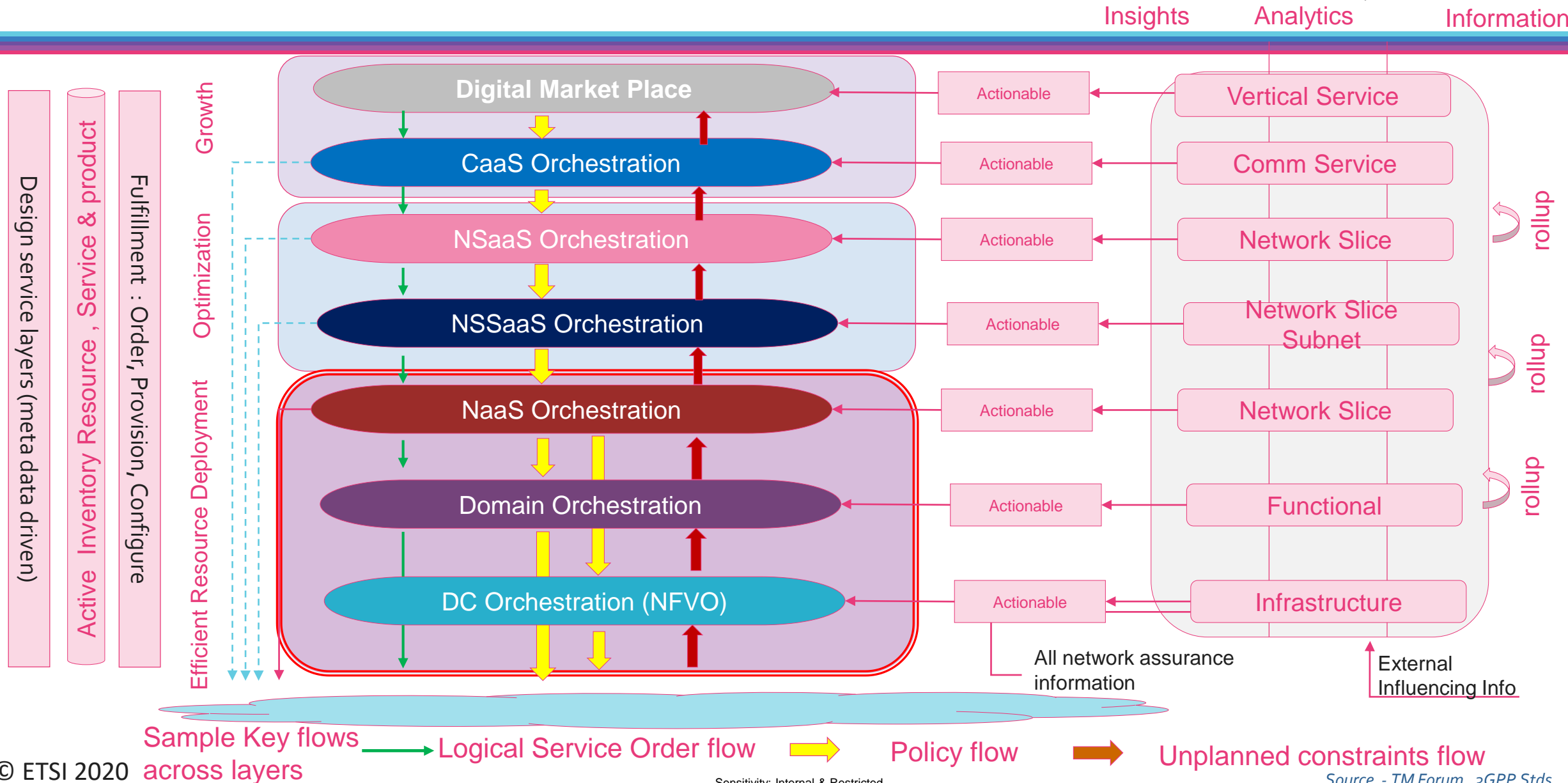
In communication Industry "SERVICE" is heavily overloaded word and can mean many different things in different contexts

Sensitivity: Internal & Restricted

Different types of Service Abstraction to address Vertical Markets

Open Source MANO

Co-opetitive Efficiency

New Digital Markets

Digital Marketplace

API Gateway

Communication Services (CaaS)

Network Sliced Service (NSaaS)

Network Sub Slice (NSSaaS)

Network Service (NaaS)

Strictly Internal Resources

API Gateway

Pharmaceuticals

Power & Energy

Entertainment

Manufacturing

Other CSP Networks

5G Network

Sensitivity: Internal & Restricted

Multi-layered Closed loop Orchestration Architecture

Open Source MANO

Insights   Analytics   Information

Design service layers (meta data driven)

Active Inventory Resource , Service & product

Fulfillment : Order, Provision, Configure

Growth

Optimization

Efficient Resource Deployment

Digital Market Place → Actionable ← Vertical Service

CaaS Orchestration → Actionable ← Comm Service

NSaaS Orchestration → Actionable ← Network Slice

NSSaaS Orchestration → Actionable ← Network Slice Subnet

NaaS Orchestration → Actionable ← Network Slice

Domain Orchestration → Actionable ← Functional

DC Orchestration (NFVO) → Actionable ← Infrastructure

rollup
rollup
rollup
rollup

All network assurance information

External Influencing Info

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Sample Key flows across layers   → Logical Service Order flow   ⇨ Policy flow   ⇨ Unplanned constraints flow

Sensitivity: Internal & Restricted

Source - TM Forum , 3GPP Stds

Exposing Service Abstraction through TMF APIs (NaaS API)

```
                        ┌─────────────────────┐
                        │  API suite for NaaS  │
                        │      TMF 909         │
                        └─────────────────────┘
```

Service Catalogue TMF 633	Service Activation & Configuration TMF 640	Service Inventory TMF 638	Service Qualification TMF 645	Service Order TMF 641	Service Quality TMF 657	Service Problem TMF 656	Service Test TMF 653

- TMF APIs are defined at fairly abstract level and can be leveraged for different types of service abstraction

- TMF 909 gives a comprehensive view of how these different APIs come together to create different business process

- While TMF 909 focuses on NaaS ,it can be applied to different service abstraction NSaaS, NSSaaS, CaaS

- Suggested order of reading Green, Blue, Grey and Purple Quick read Green and Purple

- Specifications TMF 6XX https://projects.tmforum.org/wiki/display/API/Open+API+Table+-+Production

- API suite for NaaS TMF 909 https://www.tmforum.org/resources/specification/tmf909-api-suite-specification-for-naas-v3-0/

Source . TM Forum

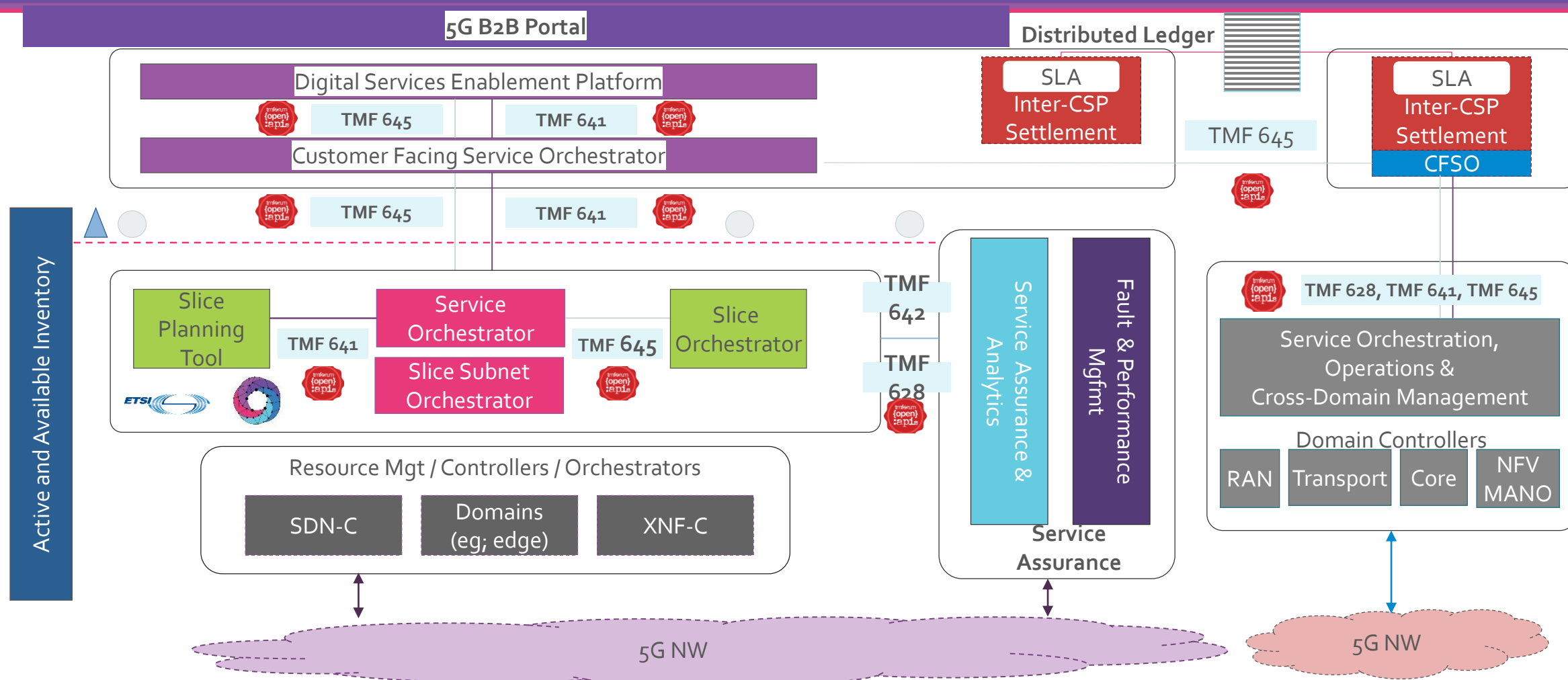# #1Ref Architecture - Enabling TMF API's into ETSI OSM MANO with Service Design & Modelling

Open Source MANO

Vertical Customers

Digital Market Place (B2B Portal)

Service Charging

TMF 633

TMF 641

TMF 641

Customer and Service Orchestration

Service Assurance

Service Design

ETSI – SOL-005

TMF 641

TMF 638

TMF 664 & 642

Active Inventory

Network Slice & Resource Orchestration ETSI-OSM-MANO

Experience Assurance & Analytics

Fault & Performance Monitoring

TMF 635

3GPP TS32.291

3GPP TS23.502

TMF 638

TMF 633

TMF 628

5G Sliced Network

- *TMF APIs I/F enabled – 633, 641, 628, 664,638 642, 635, 628*
- *3GPP I/F enabled – TS32.291, 23.502*
- *ETSI NFV ISG I/F enabled – Sol 005*

Sensitivity: Internal & Restricted

Source . TM Forum , 3GPP & ETSI Stds

Orchestrating and Dynamic allocation of 5G Network Slices

Open Source MANO

Digital Market Place

TMF 641

Service Charging

Customer and Service Orchestration

TMF 641

Active Inventory UIM

TMF 638

ETSI - OSM - MANO

TMF 638

Service Assurance

Experience Assurance & Analytics

Fault & Performance Monitoring
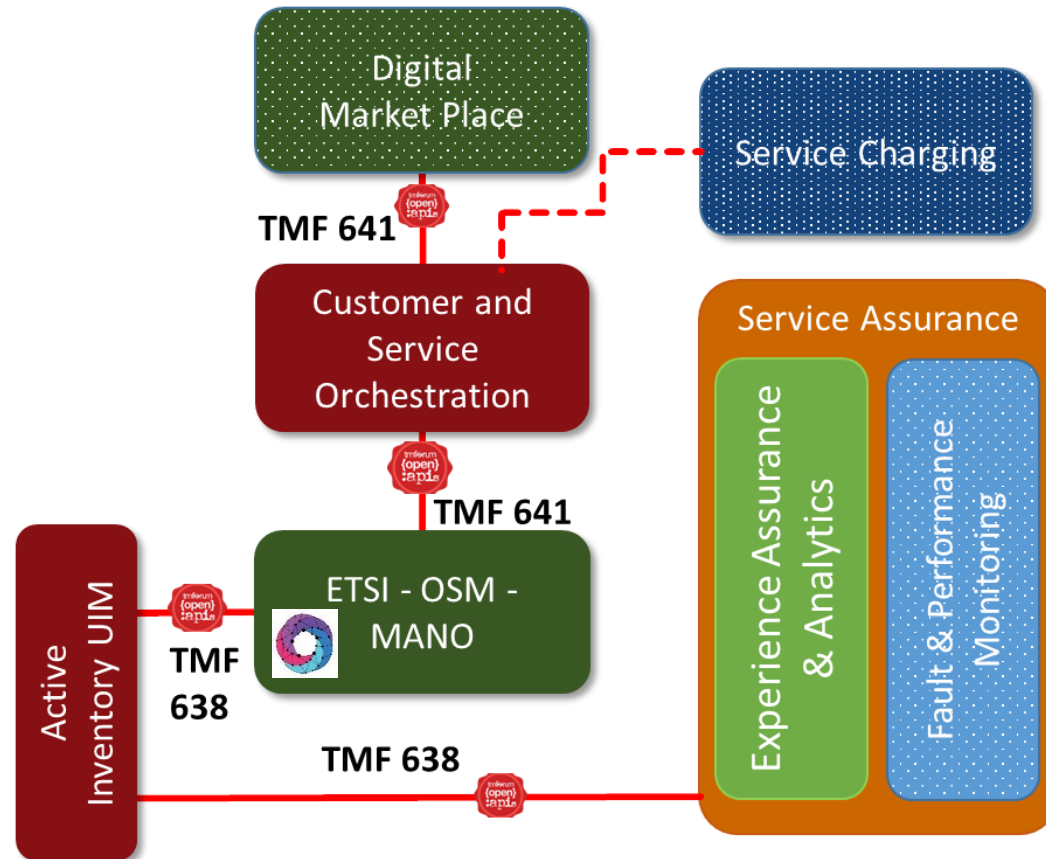
- Comprehensive end to end orchestration and managing life cycle of 5G services

1 • Orchestrating communication services

2 • LCM of CFS and Network Slices

3 • Maintaining consistencies across

  different management layers

Source . TM Forum, ETSI

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Sensitivity: Internal & Restricted

#2Reference Architecture - Enabling TMF APIs into ETSI OSM MANO with Cross Domain Manager

Open Source MANO

5G B2B Portal

Distributed Ledger

Digital Services Enablement Platform

TMF 645 | TMF 641

Customer Facing Service Orchestrator

TMF 645 | TMF 641

SLA
Inter-CSP Settlement

TMF 645

SLA
Inter-CSP Settlement

CFSO

Active and Available Inventory

Slice Planning Tool

TMF 641

Service Orchestrator

Slice Subnet Orchestrator

TMF 645

Slice Orchestrator

ETSI

TMF 642

TMF 628

Service Assurance & Analytics

Fault & Performance Mgmt

Service Assurance

TMF 628, TMF 641, TMF 645

Service Orchestration, Operations & Cross-Domain Management

Domain Controllers

RAN | Transport | Core | NFV MANO

Resource Mgt / Controllers / Orchestrators

SDN-C | Domains (eg; edge) | XNF-C

5G NW

5G NW

- *ETSI OSM MANO acting as Slice, Service & Network Orchestrator*

▲ Inventory Publish API
● Inventory Update Subscribe API

Source - TM Forum , 3GPP & ETSI Stds

TMF Extensions supporting ETSI Frameworks

TMF 641 supporting OSM MANO Architecture and customizations introduced

Extensions support to OSM MANO

ETSI – Zero Touch Network & Service Mgmt incorporated

Sensitivity: Internal & Restricted

Source . TM Forum, ETSI
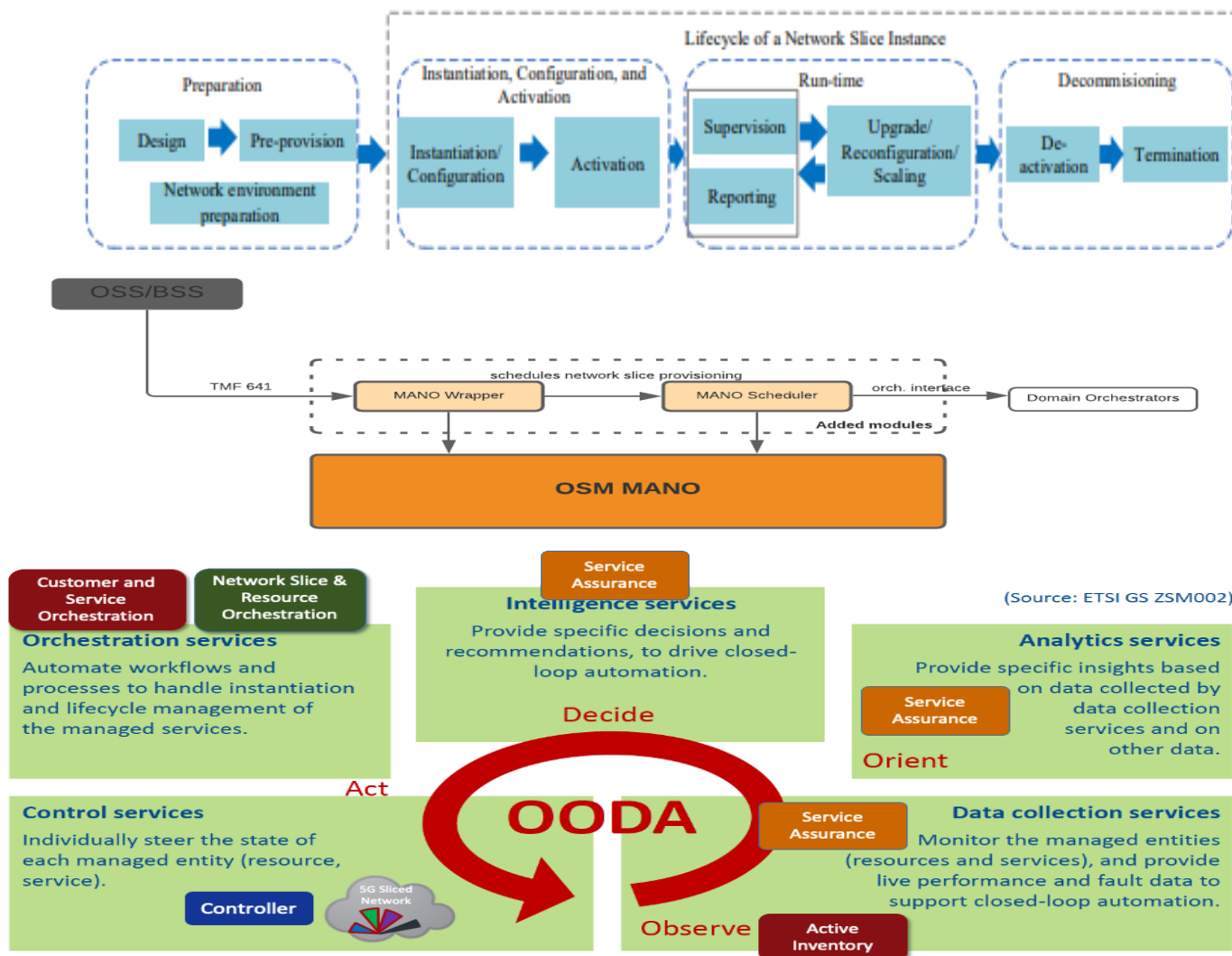
Extending OSM MANO - Network Layers of Abstraction & Orchestration using TMF API

Open Source MANO

Customer Service
- E2E Customer service In which one or more communication service are key components

DSEP (Digital Services Enablement Platform)

E2E Communication Service Inter-CSP
- Specific information exchange service between multiple end points
- May span CSP boundaries

CFSO (Customer Facing Service Orchestrator)

Extending OSM-Service Orchestrator roles

Communication Service Intra-CSP
- Service spanning across network domain between SAPs

SO (Service Orchestrator – for CS)

Network Slice as a Service (Sequence of NSIs)
- Leverage of one or more NSIs in sequence to support mobility

SLO ((Mobility) Slice Orchestrator – eCSMF*)

Network Slice Instance
- Independently manageable logical network, service guaranty between SAPs

SO (Service Orchestrator – NSMF*)

Network Subnet Slice Instance
- Subnet level entity to rapidly compose NSI & simplify management

SS-LO (Subnet Slice LC Orchestrator) – NSSMF*

E2E Network service (ETSI –NFV), SDN-R, SDN-C
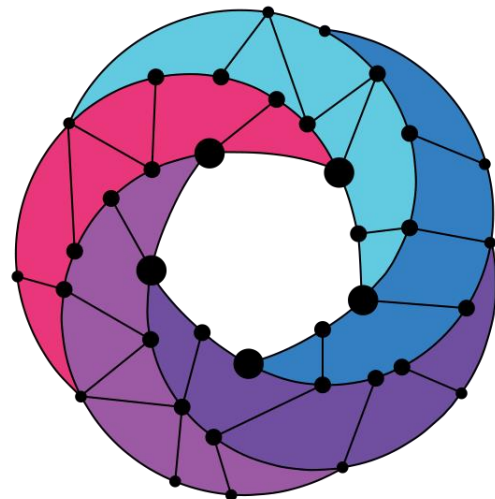- Resource layer Orchestrators, Controllers and Managers

Resource Layer Orchestrators (NFV/SDN)

* 3GPP CSMF – Communication Service Management Function, NSMF – Network Slice Management Function, NSSMF – Network Slice Subnet Management Function

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Sensitivity: Internal & Restricted

Summary

TMF extensions to OSM MANO have the following aspects:

- Able to expose communication services aligned with specific vertical industry use cases

- Orchestration of specialized and guaranteed services in a timely manner & on-demand.

- Fulfillment of SLAs guaranteed through on-the-fly process monitoring at control layer and charging mechanisms

- Enforcing SLA guarantees based on Network & Service related KPIs & KQI that are collected at Network Slice Instance level

- Predicting change in demand for business critical services, and triggering dynamic & closed loop mitigating actions

Demo

Thank you