OSM 3rd Hackfest – Introduction to NFV and OSM

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Agenda

- **Quick review of NFV**
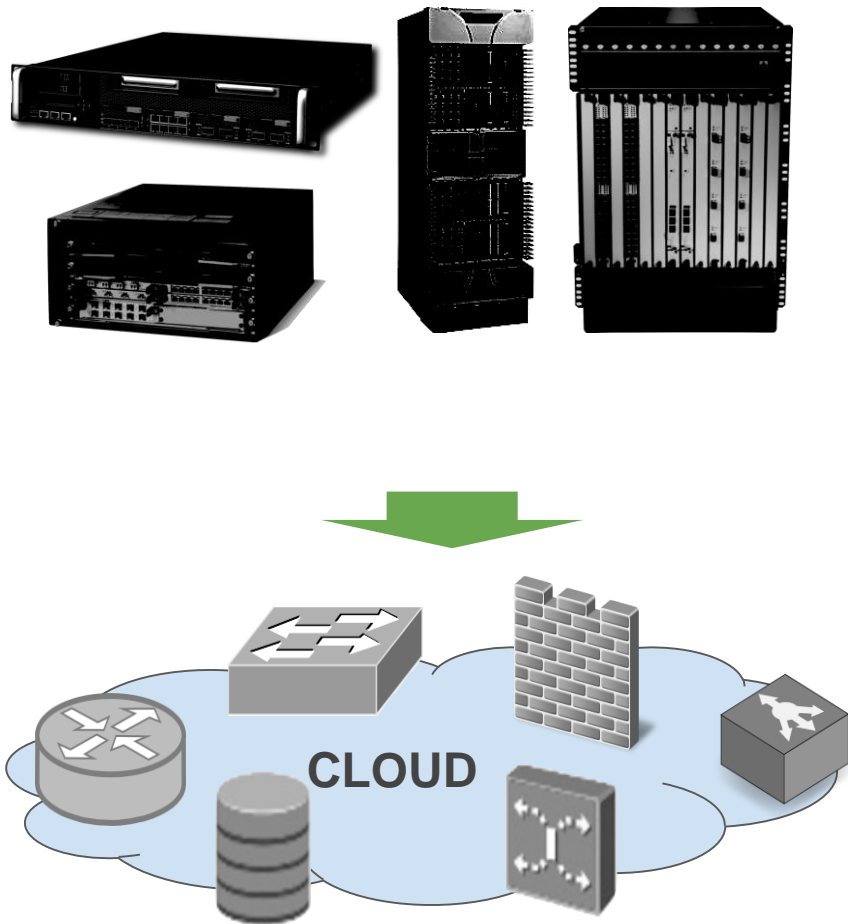
- Introduction to OSM Release 4

- Contributing to the Community

Quick review of NFV

What is NFV trying to address?

- Network Function Virtualization (NFV) proposes to virtualize network functions that typically run in dedicated appliances

- The main goal is to support virtualized functions over COTS servers.

- Virtual Network Functions (VNFs) acquire all the advantages of Cloud Applications!

How was this originated?

- A white paper was written in 2012 by the world's leading telecom network operators.

- This group evolved to the ETSI NFV ISG (Industry Specification Group), formed today by 300+ companies.

- Their main motivation had to do with the increasing TCO of building a network with proprietary hardware appliances.

Network Functions Virtualisation – Introductory White Paper   Issue 1

Network Functions Virtualisation

An Introduction, Benefits, Enablers, Challenges & Call for Action

OBJECTIVES

This is a non-proprietary white paper authored by network operators.

The key objective for this white paper is to outline the benefits, enablers and challenges for Network Functions Virtualisation (as distinct from Cloud/SDN) and the rationale for encouraging an international collaboration to accelerate development and deployment of interoperable solutions based on high volume industry standard servers.

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PUBLICATION DATE

October 22-24, 2012 at the "SDN and OpenFlow World Congress", Darmstadt-Germany.

ETSI Publications

- Based on member's feedback, field experiences and proof of concepts, standard documents have evolved.

- 60+ publications exist today, including the following three main documents:

  - NFV Architectural Framework
    http://www.etsi.org/deliver/etsi_gs/NFV/001_099/002/01.02.01_60/gs_NFV002v010201p.pdf

  - NFV Infrastructure Overview
    http://www.etsi.org/deliver/etsi_gs/NFV-INF/001_099/001/01.01.01_60/gs_NFV-INF001v010101p.pdf

  - NFV Management and Orchestration
    http://www.etsi.org/deliver/etsi_gs/NFV/001_099/002/01.02.01_60/gs_NFV002v010201p.pdf

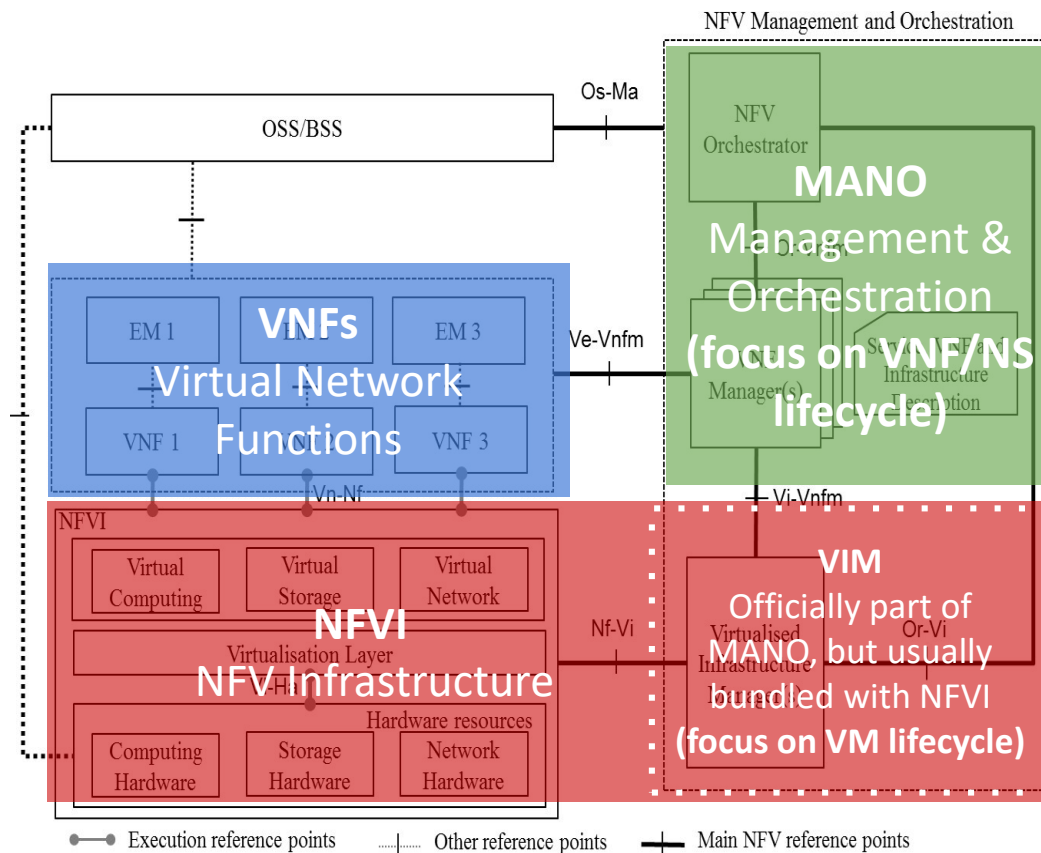http://www.etsi.org/standards-search

Benefits of a standard NFV architecture

- We are looking for a **unified and generic virtualization infrastructure**, compatible with any vendor's Virtual Networking Function (VNF), **so standardization is a must**.
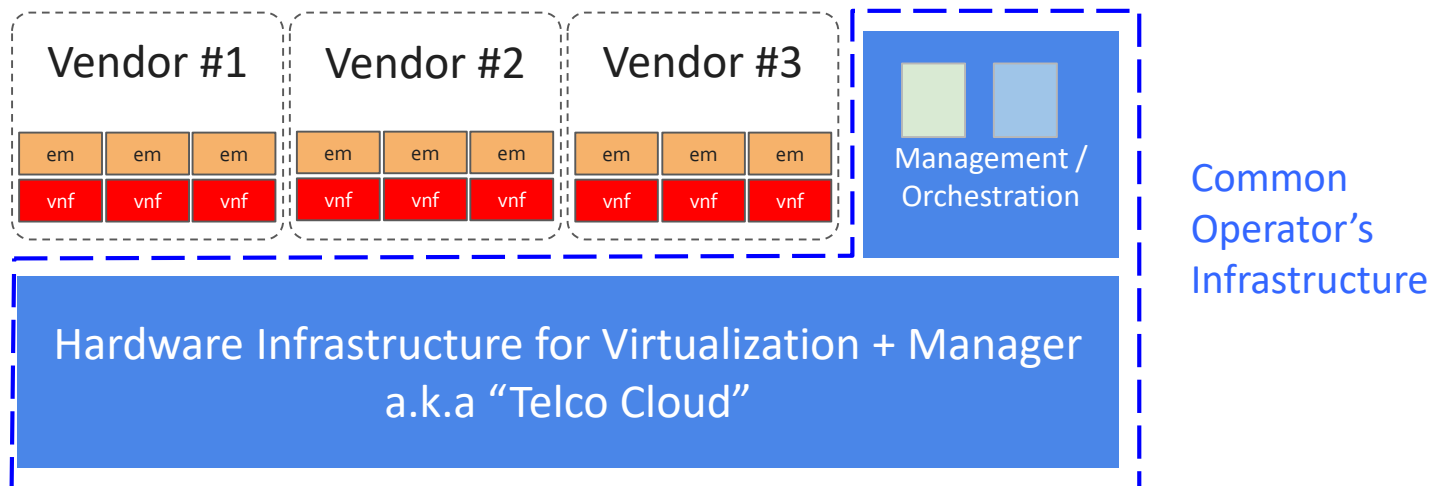
The ETSI NFV Architecture

- The standard architecture can be better understood in three blocks:

VNFs Virtual Network Functions

MANO Management & Orchestration (focus on VNF/NS lifecycle)

NFVI NFV Infrastructure

VIM Officially part of MANO, but usually bundled with NFVI (focus on VM lifecycle)

NFVI: NFV Infrastructure

- NFVI goal is to provide a virtualization environment for VNFs, including virtual compute, storage and networking resources.
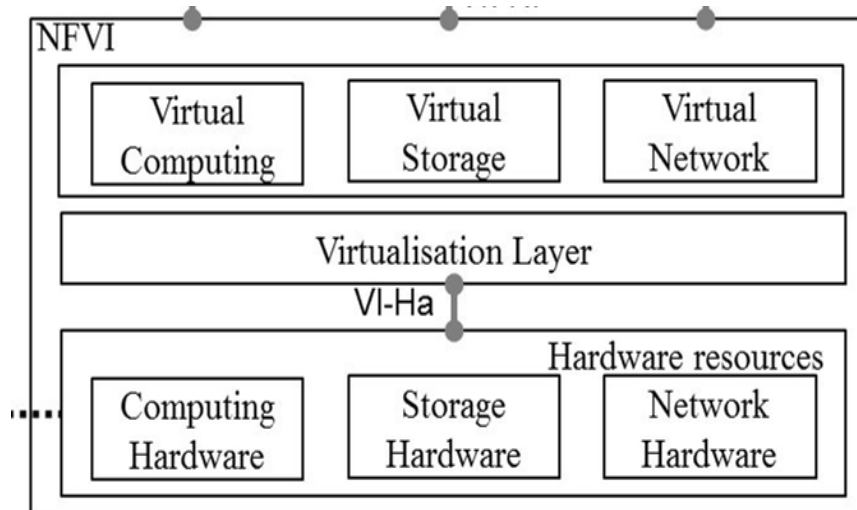

- But! networking applications may have more strict performance requirements, we will discuss that later.

VNF Special Requirements

VNFs, especially data-plane ones, usually have additional requirements than common cloud applications, including:

- Minor latency (disk I/O & network)
  → faster disks, QoS, higher BW

- Geographical distribution
  → multi-site cloud

- Horizontal auto-scaling
  → automated operations

- Higher throughput or PPS
  → EPA: Enhanced Platform Awareness
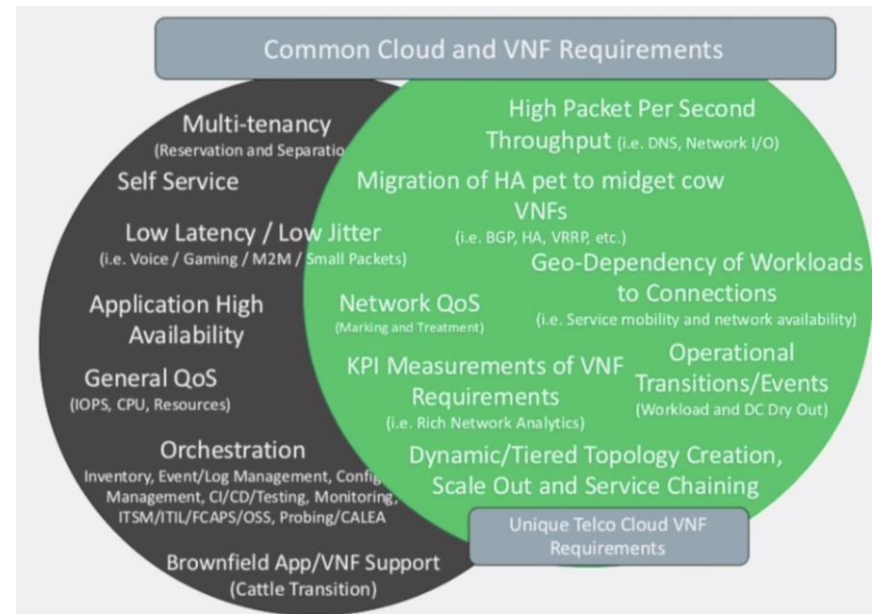
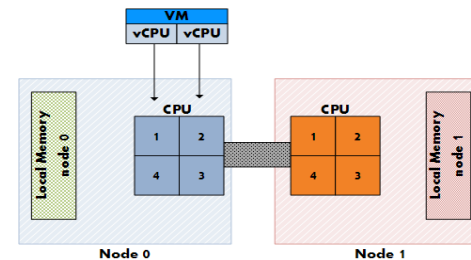*OpenStack Austin 2016: Telco Cloud Requirements: What VNF's Are Asking For*

VNF Special Requirements

EPA covers the different approaches that can be taken at the NFVI layer to increase performance while maintaining a generic (COTS) infrastructure. VIM and MANO should be able to request them.
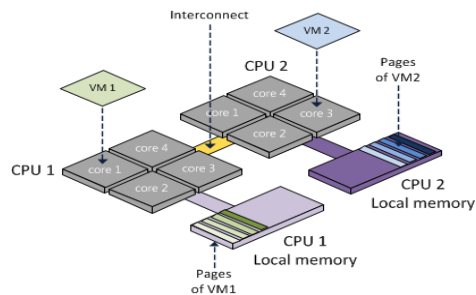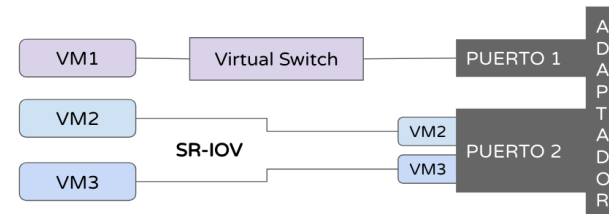
Huge Pages

NUMA Topology Awareness
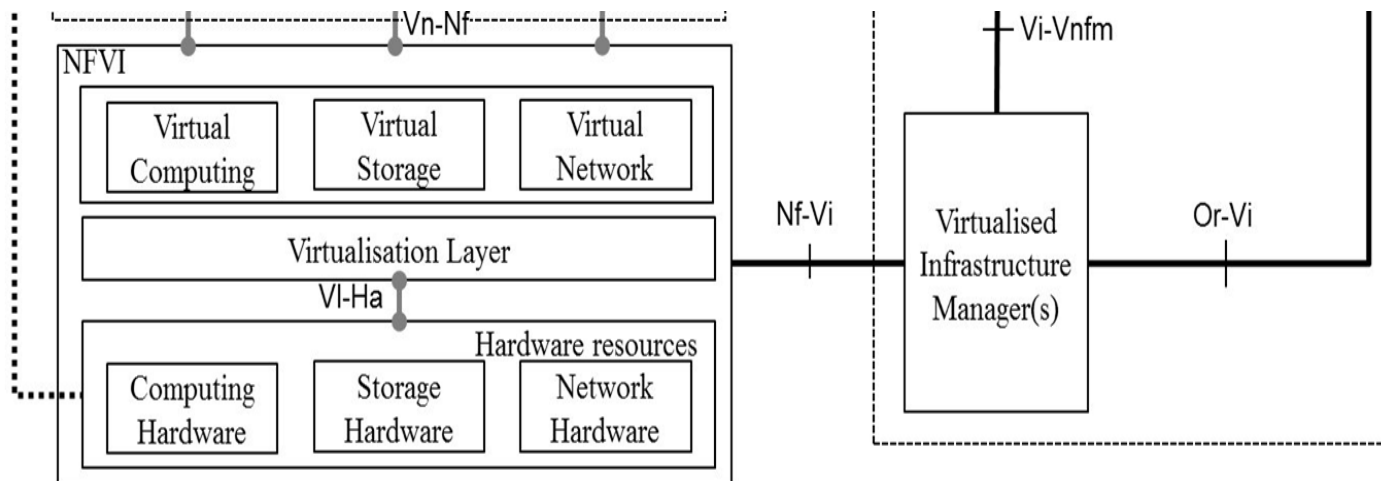

CPU Pinning

Data Plane assignment

# MANO: Virtualized Infrastructure Manager (VIM)

- The Virtualized Infrastructure Manager is part of the 'MANO Stack' and addresses provides lifecycle management for virtualized resources (VMs, volumes, networking paths and connectivity, etc.)

Examples: OpenStack distributions, VMWare products, Public Cloud managers, etc.
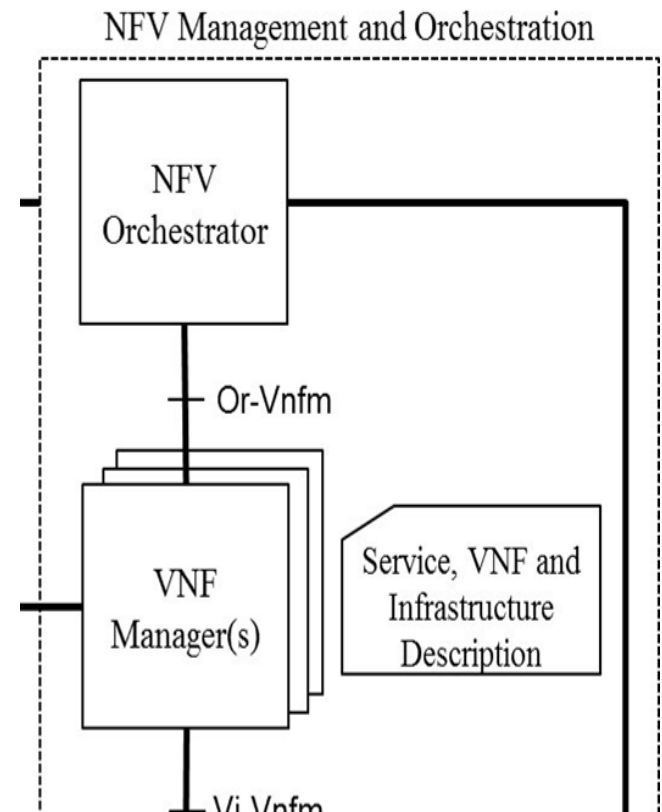
MANO: VNF Manager (VNF-M)

- The VNF Manager, also part of the 'MANO Stack', covers lifecycle management for Virtual Network Functions (VNFs), either directly or through their own Element Management System (EMS).
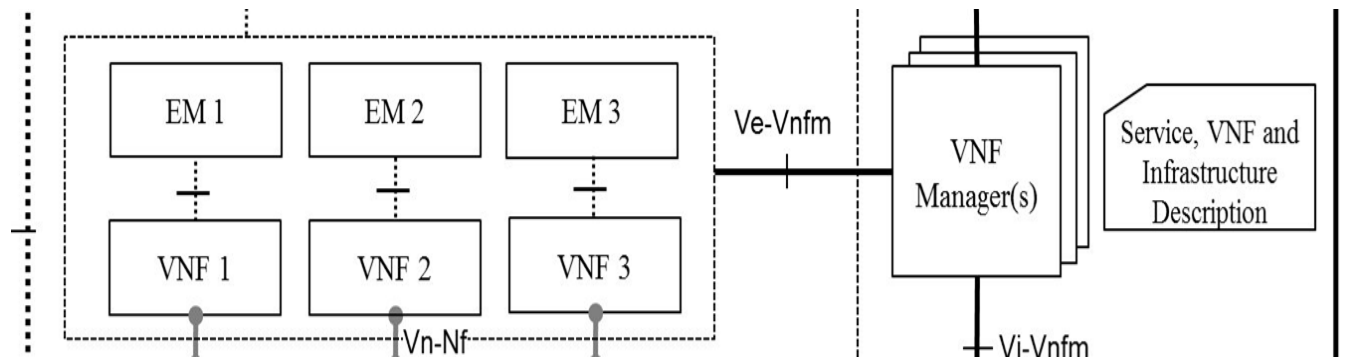
- VNF Managers can be generic (current trend), or vendor-specific ones.

MANO: NFV Orchestrator (NFV-O)

- The NFV Orchestrator, the higher entity in the 'MANO Stack', covers general resource orchestration and services lifecycle, which comprise multiple VNFs and define their roles (traffic paths, scaling decisions, and other service-related requirements)

- It can interact with a generic VNF Manager, or vendor-specific ones.

NFV Management and Orchestration

NFV Orchestrator

— Or-Vnfm

VNF Manager(s)

Service, VNF and Infrastructure Description

— Vi-Vnfm

Virtual Network Functions (VNF)

- Finally, the VNFs, which are supported by the underlying NFVI, and managed by their own EM (internal manager) and the VNF Manager (external, 'context-aware' manager)

- They should be able to provide any networking function and interact with other VNFs.
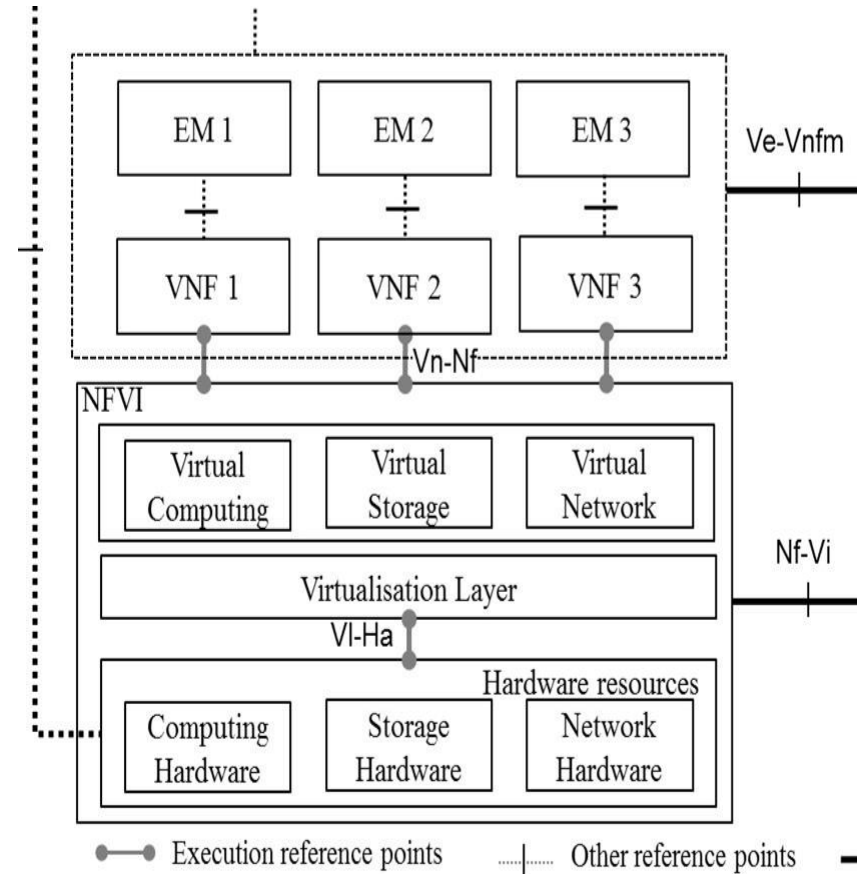
VNF Descriptor files (VNFD)

One of the most important aspects of achieving a unified VNF catalogue, is having a standard way of describing VNFs.

- MANO solutions should give the possibility to describe VNFs through 'descriptor files'

- The industry's goal is a unified and standard descriptor file format across different platforms.

- Both NS (comprised of VNFs) and VNFs should be described in a simple way.

```
vnfd:vnfd-catalog:
  vnfd:vnfd:
  -   vnfd:connection-point:
      -   vnfd:name: eth0
          vnfd:type: VPORT
      vnfd:description: Generated by OSM pacakage generator
      vnfd:id: ubuntuvnf_vnfd
      vnfd:mgmt-interface:
          vnfd:cp: eth0
      vnfd:name: ubuntuvnf_vnfd
      vnfd:service-function-chain: UNAWARE
      vnfd:short-name: ubuntuvnf_vnfd
      vnfd:vdu:
      -   vnfd:cloud-init-file: cloud_init
          vnfd:count: '1'
          vnfd:description: ubuntuvnf_vnfd-VM
          vnfd:guest-epa:
              vnfd:cpu-pinning-policy: ANY
          vnfd:id: ubuntuvnf_vnfd-VM
          vnfd:image: ubuntu_admin
          vnfd:interface:
          -   rw-vnfd:floating-ip-needed: 'false'
              vnfd:external-connection-point-ref: eth0
```

The NFV MANO Landscape

- Given that the VIM is already well covered by OpenStack distributions and proprietary solutions, in practice, **the "NFV MANO" part focuses on the VNF Manager and NFV Orchestrator.**

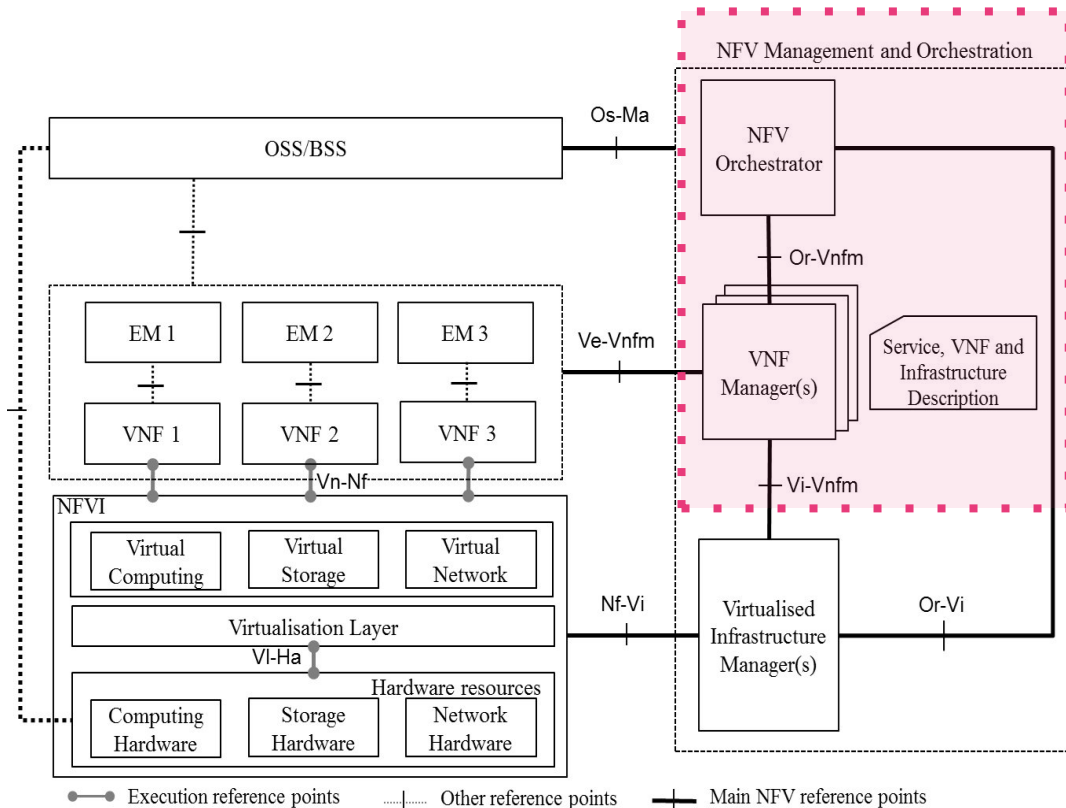- Among the most popular open source platforms for NFV MANO, we have:
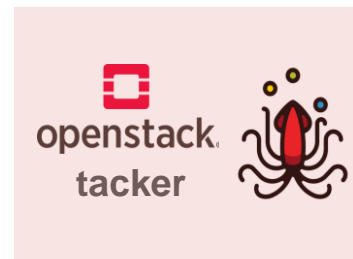
Open Source
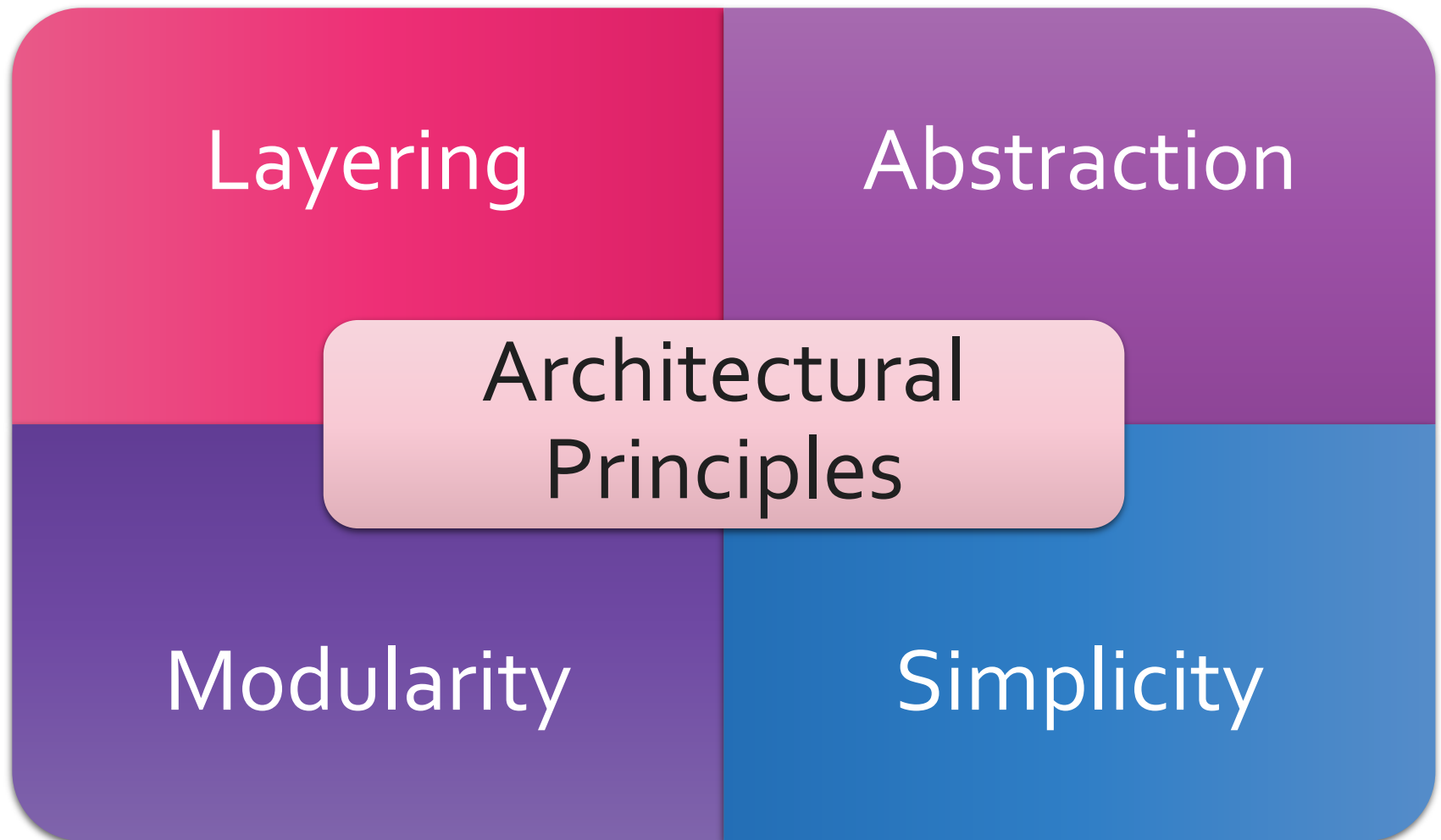MANO

Introduction
to OSM
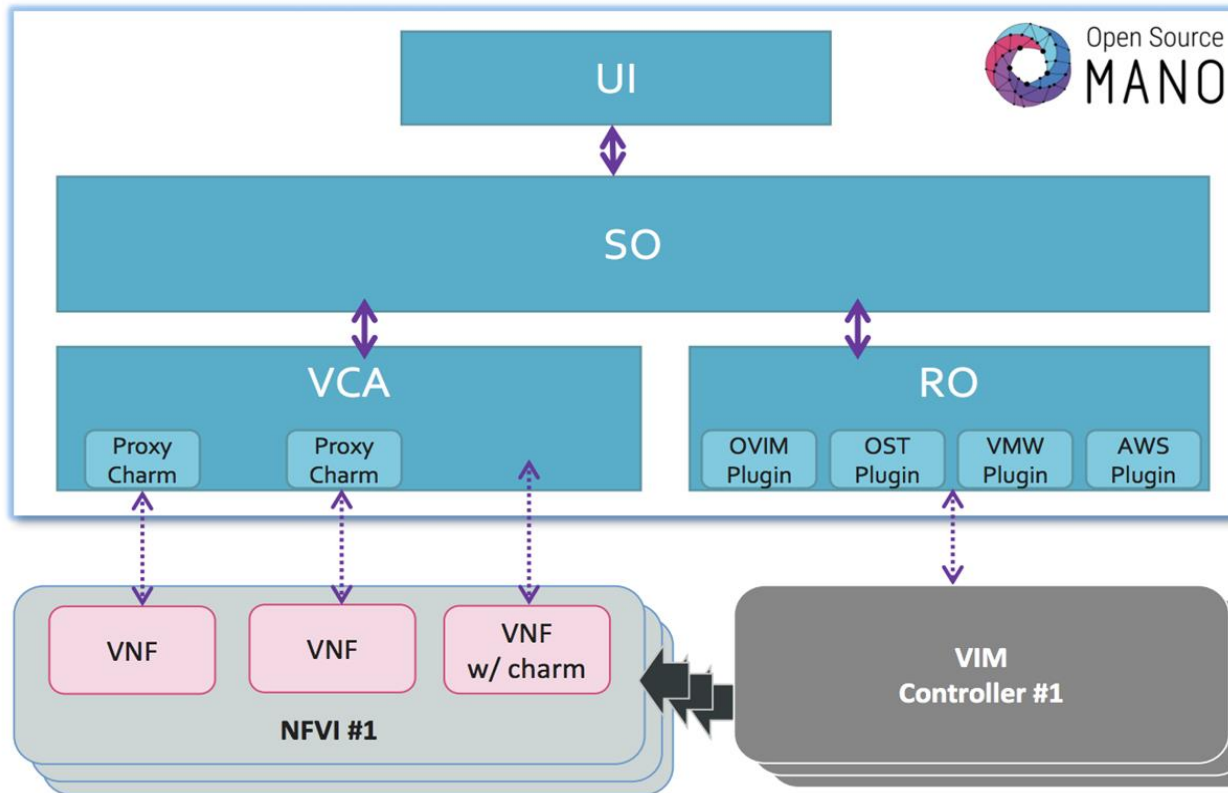Release Four

The Open Source MANO Project

We are here!
Open Source MANO is an ETSI-hosted project to develop an Open Source NFV Management and Orchestration (MANO) software stack aligned with ETSI NFV.

Open Source
MANO

Layering	Abstraction
Architectural Principles	
Modularity	Simplicity

Release 3 simplified architecture

Release 4 architecture & additions

Open Source MANO

Common Services

OSM IM
Common Database (NoSQL)

Object Storage

Logs

Auth

osmclient | light-ui

New OSM's NBI

OSM IM
NBI

LCM

N2VC

VCA

RO

OSM IM

Kafka bus

PM

MON

5 → **Complete control through CLI and stand-alone new UI**

4 → **Unified Northbound Interface**

3 → **Lighter version of the orchestrator: LifeCycle Management (LCM) component as an alternative to SO**

2 → **Integrated components for policy, fault and performance management (auto-scaling, monitoring, etc)**

6 → **common DB, storage, authentication and logging systems**

1 → **unified message bus for async communications**

Why is OSM Awesome?

It has a rich and open information model

- Agnostic to VIM, SDN platform, VNF and OSS connectors/specifics.

- It allows for a uniform NFV orchestration, abstracted from the environment

- Aligned with ETSI-NFV Information Model

Visit:

https://osm.etsi.org/wikipub/index.php/OSM_Information_Model

Why is OSM Awesome?

It has a large and diverse community!
More than 90 members and growing

- 11 Global Service Providers
- Leading IT/Cloud players
- VNF providers

Why is OSM Awesome?

It is well organized for producing production-ready upstream code
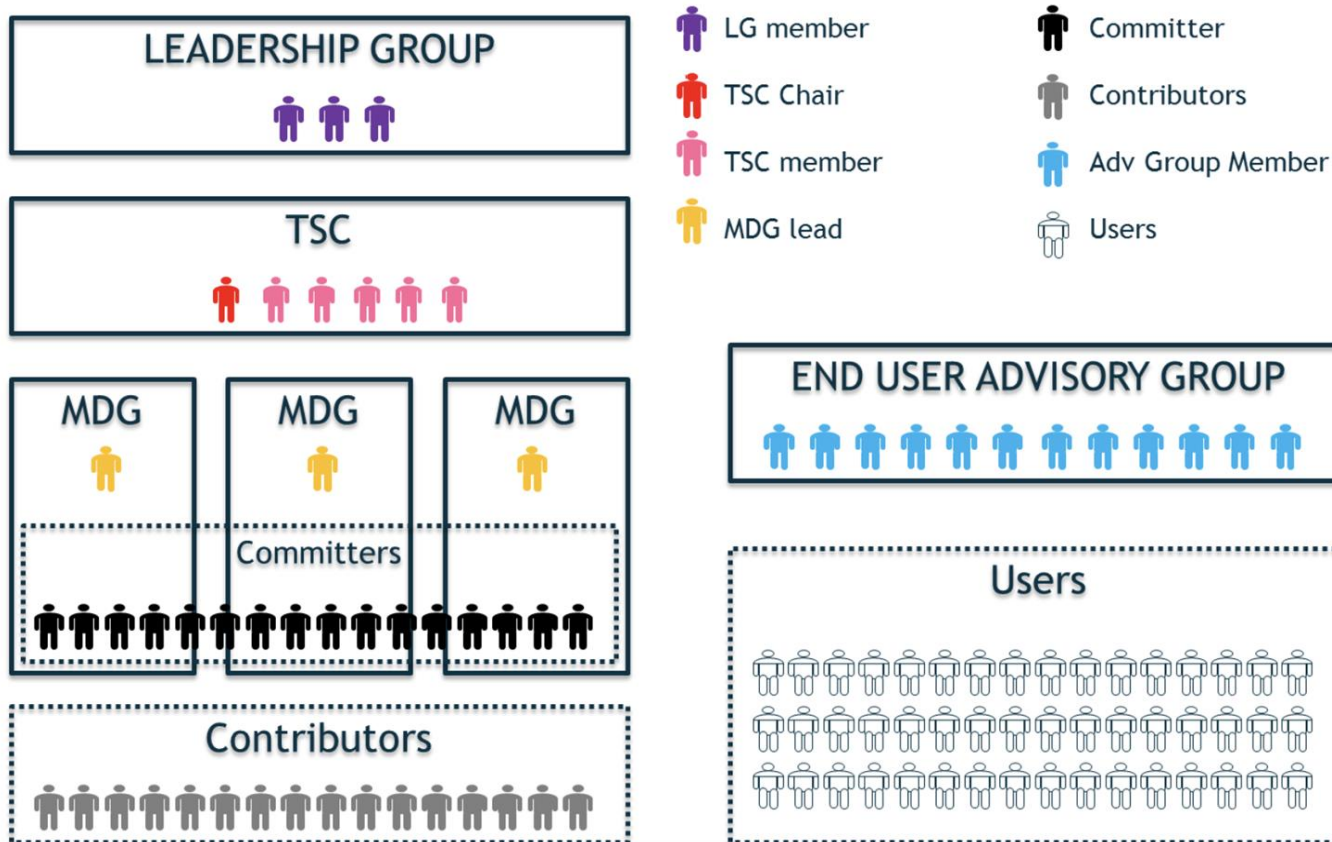
Why is OSM Awesome?

It prioritizes features for production readiness

APRIL 2017

DECEMBER 2017

MAY 2018

OCT 2016 — Open Source MANO — Release ONE

Open Source MANO — Release TWO

Open Source MANO — Release THREE

Open Source MANO — Release FOUR

MAY 2015 — Open Source MANO — Release Zero

Release TWO
- Multi-VIM
  OpenStack, AWS, VMWare
- Multi-SDN
  ODL, ONOS, Floodlight
- One-click installer
- Network Service Scaling
- Multi-Site, and more!

Release THREE
- Multi-tenancy & RBAC
- Monitoring Module
- Enhanced VIM support & emulation
- NB API Consolidation
- Affinity/Anti-Affinity Rules
- CI/CD Workflow
- Information Model Consolidation

Release FOUR
- Model-driven NBI
- Monitoring Improvements
- Cloud-native deployment
- Improved modeling
- Service Chaining
- Native Charms
- Enhanced usability

Why is OSM Awesome?

...and will keep expanding its features towards production deployments:

- Improved interface towards VNFs

- Further evolution of Performance and Fault Management capabilities

- Management of VNFs of new generation
  - Docker containers + Kubernetes management
  - Hybrid NFs (Virtual + Physical)

- Support of future 5G deployments
  - Network Slicing likely to require NS Nesting, Management of shared resources

Open Source MANO

Contributing to the Community

Joining the OSM Community
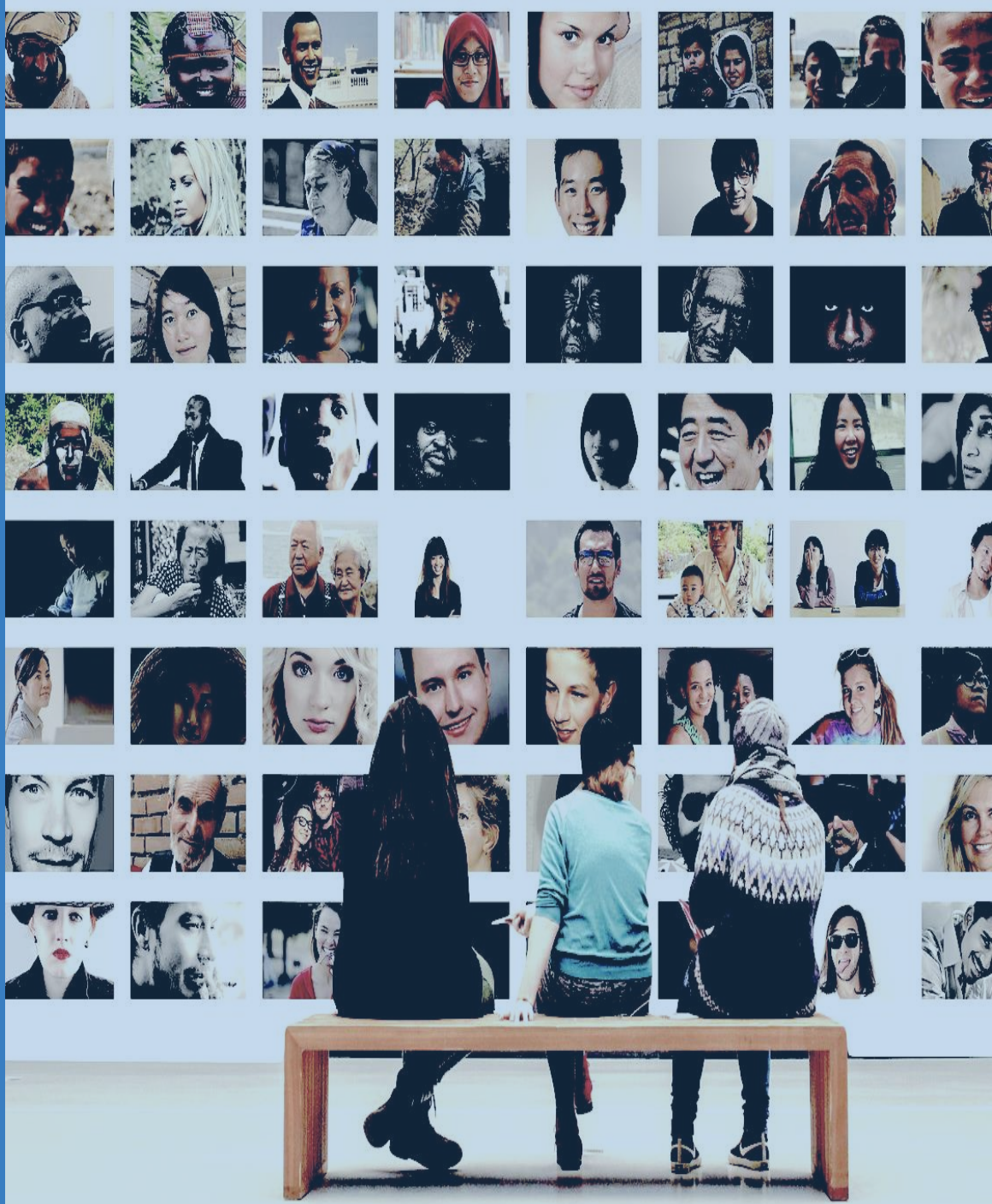
- Join [here](#) as a company or individual contributor!

HOW TO GET INVOLVED IN OSM

There are two paths to get involved in OSM as an organisation: as an ETSI Member, or as an OSM Participant.

Check first if your organization is already involved by consulting the list of OSM Members and Participants.

Get involved as an ETSI Member

To take part in the development of OSM and participate to the meetings, ETSI Members need to sign the OSM Membership Agreement and CCLA. In doing this, they agree to the OSM operating rules which in some cases are different from those in ETSI's Technical Working Procedures. Check if your company is an ETSI Member.

Get involved as an OSM Participant

Organizations who are not members of ETSI may also participate in OSM, attend meetings and help to develop OSM by making technical contributions. They are not applicable for leadership (LG) positions and must pay a participation fee to attend OSM meetings. To get involved as a Participant, please sign the OSM Participant Agreement and the CCLA.

Developers and Users

Individual developers and end users are welcome to contribute code and feedback to OSM,

they just need to create an individual contributor or user account.

OSM Community Activities

- Weekly Conference Calls
  - Technical, leadership, DevOps, and more!

- Face to Face Meetings
  - Plenaries and Mid-Release meetings (every 3 months)
  - Next location: Palo Alto (US)

- OSM Hackfest
  - Third edition taking place on June 2018 at Norway, expecting to keep co-locating with OSM Face-to-Face meetings.

Ways to contribute to OSM

- **Try OSM** and give feedback to the community.

- Join as a developer to **make contributions to the code**.

- Join the community to **contribute to design discussions**.

- **Start building your own distribution** of OSM as an integrator.

- **Host an OSM meeting** to contribute to the community's growth and diversity.
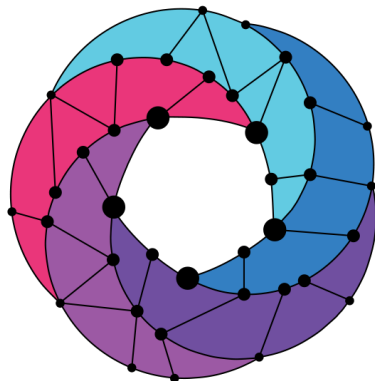
Find us at:
osm.etsi.org
osm.etsi.org/wikipub