The Need to Succeed: Tearing Down NFV Interoperability Walls

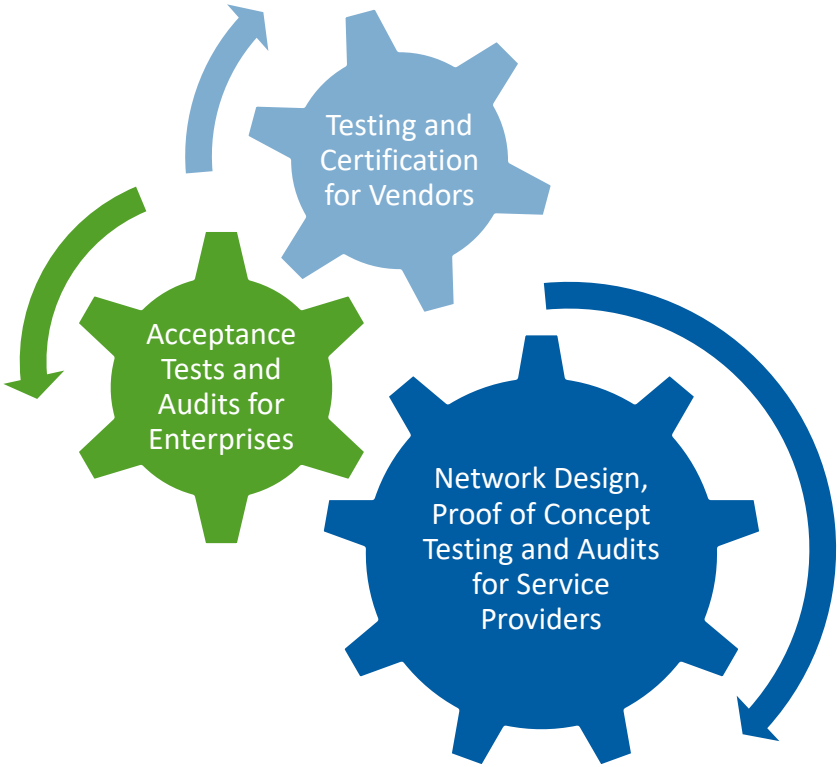
Carsten Rossenhoevel, Co-Founder & CTO

November 14, 2018

EANTC

EUROPEAN ADVANCED NETWORKING TEST CENTER

About the European Advanced Networking Test Center



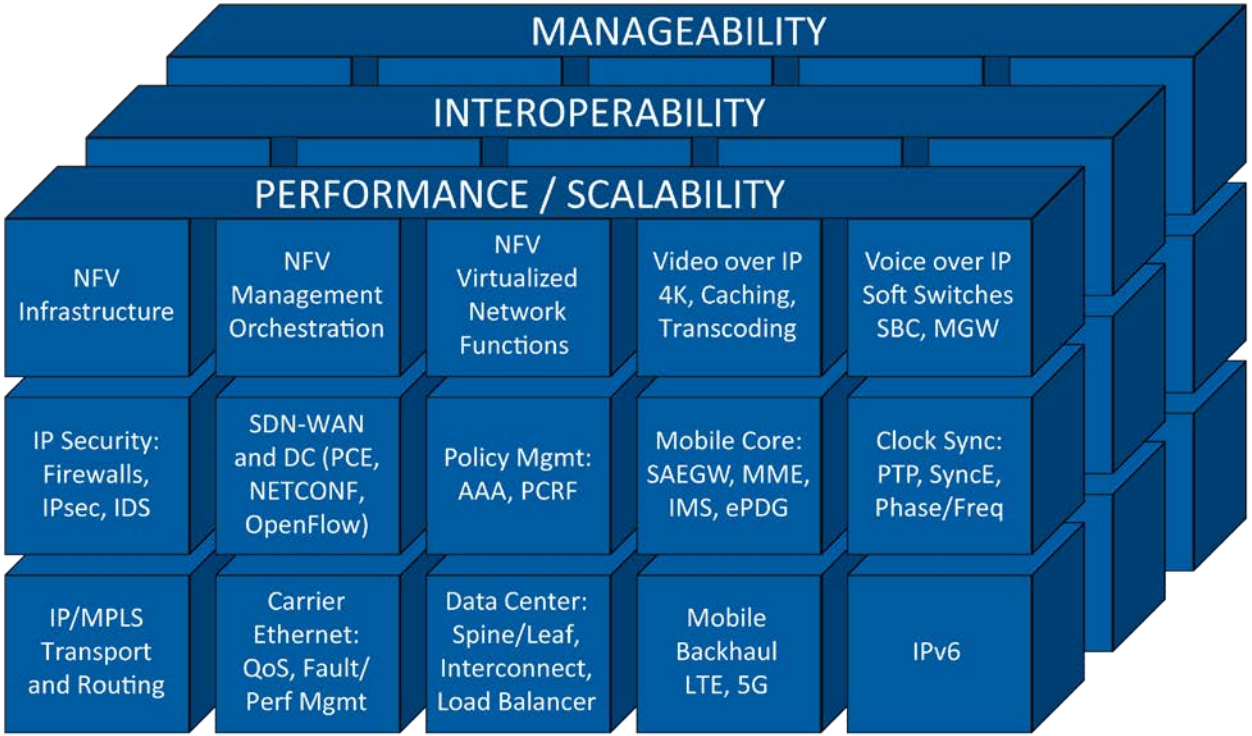
- State of the art testing expertise focusing on innovative telecom technologies
- Emulating fully realistic scenarios representative for today's production networks
- EANTC is 100% independent and vendor-neutral
- Adhering to highest quality standards and actively participating in test methods standardization

redefine the possible log in. berlin.

Tested by EANTC 2018

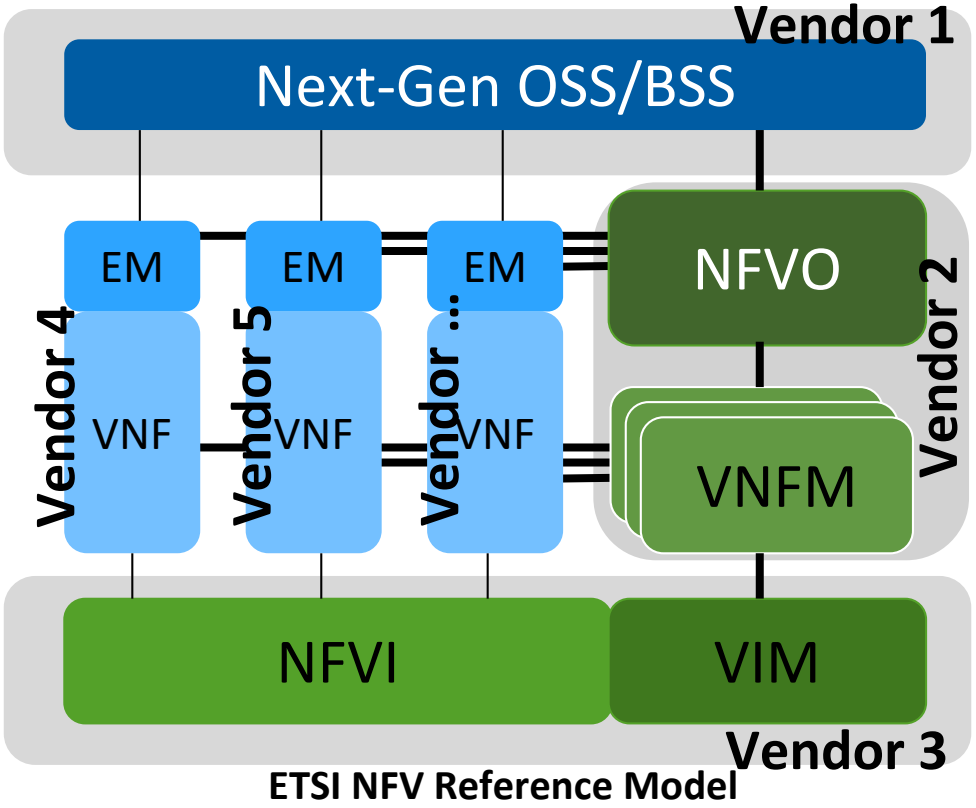
EANTC

Technology Areas – EANTC Strengths



Interoperability in NFV – Why and How

Multi-Vendor Telco Cloud Goal

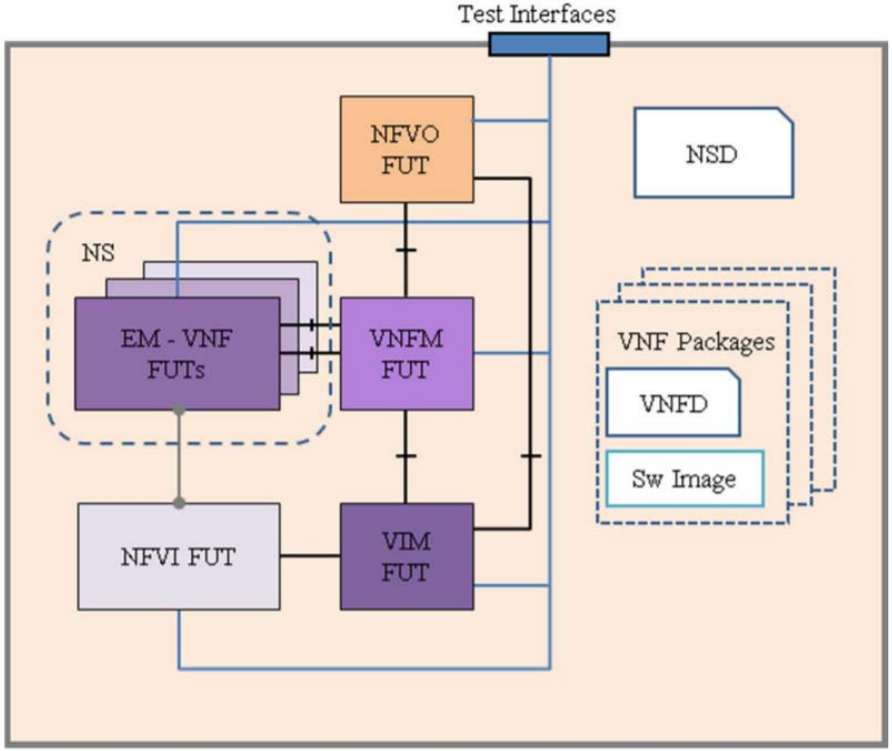


ETSI NFV Reference Model

Communications Service Providers want to avoid vendor lock-in and any single source issues

→ Multi-vendor interoperability is a requirement

NFV Reference Model – Interoperability Points



ETSI GR NFV-TST007

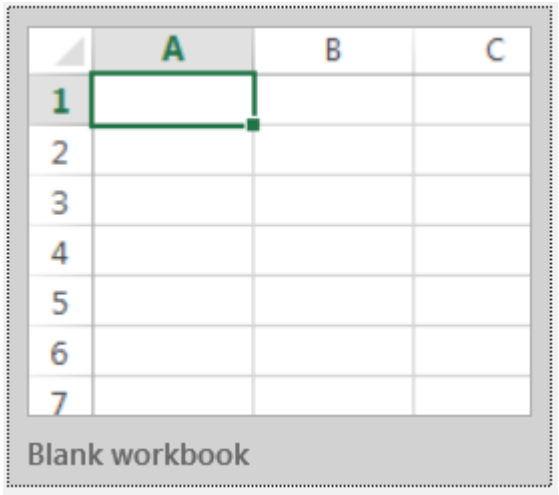
- Defines standard interoperability guidelines for NFV orchestration

Usually three distinct functional blocks under test (FUTs) in a multi-vendor scenario:

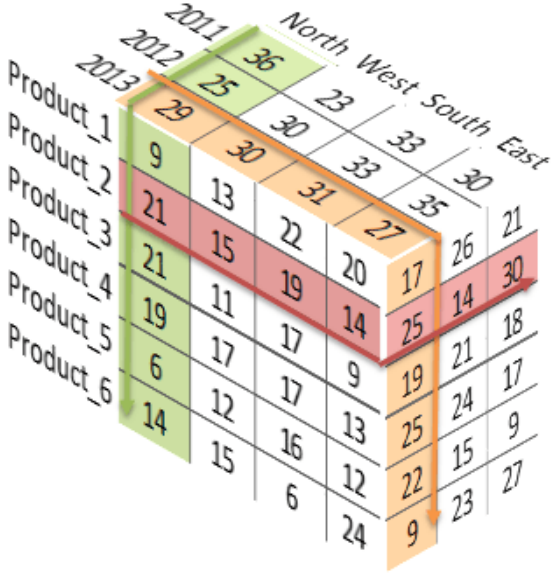
- NFV Orchestrator (NFVO)
- Virtualized Network Function (VNF)
- NFV Infrastructure (NFVI) plus Virtual Infrastructure Manager (VIM)
- (VNF Manager association varies)

Effort of Interoperability Testing

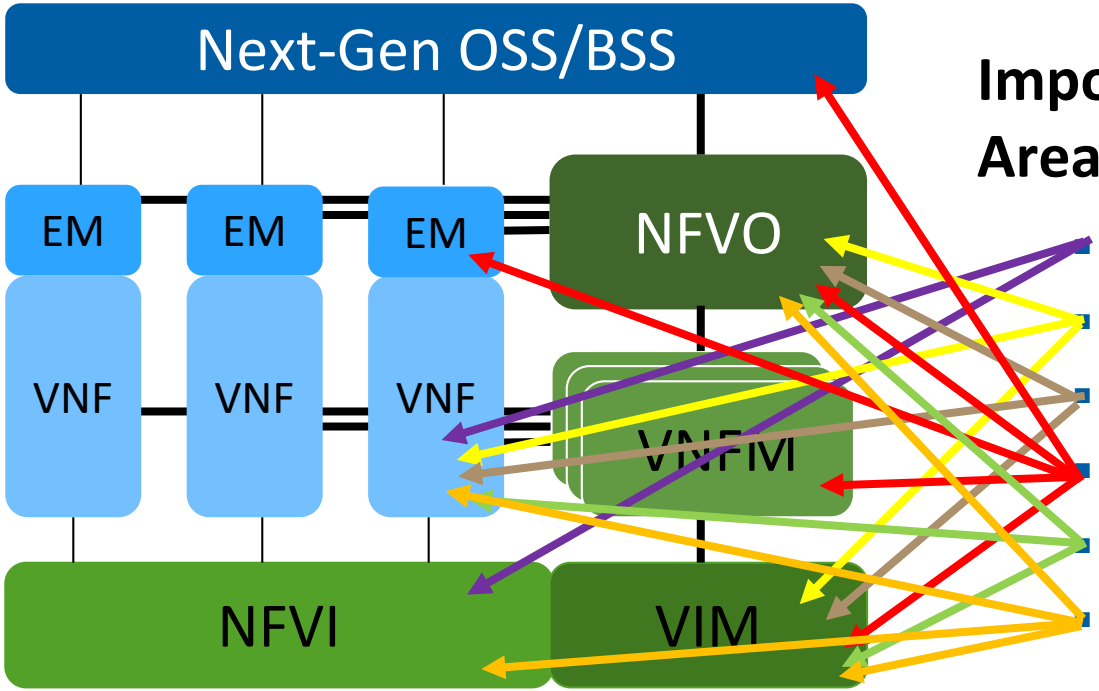
Traditional: Two Parties in each combination



NFV MANO: Three parties per combination



Beyond Functional Interoperability



ETSI NFV Reference Model

Important Quality Assurance Areas to Look for:

- Data Plane Performance
- Service Scalability
- High Availability
- Manageability
- Service Agility
- Security

Situation Today

Where Is NFV Today?

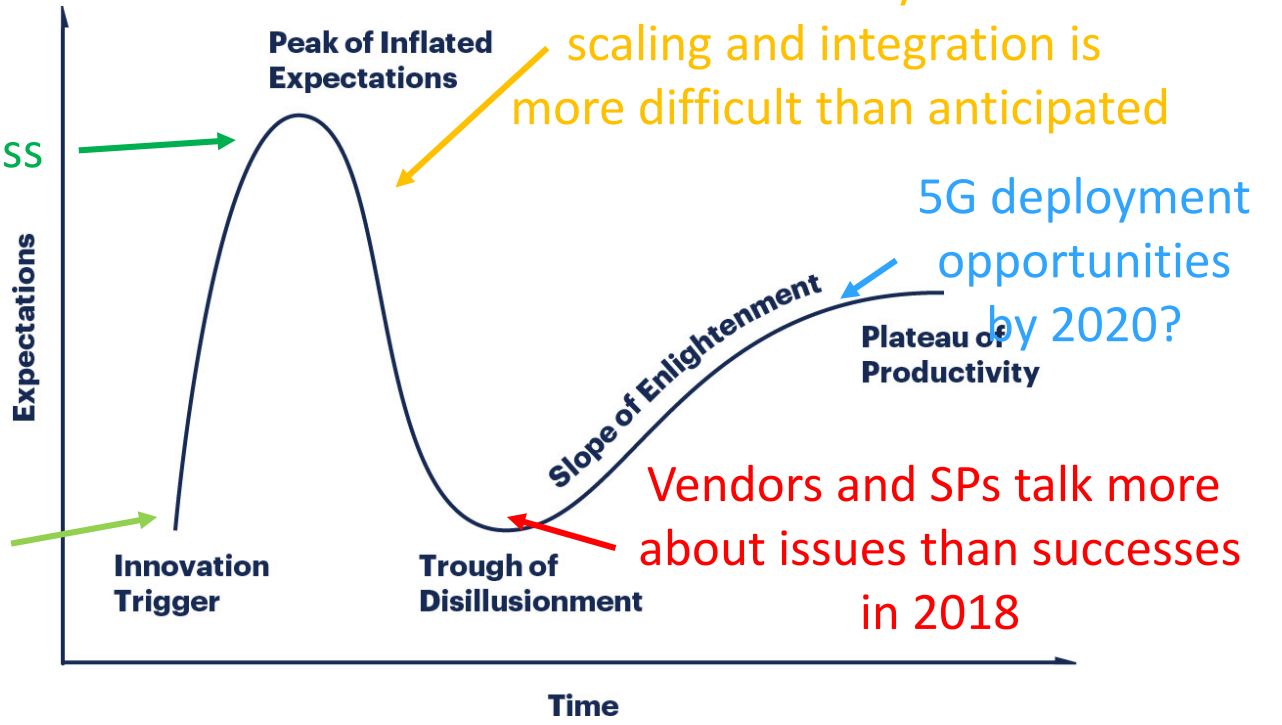
Major expectations and an avalanche of PoC success stories by 2014-2016

2016-2017: Industry notices that scaling and integration is more difficult than anticipated

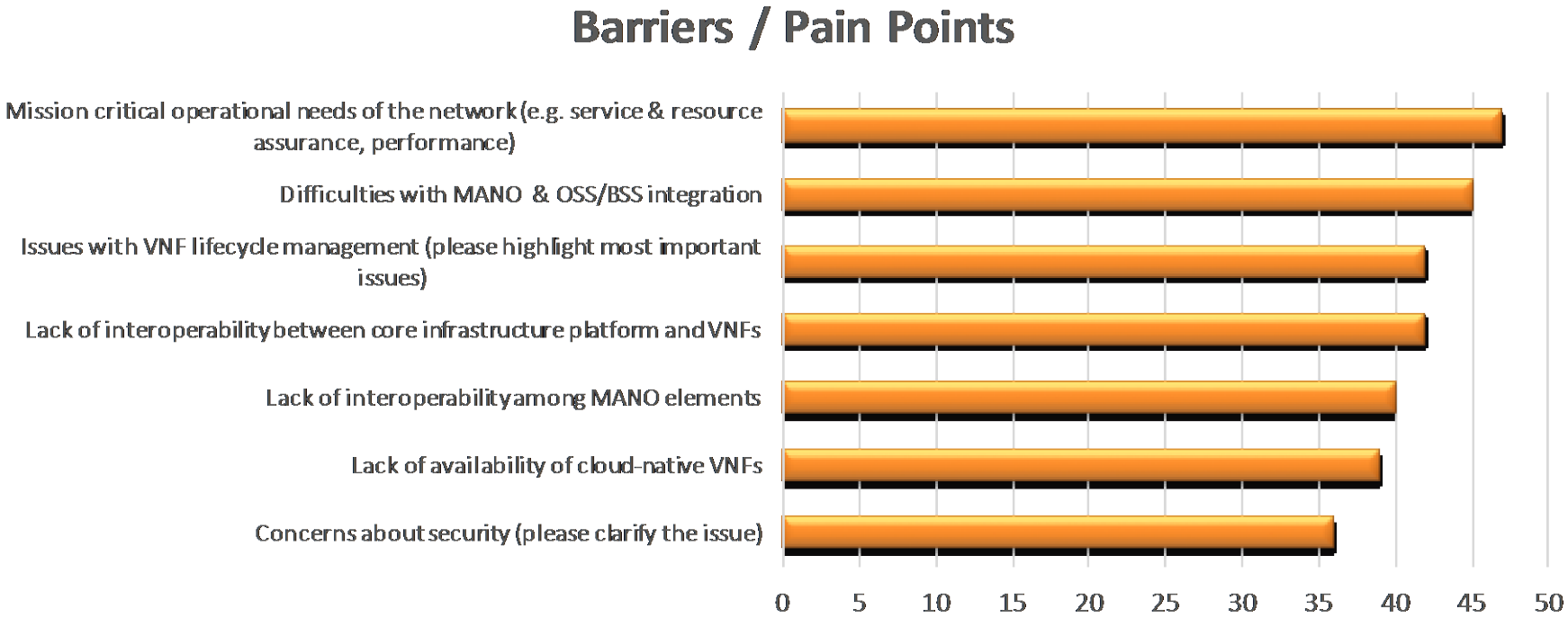
5G deployment opportunities by 2020?

Started with a big bang of Tier-1 SPs aligning their plans in 2013

Vendors and SPs talk more about issues than successes in 2018



What Are Main Issues Perceived?

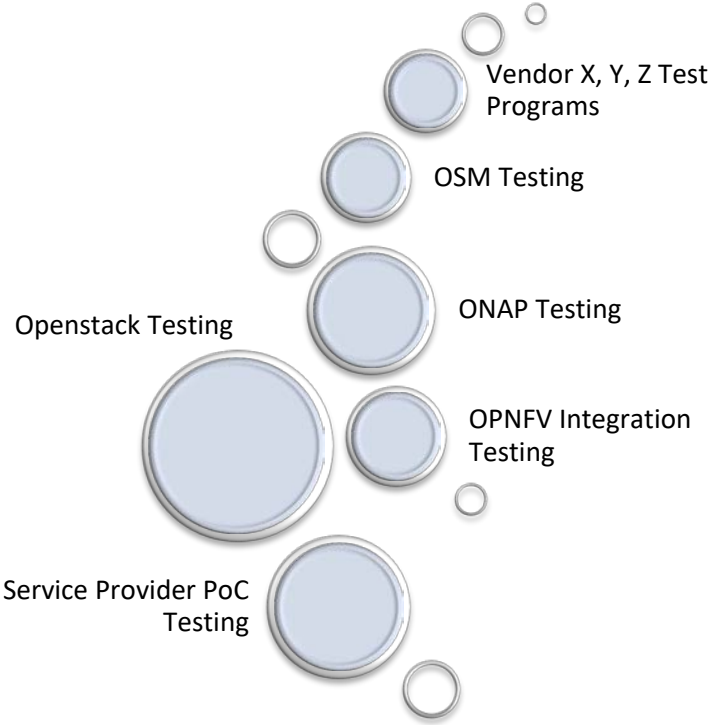


Score is weighted total based on the priority input (High = 5, Medium = 3, Low = 1)

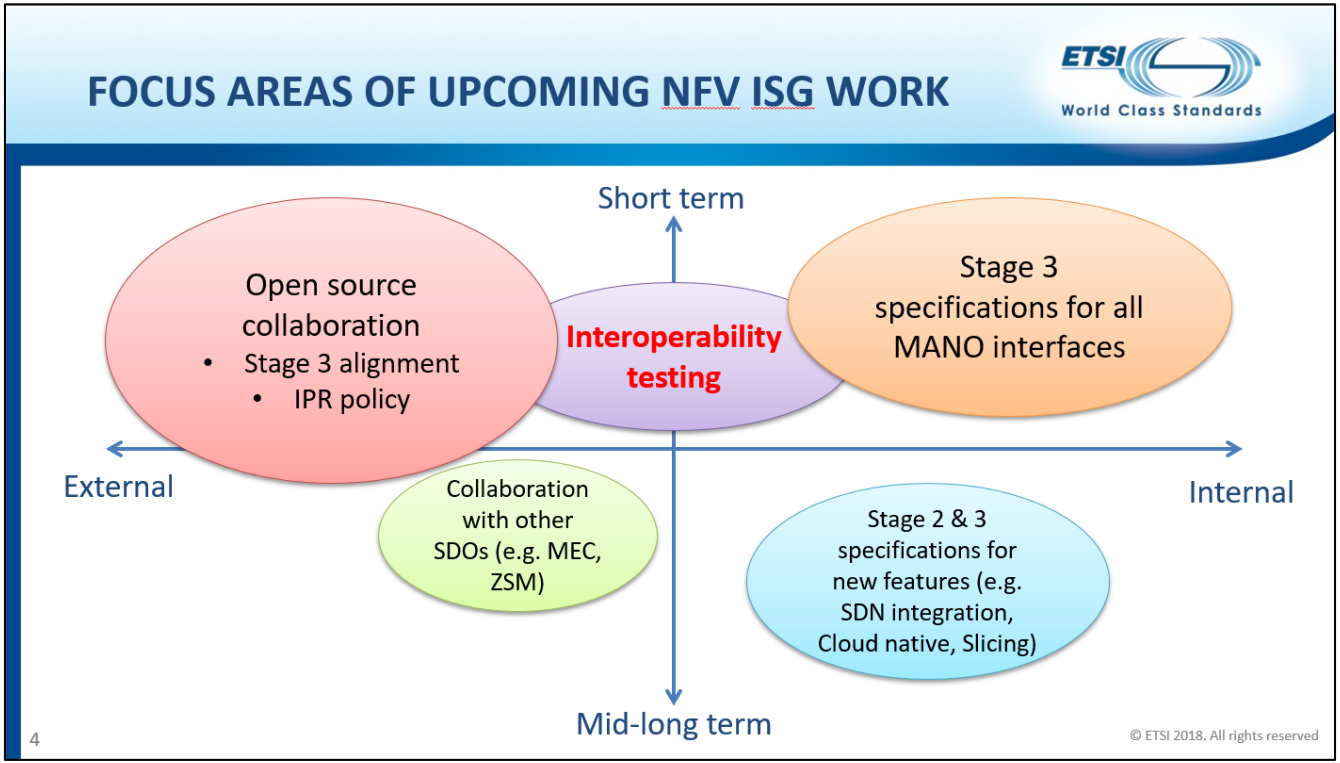
Source: ETSI NFV ISG, Network Operators Council, 07/2018 reproduced with permission by Tetsuya Nakamura

Why Do These Issues Still Exist After Lots of Testing?

- Test programs are mostly isolated
- Collaboration within open source domain but not across open source and commercial programs
- Vendor programs lack transparency, or are simplistic, or one-time-only efforts
- Service providers re-test the same basics and do not build on each others‘ successes
- Business cases also relate to performance, reliability, manageability, security, … rarely taken into account in test programs

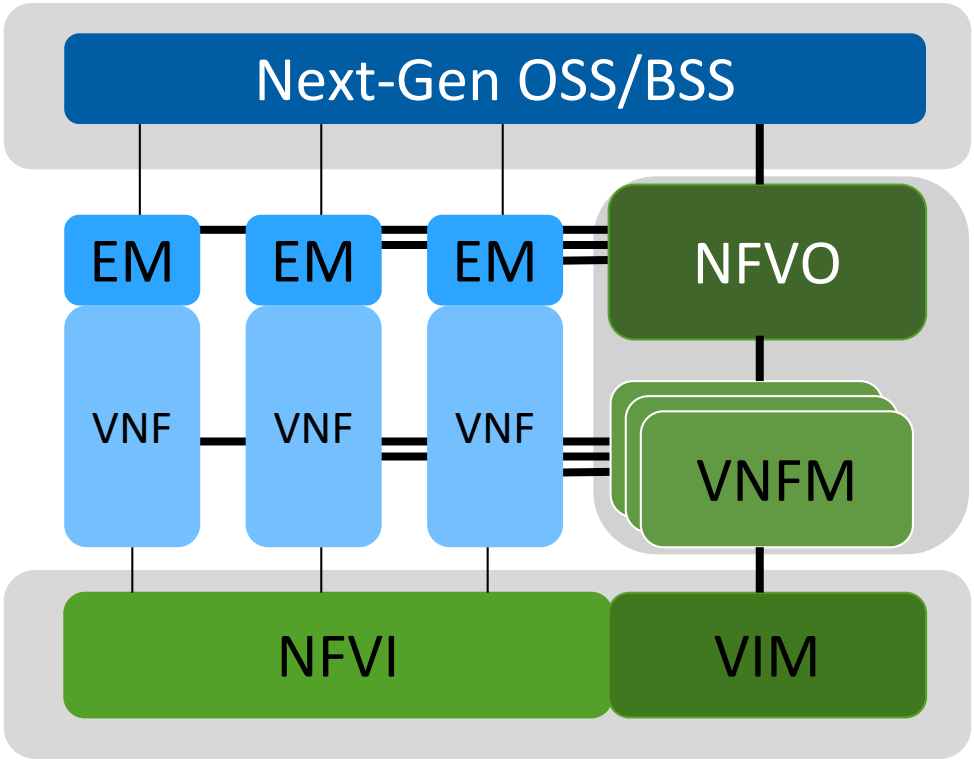


ETSI NFV Recognizes Interoperability as A Main Task



Source: ETSI NFV ISG, Network Operators Council, 07/2018 reproduced with permission by Tetsuya Nakamura: Highlighting of "Interoperability Testing" by author of this presentation

State of Multi-Vendor Aspects Beyond Functionality



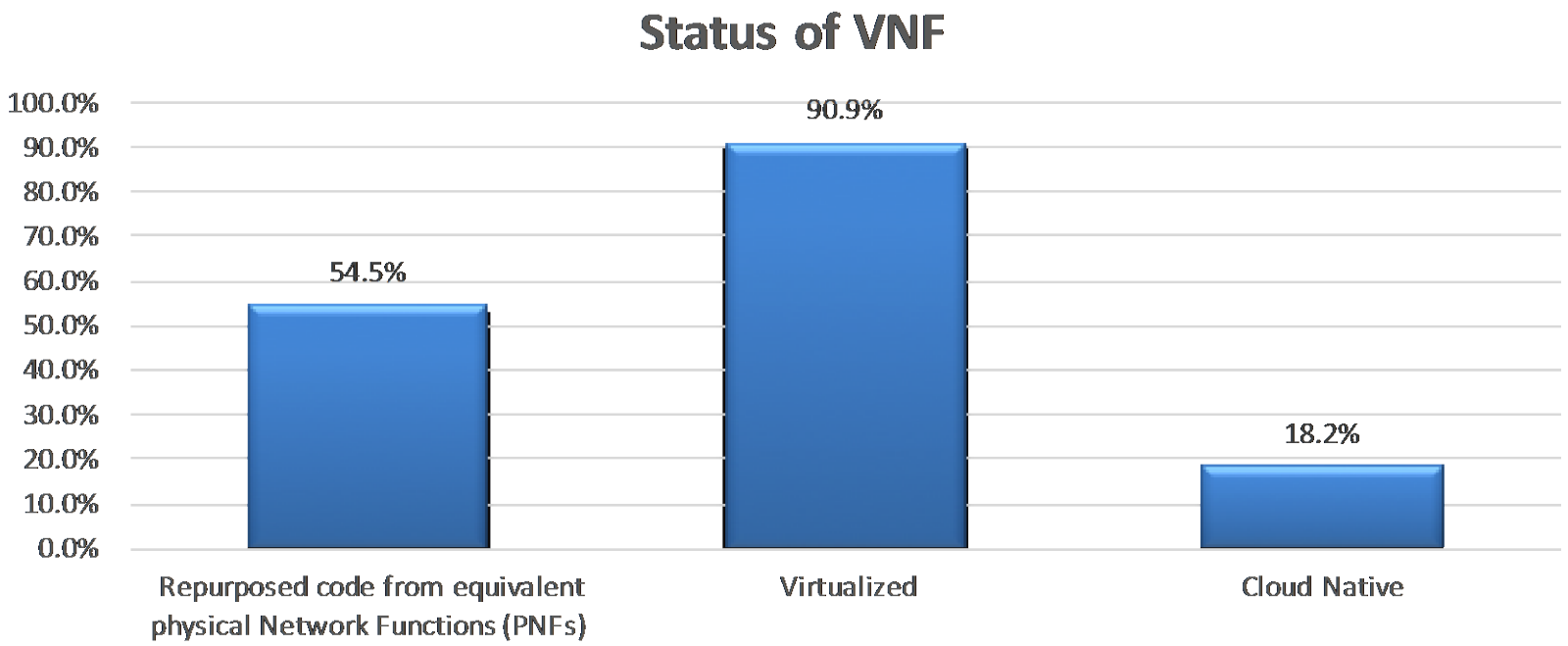
ETSI NFV Reference Model

Full Multi-Vendor Solutions Today:

- ??? Data Plane Performance
- ??? Service Scalability
- ??? High Availability
- ??? Manageability
- ??? Service Agility
- ??? Security

Multi-vendor solutions require much more integration and quality assurance to become ready for production deployment at scale

Status of VNFs in Commercial Deployment



Source: ETSI NFV ISG, Network Operators Council, 07/2018 reproduced with permission by Tetsuya Nakamura

NFV Interoperability Testing Programs with EANTC Involvement

ETSI NFV Plugtests

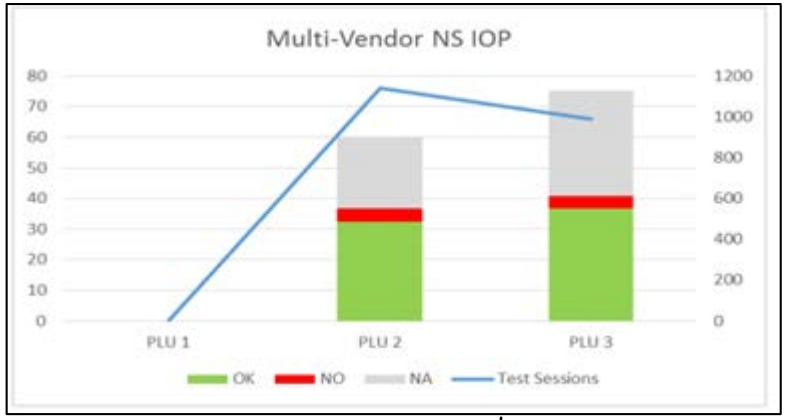
ETSI NFV Plugtests provide NFV interoperability testing campaigns
once or twice per year since 2017

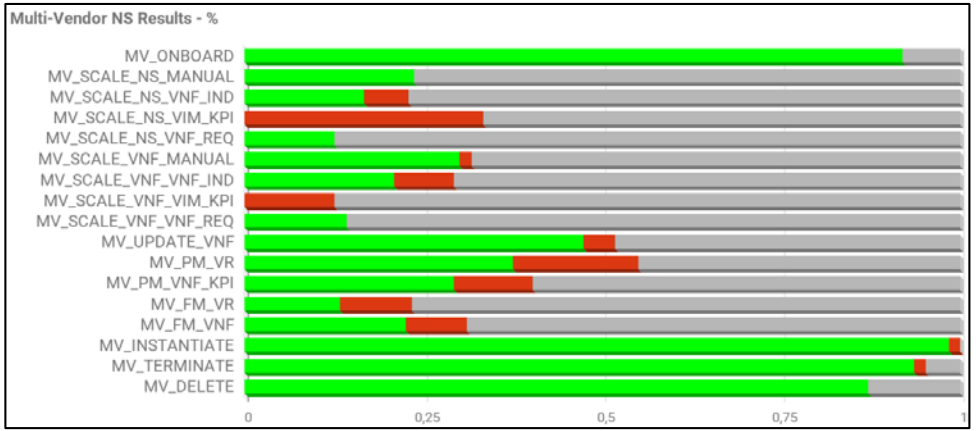
Confidential tests for engineering benefit – only anonymized results get published

Components:

- Virtual Infrastructure Managers and NFV Infrastructure (VIM&NFVI)
- Virtual Network Functions (VNFs)
- Management and Orchestration (MANO) solutions
- Testing and automation platforms

Multi-Vendor Network Service Interop Testing





Source: ETSI CTI 2018, Public Information
Results Anonymized by ETSI

New IP Agency Interoperability Tests

- Not for profit, neutral, industry-wide NFV education and interoperability testing initiative
- Vendor and communication service provider members – open to all
- Closing the gap between open source programs and SP PoCs
- Tests create a growing database of precise, reproducible results usable by service providers
- Gradually enabling distributed and automated (regression) testing

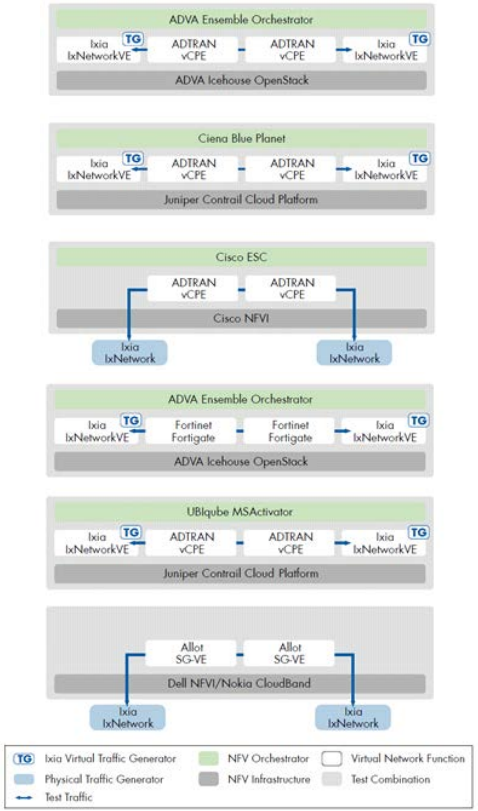
1st Campaign: NFVIs with VNFs Interop
2015 – 2016

Results Highlights:

- 7 NFVIs, 3 NFVOs and 23 VNFs participated
- 26 successful combinations count for a pass rate of 64%
- NFV life-cycle management was covered:
  - on-boarding
  - instantiating
  - tearing down
  - modifying operational parameters of VNFs
- Tests were executed at EANTC in Berlin (up to 85 % remotely)

Vendor	Function	VNF/NFVI Dec 2015	VNF/NFVI Dec 2016
ADTRAN	VNF		
ADVA Optical Networking	NFVI		
	NFVO		
Allot Communications	VNF		
Ciena	NFVO		
Cisco	NFVI	NFVI	
	VNF	ASAv, CSR1000v	
	NFVO		
Cobham Wireless	VNF	TeraVM	
Dell EMC	NFVI		Dell EMC NFVI
Fortinet	VNF		FortiGate
Hitachi	VNF	vMC	
Huawei	NFVI	FusionSphere	FusionSphere
	VNF	VNE	
Infoblox	VNF		Trinzic vNIOS
Ineoquest	VNF	IQDialoge ASM, DVA	
Ixia	VNF		
Juniper	NFVI	Contrail	
	VNF	vMX, vSRX	
Metaswitch	VNF	Perimeta vSBC	
Mitel	VNF		DSC
NetNumber	VNF	TITAN	
Netrounds	VNF	Test Agent	
Nokia	NFVI	CloudBand	CloudBand
	VNF	VSR, VMG, VMM	
Procera	VNF	PacketLogic/V	PRE
Sonus	VNF	SBC SWe	
UBIqube			

2nd Campaign: Service Function Chaining Interop
2016



Results Highlights:

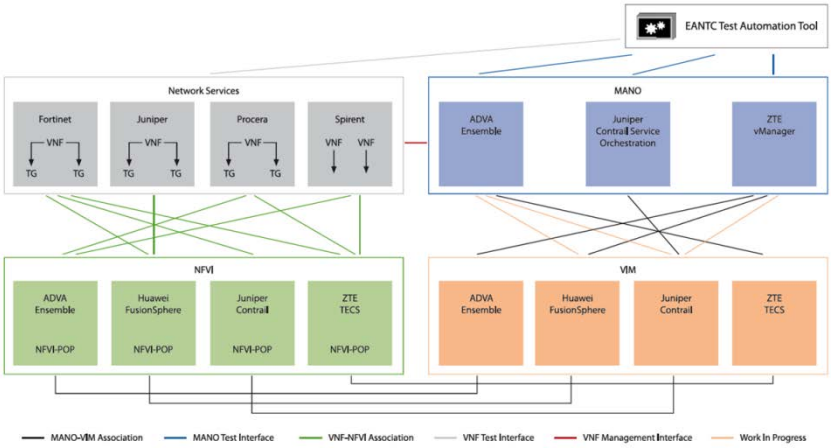
- 6 six multi-vendor combinations of orchestrated service function chains (SFCs) on a range of NFV infrastructure (NFVI) solutions
- 12 participants
- 8 pages white paper

3rd Campaign: MANO-VIM Interoperability
2017

Results Highlights:

- NFV Orchestrator to Infrastructure interoperability
- 7 participants with 12 solutions
- Tests performed according to the ETSI NFV MANO architectural framework

ADVA Optical Networking · FORTINET · HUAWEI · JUNIPER NETWORKS · PROCERA · SPIRENT · ZTE

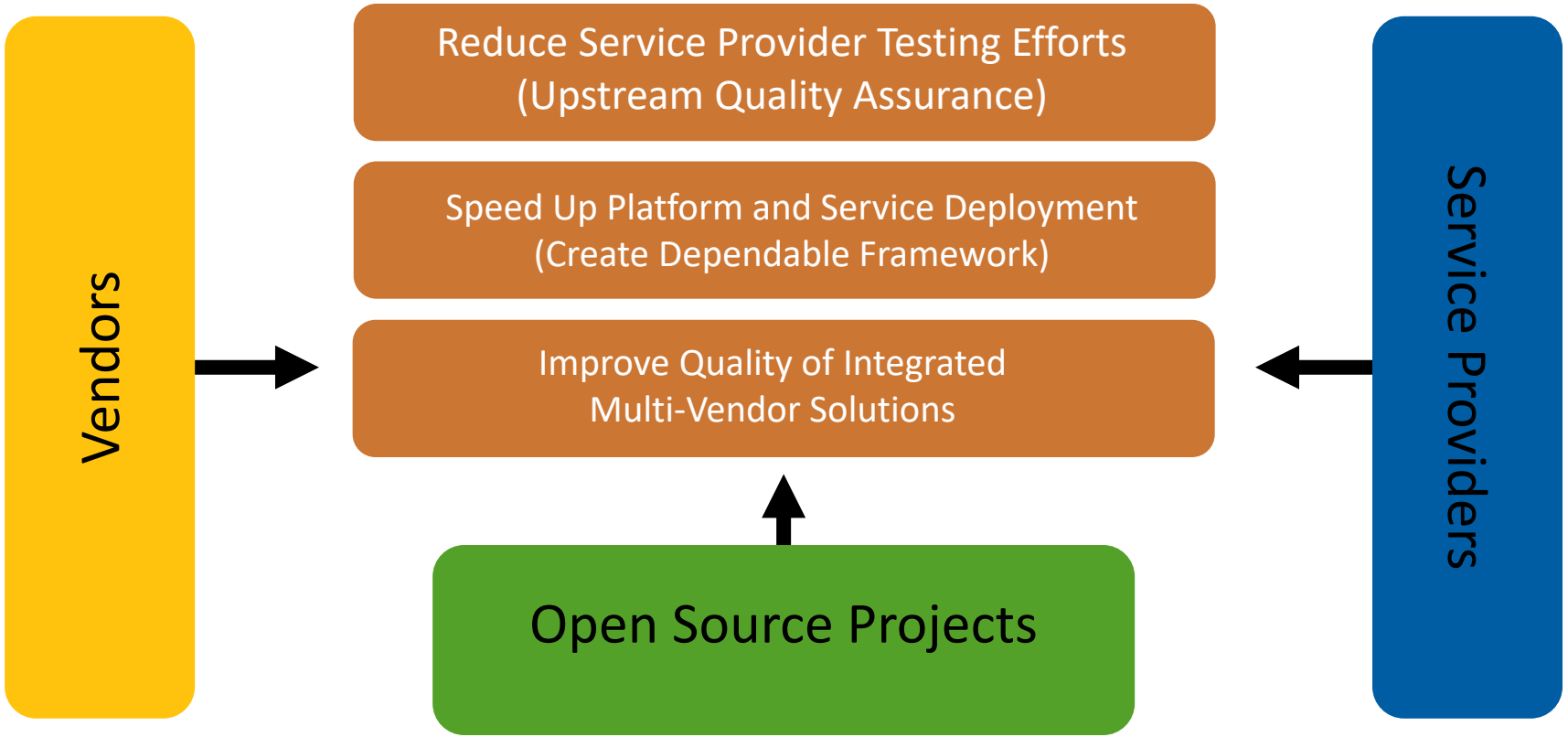


Findings

- Multi-Vendor NFV interoperability requires non-trivial integration efforts
- Implementation support for scaling and healing test cases varied
- Efficient testing requires automation; automated northbound control of NFV orchestrators is investigative undertaking

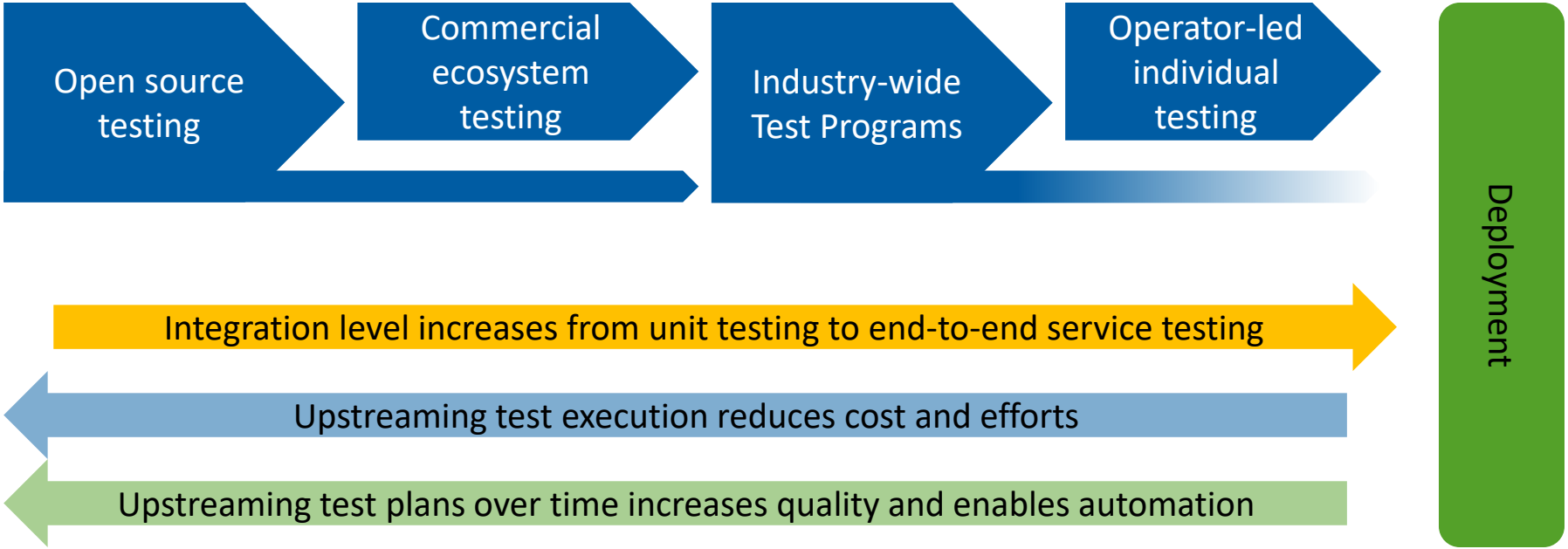
Reaching Multi-Vendor Interoperability and Dependable Performance

Why Certification?



Testing Integration Pipeline

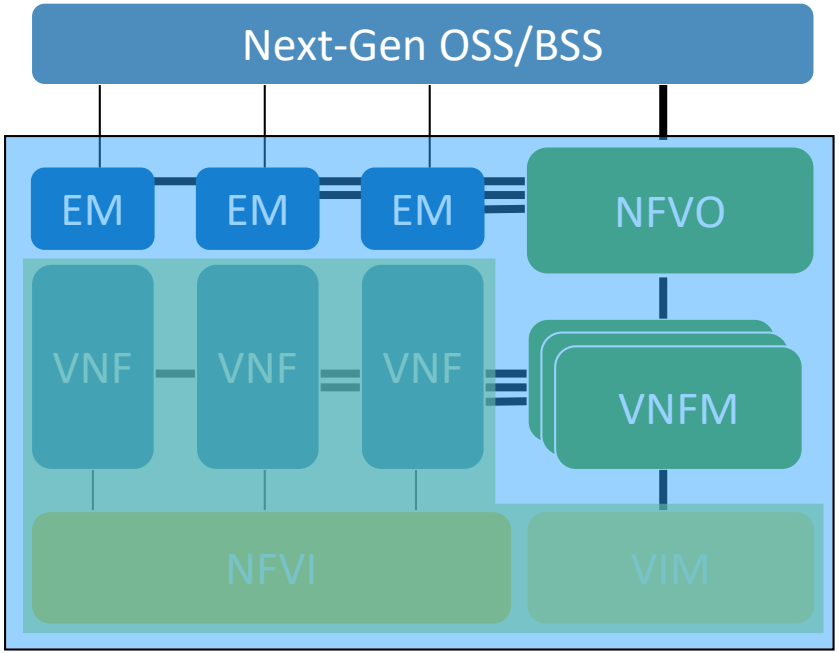
NFV requires collaboration of all stakeholders to improve quality assurance



Certification Program Coverage

Neutral multi-vendor interoperability certification program referencing ETSI NFV-TST 007

- **Virtual Network Functions Cert** – Verifies VNF lifecycle operations on VIM-NFVI
- **Network Services Cert** – Verifies Network Services lifecycle management by NFVO



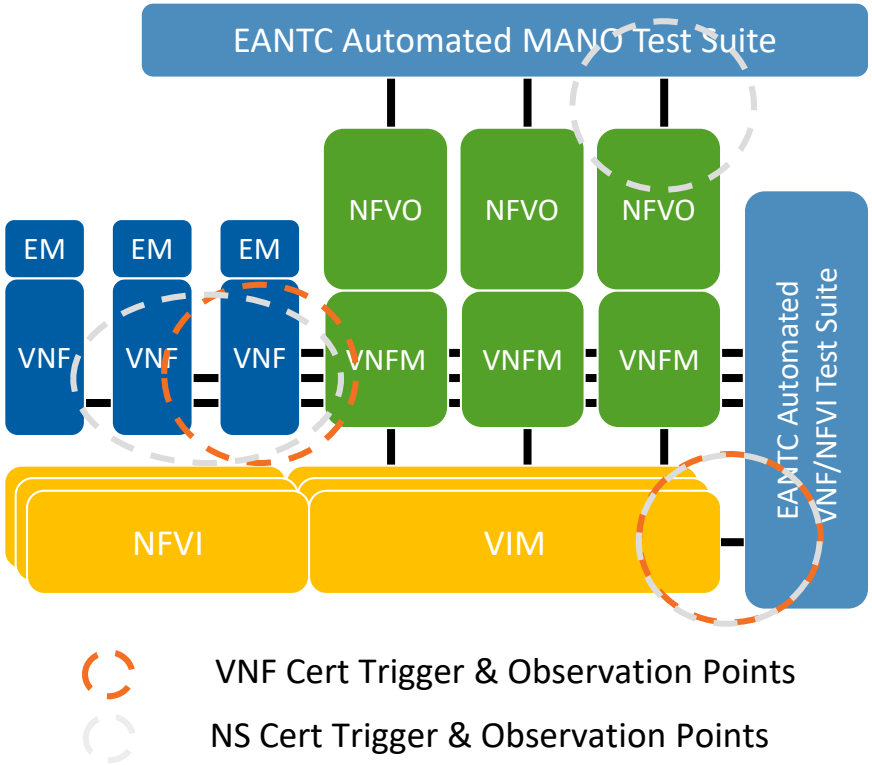
Certification Framework

Primary VNF lifecycle operations

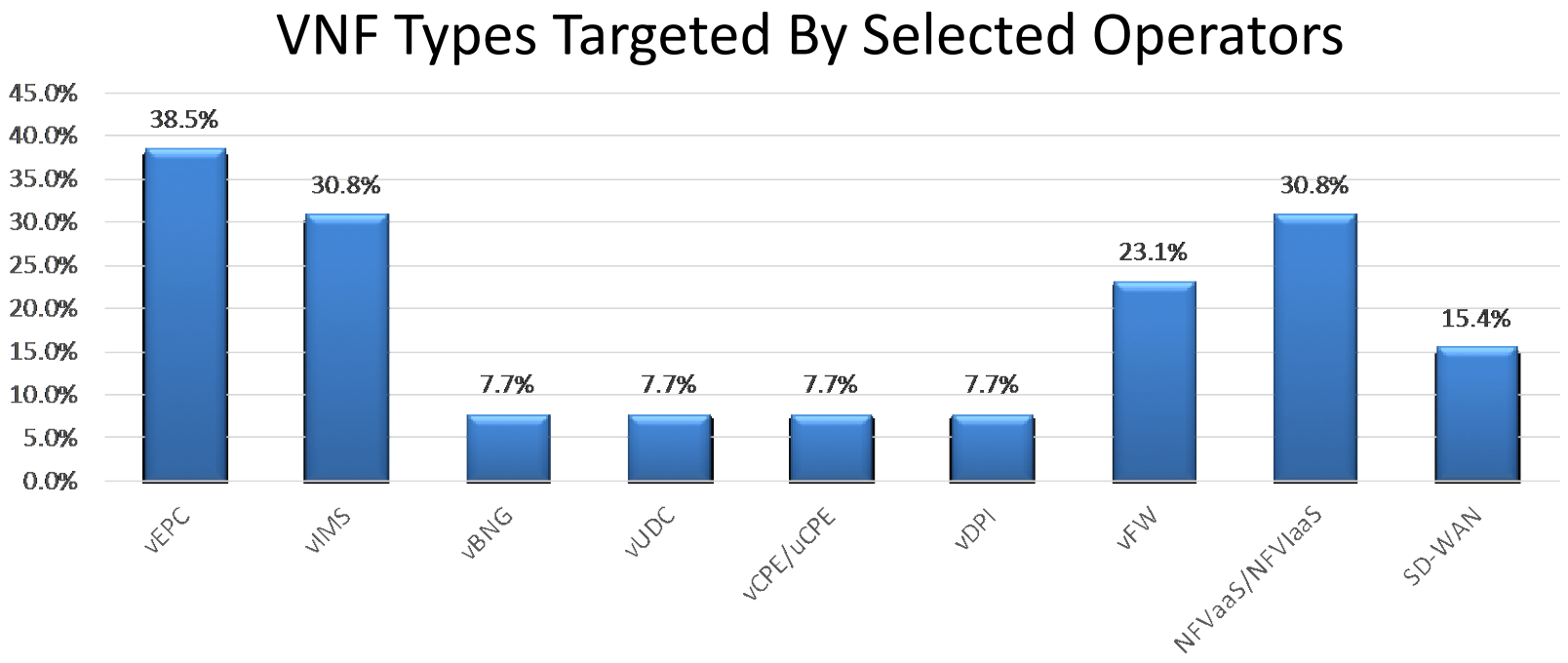
- Software Image Management
- VNF Instantiation
- Operational Status Updates (Start/Stop)
- VNF Termination

Network Service lifecycle management

- NS Instantiation
- Single Step NS-Level Scale Out/In by NFVO
- NS Operational Status Updates (Start/Stop)
- NS Healing
- NS Termination



Application-Layer Performance Scope



Source: ETSI NFV ISG, Network Operators Council, 07/2018 reproduced with permission by Tetsuya Nakamura

Independent EANTC Performance Testing Reports

VNF Types Covered

- EPC
- IMS Border Gateway
- Firewall, vLoadBalancer
- SD-WAN
- Virtual Router

Commercial baseline NFVI performance tested

- Standards yet to come

Multi-vendor VNF performance coming!

Thank you for your interest!

For further information, please contact us:

EANTC AG
Salzufer 14
10587 Berlin
Germany

Phone: +49.30.318 05 95-0
E-mail: info@eantc.de
Website: www.eantc.de

Follow us