Organization Transformation for Network Function Virtualization Infrastructure As A Service (NFVIaaS)

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Table of Contents

Introduction

As history teaches us, the evolution of technology can have significant influence on the future success, or failure, of companies that operate within an industry. Some new technologies are so impactful that adoption will be essential for assuring future survival and growth.

Traditional communications service providers face this challenge today. The technologies driving this transformation are Cloud, Network Function Virtualization (NFV) and Software Defined Networking (SDN).

Communications service providers (CSPs) look at the NFV model and see new ways to accelerate innovation, create competitive advantages, reduce cost and drive new business models. Yet many CSP leaders become so focused on the vision or the technological requirements of the new technology that they lose sight of whether their organization is properly prepared for the new world.

Successful transformation requires that CSPs also evolve their operating model: evolving related roles, organizational structure, skill sets, processes and culture to reflect the reorientation of the company.

Changes of process and operational procedures, together with the need for agile service provision and operations—especially e2e assurance and security - will be drivers for successful technology adoption.

In a recent survey by Ashton Metzler and Associates, communications service provider executives were asked about the impact NFV will have on the organization of their companies over the next two years. More than 33 percent indicated that NFV would have either a 'significant' or 'very significant' impact on organizational structure and more than 43 percent indicated that NFV would have either a 'significant' or 'very significant' impact on employee skills as shown in Figure 1.
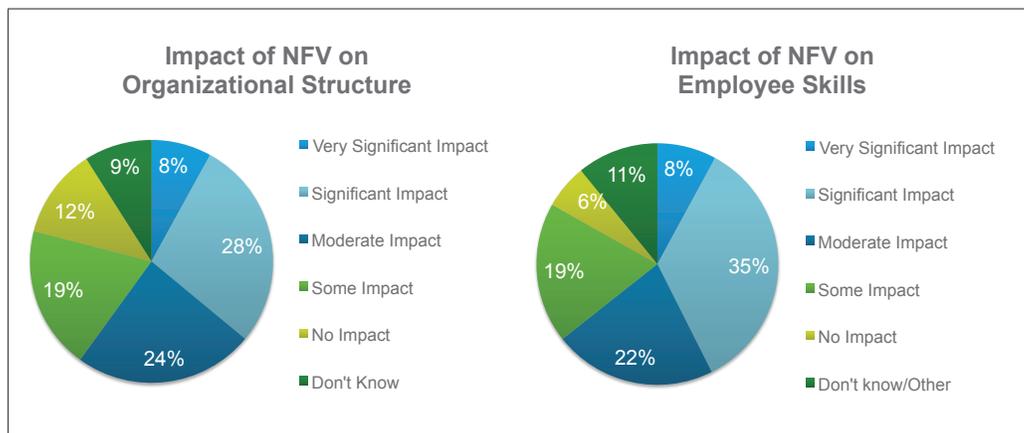

Figure 1. How will NFV impact organizations overall (source: *The 2015 Guide to SDN and NFV*, Ashton Metzler and Associates, January 2015)

NFV Infrastructure as-a-Service Operating Model

The European Telecommunications Standards Institute (ETSI) has identified several "as-a-Service" use cases such as NFV Infrastructure as a Service (NFVIaaS), Virtual Network Function as a Service (VNFaaS) and Virtual Network Platform as a Service (VNPaaS).

We strongly believe that the "As-a-Service" cloud-based operating model is the right operating model to achieve the full benefits of agility, operational efficiency, faster time-to-market and cost reduction, as successfully demonstrated by early adopters like Google, Facebook and Amazon. These early movers are at a tremendous advantage. CSPs may be at risk if they don't aggressively embrace As-a-Service capabilities.

According to this philosophy NFV Infrastructure has to be delivered, managed and operated as an end-to-end service.

Adopting an "As-a Service" operating model is less about technology and more about progressive people, organization, culture and process changes. Getting to As-a-Service requires simplification–removing unnecessary complexity, poor processes, and manual intervention to make way for a more nimble and proactive way of running a business.

The siloed, functional-based organization does not work in a service-centric model. Services need to be built, delivered and managed across vertical functions. A cross-functional organizational model has to be set up to support activities centered on how services are defined, delivered, consumed, and financed. Roles will need to evolve, with different responsibilities and skills required for success.

NFV Infrastructure as-a-Service Organizational Model

NFV Infrastructure as-a-Service organizational model should include two key elements: NFVI Tenant Operations, and NFV Infrastructure Operations, as shown in the figure below.
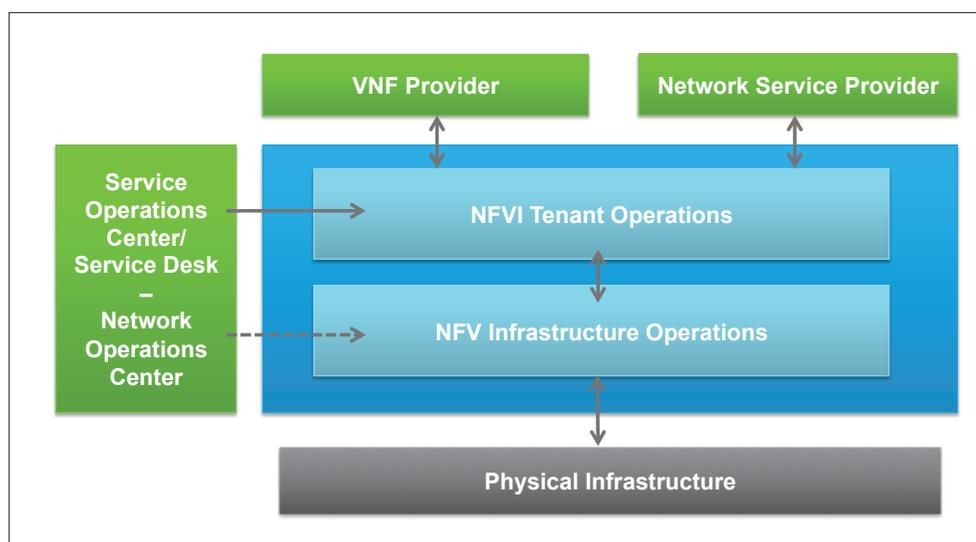
**Figure 2:** NFV Infrastructure as-a-Service Organizational Model

- NFV Infrastructure Operations is responsible for architecting, engineering, deploying, and operationally managing the underlying NFV infrastructure.

- NFVI Tenant Operations manages NFV infrastructure consumer organization relationships as well as governing, developing, releasing, and operationally managing the infrastructure and network services offered on the NFV infrastructure. Tenant Operations need to embrace concepts from Agile and, in particular, DevOps, as the way to speed service delivery..

NFV Infrastructure Operations – Roles Definitions

NFV Infrastructure Operations is a team of NFV infrastructure operations specialists. It serves as the focal point for all decisions and actions involving NFV infrastructure and its operations, and also defines a set of cross-domain roles aimed at creating a much closer relationship among architecture, engineering, and operations teams.

The charter of NFV Infrastructure Operations is to continually develop and implement innovative ways to architect, engineer, deploy, and operate the NFV infrastructure in the most cost-effective way possible—while satisfying the operating level agreements (OLAs) for NFVI-based services.

The NFV Infrastructure Operations roles are depicted in Figure 3.
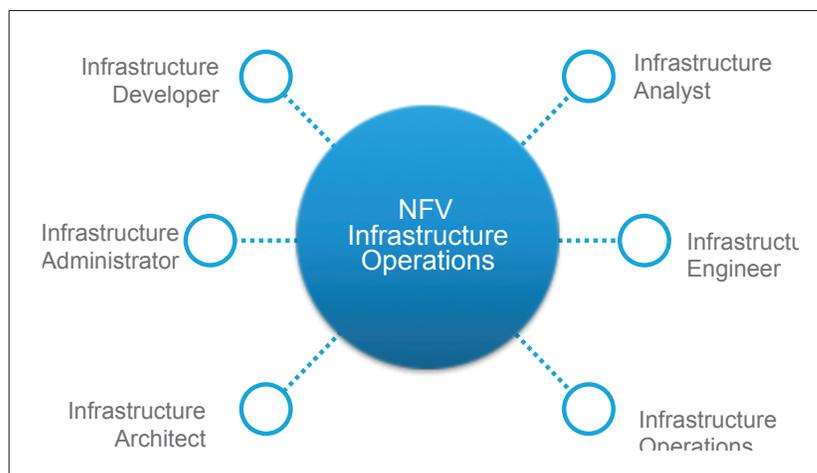
Figure 3: NFV Infrastructure Operations roles

- **Infrastructure Operations Leader:** Responsible for overall vision, strategy and execution for the NFV Infrastructure Operations, ensuring consistency with NFV Tenant Operations and with the overall NFV Operations strategy. Provides leadership and guidance to NFV Infrastructure Operations team members and is accountable for the delivery of agreed operational Levels.
- **Infrastructure (Operations) Architect:** Responsible for designing and developing end-to-end NFV Infrastructure architectures always ensuring that the NFV Infrastructure architecture provides scalability, efficiency, reliability, resilience, performance and security as required by the NFV Infrastructure services offered to NFV Infrastructure consumers (e.g. VNF providers, Network Services providers). In addition to designing specific architectural standard, the Infrastructure Architect is responsible for defining operational standards, policies and processes.
- **Infrastructure (Operations) Engineer:** Responsible for technical development and implementation of the NFV Infrastructure architectural and operational solution. The Infrastructure Engineer is a generalist role expected to provide coverage across the compute, network, storage, virtualization and security roles. If the scale and complexity of the NFV Infrastructure becomes large, domain-specialized Infrastructure Engineers could be required coordinated by a Lead Infrastructure Engineer. Designs and develops technical solutions for NFV Infrastructure layer integration points with NFV ecosystem including VNF(s), VNF Manager(s), Service Orchestrator, Resource Orchestrator, legacy systems, tools, and management applications.
- **Infrastructure (Operations) Developer:** Responsible for the design, development, testing and deployment of automated workflows and scripts within the NFV infrastructure that can be used for implementing the automation of run-book workflows and actions regarding deployment, configuration, monitoring, remediation, compliance, or other routine tasks. Implements any required NFV infrastructure component integration with other systems and applications.

- **Infrastructure (Operations) Analyst:** Responsible for all facets of proactively and predictively monitoring the NFV Infrastructure and working with other NFV Infrastructure Operations team and ecosystem members to take action on events before they affect service. The Infrastructure Analyst develops and maintains NFV Infrastructure capacity forecasts and defines NFVI capacity plans working with the Infrastructure Architect, and is responsible for ongoing capacity and resource management.
- **Infrastructure (Operations) Administrator:** In addition to administering and maintaining the NFV infrastructure technical platforms, performing procedures and run-book workflows specified by the infrastructure Engineer, the Infrastructure Administrator is responsible for deploying and configuring the related NFV Infrastructure components in production environment. Assists with level 2 and 3 production support of the NFV Infrastructure.

NFVI Tenant Operations – Roles Definitions

NFVI Tenant Operations is central to defining, developing, and providing NFVI-based service offerings. It incorporates service governance and life cycle management, service definition, design, development, release management, service transition, service operations and service consumer relationship management.

The charter of NFVI Tenant Operations is to continually develop and implement innovative ways to govern, design, develop, release, provide access to, and proactively operate the portfolio of NFV Infrastructure services provided to consumers while actively maintaining consumer relationships and quality of service.

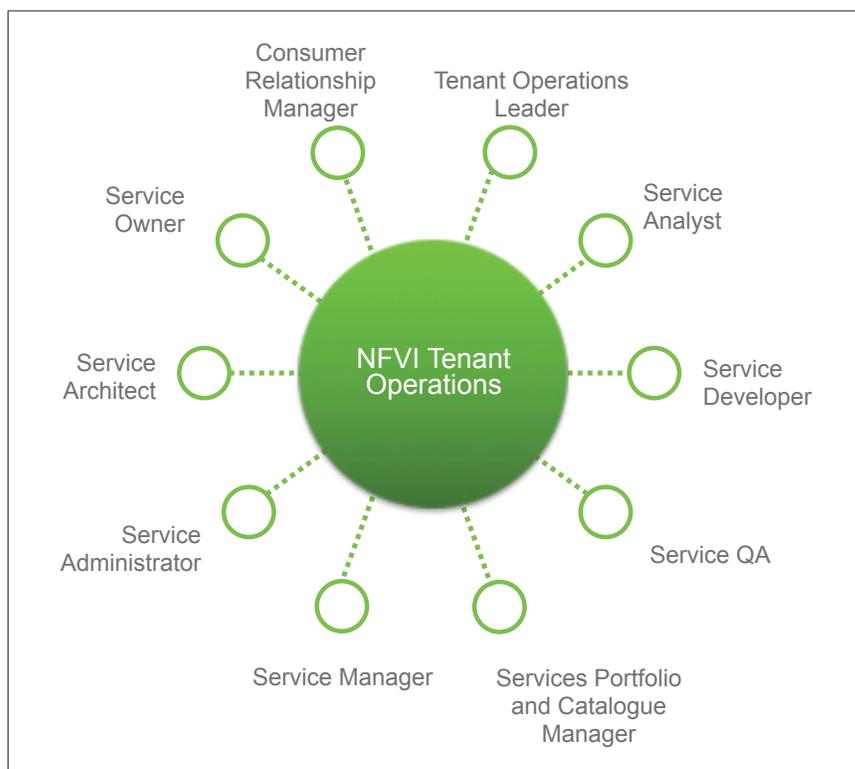The NFVI Tenant Operations roles are depicted in Figure 4.

Figure 4: NFV Infrastructure Operations roles

- **Tenant Operations Leader:** Responsible for defining and executing vision and strategy for the NFVI Tenant Operations, ensuring consistency with the overall NFVI Operations strategy. Is accountable for the delivery of agreed Service Levels working with the Service Owners. Acts as ultimate contact & focal point for escalations from tenants on the NFVI.

- **Consumer Relationship Manager:** Responsible for establishing and maintaining working relationships with one or more NFVI Tenant (consumer) organizations. Determines, collects, and documents consumer organization service offering requirements and determines consumer demand. Responsible for consumer organization escalation management and resolution. The relationship between the Consumer Relationship Manager and NFVI Tenant organization could be:
  - 1:1, with one Consumer Relationship Manager for each NFVI Tenant organization (e.g. one Consumer Relationship Manager for Ericsson VNFs, one Consumer Relationship Manager for Huawei VNFs, one Consumer Relationship Manager for Nokia VNFs.)
  - N:1, with N Consumer Relationship Manager for each NFVI Tenant organization (e.g. a Consumer Relationship Manager for vIMS, a Consumer Relationship Manager for vEPC,)

- **Service Owner:** Responsible for addressing and overseeing the NFVI service lifecycle from consumer initiation through development and delivery to operations and improvement. The role is also responsible for setting the overall NFVI service governance and control parameters for better service quality and continual service improvement. Is accountable for developing service proposals and defining NFVI services based on consumer requirements and NFV infrastructure capabilities. Is responsible for defining and maintain service level agreements (SLAs) with Tenant organizations and operating level agreements (OLAs) with NFV Infrastructure Operations team for related NFVI services.

- **Service Architect:** Responsible for translating Network Services and Virtual Network Functions requirements into NFV Infrastructure requirements that can be used to architect a NFVI service offering based on NFV infrastructure capabilities. Responsible for defining the service architecture blueprint and guidelines for service design and to ensure that service design follows the architectural guidelines.

- **Service Manager:** Responsible for the service management and orchestration of NFVI services delivered by the NFVI Tenant Operations team. The management and orchestration of virtualized infrastructure services should be able to handle NFV infrastructure resources, offered as-a-Service, in NFVI Point-of-Presences (NFVI PoPs). Management and orchestration aspects include not only the traditional FCAPS (Fault, Configuration, Accounting, Performance and Security) but also the new set of management functions focused on the creation and lifecycle management of the NFVI services needed for the VNF, such as NFVI service management and orchestration needed to instantiate, scale, update/upgrade and terminate VNF.

- **Service Portfolio and Catalogue Manager:** Responsible for establishing and maintaining the portfolio and the catalogue of NFVI services that support the organization's overall NFVI strategy. This includes verifying that the appropriate services are within the service pipeline at the necessary time, services are developed and released when required, and services that are no longer required are retired. The Service Portfolio and Catalogue Manager is responsible for managing the live catalogue of services that can be consumed from the NFVI. The NFVI service catalog represents the repository of all of the on-boarded NFVI services. The Service Portfolio and Catalogue Manager is responsible to publish the NFVI services available in the service catalogue for consumption by the tenants.

- **Service Developer:** Responsible for developing NFVI services aligned to Tenant's requirements in terms of the service lifecycle process. Translates service requirements captured by other NFVI Tenant Operations team members into appropriate language for input into service blueprints.

- **Service Quality Analyst:** Responsible for ensuring the quality of services delivered on the NFV Infrastructure. The role is closely aligned to the Service Developer and the Service Portfolio and Catalog Manager and supports all stages of testing (integration, system test, load and performance testing, and pre-production simulation) throughout the service development and release cycle. The role is also responsible for providing quality approvals for a service to move through the testing process to the production environment.

- **Service Analyst:** Responsible for maintaining service quality within NFV Infrastructure services, promoting proactive service operations and identifying and resolving areas of concerns before they become issues and/or quickly detecting service impairments, identifying root cause and automated remediation actions. The Service Analyst also provides recommendations and trend analysis to assist in service lifecycle management from planning, through development and release, to support, operations, measurement, reporting, and continual service improvement.

- **Service Administrator:** Responsible for administering and managing the NFVI consumer organization (i.e. Tenant) users, groups and roles, for managing virtual datacenters created in NFVI-PoP and assigned to the NFVI consumer organization and for managing the service catalog created and assigned to the NFVI consumer organization.

Organization Transformation

Of course, the transformation from the current organization to the target organization described in the sections above doesn't happen overnight, but rather is the result of a well-planned organization transformation journey.

The journey starts recognizing that the key principle of NFV is Network-IT convergence (Network applications running on a common IT infrastructure) and the organizational model has to support this convergence to make NFV successful. The NFVI Tenant Operations organization has to speak the same language of VNF providers, the language of vIMS, vEPC and vCPE experts, to understand their requirements and translate them in terms of NFV Infrastructure services. On the other end, the NFV Infrastructure Operations organization designs, delivers, operates and manages a modern IT infrastructure, requiring virtualization, cloud and DevOps skills, expertise and best practices.

An organizational model has to move along two dimensions: coordination and collaboration/cooperation. The service-orientation of the organizational model introduced in this article drives coordination, while for enabling collaboration we suggest adopting the "champions" mechanism. Organizational champions are transformational leaders that, on one hand, are able to bring and promote the culture of change in their current functional teams. On the other hand, champions from the different functional teams (e.g. virtualization, server, storage, network) are grouped together into the NFV Infrastructure Operations Center of Excellence to create a cross-functional culture, breaking silos and enhancing collaboration.

A gradual introduction of service-orientation and champions will facilitate a smooth, evolutionary transition from the current organizational model to the NFVIaaS target organizational model.

For example, a three phase organization transformation can be structured in the following way.

- **Phase 1:** NFVI Tenant Operations and NFV Infrastructure Operations virtual teams are established. Network "champions" are shared between their current teams (e.g. Mobile Core Network Engineering and Operations team, Fixed Access Network Engineering and Operations team, Customer Network, etc.) and the NFVI Tenant Operations virtual team and IT "champions" are shared between their current teams (e.g. data center virtual or physical server, storage, networking) and the NFV Infrastructure Operations virtual team. The full set of roles is implemented in the NFV Infrastructure Operations team and a first subset of roles is established in NFVI Tenant Operations to enable the service-oriented approach.
- **Phase 2:** NFVI Tenant Operations and NFV Infrastructure Operations teams move from virtual to real teams. The full set of roles is implemented in the NFVI Tenant Operations to realize the service-oriented organizational model.
- **Phase 3:** In NFVI Tenant Operations some "champions" are moved from NFVI Tenant Operations team into the NFV Infrastructure team and vice versa to create fully converged Network-IT operating mindset, processes (e.g. integrated cross-domain orchestration), best practices and culture.

What's Next?

VMware offers a structured 1 day workshop that explores your current Telco Operator organizational model, to help you pinpoint your specific challenges in achieving agility, speed and efficiency. The workshop addresses the NFV organizational model for your specific environment and proposes specific next steps for NFV Infrastructure-as-a-Service (NFVIaaS) transformation.

Please contact your VMware representative to learn more about scheduling an Organization Transformation for NFVIaaS Workshop.

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