NFV Quality Management Framework Proposal

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Summary

- ETSI is driving standards for network function virtualization (NFV), including "Network Function Virtualization Service Quality Metrics" (published in December '14)
- TM Forum is driving standards for SLA management, including GB917 "*SLA Management Handbook, Volume 2, Concepts and Principles*" and TR178 "*Enabling End-to-End Cloud SLA Management* "
- QuEST Forum drives TL 9000 Measurements Handbook defining objective and quantitative measurements (e.g., outages) for quality management of telecom networks and equipment
- NFV Strategic Initiative was chartered by QuEST Forum's Executive Board, and that group is now working a draft "***NFV Quality Management Framework***" which **enables objective and quantitative prediction, control and quality improvement of NFV-based services and applications**
  - This presentation covers the 4/29/15 review draft of that Framework

QuEST Forum Executive Board NFV Strategic Initiative Team

The Network Function Virtualization Vision

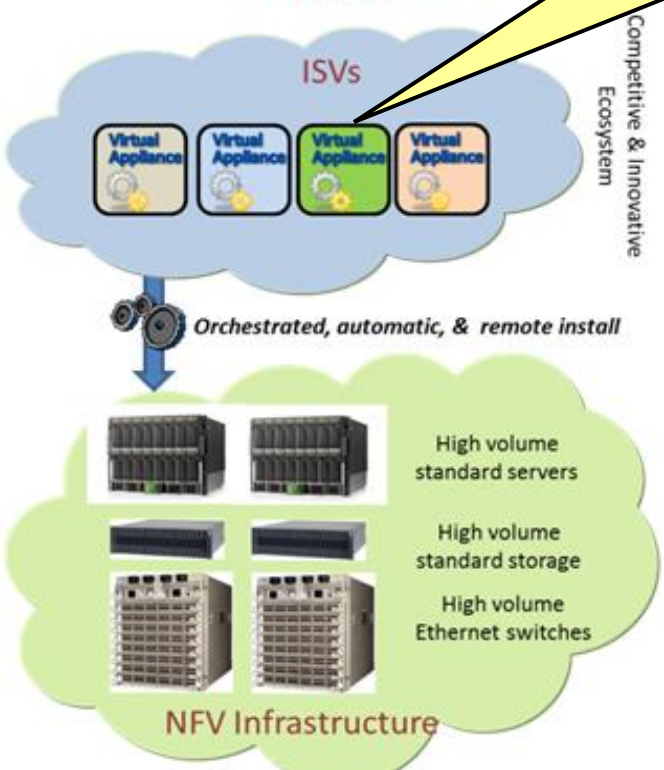
Today….

Classical Network Appliance Approach

Tomorrow…

NFV Approach

a.k.a., cloud-based applications, or virtualized network functions (VNFs)



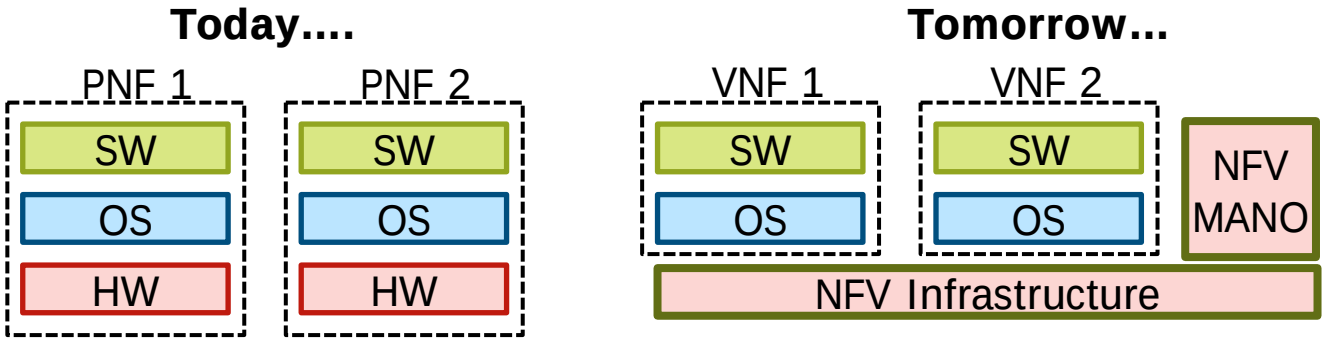
VNF Service Provider Organization

NFV Infrastructure Service Provider Organization

Figure from ETSI NFV Whitepaper
http://portal.etsi.org/nfv/nfv_white_paper.pdf

Fundamental Changes due to NFV

1. Decoupling Software from Hardware
2. Shared compute, memory, storage and networking infrastructure
3. Automated Resource and Application Lifecycle Management
4. Automated Network Service Lifecycle Management
5. Dynamic Operation
6. Increasingly Complex Multivendor Environment



Traditional Network Function Deployment

Every success

Virtual Network Function Deployment

Objectives of the NFV Quality Measurement Framework

NFV quality measurements should be…

1. Quantitative and Objective
2. Future proof
3. Recognize Different Resource Service Quality Expectations
4. Recognize Different Application and Service Architectures
5. Support Leading Service Quality Indicators
6. Enable Side-by-Side Physical and Virtual Quality Comparisons
7. Principle of Simplicity (Parsimony)

Sample Motivational Scenario

1. One organization offers VoLTE on NFV infrastructure shared by other tenants (e.g., EPC, IP-TV, enterprise communications)

2. VoLTE provider buys best-in-breed VNFs from several suppliers

3. VoLTE provider and partners write the policies and descriptors that configure and chain VNFs...

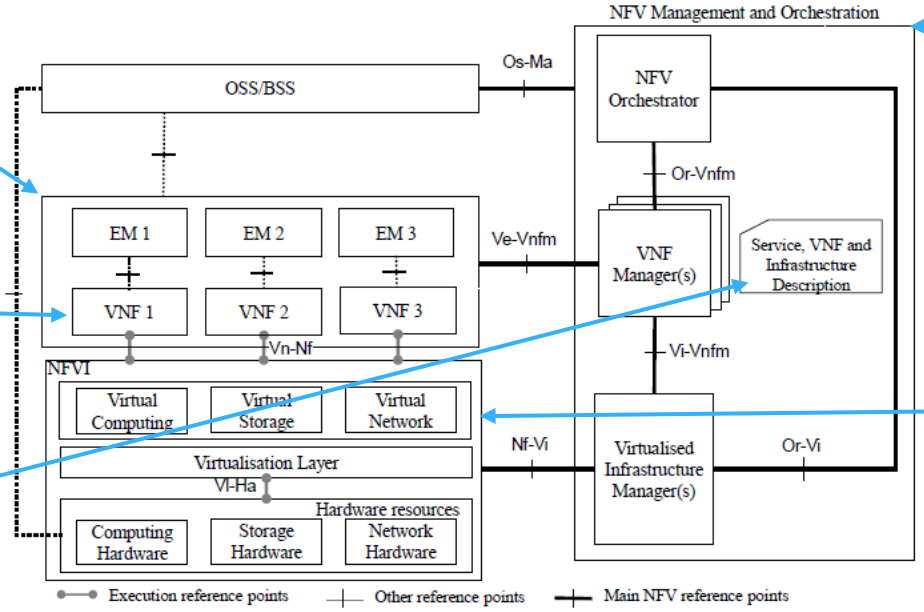


Figure 4: NFV reference architectural framework

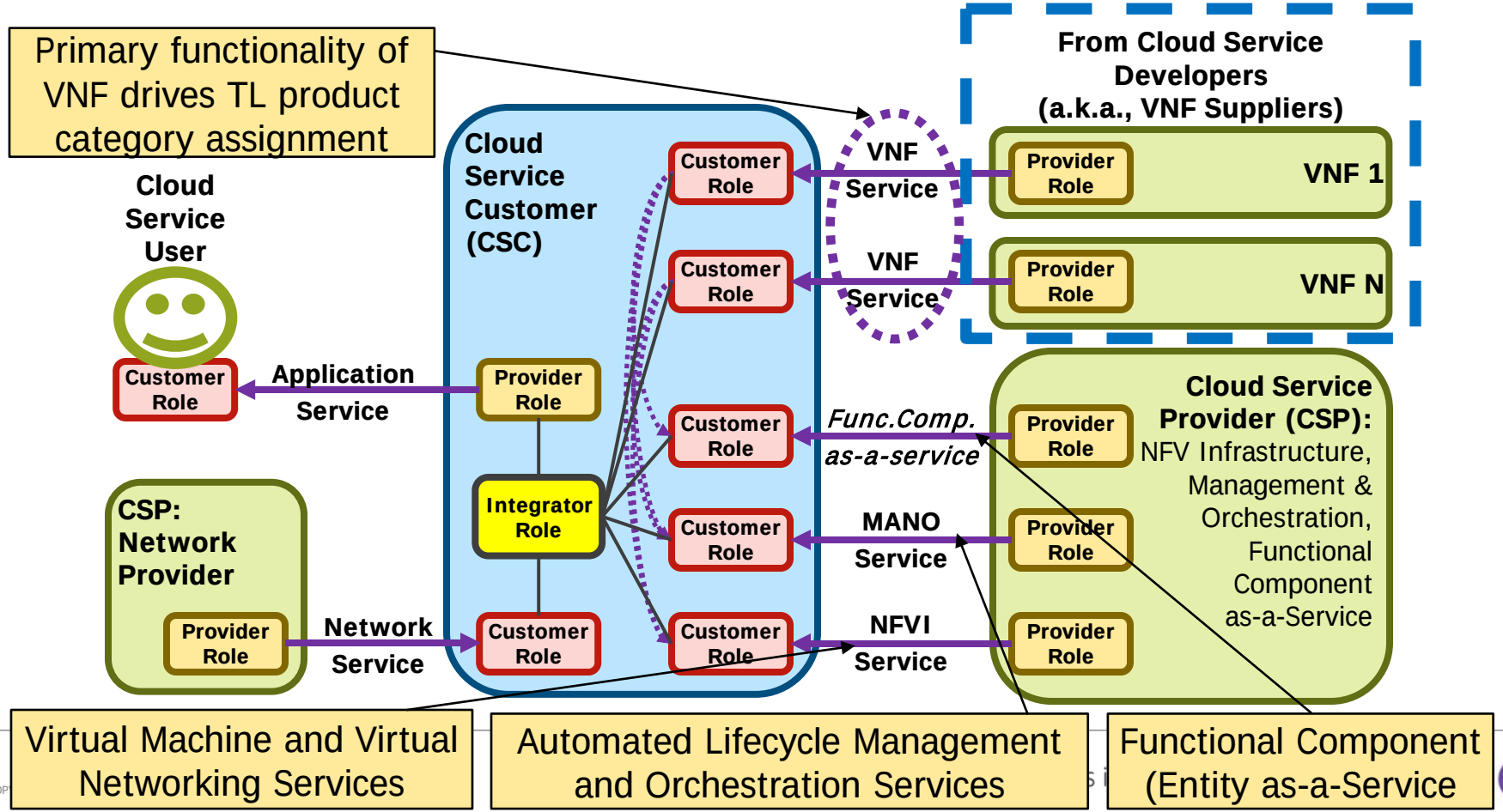
5. NFV Infrastructure service provider's systems from other suppliers automatically apply policies and descriptors to configure and operate VoLTE provider's (and other tenants') service....

4. NFV Infrastructure service provider buys COTS servers, storage and switches from several equipment suppliers

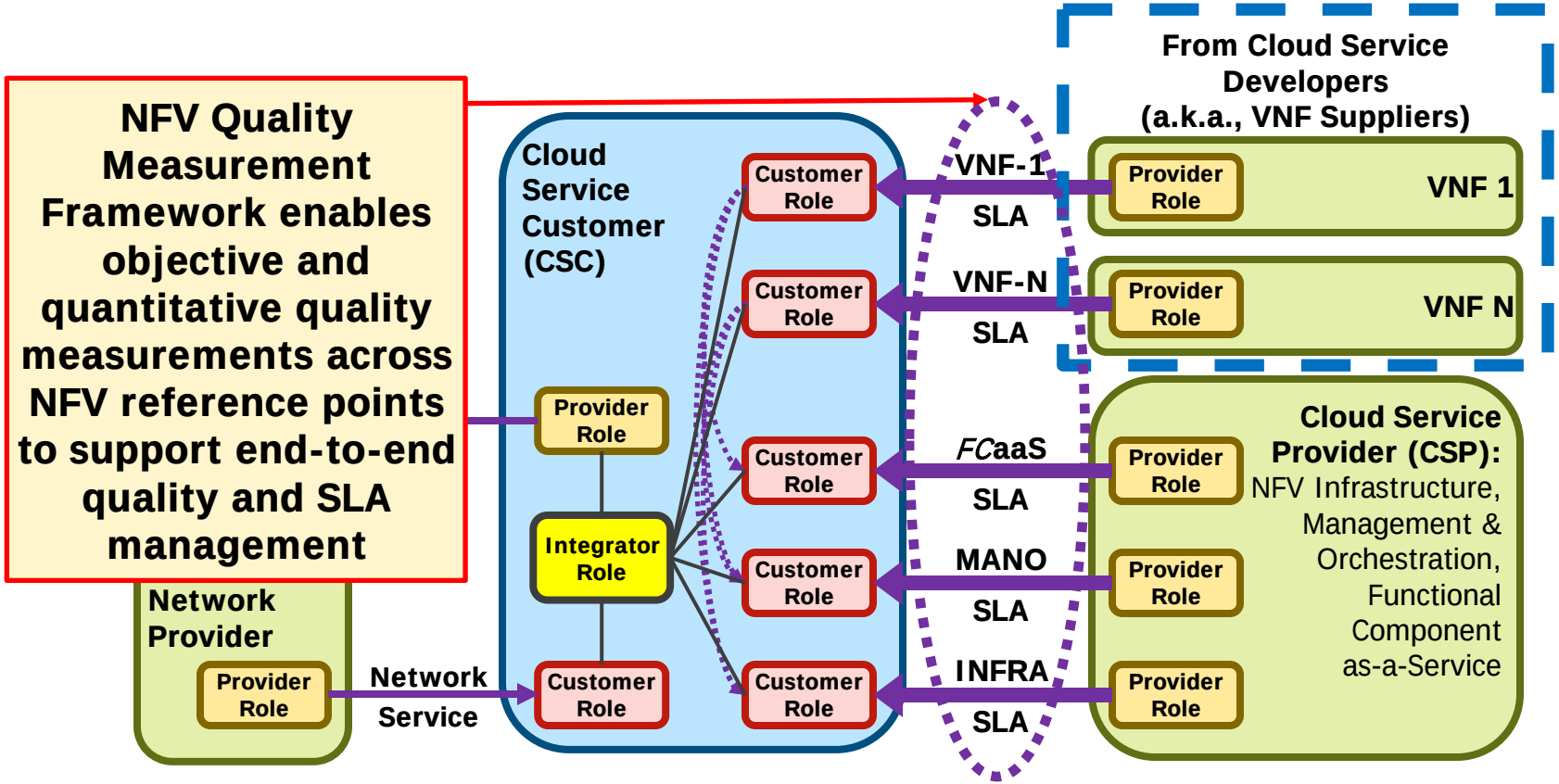
How does one rapidly localize, drive root cause analysis and decide on corrective actions in this shared, decoupled, flexible, dynamic and multi-vendor environment?

Underlay figure from "*Network Functions Virtualization (NFV); Architectural Framework*," GS NFV 002 V1.2.1 (2014-12)

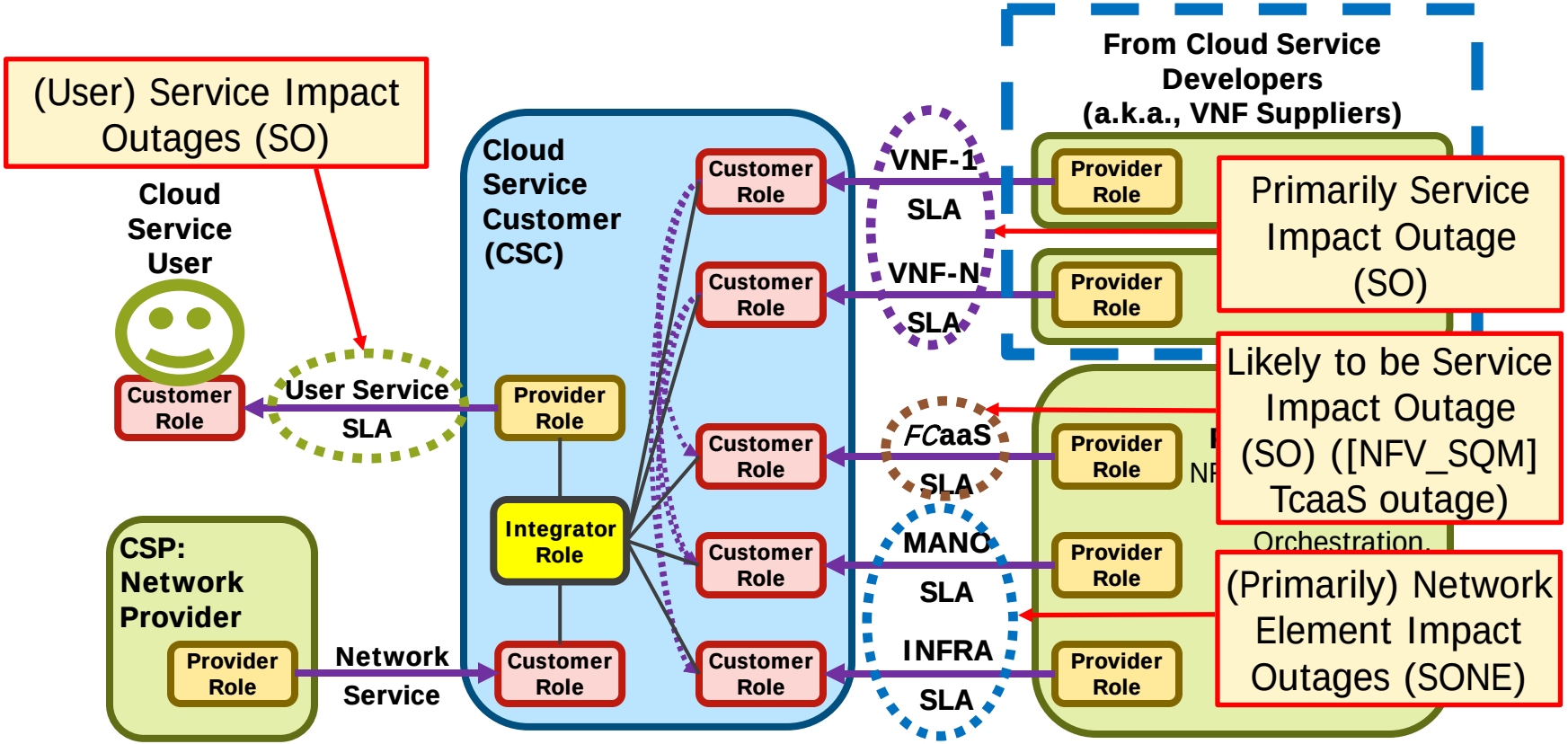
End-to-End Quality Management Framework (TR178 Style View)



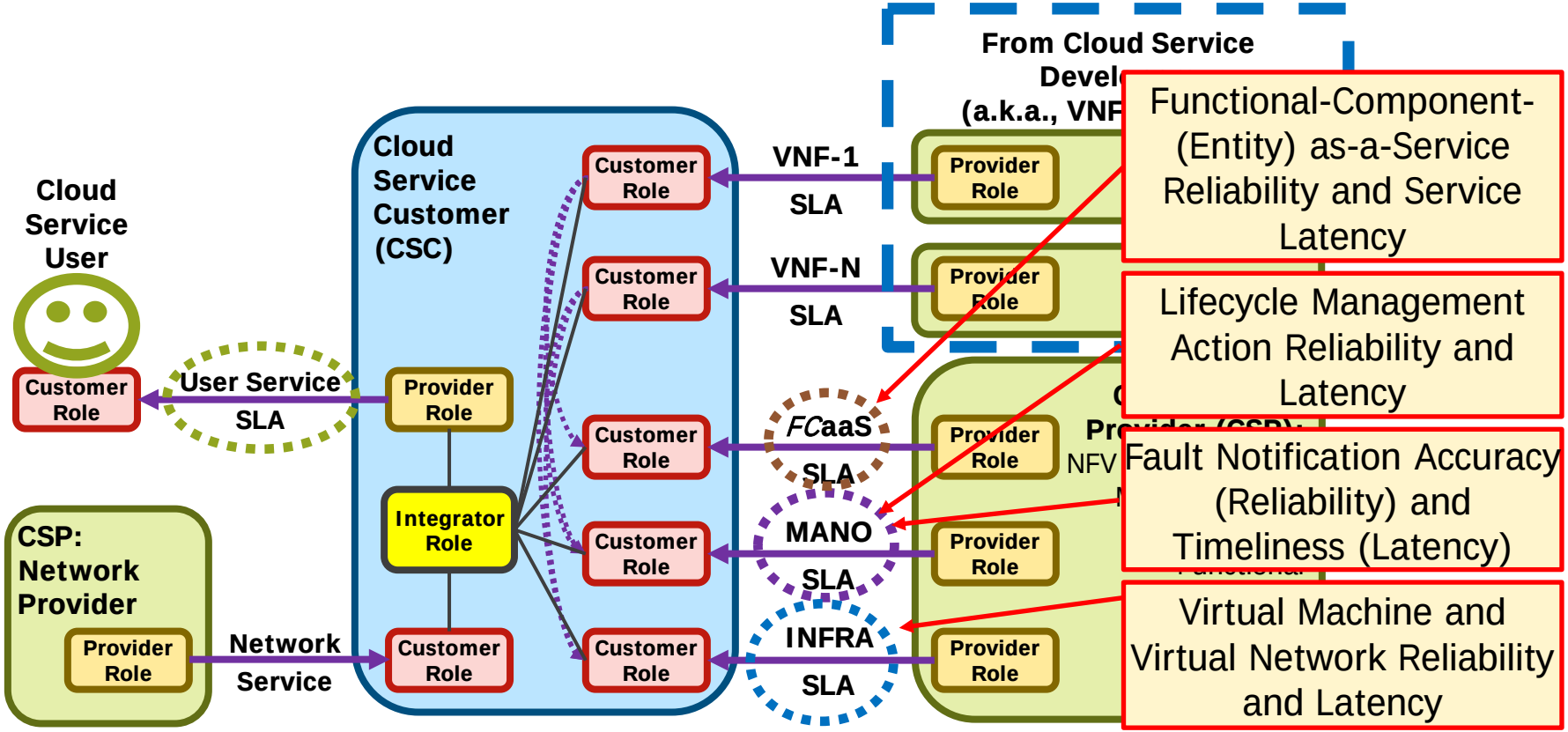
NFV Quality Management Framework



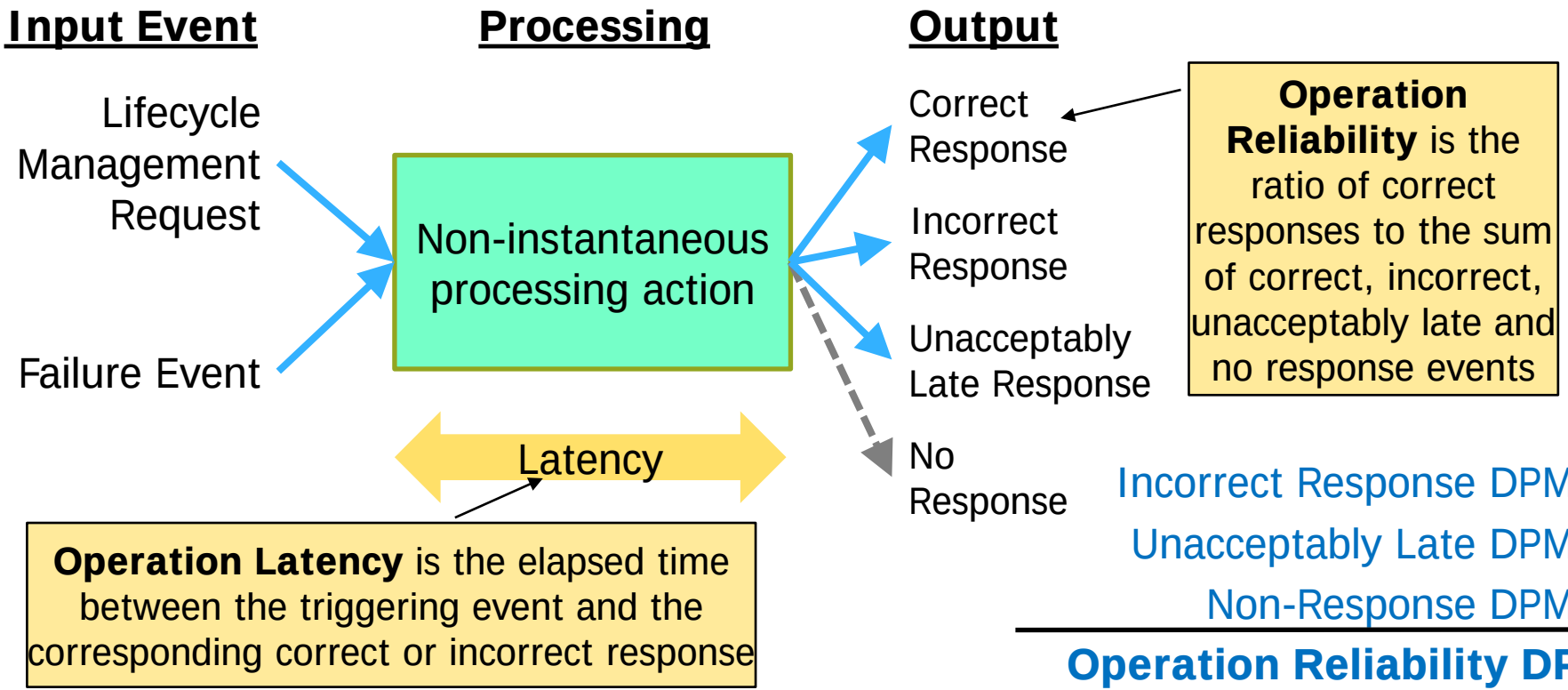
Outage Metrics in NFV Quality Measurement Framework



Transaction Metrics in NFV Quality Measurement Framework



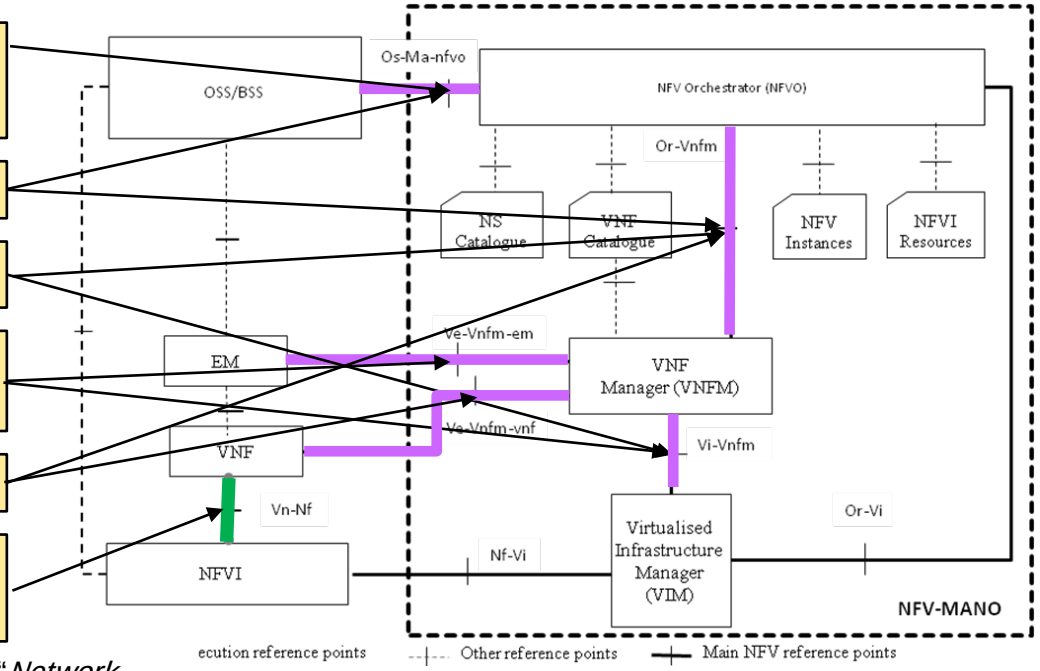
Transaction Quality Model



Measure Operational Quality (Reliability and Latency) Across Standard NFV Reference Points

Examples:

- Network Service Lifecycle Management (7.1.2)
  Network Service Fault Management (7.1.5)
- VNF Lifecycle Management (7.2.4)
- Virtualized Resources Management (7.3.3)
- Virtualized Resources Fault Management (7.3.5)
- VNF Fault Management (7.2.8)
- Virtual Machine and Virtual Networking Reliability and Latency



Section numbers in callouts (e.g., 7.1.2) are from "*Network Functions Virtualization (NFV); Management and Orchestration*," GS NFV-MAN 001 V1.1.1 (2014-12) document

Proposed Lifecycle Management Errors

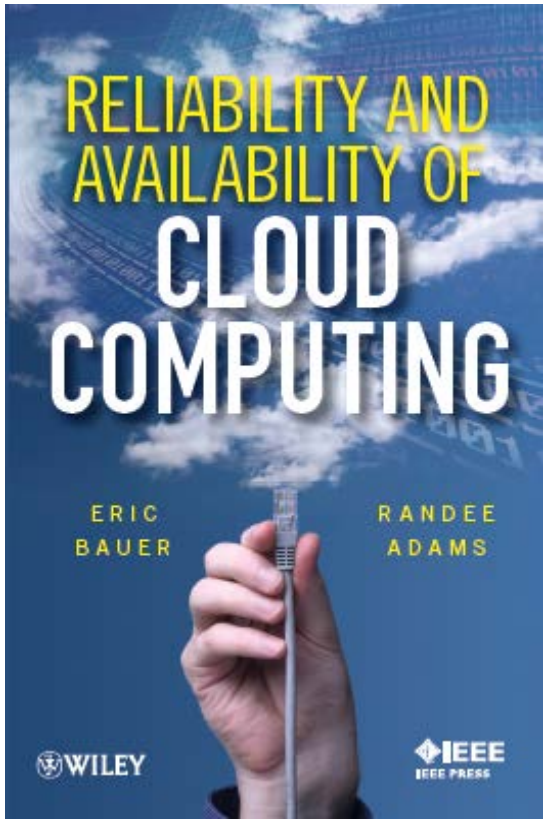
[TL_9000] Procedural Error	(Proposed) Lifecycle Management Error	Example of Elevated VNF Service Risk due to Lifecycle Management Error
An error that is the direct result of ***human intervention or error.***	An error that is the direct result of ***policy, management, or orchestration.***	
Contributing factors can include but are not limited to…		
a) deviations from accepted practices or documentation,		Failing to continuously enforce anti-affinity placement rules for VNFCs can lead to both primary and protecting VNFC instances appearing in a single NFV infrastructure failure group
b) inadequate training,	*not generally applicable*	
c) unclear, incorrect, or out-of-date documentation,	faulty or out of date: automation scripts; service, VNF or resource descriptors; etc	Proper execution of faulty or out of date scripts can produce faulty and higher risk (e.g., simplex) VNF configurations
d) inadequate or unclear displays, messages, or signals,	inadequate, insufficient or stale FCAPS input data	Inadequate, insufficient or stale performance information can produce faulty elastic capacity management decisions
e) inadequate or unclear hardware labeling,	*not generally applicable*	
f) miscommunication,	*not generally applicable*	
g) non-standard configurations,		Configuring non-standard third party software to monitor, manage, backup or control a VNF instance.
h) insufficient supervision or control		Failing to diligently monitor alarms and correct unsuccessful VNF repair actions can leave impacted VNF simplex exposed
i) user characteristics such as mental attention, physical health, physical fatigue, mental health, and substance abuse.	faulty execution of policy by a management or orchestration element	Faulty execution of automation scripts can produce faulty and higher risk (e.g., simplex) VNF configurations
	tardy execution of lifecycle management action	Insufficient automated management and orchestration capacity or other causes result in late execution of VNF repair, capacity change or other lifecycle management action, thereby prolonging service risk to target VNF.
	risky operational policies	Failing to maintain sufficient spare application capacity online can yield poor user service quality when unforecast surges in offered workload occur during capacity change lead time intervals

Standardizing definition of lifecycle management errors enables richer conversations about roles, responsibilities and accountabilities…before outages occur

Outlook

- 4/29/15 draft of NFV Quality Management Framework will be reviewed on 5/21/15 at QuEST Forum meeting; goal is to baseline this non-normative document 3Q15
- ETSI NFV work item in support of NFV Quality Management Framework will be considered later this month
- QuEST Forum will continue to work with TM Forum, ETSI NFV, NIST and appropriate other SDOs to enable standardized, objective and quantitative metrics to facilitate rapid and accurate fault localization, root cause analysis, and end-to-end SLA management

Questions?



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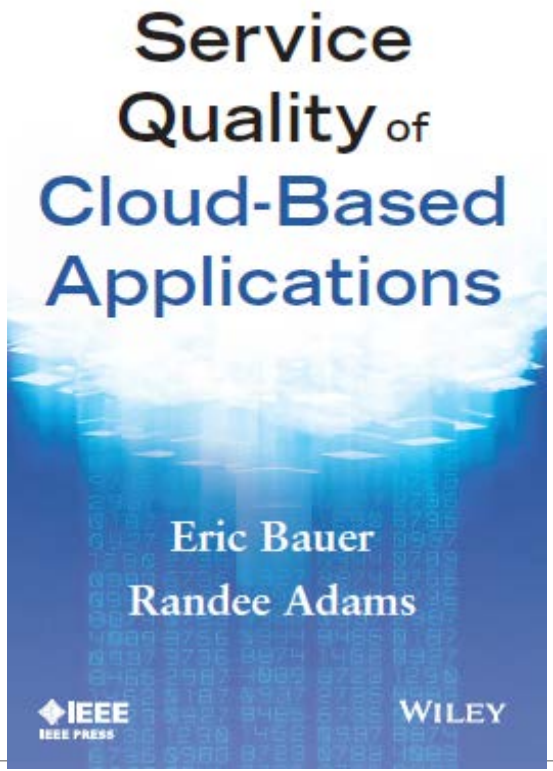

Every success has its network