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# Beginner's Guide to Carrier Grade Services in the Cloud

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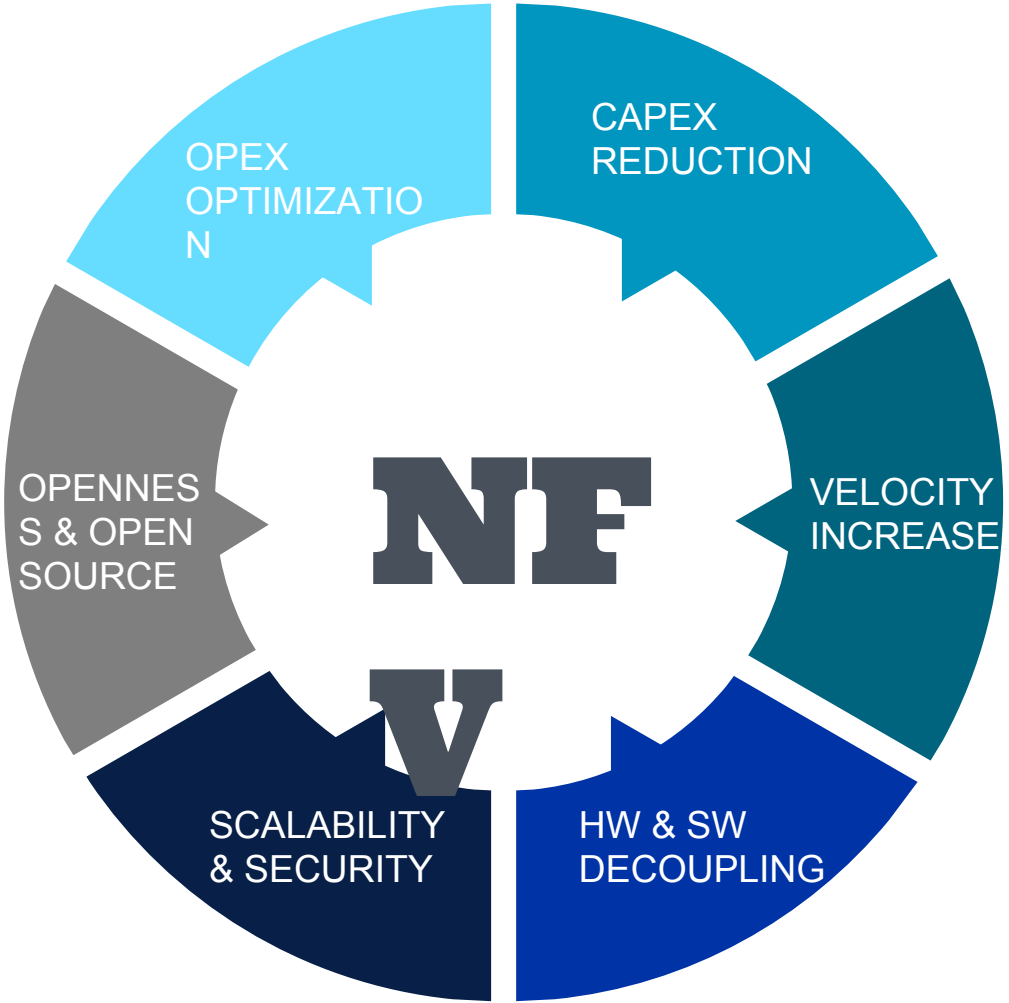
# Forces Shaping the NFV Market





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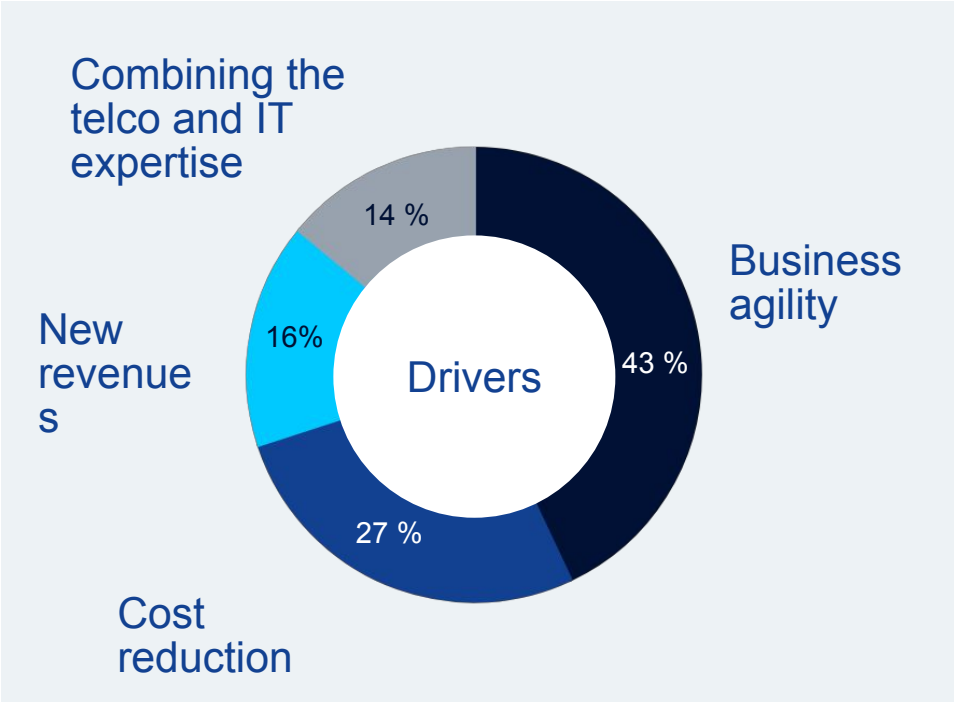
# Main Drivers for the telco cloud

## Business agility drives the market




"**Having the agility to scale** up and down instantly will **allow us to be more flexible** towards our customers needs. They will be able to pay for what they need, and then ask for more capacity when their app or service becomes successful"

*- operator in USA*

"**Telco cloud has the ability to create a more efficient and a more reliable network**, delivering a much better user experience to the consumer"

*- operator in UK*

"**The number one objective for telco cloud is to save on costs** – both on the cost of new hardware and the costs associated to managing the network"

*- operator in India*

Source: Nokia market study, April 2015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# Key market shift which will need to be accommodated in your networks

Remain profitable and efficient

**IOT**

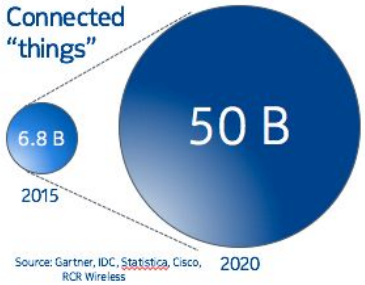
Bandwidth & content demands

| Capacity | Latency |
|---|---|
| 10,000 X more traffic 10-100 X more devices | 1 millisecond |
| **Data Rates** | **Coverage** |
| 10 Gbit/s @ peak | 100 Mbit/s wherever |

**5G**

**NFV / Cloud**

Make the business case work




Scale demands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# Today's reality

Cloud goes commercial

**2017**

vEPC, vVoLTE, vCPE

**#1**

Vertical: vendor-specific, service-specific clouds

Pre-integrated, end-to-end, for confident first step into NFV

Operators can experience digital networks, operations & benefits

Vendors can focus on addressing key challenges

**It works**

Stable platform, Standard & Vendor agnostic modelling, Orchestrated, automated service chains

**Its evolving**

Nokia MANO commercial deployments

Live service

**33%**

MANO deployments

**66**

Generic-VNFM

**33%**

Multi-vendor MANO

**28%**

EPC
VoLTE
vCPE

60%

Cable VoIP
Fixed VoIP
Government Cloud
NFV Platform
RAN
Public Safety

40%


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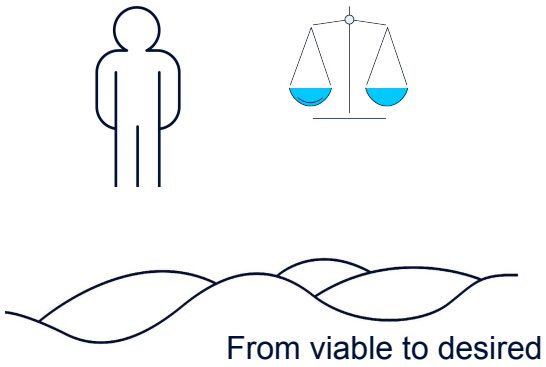
# Decision factors
## Technical and business




| Decision factor | Viable | Desired |
|---|---|---|
| Approach | Turnkey pre-integrated | NFV platform |
| Software | Working and proven SW | Open source and vendor supported |
| Design, composition and cloud capacity | Single-service, single-vendor, small cloud, Over-dimensioned | Multi-service, multi-vendor, large cloud, scalable |
| VNFM | Specific | Generic |
| Orchestration | Centralized VNF LCM | Network Service orchestration |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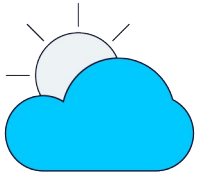
# Approach

## Primarily a business choice weighed against business benefits

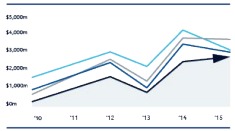
**Turnkey**

Influenced by:

- Timeline pressure
- Design composition
- SLA transformation
- Reliable, capable and proven prime integrator
- Balancing between short term goals & long term vision



**NFV platform**



NFV platform's challenges do payoff:

- Flexibility in choosing suppliers
- Agility in experimenting
- Speed in rolling out new services
- Adaptability in new business models

NFV platform is ideal when:

- Business conditions do not rule it out
- Adding new virtualized services
- Expanding already virtualized services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# Design, composition and cloud capacity

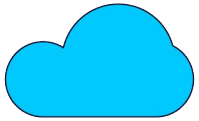
## Today's vertical deployments; Tomorrow's multi-purpose clouds

Single-service,

Single-vendor,

Small cloud

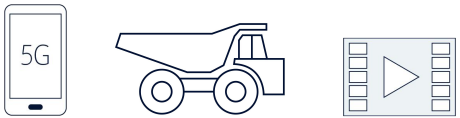
Service-based peak capacity funded by business manager



Multi-service,

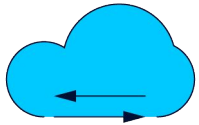
Multi-vendor,

Large cloud




Multi-service shared capacity relies on cost-allocation methods & internal SLAs

CloudBand Infrastructure Software



Expand current cloud asset, or build a new one?

- Service-specific demands (media, reliability, storage, security)
- Reliability & resiliency (avoid national outage)
- Geographic latency
- Traffic grooming
- Capacity planning

Decouple hardware capacity from service capacity:

- More efficient, requires fewer overall resources
- Unblocks capacity to experiment for what is next
- Gateway for converting silos to scalable platform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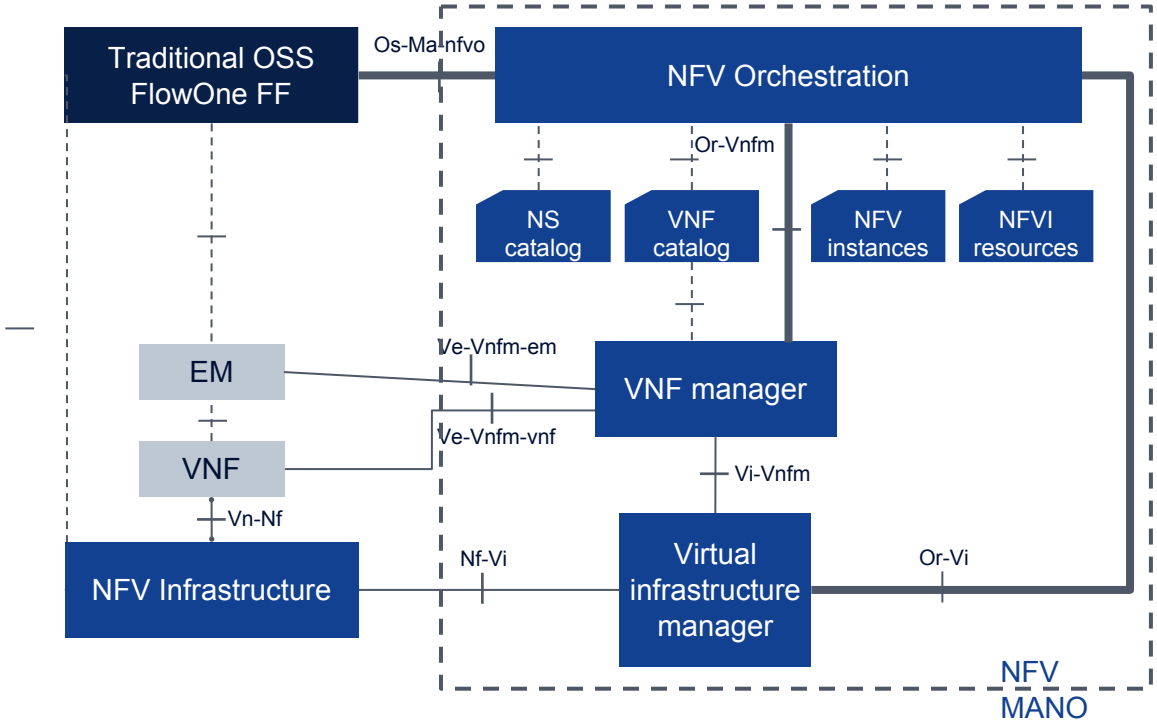
# ETSI NFV-MANO Architecture Framework





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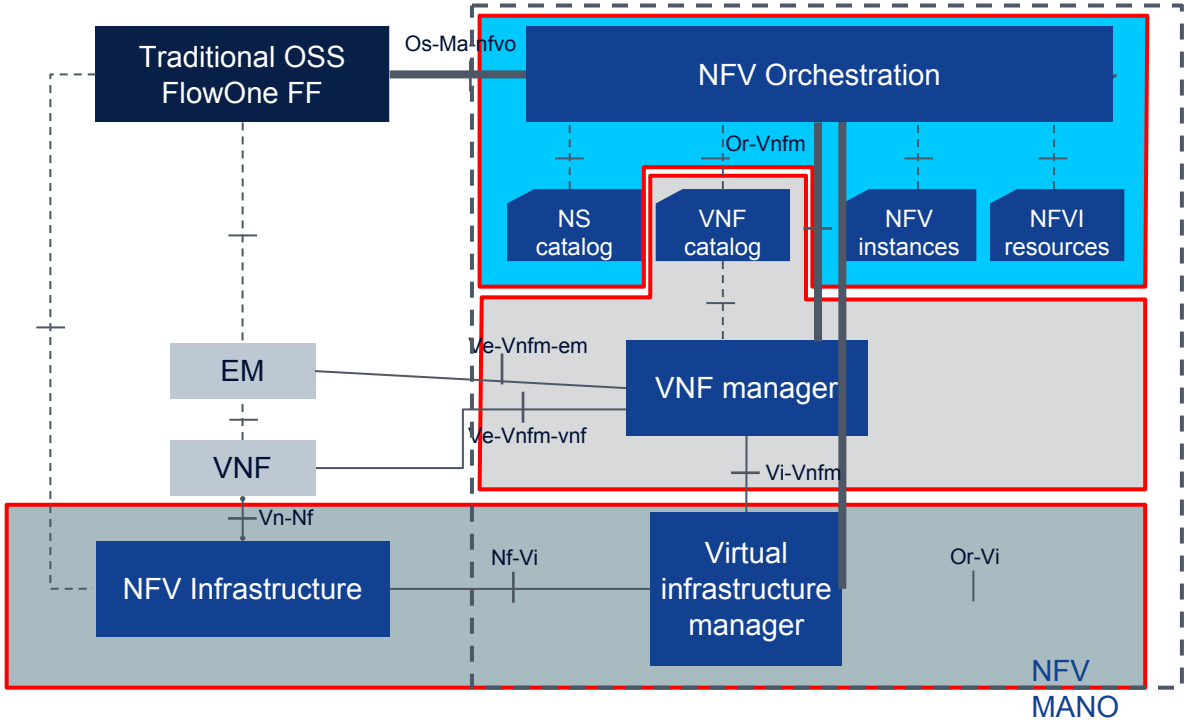
# ETSI NFV-MANO Architecture Framework




**CloudBand Network Director**
Automates network services delivery operations (LCM events) in a distributed multitenant–multivendor environment while optimizing and governing platform resource utilization

**CloudBand Application Manager**
Manages the lifecycle of VNF instances, including processes such as instantiation, deployment, scaling, healing, monitoring and upgrades

**CloudBand Infrastructure Software**
Software infrastructure for virtualization and management of compute, storage and networking, providing flexibility, performance, robustness, security, visibility and operational efficiency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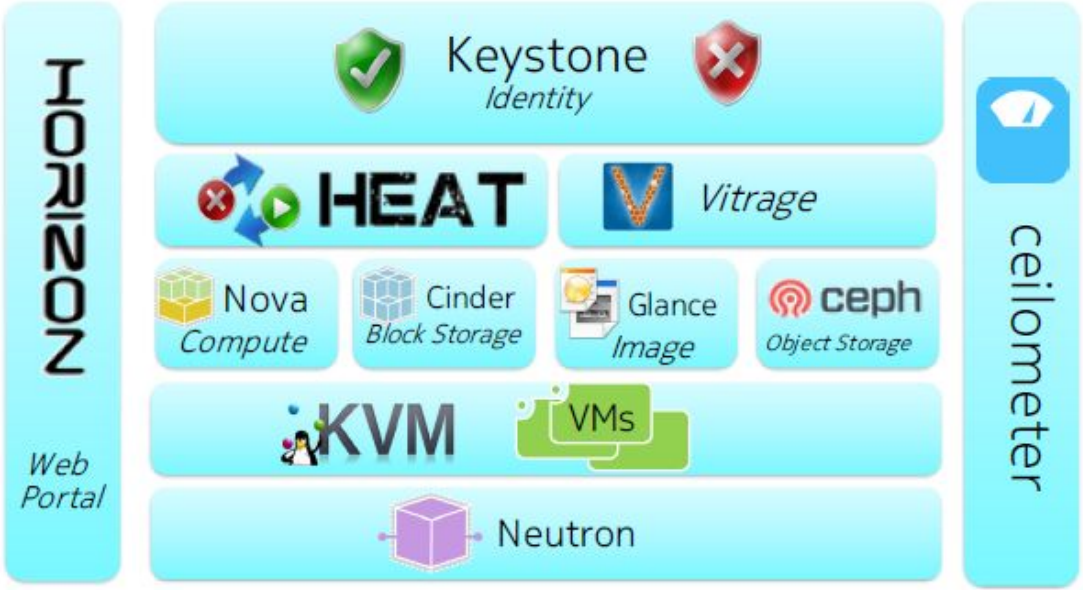
# CBIS OpenStack Functional Architecture

- Implementing standard OS architecture – RHOSP 10 (Newton)
- Neutron based on
  - Vanilla OVS, DPDK
  - Nuage SDN
- Full HA architecture
- Vitrage project added for RCA





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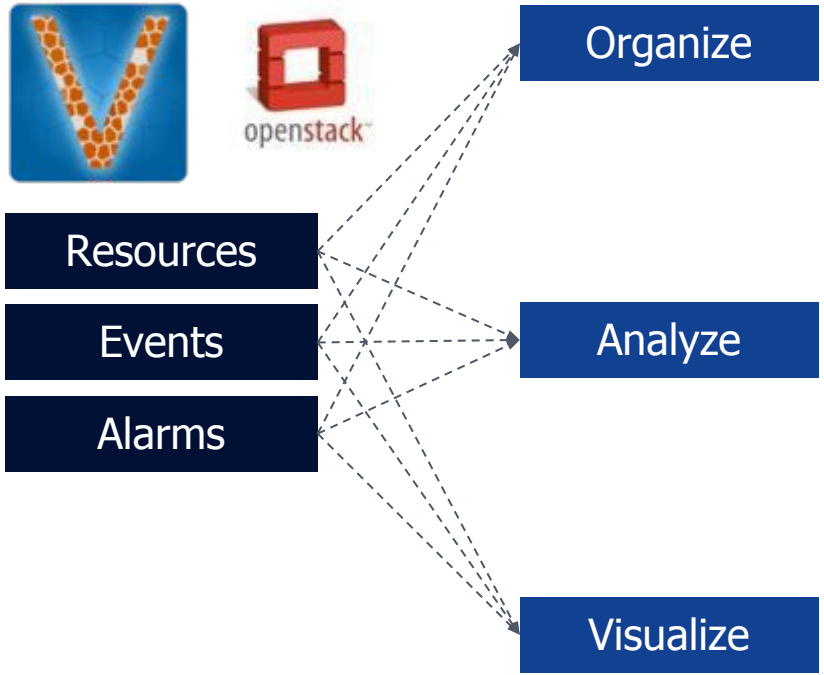
# OpenStack Vitrage – an **official** project in OpenStack

## Contributing to improve OpenStack operational simplicity




Physical to virtual mapping

Deduced alarms

Root cause alarm calculation

Alarm aggregation

https://wiki.openstack.org/wiki/Vitrage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# OpenStack Vitrage – an **official** project in OpenStack

## Contributing to improve OpenStack operational simplicity

Resourc

Events

Alarms

n

### Vitrage CV

- Initiated in November 2015
- Accepted into the Big Tent in June 2016
- First official version – Newton, in October 2016
- 2017 – available in RDO
- 2017 - Running in production

VITRAGE

*an OpenStack Community Project*

https://wiki.openstack.org/wiki/Vitrage


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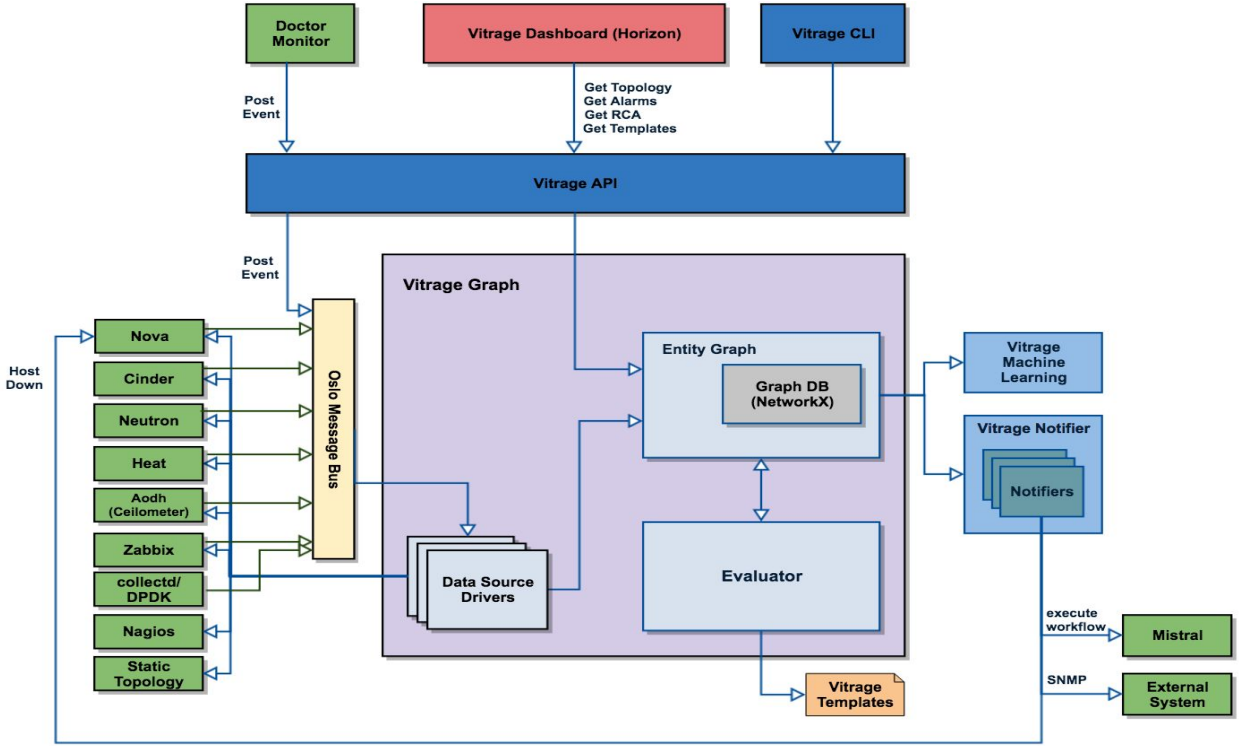
# Vitrage High Level Architecture





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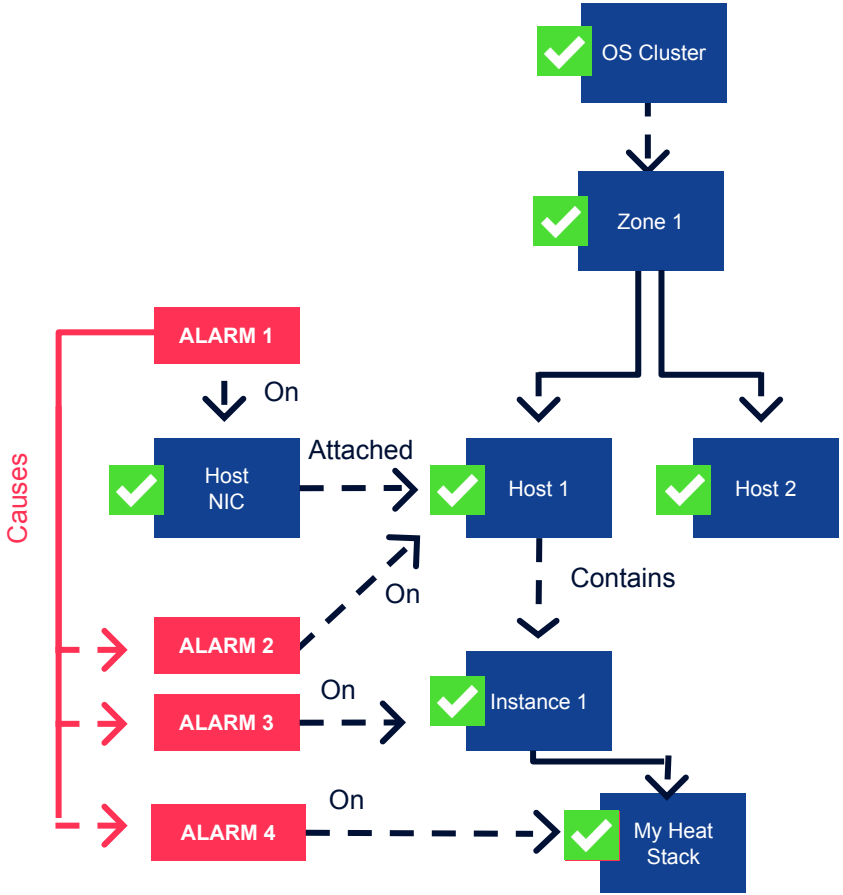
# Vitrage example: Host NIC failure

- Monitor host NIC (public/ tenant network) by Zabbix, raise an alarm when failed
- Vitrage will receive alarm from Zabbix, add it to the entity graph, connected to the Host NIC vertex
- Find matching scenario (template) and perform the following actions:
  - Raise deduce alarm on host (and add it to the entity graph)
  - Change host state in Vitrage (may trigger also calling Nova API to modify state)
  - Add causal link between alarms
- Once the deduced alarm on host is added, a similar flow will occur on the hosted instances
- A similar flow will occur on the Heat stack (based on VNF policy and topology as described on Vitrage template (warning, error, etc.)





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# The NFV Infrastructure Operational Cycle
## High Level Challenges

| | |
|---|---|
| Deployment | **Get set up quickly, using automatic deployment** |
| VNF integration | **Easily get your VNFs up and running, with top performance, and no hassle,** by adapting infrastructure to VNF's needs. |
| Service Assurance | **Detect problems and automatically correlate across the stack** |
| Upgrade, Maintenance | **Apply well defined, tested and automated operational procedures** to maintain faulty hardware, apply patches, upgrade software, and add compute / storage nodes. |


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# Summary

Good progress made,
NFV's goals are not yet achieved

OpenStack has the maturity to scale
Requires packaging & guarantees beyond vanilla open source

Operational Challenges
- Upgrade and maintenance
- More automation is needed
- More requirements for service assurance, security, etc.
- Integration with open source tools

Plenty of work ahead for the next months

**CloudBand:** Operationalizing the NFV cloud – reliable, automated, repeatable


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