



LFN Developer & Testing Forum

# **XGVela**

## **Information Model and APIs**

**XGVela Team**



# Agenda

- Scope
- Metamodels in TM Forum Open APIs
- Configuration Management
- Topology and Inventory Management
- Fault Management and Notifications
- Performance Management

Following are the initial focus areas for XGVela Information Modeling and APIs,

- CMaaS: Configuration management framework and APIs
- TMaaS: Topology, Inventory and APIs for Managed Entities
- FMaaS: Fault Management, Event framework, Notifications, Alarm Management APIs
- MMaaS: Performance management with Prometheus for data collection. Additionally, VES 'measurement' and 'hvMeas' events for closed loop integration with MANO

# Metamodels in TM Forum Open APIs

## Information Model

Representation of business concepts, their characteristics and relationships, described in an implementation independent manner

## Data Model

Provides specific definition and format of values available to an instance

### JSON Schema

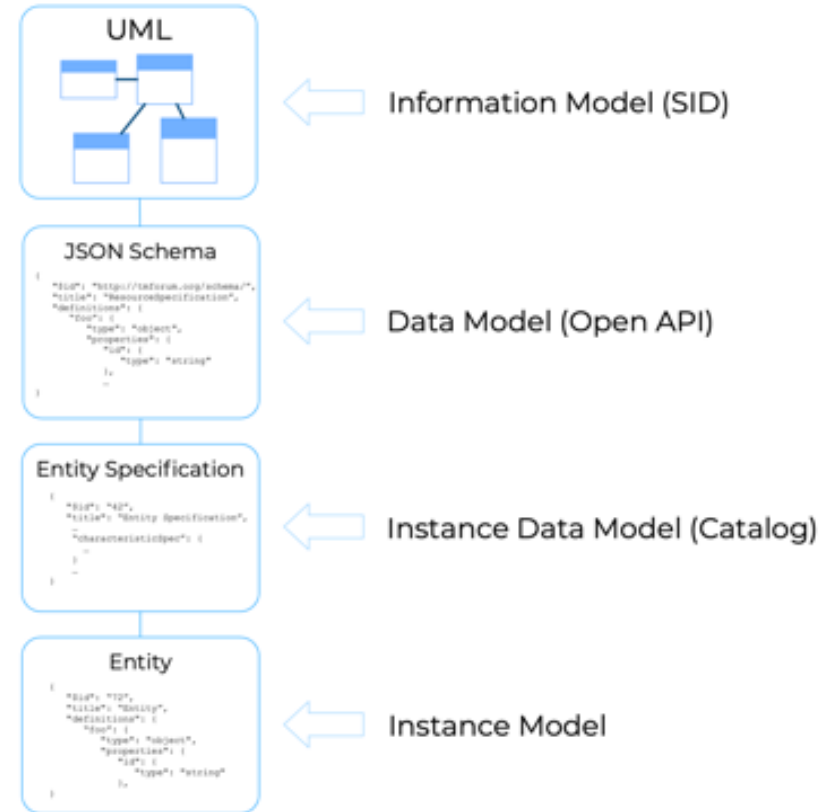
Defines JSON encoding included in Open API specification (OAS)

### Specification

Provides a specific set of available characteristics and features to be included in a Catalog

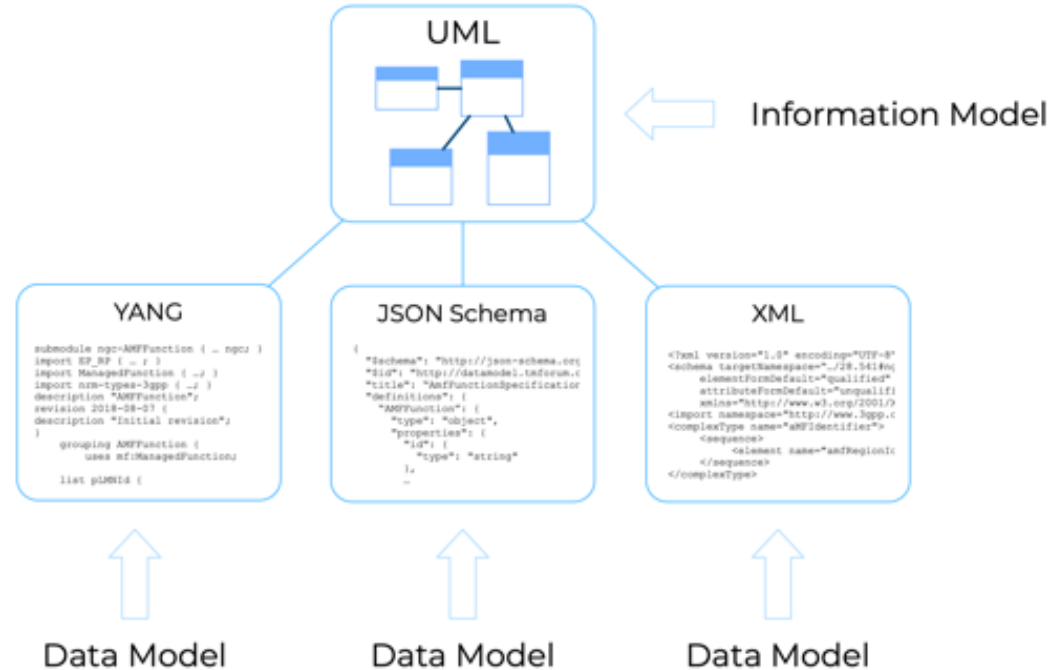
## Instance Model

Representation of an instantiated entity with values which are valid in the context of the Data Model



# Data Model Equivalency

- Data Models derived from a common Information Model are equivalent
- Data values used in one encoding may be mapped to values for another encoding

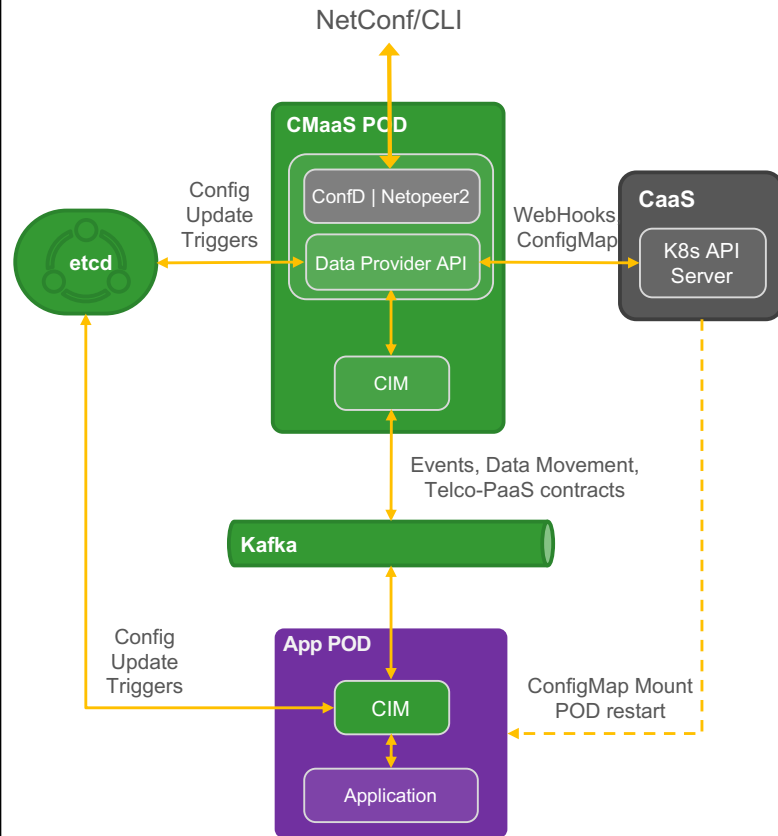


# CMaaS (Configuration Management as a Service)

- Application configuration
  - is designed and consumed by the individual applications
  - is vendor and Application specific
  - Vendor may choose to align with 3GPP models using Yang
- Seed code
  - Yang is supported data model for configuration (RFC 7950)
  - NetConf is the management protocol and API (RFC 6241)
  - JSON is the supported encoding for configuration (RFC 7951)

# CMaaS: Seed code

<https://github.com/XGVela/cmaas>



- Netopeer2 integration is ongoing. A future release might support option for the end user to pick between ConfD or Netopeer2.
- CNF and  $\mu$ Service configuration are stored in ConfigMap. Addresses Day-0, 1 delivery.
- CMaaS discovers new CNF and configuration changes using k8s service discovery mechanism.
- On new CNF deployment, loads any management configuration yang and json from ConfigMap and provisions the NetConf server module.
- Day-2 configuration changes are delivered via k8s rolling update or by direct API calls to application containers via etcd and CIM per application need.

# TMaaS (Topology Management as a Service)

- XGVela builds CNF resource inventory as per tmforum information model (IG 1217, TMF 634, TMF 639)
  - XGVela may need access to the CNF catalogue. Certain key LCM and policy related information are present in the catalogue or could be injected to k8s resource specifications as annotations or CRDs
- XGVela implements APIs to operate and get CNF topology and resource inventory information.
- Seed code
  - Implements a customised Yang data model based on 3GPP 32.622
  - Topology data can be queried over NetConf



# TMaaS: Generic Network Resource Model (3GPP 32.622)

## SubNetwork

Set of managed entities

## ManagementNode

element manager (EM)

## ManagedElement

network element (NE)

## ManagedFunction

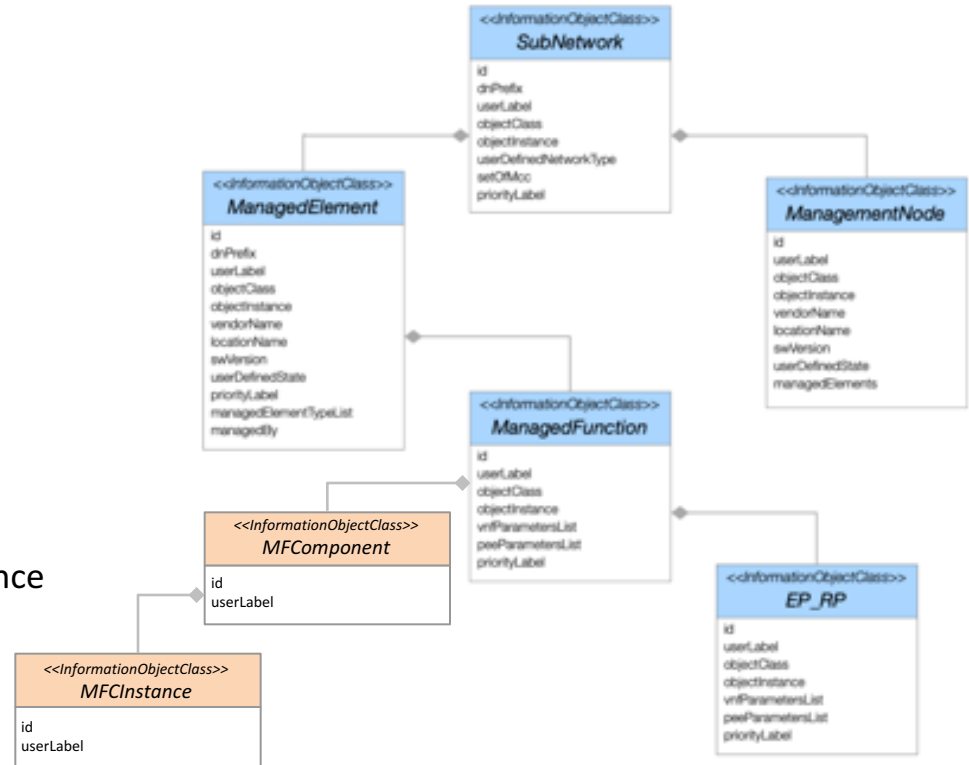
for sub-classing only

represents a telecommunication function (e.g.

NetworkSlice, AMF)

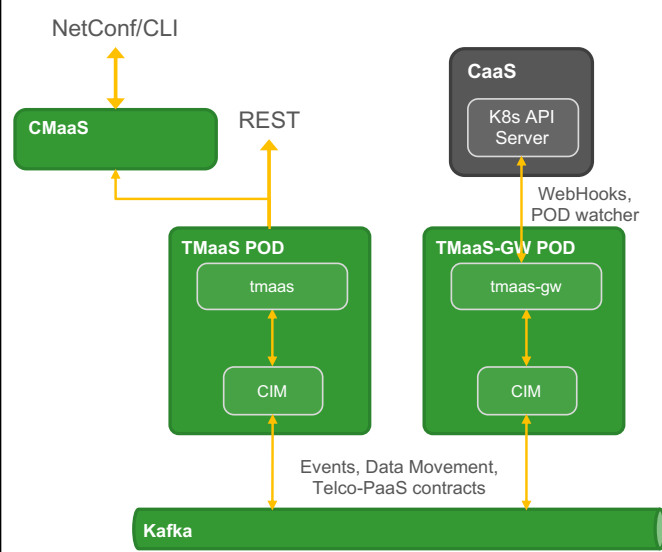
## Endpoint (EP\_RP)

represents an end point of a link across a reference point (e.g. X2, N1)

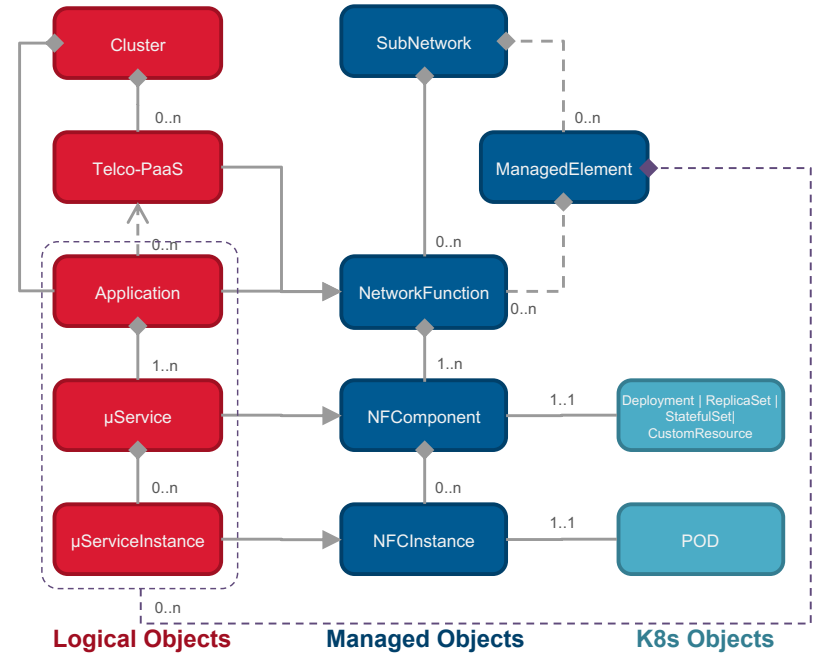


# TMaaS: Seed code

<https://github.com/XGVela/tmaas>  
<https://github.com/XGVela/tmaas-gw>



- Watches k8s for CNF deployments, updates
- Constructs/updates ManagedObjects (extended from 3GPP)
- Employs ETSI states for CNF and CNFC/μService



**ETSI NF States,**

- NULL
- INSTANTIATED\_NOT\_CONFIGURED
- INSTANTIATED\_CONFIGURED\_ACTIVE
- INSTANTIATED\_CONFIGURED\_INACTIVE

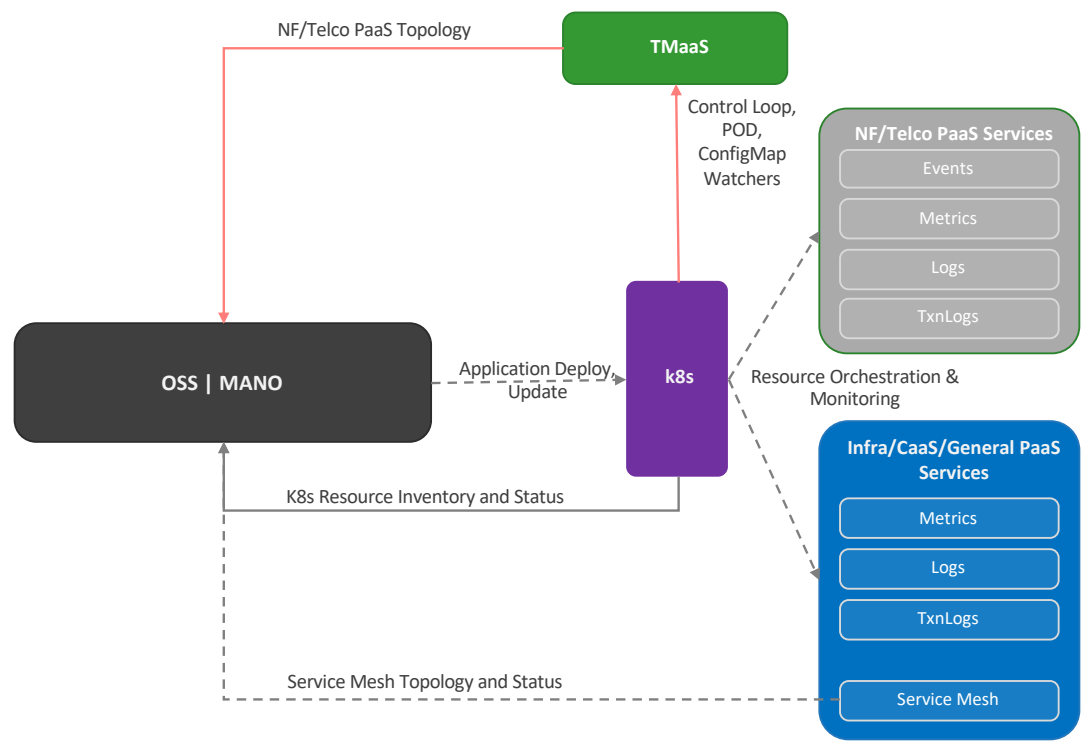
**Correlated from k8s probes and resource events,**

- Startup Probe
- Liveness Probe
- Readiness Probe
- ...

**POD annotation**

```
xgvela.org/tmaas {
  telcoPaasId: <>
  dnPrefix: <>
  nfId: <>
  nfType: <>
  vendorName: <>
}
```

# TMaaS: Observability

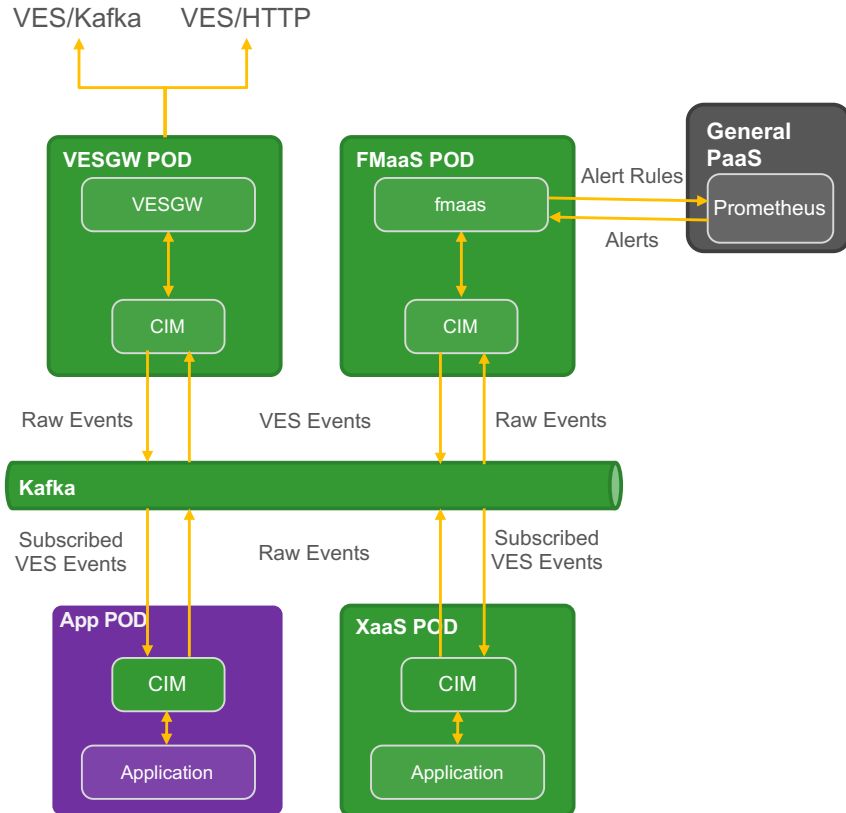


# FMaaS (Fault Management as a Service)

- XGVela conforms to ONAP VES specification for event format and notification (ONAP VES)
- XGVela conforms to tmforum APIs for alarm management (TMF 642)
- XGVela implements event framework for applications to generate and subscribe to events.
- Seed Code
  - Events are formatted as per ONAP VES 7.1
  - Notification overs REST (as per ONAP VES 7.1) or Kafka transport

# FMaaS: Seed code

<https://github.com/XGVela/fmaas>

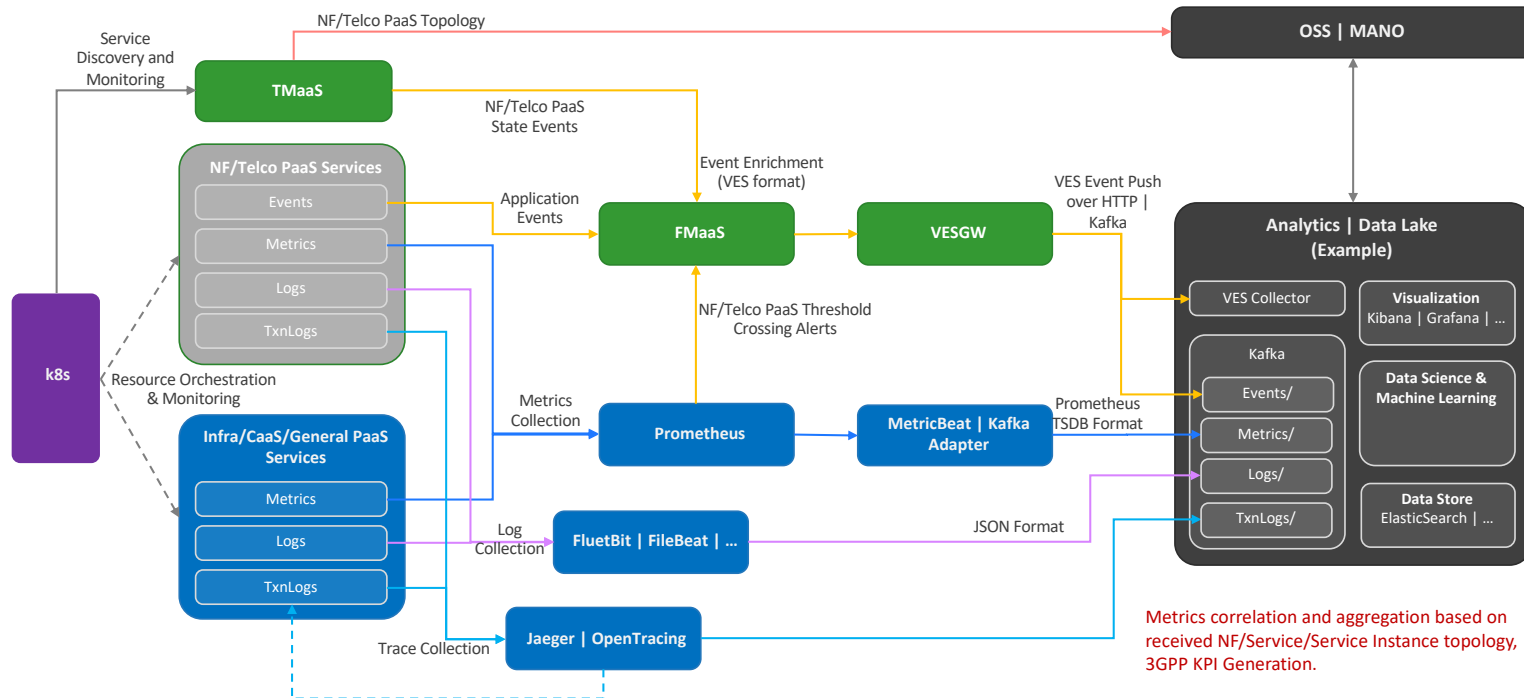


- Implements VES 7.1 specifications. Following domains are supported currently,
  - Fault
  - Heartbeat
  - Notification
  - TCA Alerts
  - Measurement
- Interfaces with applications via CIM and with Prometheus for TCA.
- Enriches and correlates events.
- VESGW implements notification service and supports push towards a VES collector or Kafka endpoints.
  - Primarily ONAP/VESPA extended to run in PaaS, outside of the NFs and supporting multiple NF streams.
- CIM provide APIs for applications to subscribe to and get notified about certain events based on nfld, category or eventName.

# FMaaS: Observability

## Telco Observability Framework Requirements:

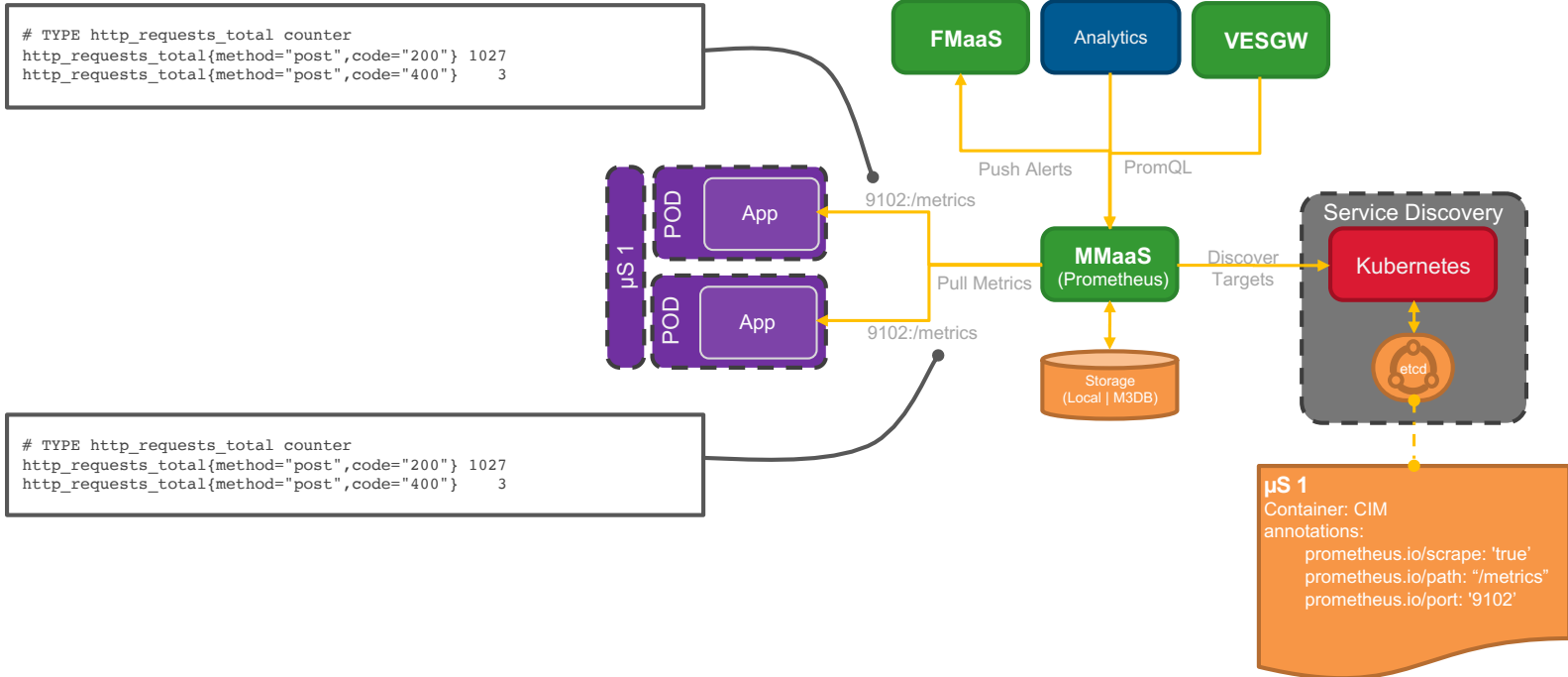
- Alarms/events, Metrics, logs shall contain NF/Service/Service Instance/slice identifiers
- Logging mechanism shall support ASCII, Binary and Crash file reliable log/crash file delivery
- 3GP subscriber Tracing and Transaction log (Jaeger does not need Telco requirements for Tracing) flows are not identified here for simplicity. Need to review and consider these functions in XGVela Telco PaaS.



# MMaaS (Metrics Management as a Service)

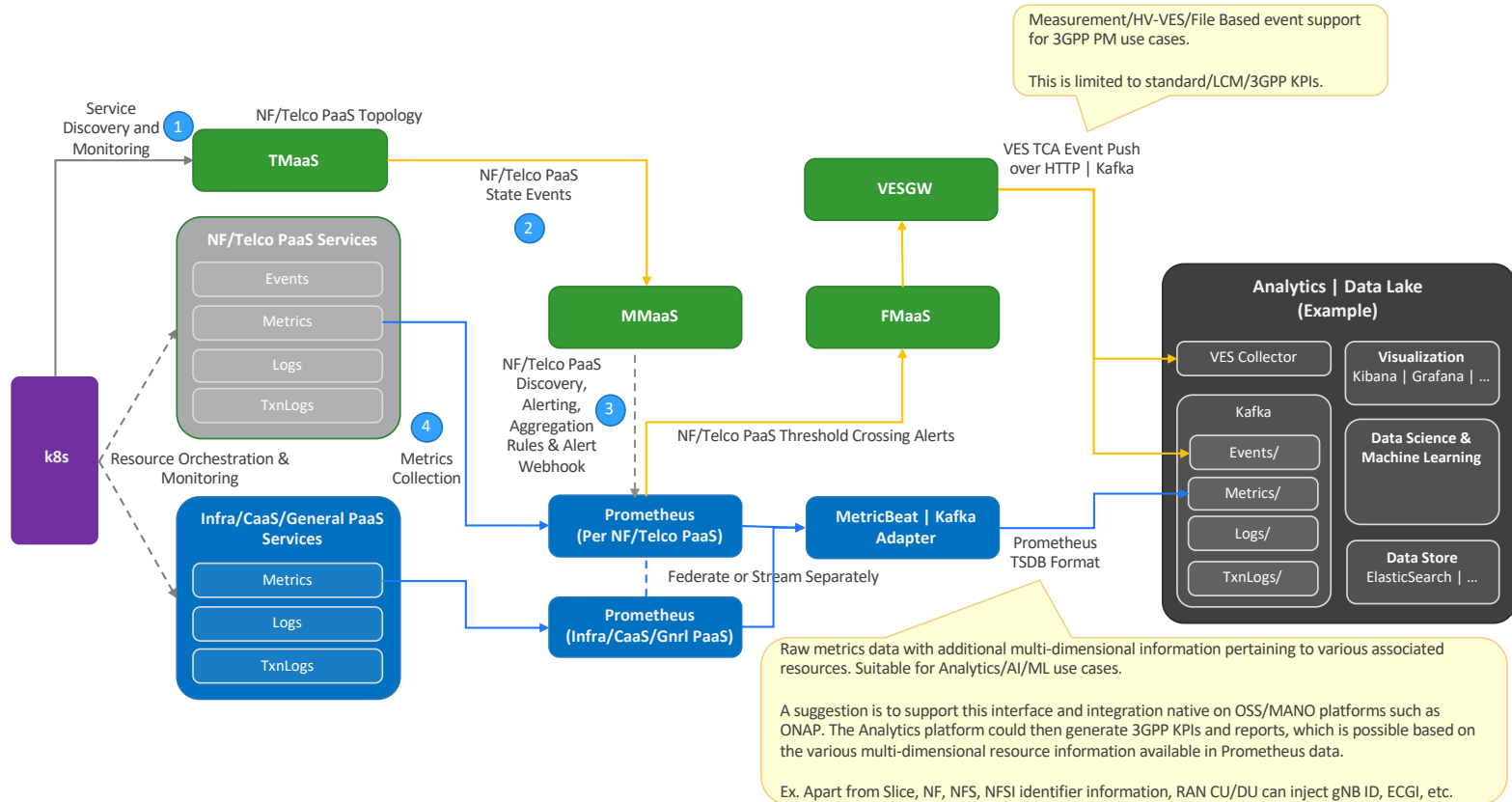
- Prometheus for data collection
  - All containers support REST endpoint and expose metrics using [Prometheus exposition format](#)
  - Suitable for high volume and multi-dimensional data collection in a flexible format for Analytics
- ONAP VES 'measurement' and 'hvMeas' events for certain closed loop LCM integrations with MANO.
- Seed code
  - Supports VES 'measurement' event
  - Automatically configure Prometheus CRDs for Service/Pod discovery, TCA and recording rules.

# MMaaS (Metrics Management as a Service)





# MMaaS: Seed code





# OLF NETWORKING

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