MATILDA Overview

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5G-ready Network Applications Development and Orchestration over Network Slices with Mobility Support Workshop

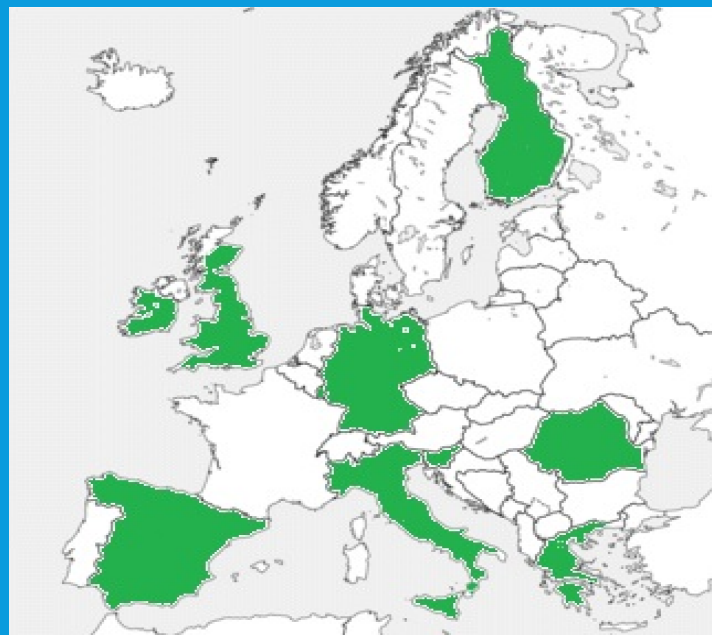Verona, 27th November 2018

THE **MATILDA** CONSORTIUM

A HOLISTIC, INNOVATIVE FRAMEWORK FOR THE DESIGN, DEVELOPMENT AND ORCHESTRATION OF 5G-READY APPLICATIONS AND NETWORK SERVICES OVER SLICED PROGRAMMABLE INFRASTRUCTURE

THE **MATILDA** VISION

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The vision of MATILDA is
- To design and implement a novel holistic 5G end-to-end services operational framework,
  - By tackling the overall lifecycle of design, development and orchestration of 5G-ready applications and 5G network services over a programmable infrastructure
  - By following a unified programmability model and a set of control abstractions

MATILDA aims
- To devise and realize a radical shift in the development of software
  - for 5G-ready applications
  - for virtual and physical network functions and network services

…through
  - the adoption of a unified programmability model
  - the definition of proper abstractions
  - the creation of an open development environment that may be used by application as well as network functions developers.

MATILDA in a Nutshell

- MATILDA is implementing a platform where **cloud-native** components can be deployed in a configurable **Telco Infrastructure**

- It advances the State-of-the-Art in **two distinct areas**:
  - Vertical Application Orchestration (VAO)
    - Making use of advanced network programmability features
      - Slice Definition
      - Slice Reconfiguration
      - Policy Management
  - Telco enhanced OSS
    - Formal definition of an API that can be consumed by 'external' entities
    - Internal orchestration of VNFs that are transparently integrated into the application graph

GOALS OF MATILDA

MATILDA

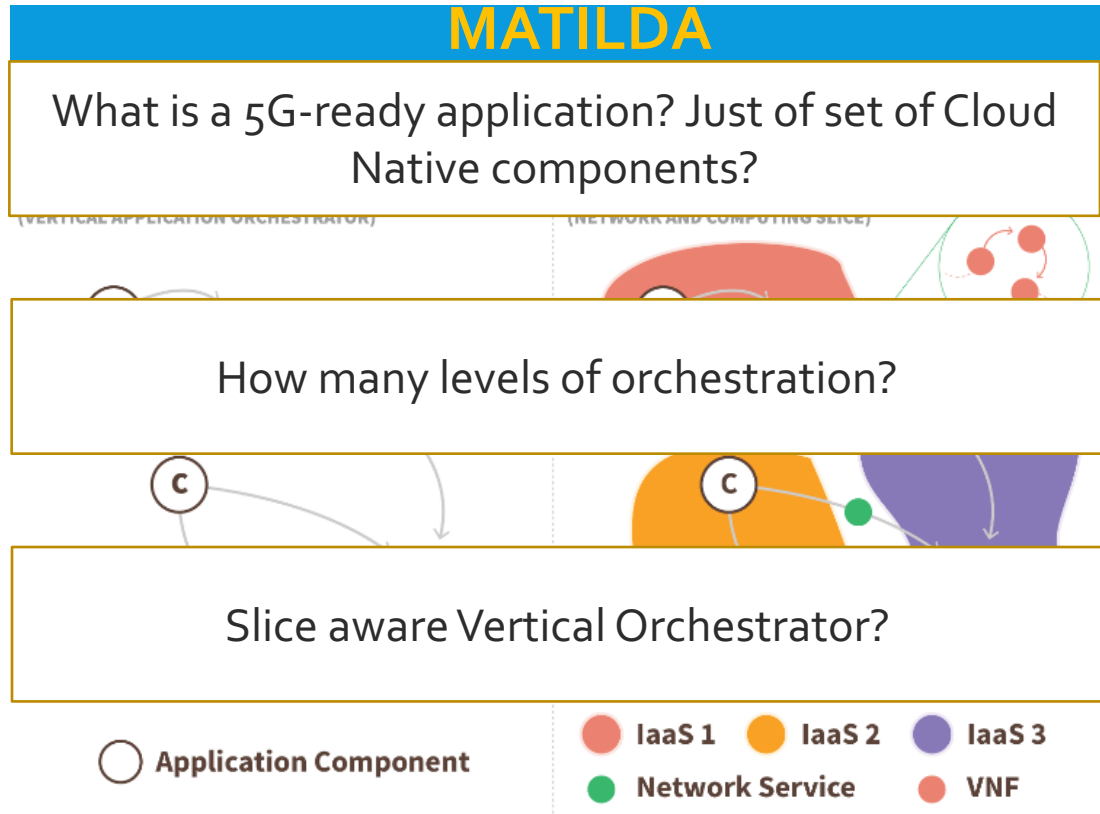Design and develop 5G-ready applications; applications able to take advantage of 5G programmable infrastructure.

Optimally manage and provide services/applications through a set of intelligent orchestration mechanisms.

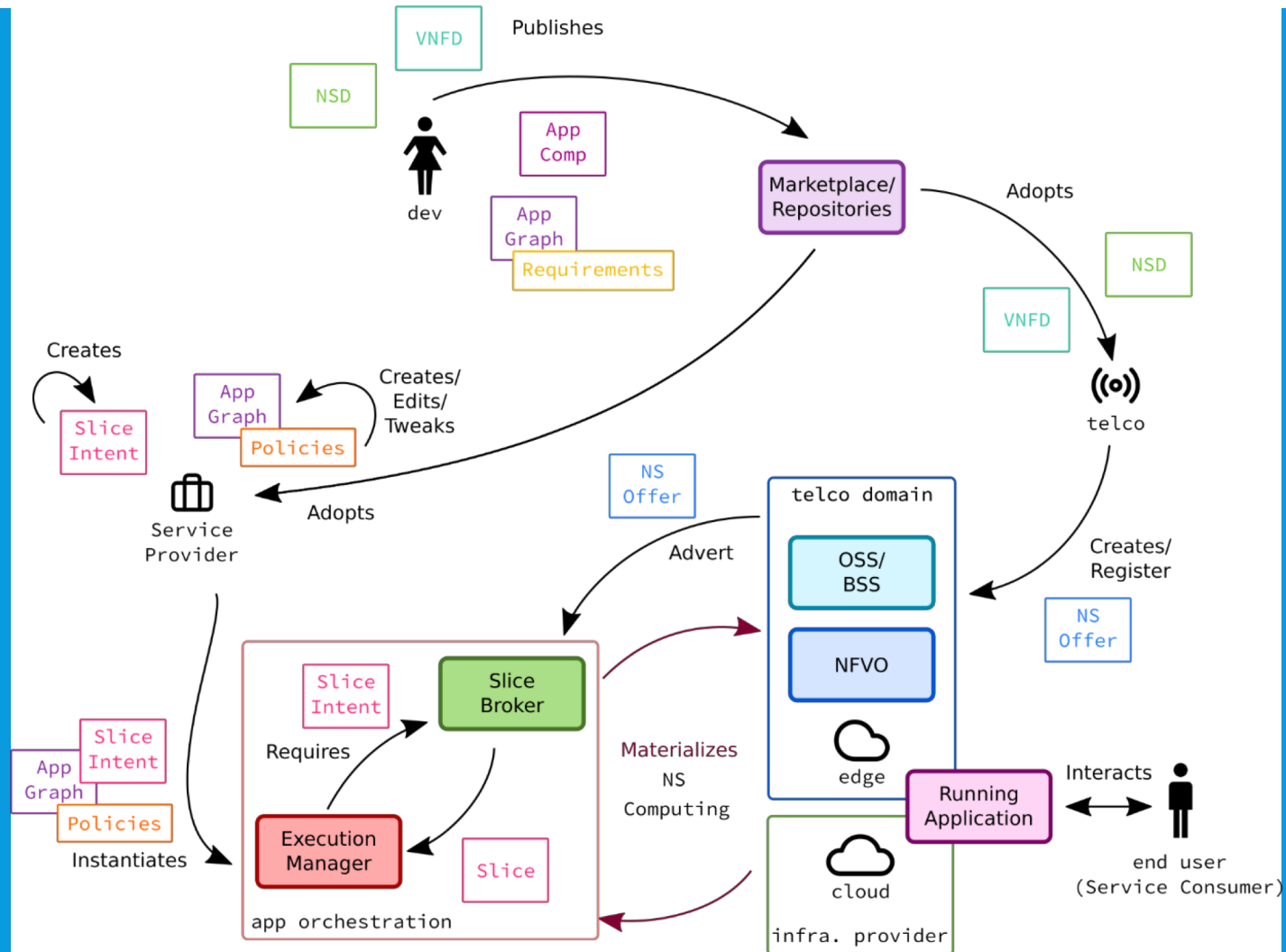Dynamically create and manage application-aware network slices able to serve 5G-ready application needs.

Separation of concerns among vertical applications and network services orchestration.

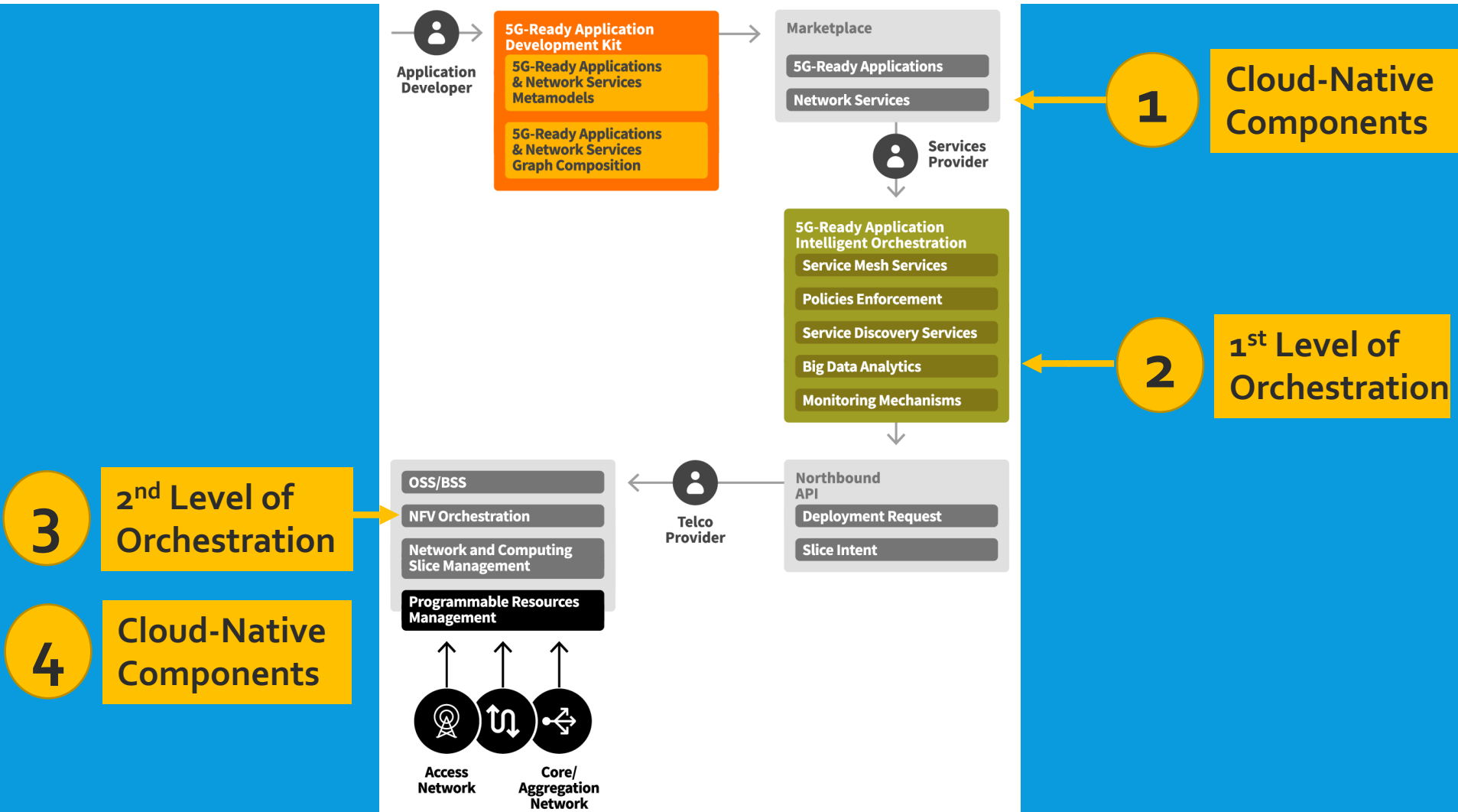What is a 5G-ready application? Just of set of Cloud Native components?

How many levels of orchestration?

Slice aware Vertical Orchestrator?

(VERTICAL APPLICATION ORCHESTRATOR)   (NETWORK AND COMPUTING SLICE)

c   c

○ Application Component

● IaaS 1   ● IaaS 2   ● IaaS 3

● Network Service   ● VNF

END-TO-END STORY

ARCHITECTURAL FLOW

MATILDA

Application Developer

5G-Ready Application Development Kit

5G-Ready Applications & Network Services Metamodels

5G-Ready Applications & Network Services Graph Composition

Marketplace

5G-Ready Applications

Network Services

Services Provider

5G-Ready Application Intelligent Orchestration

Service Mesh Services

Policies Enforcement

Service Discovery Services

Big Data Analytics

Monitoring Mechanisms

Northbound API

Deployment Request

Slice Intent

Telco Provider

OSS/BSS

NFV Orchestration

Network and Computing Slice Management

Programmable Resources Management

Access Network

Core/ Aggregation Network

1 Cloud-Native Components

2 1st Level of Orchestration

3 2nd Level of Orchestration

4 Cloud-Native Components

SEPARATION OF CONCERNS AMONG ORCHESTRATION LEVELS

DEPLOYMENT ARCHITECTURAL COMPONENTS
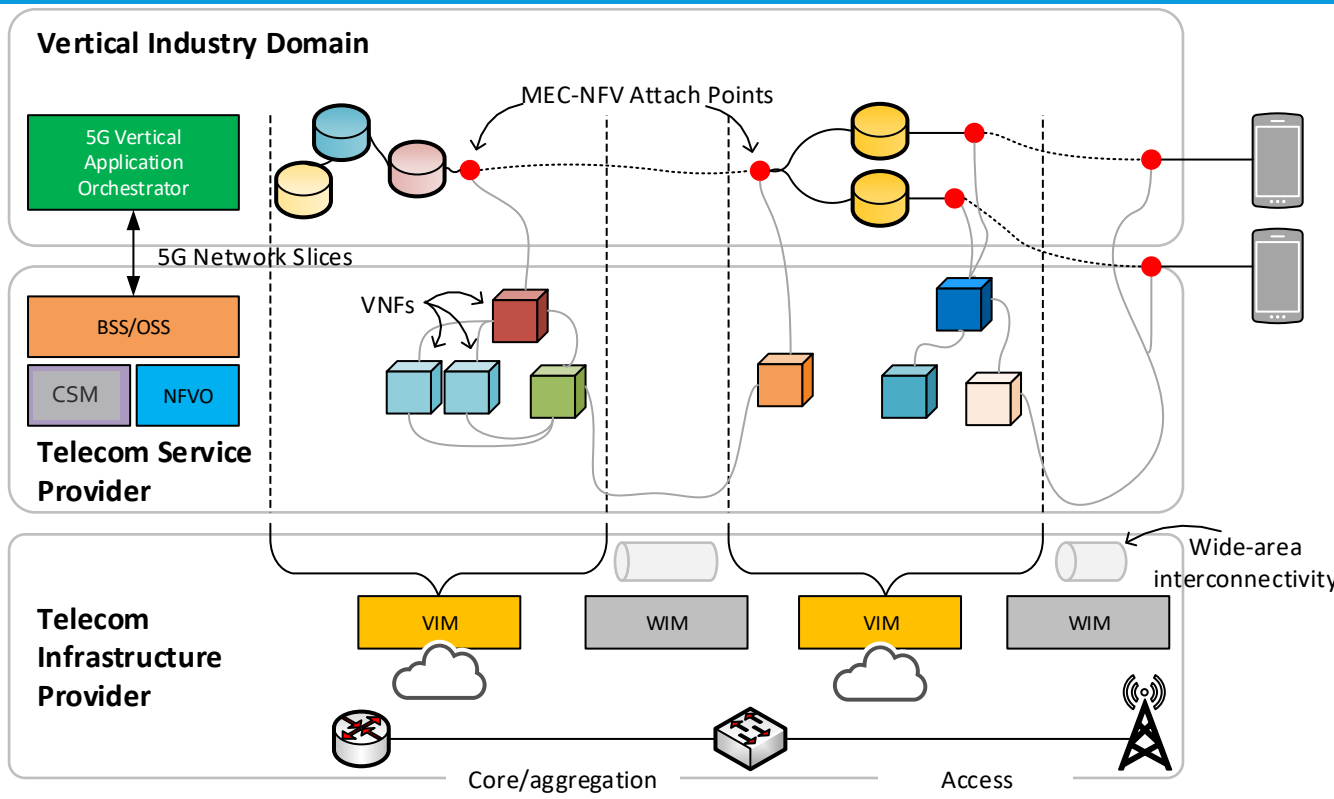
Legend

CSM: Computing Slice Manager

VIM: Virtua Infrastructure Manager

VNF: Virtual Network Function

NFVO: Network Functions Virtualization Orchestrator

WIM: Wide-area Infrastructure Manager

MEC: Multi-access Edge Computing

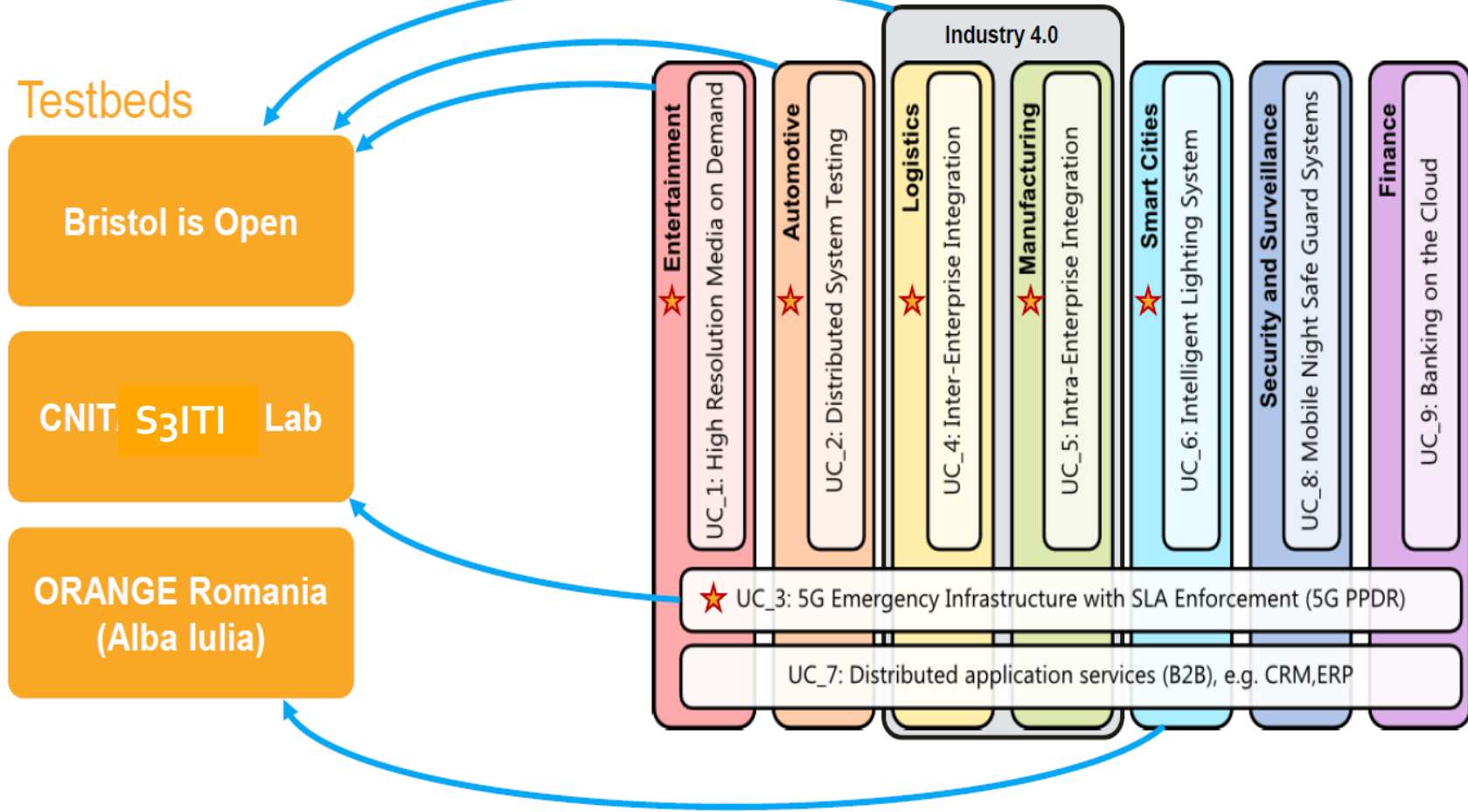**BSS / OSS:** Business Support System / Operational Support System

MATILDA OSS

MOBISLICE/5GNETApp Workshop, Verona, Italy
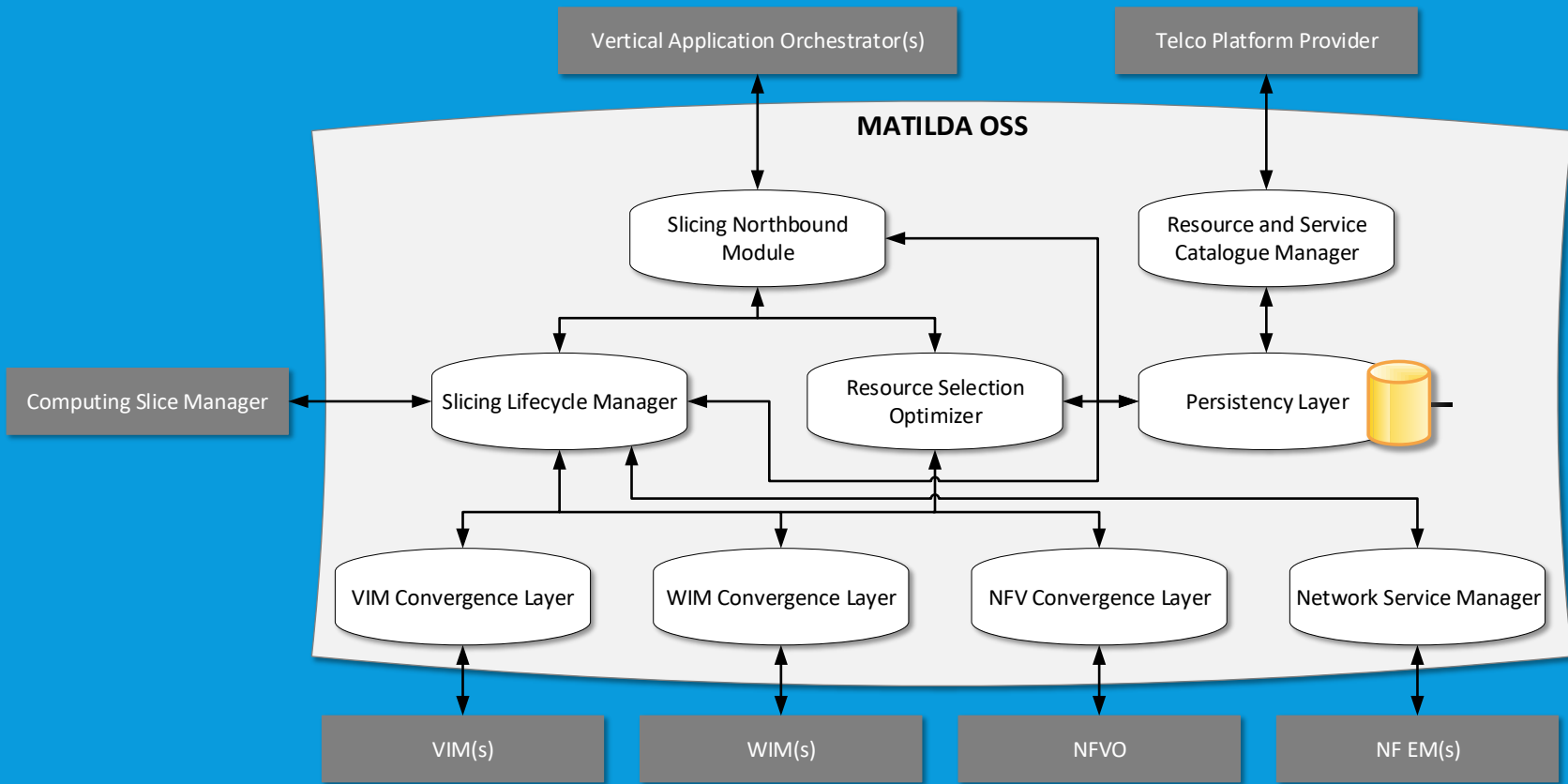
TESTBEDS AND USE-CASE APPLICATIONS

COMPONENT MARKETPLACE & REGISTRATION

MATILDA

- COMPONENTS
- SSH KEYS
- RESOURCES
- DETECTION RULES
- PLUGINS
- CONFIGURATION

Name

Search by Name

Filter | Reset

Identifier	Name ▾	Visibility	Date Created		
nxZ6RyPgS5	CustomMetricApp	Public	Wednesday, November 21, 2018 11:11 AM	Edit Delete	⋮
6fmnzF4kKd	DivFunc	Public	Wednesday, November 21, 2018 11:11 AM		⋮
JgT2p82zY3	FaceDetector	Public	Wednesday, November 21, 2018 11:11 AM		⋮

- COMPONENTS
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Name

Search by Name

Filter | Reset

Identifier	Name ▾	Visibility	Date Created	
r9RigSSYax	CMSApp	Public	Wednesday, November 21, 2018 11:11 AM	⋮
7ZmGuAWgMD	CustomMetricApplication	Public	Wednesday, November 21, 2018 11:11 AM	⋮
yV0m2TUrhX	DBMS	Public	Wednesday, November 21, 2018 11:11 AM	⋮
jLFrwPZPgm	HttpServerApplication	Public	Wednesday, November 21, 2018 11:11 AM	⋮
bmTZ8fueqf	PPDR	Public	Wednesday, November 21, 2018 11:11 AM	⋮

APPLICATION COMPOSER

MATILDA

≡

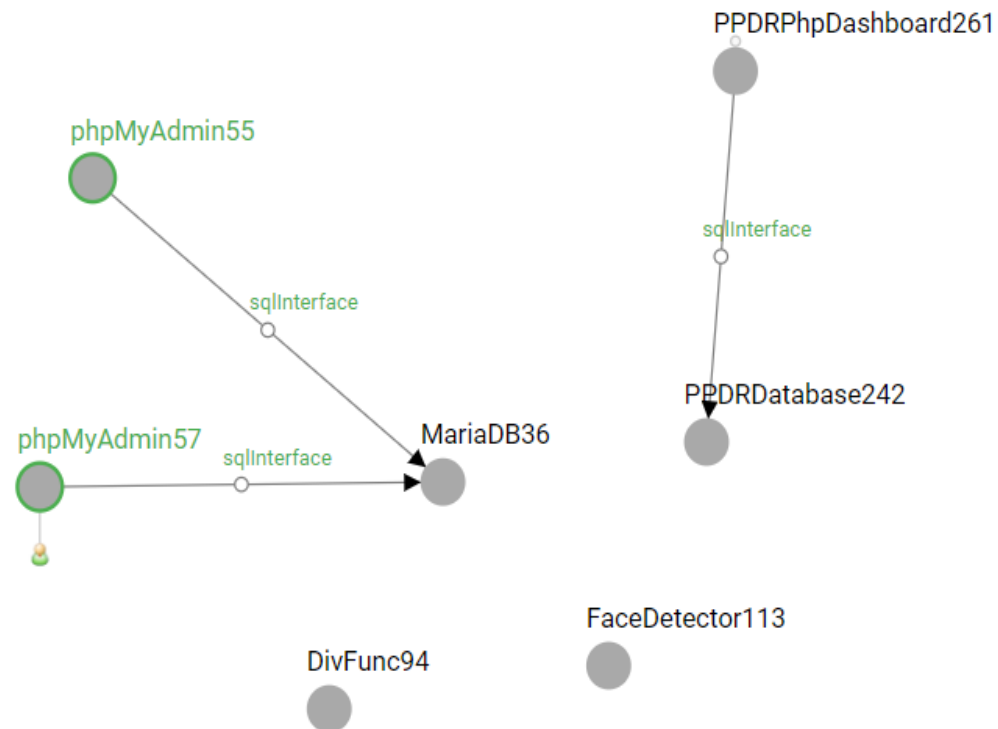☐ **(Public) If this option is checked, anyone could see this Application**

Search a component

phpmy

Generic info:

ID: GBusQe0cgA
Name: phpMyAdmin

phpMyAdmin57 ✏️ 🗑️

Required Interfaces:

1. Interface: sqlInterface

Exposed Interfaces:

1. Interface: httpAccessInterface

PPDRPhpDashboard261

phpMyAdmin55

sqlInterface

sqlInterface

PPDRDatabase242

phpMyAdmin57   sqlInterface   MariaDB36

FaceDetector113

DivFunc94

CONSTRAINTS DEFINITION

SLICE INTENT CREATION (CONSTRAINTS)

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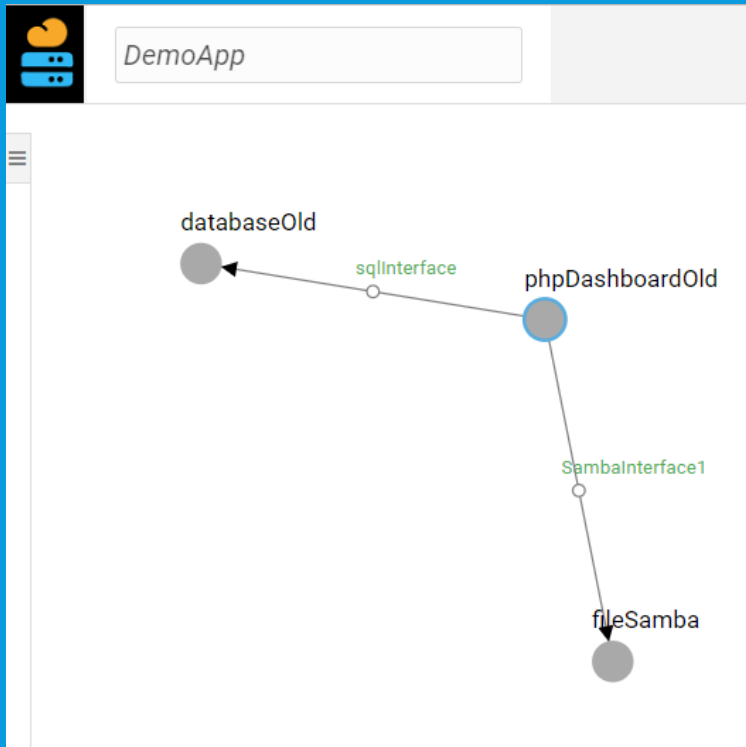
Maximum Delay (ms)

Value

`Maximum Delay that can b`

Constraint Type
○ Soft ○ Hard

Maximum Jitter (ms)

Value

`Maximum Jitter that can b`

Constraint Type
○ Soft ○ Hard

Maximum Packet Loss (%)

Value

`Maximum Packet Loss tha`

Constraint Type
○ Soft ○ Hard

Minimum Throughput (Kbps)

Throughput

`Minimum guaranteed Thro`

Constraint Type
○ Soft ○ Hard

```
{
    "applicationInstanceID": "580",
    "name": "OSSScenario",
    "callbackURL": "http://localhost:8080/api/v1/callback/slice/580",
    "authenticationDetails": {
        "clientToken": "!telcoprovider!",
        "clientKey": "telcoprovider"
    },
    "componentNodeInstances": [{
        "componentNodeInstanceID": "581",
        "componentNodeInstanceName": "TestCaseMariaDB"
    }, {
        "componentNodeInstanceID": "587",
        "componentNodeInstanceName": "TestCasePhpMyAdmin"
    }],
    "constraints": [{
        "constraintID": "591",
        "interfaceInstanceID": "590",
        "qi": "10",
        "radioServiceType": "1",
        "resourceType": "DELAY_CRITICAL_GBR",
        "allocationRetentionPriorityProfile": 1,
        "minimumGuaranteedBandwidth": 120.0,
        "maximumRequiredBandwidth": 200.0,
        "constraintUnit": "kbps",
        "category": "ACCESS",
        "type": "HARD"
```

AUTOMATED DEPLOYMENT

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database

phpDashboardLB

phpDashboard (1 WRKs)
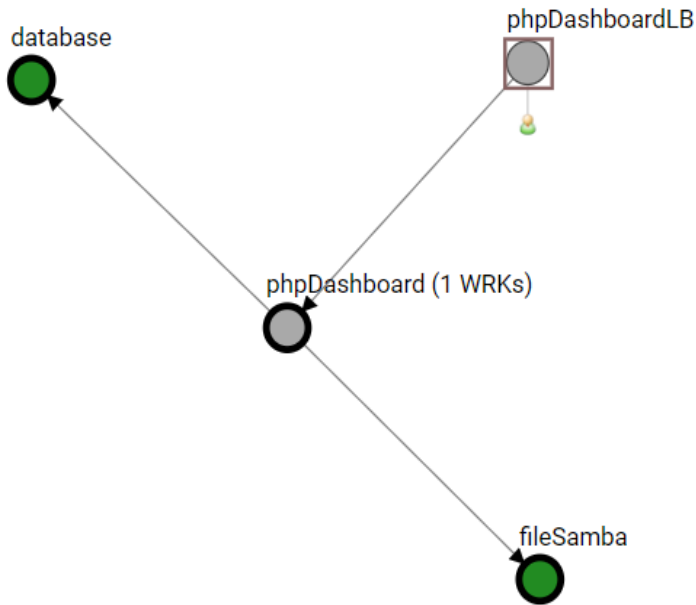
fileSamba

Logs

- 21-11-2018 11:35:00 [LOADING] : fileSamba - Component is loading...
- 21-11-2018 11:35:00 [LOADING] : database - Component is loading...
- 21-11-2018 11:35:00 [LOADING] : phpDashboardLB - Component is loading...
- 21-11-2018 11:35:00 [LOADING] : phpDashboard - Component is loading...
- 21-11-2018 11:35:41 [INFO] : phpDashboard - The VM is spawning
- 21-11-2018 11:35:41 [INFO] : fileSamba - The VM is spawning
- 21-11-2018 11:35:41 [INFO] : database - The VM is spawning
- 21-11-2018 11:35:41 [INFO] : phpDashboardLB - The VM is spawning
- 21-11-2018 11:36:17 [INFO] : phpDashboard - The VM spawned
- 21-11-2018 11:36:17 [INFO] : fileSamba - The component image downloaded
- 21-11-2018 11:36:17 [INFO] : database - Agent dependencies fulfilled
- 21-11-2018 11:36:17 [INFO] : phpDashboardLB - The VM spawned
- 21-11-2018 11:36:36 [INFO] : phpDashboardLB - The component is waiting for it's dependencies
- 21-11-2018 11:36:43 [SUCCESS] : fileSamba - Component is healthy, up and running
- 21-11-2018 11:36:43 [INFO] : phpDashboard - Agent dependencies fulfilled
- 21-11-2018 11:37:08 [SUCCESS] : database - Component is healthy, up and running
- 21-11-2018 11:37:50 [SUCCESS] : phpDashboard - Component is healthy, up and running

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Thank you