Framework for the Design, Development and Orchestration of 5G-ready Applications and Network Services, over Sliced Programmable Infrastructures

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Challenges

• Define abstractions for the design of 5G-ready applications.

• Develop an agile programming and verification platform for verifying industry vertical 5G-ready applications and network services.

• Support mechanisms for translation of application-specific requirements to programmable infrastructure requirements.

• Support intelligent orchestration mechanisms for managing the entire lifecycle of 5G-ready applications and network services.

• Support mechanisms for multi-site network, compute and storage resource management.

• Involve key actors of the value chain in the operational model.
Layering in MATILDA

**Applications Layer**
- **Smart Cities**
- **Emergency Comms**
- **Media**
- **Industry 4.0**
  - **Application Graph**
  - **Networking Requirements**
  - **5G-Ready Application**

**Orchestration Layer**
- **Network-Aware Application Graph**
- **Machine Learning**
- **Optimisation**
- **Runtime Policies Enforcement**
- **Context-Awareness**
- **Intelligent Orchestration Mechanisms**

**Network Functions and Resource Management Layer**
- **Virtualised Resources**
- **Physical Resources**
- **VNFs**
- **PNFs**
- **Application-Aware Network Slice**

**Infrastructure Layer**
- **C-RAN**
- **Edge/Fog Computing**
- **Cloud Computing**
- **Transport/Core Network**
MATILDA main objectives

• O1: to facilitate **vertical industries** to exploit the full potential of the 5G ecosystem by enabling the **development of network-aware applications**.

• O2: to provide an **open-source development and application/services composition environment** along with a critical mass of VNFs and network-aware chainable application components.

• O3: to provide a **network-aware applications orchestrator** able to deploy and manage applications over the network.
  • The orchestrator is going to support a **set of intelligent orchestration mechanisms**, including deployment and runtime policies enforcement, data monitoring, fusion and analysis and a context awareness engine for inference of knowledge based on the collected information.
MATILDA main objectives

• O4: to provide dynamic end efficient management of resources constituting an application-aware network

• O5: to prove the applicability, usability, effectiveness and value of the MATILDA framework for vertical industries.

• O6: to ensure wide communication and scientific dissemination of the innovative MATILDA results to the 5G community.
Conceptual Architecture
Analytics

Leverage on big data

Network

Customer

Social Network

Other Sources

Big Data & Analytics are the foundation

Intelligent Platform

Insights

Predictions

Actions
Analytics

Available Data

- Data regarding VNF metrics
  - available bandwidth
  - end-to-end delay
  - download and upload speed
  - physical radio parameters

Resources usage metrics from Chainable Components or VNFs

- average CPU usage
- memory usage

Application component specific metrics

- average response time
- http requests

Real-time & a posteriori processing

Predictive Analytics
(e.g. classification / regression algorithms, time series forecasting, neural networks etc.)

Analytics Component

Prescriptive Analytics
(e.g. reinforcement learning, what-if analysis etc.)
Thank You!