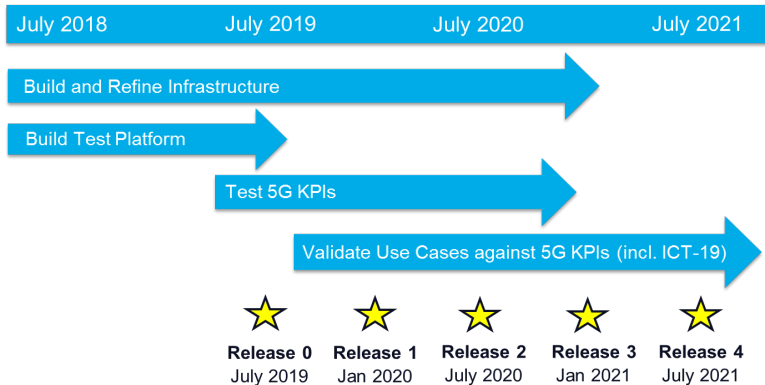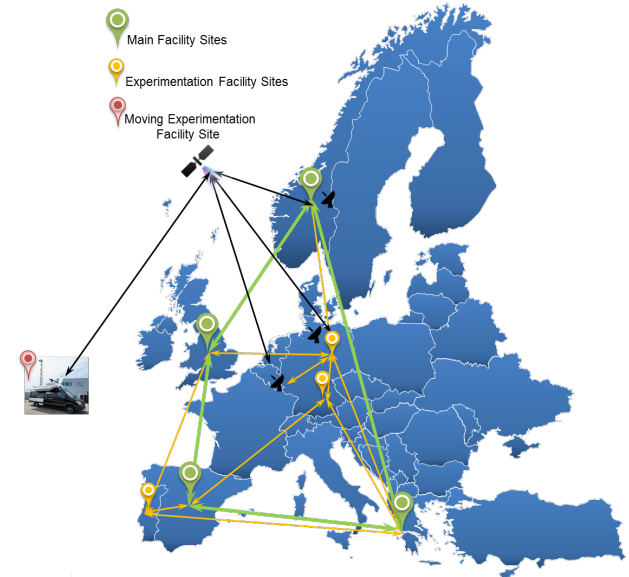(Horizon 2020 ICT-17 project)

Experiences on Implementing 5G and Services for the Verticals

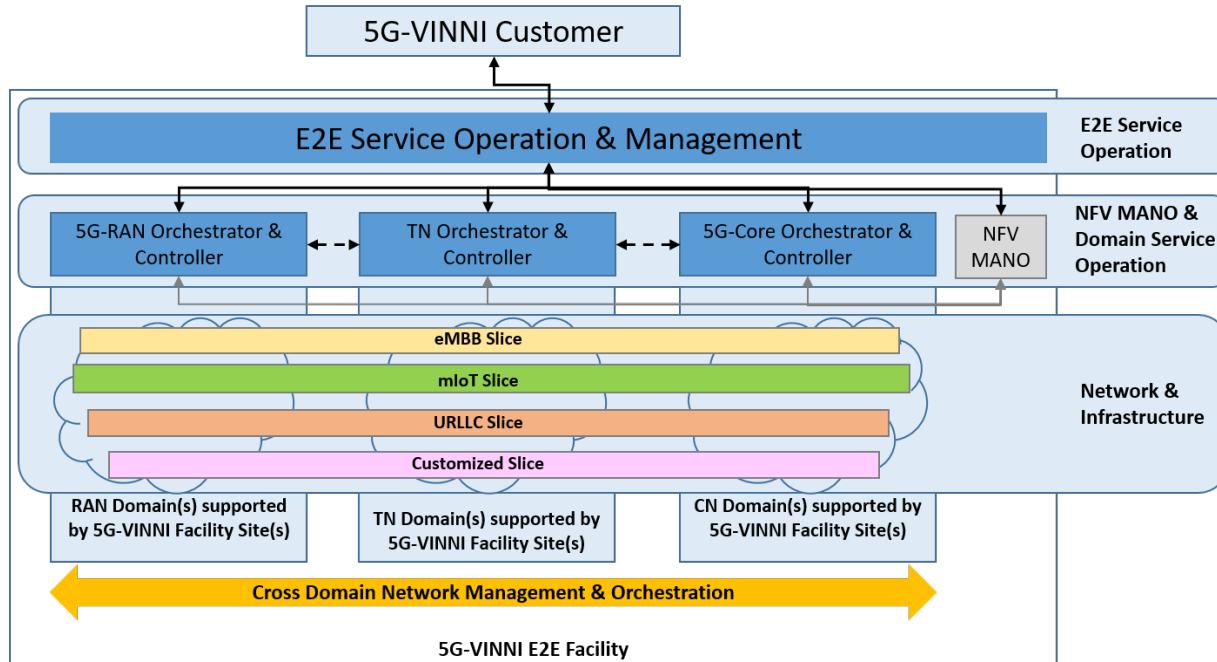**Dr. Pål Grønsund, Telenor Research, 5G-VINNI Coordinator**

Workshop on 5G Experimentation Facilities and Vertical Trials, Online, 14th October 2020

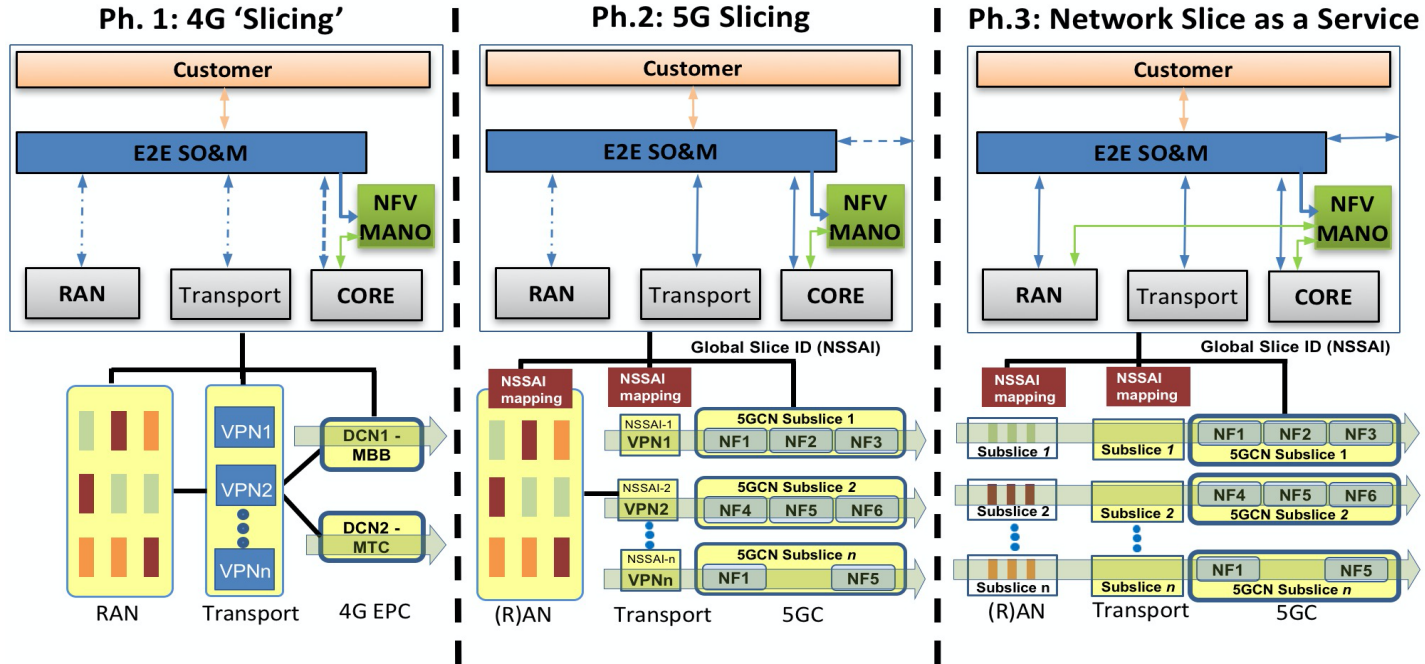# 5G-VINNI (**5G V**erticals **INN**ovation **I**nfrastructure)

- Build an open large scale 5G End-to-End facility that can
  - demonstrate that key 5G network KPIs can be met
  - be used by vertical industries to test use cases and validate 5G KPIs

- Duration: 1.July 2018 – 1.July 2021

- Consortium: 23 partners (operators, vendors, academics, SMEs)

- External Stakeholder Board (vertical industries)

- Main Facility Sites
- Experimentation Facility Sites
- Moving Experimentation Facility Site

July 2018	July 2019	July 2020	July 2021

Build and Refine Infrastructure

Build Test Platform

Test 5G KPIs

Validate Use Cases against 5G KPIs (incl. ICT-19)

★ Release 0 — July 2019
★ Release 1 — Jan 2020
★ Release 2 — July 2020
★ Release 3 — Jan 2021
★ Release 4 — July 2021

telenor — SAMSUNG — ERICSSON — KEYSIGHT TECHNOLOGIES — EANTC — simula — ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ

Telefónica — NOKIA — HUAWEI — INTRACOM TELECOM — altice labs — uc3m Universidad Carlos III de Madrid — ENGINEERING

BT — SES — CISCO — SRS SOFTWARE RADIO SYSTEMS — Lime microsystems — Fraunhofer FOKUS — EURESCOM

5G-VINNI

5G-VINNI E2E Network Slicing Architecture

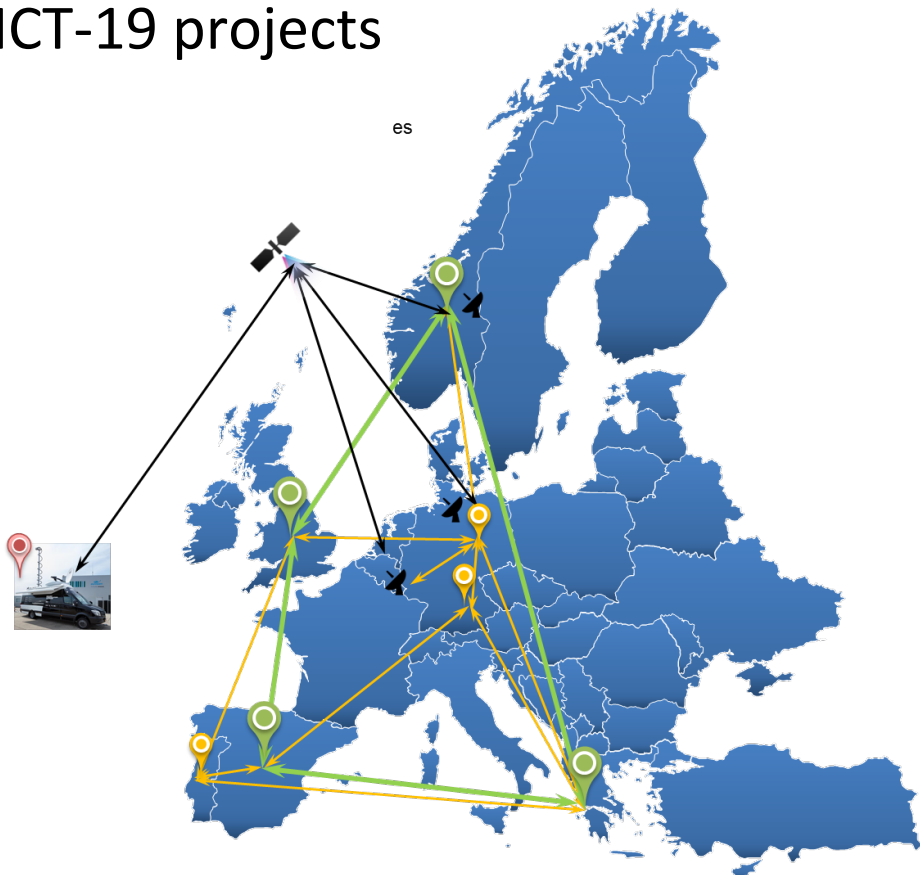# We agreed on a roadmap for Slice orchestration

Services offered by 5G-VINNI to ICT-19 projects
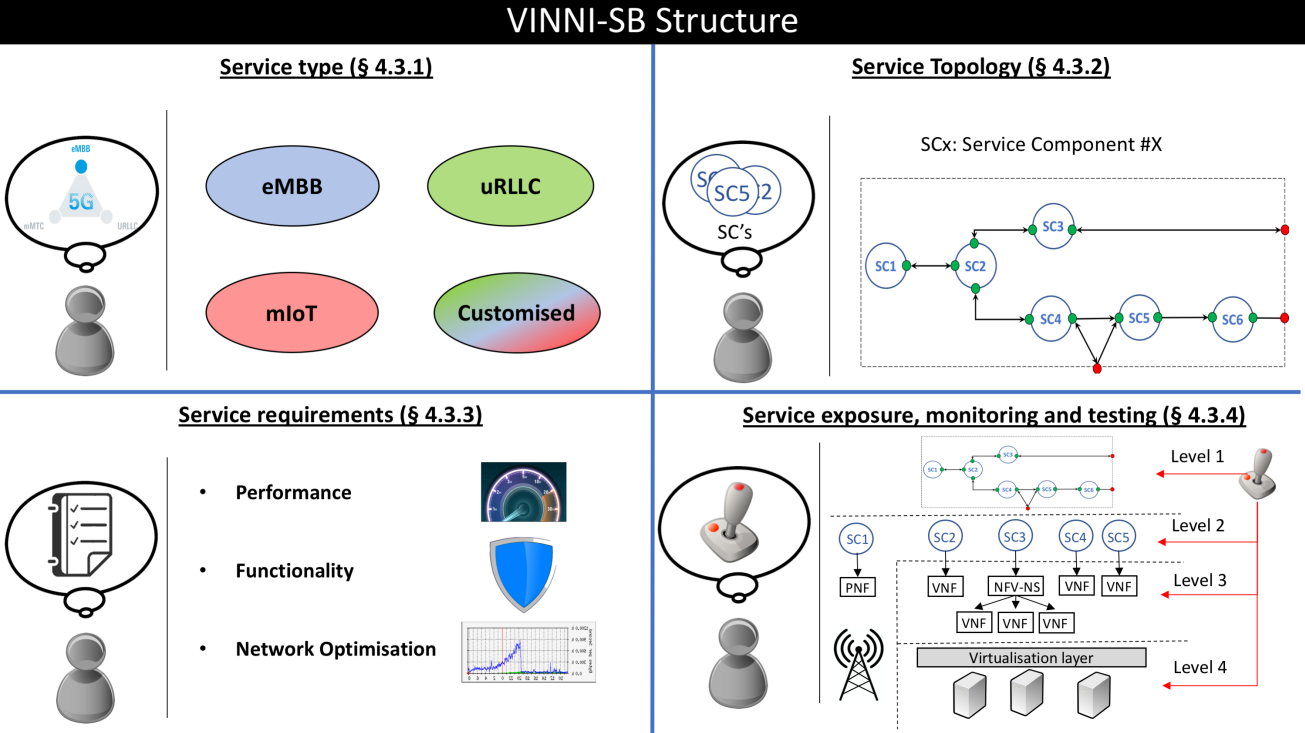## (Main Facility Sites)

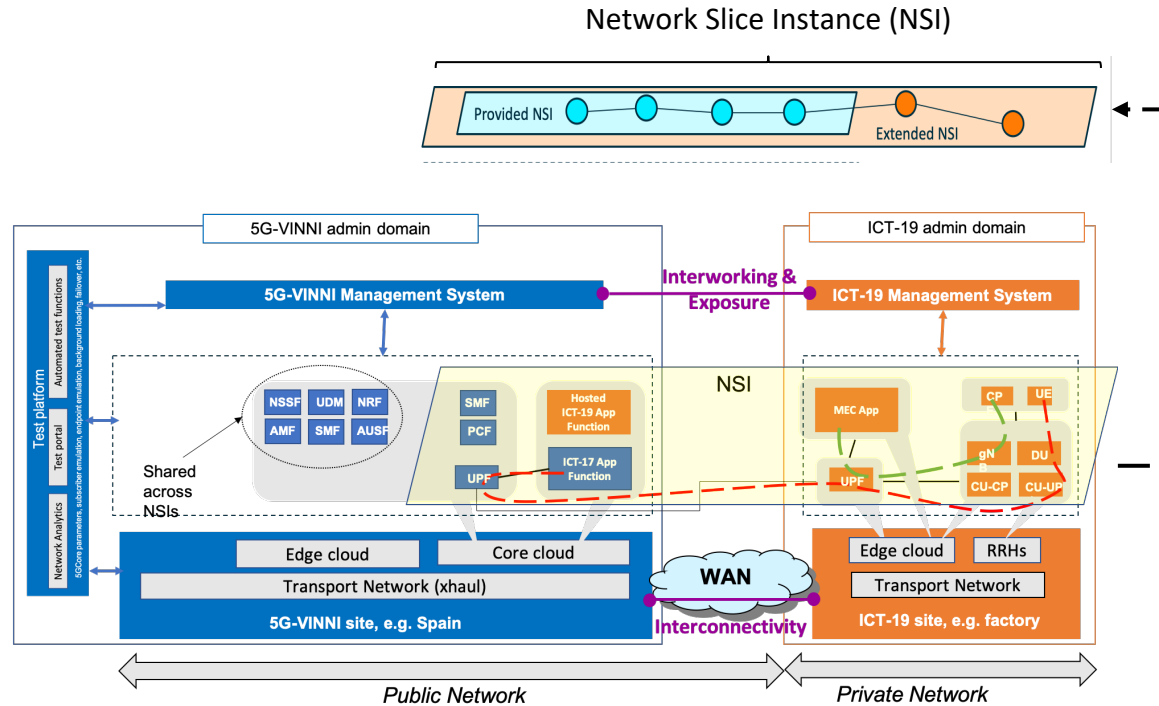| Network Slice-as-a-Service (NSaaS) |
| --- |
| eMBB network slice as a service |
| uRLLC network slice as a service |
| mIoT network slice as a service |
| Customised network slice |

Value Added Services
Monitoring-as-a-Service
Testing-as-a-Service
Security-as-a-Service
3rd party VNF hosting
Distributed data fabric
Edge and Autonomous Edge
Flexible backhaul for redundancy (e.g. Satellite)
Interconnection with other 5G sites

es

5G-VINNI

Network Slice-as-a-Service (NSaaS) request - ordering a 5G-VINNI Service Blueprint (VINNI-SB)

An example integration with Vertical (ICT-19) based on NSaaS

Network Slice Instance (NSI)

NSaaS Operation – Service Capability Exposure

Customer is able to consume operations related to…	Level 1	Level 2	Level 3	Level 4
E2E network slice <u>application layer</u> config & management	✓	✓	✓	✓
Network slice subnet (and NF) <u>application layer</u> config & management -> 3GPP scope for RAN and CN, IETF scope for TN.	✗	✓	✓	✓
Network slice subnet (and NF) <u>virtualized resource layer</u> config & management -> ETSI NFV network service (and VNF) orchestration	✗	✗	✓	✓
Resource control and management at the <u>virtual infrastructure layer</u> -> NFVI with optional EPA capabilities and infrastructural SDN control	✗	✗	✗	✓

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Test-as-a-Service (TaaS) providing automated testing services

Tool Types

L4-L7 Traffic Generators
App emulators
Attack/breaching Emulators

Conformance Tools
5G Traffic Generators
Attack/breaching Emulators

N/A

L4-L7 Traffic Generators
Attack/breaching Emulators
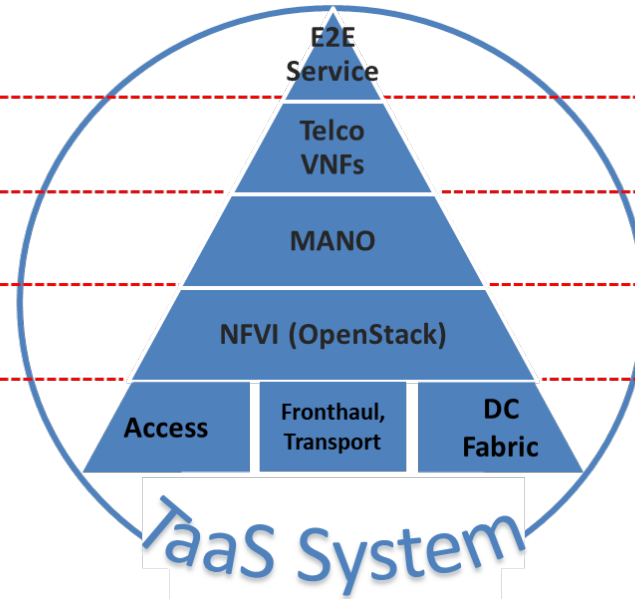
L2-L3 Traffic Generators

Test Types

Performance
QoE
Security

Conformance
Performance
Security

Conformance

Performance
Security

Performance

E2E Service

Telco VNFs

MANO

NFVI (OpenStack)

Access | Fronthaul, Transport | DC Fabric

TaaS System

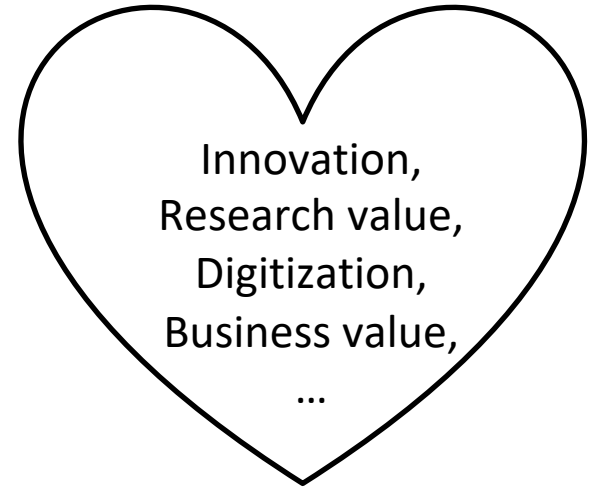*from 5G PPP Test, Measurement, and KPIs Validation WG White Paper

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Some motivation to conclude the talk

Advanced 5G facilities for Sandboxing and Validation
(ICT-17s)

$+$

Advanced Verticals use case implementations
(ICT-19s, and others)

$=$

Innovation,
Research value,
Digitization,
Business value,
…

Lots of learnings and value creation so far, let's keep on the tight cooperation, innovation, research and value creation together!

5G-VINNI

Please contact 5G-VINNI for further information, discussion and interest

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- greece-facility@5g-vinni.eu
- portugal-facility@5g-vinni.eu
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