The Standards People

Methodologies for E2E Testing & Validation of Vertical Applications over 5G & Beyond networks, an ETSI TC INT Perspective on EC-funded 5GPP Projects Contributions to Standards

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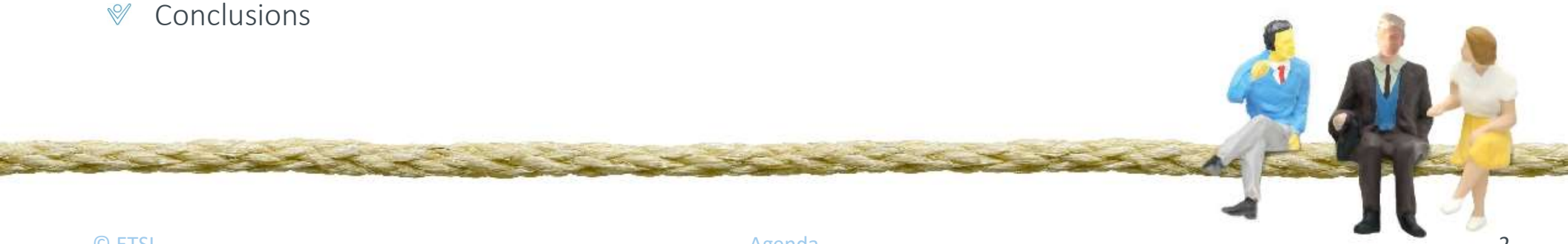
For: **ITU-ETSI-IEEE Joint SDOs Brainstorming Workshop on Testbeds Federations for 5G and Beyond: Interoperability, Standardization, Reference Model and APIs**

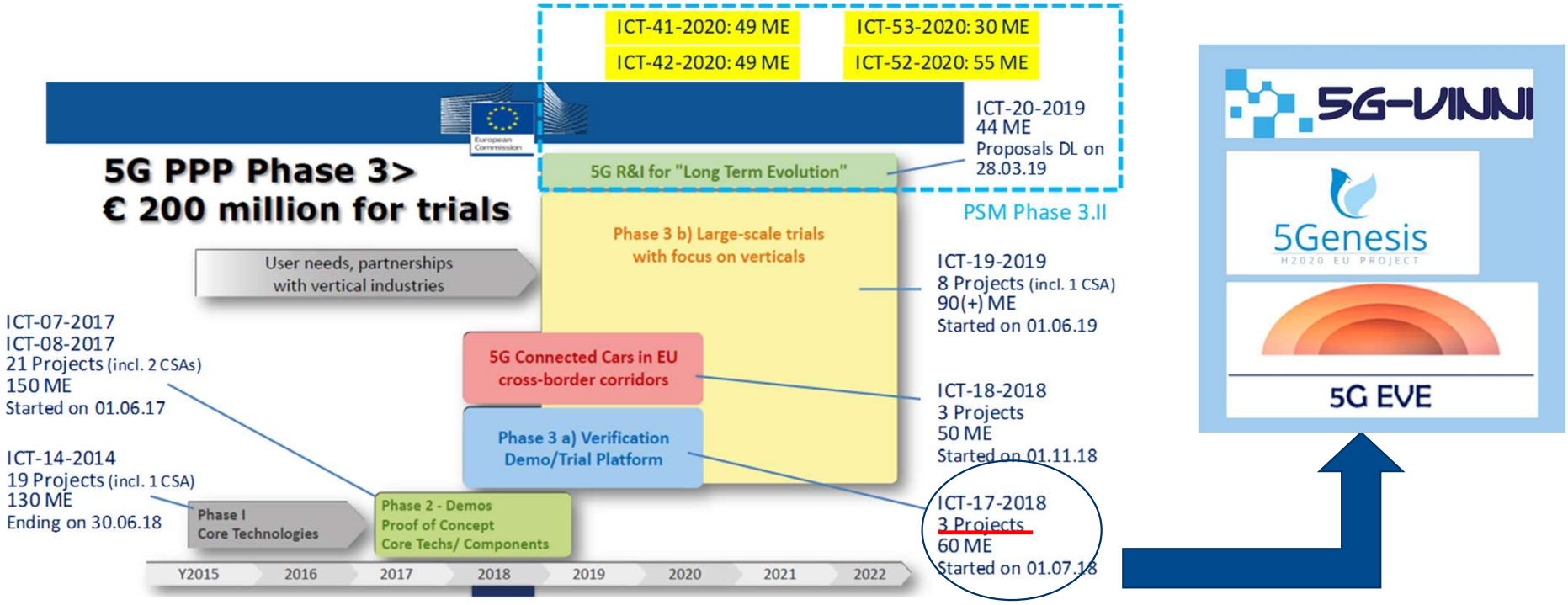
15/3/2021

AGENDA

- Brief background on EC-funded 5GPP Projects and ETSI INT TC WI creation
- Vertical expectations on E2E Testing & Validation of Vertical Applications over 5G & Beyond networks
- 5GPP testing platforms assessment
- The ETSI vision of a generic testing and validation platform, recommendations highlights:
  - Technology capabilities
  - Test methodology and processes
  - The importance of multi-dimensional experimentation and validation process
- Conclusions

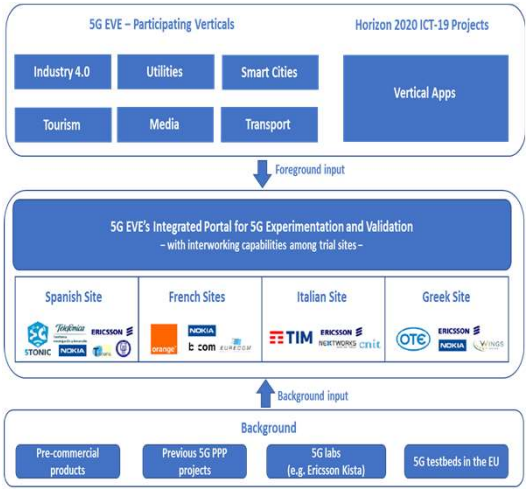


2018 up to today: 5G PPP EU vertical trials



E2E validation facilities as
unique ecosystems for Verticals and SMEs to unlock the 5G technology value

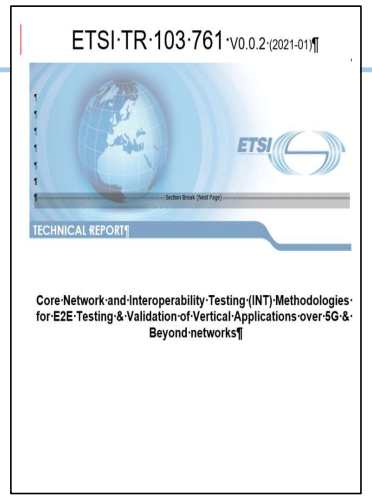
Mid 2020: Creation of new WIs in ETSI INT



5G EVE

findings:

5G Testing facility can validate vertical services *in pre-comercial stage. 5G and beyond* ***service and technology disruption*** *need new and* ***evolving test methodologies***



5G EVE
5G-VINNI
5Genesis
5GROWTH
5G PPP

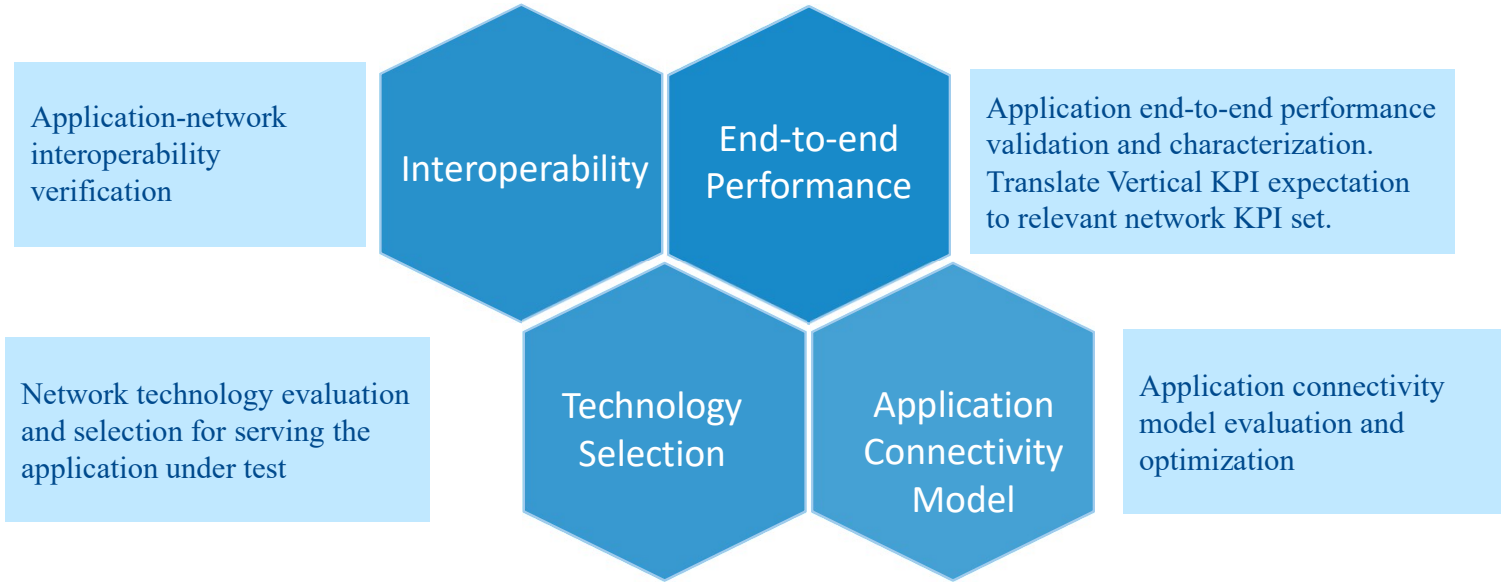
WI 00170: Technical Report –in progress
To be published july 2021

WI 00180: Technical Specification (TS) – To be planned

ETSI INT goal: *"identify the* ***main testing challenges of 5G and beyond****, developing a* ***reference testing architecture*** *for the 5G and beyond services and providing* ***guidelines and roadmaps for standardization*** *in ETSI and some other SDOs."*

ETSI INT WI 00170: vertical expectations

VSV6

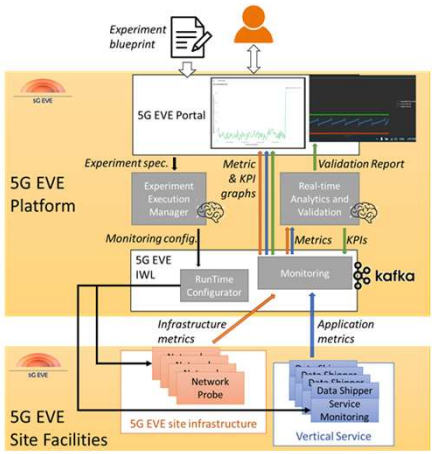


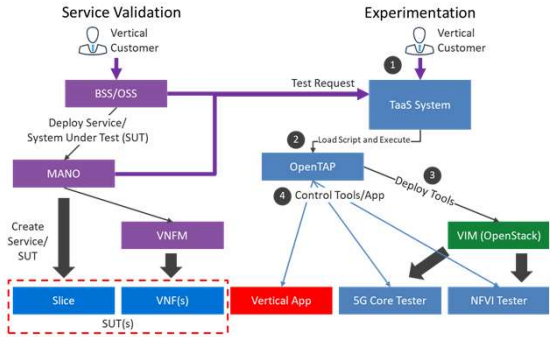
Slide 5

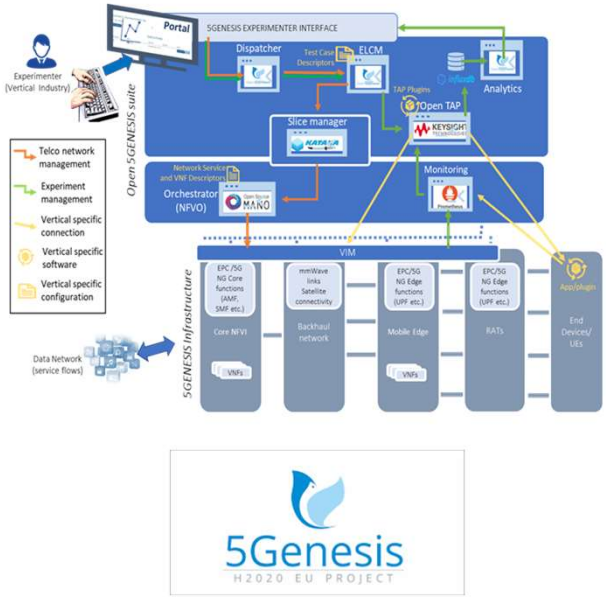
VSV6 mention mapping of vertical KPi to core KPI

Veronica Sanchez VEGA; 05/03/2021

ETSI INT 170 WI: 5G PPP platform assessment



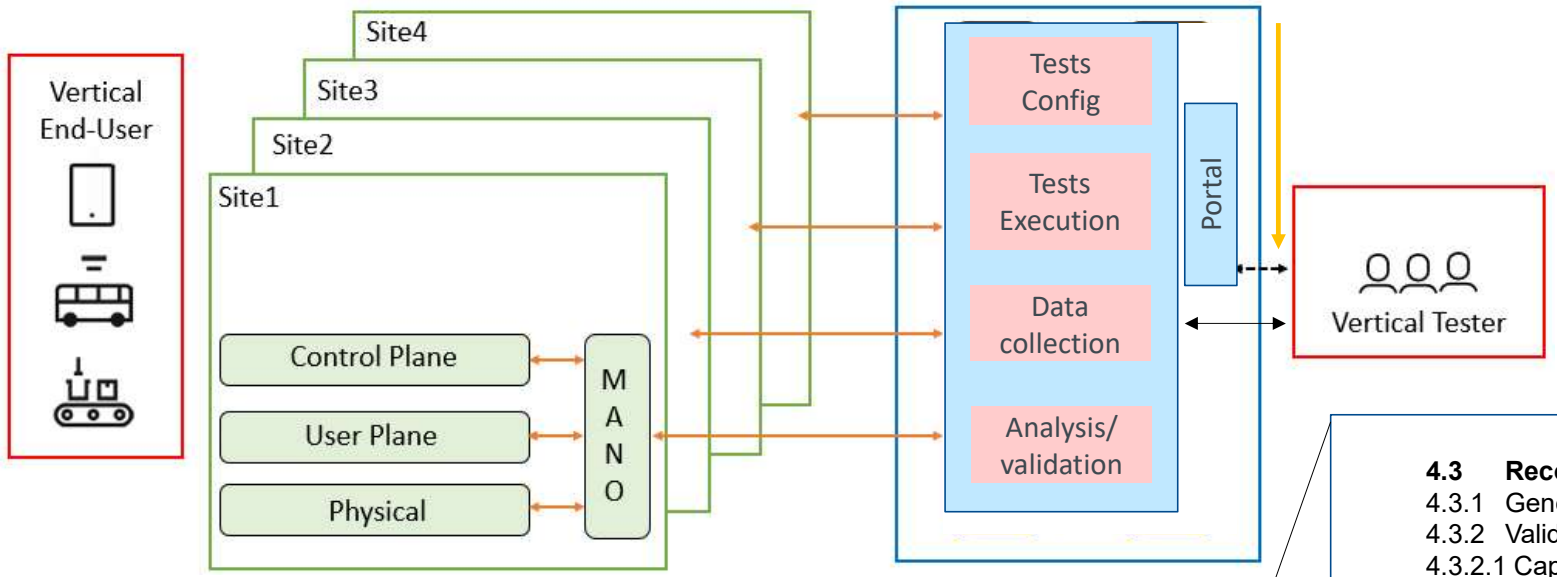




- ✓ Vertical as the Test under subject using TaaS validation framework
- ✓ Vertical application KPI validation
- ✓ Controlled multi-site 5G facilities with latest 5GS technology (3GPP releases) and MANO
- ✓ Automated experiment workflow

ETSI 170 WI: the vision of a generic validation platform

APIs exposed that can used for federation with other platform/testbeds



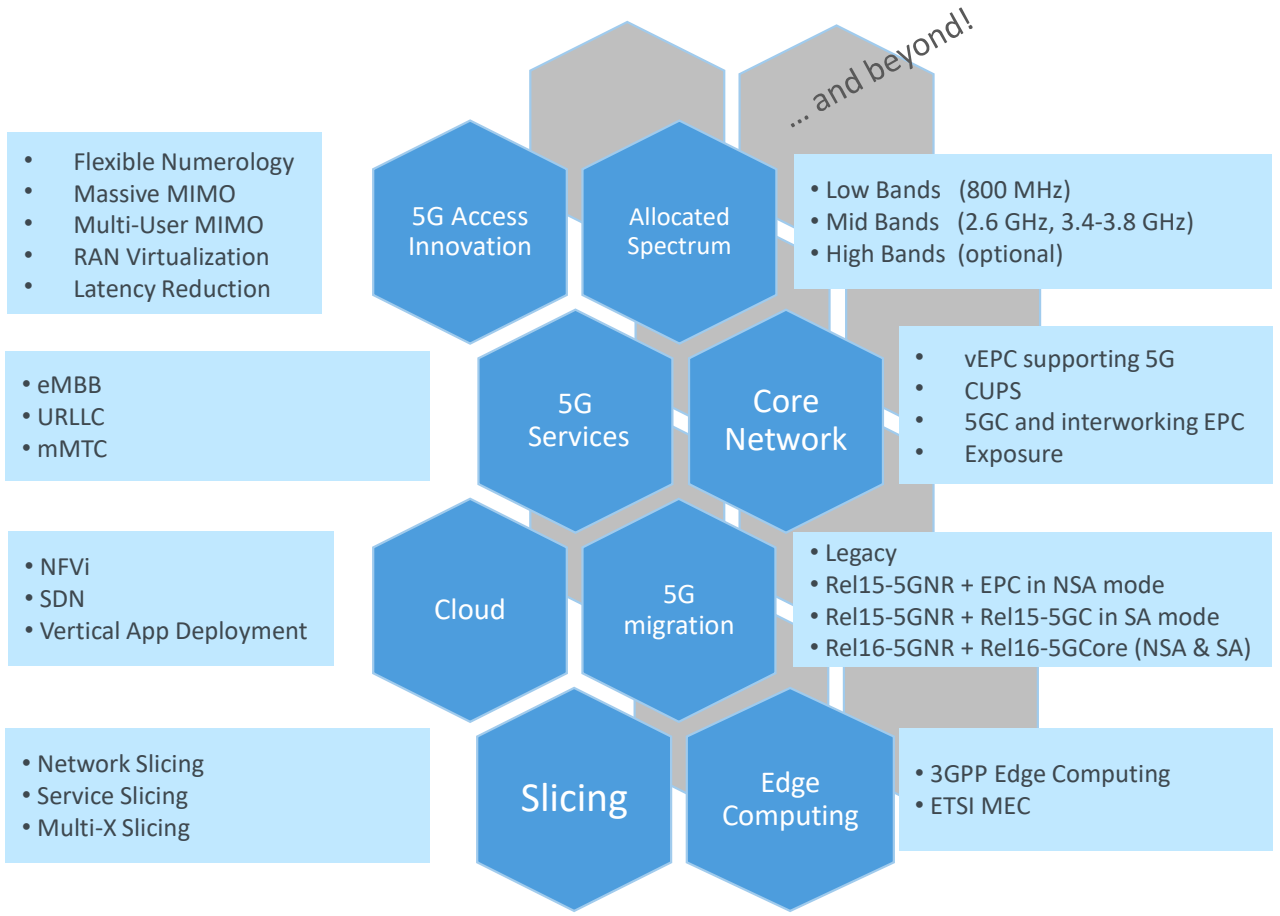
5G enabled vertical applications

5G and beyond technologies

The B5G-app testing and validation platform

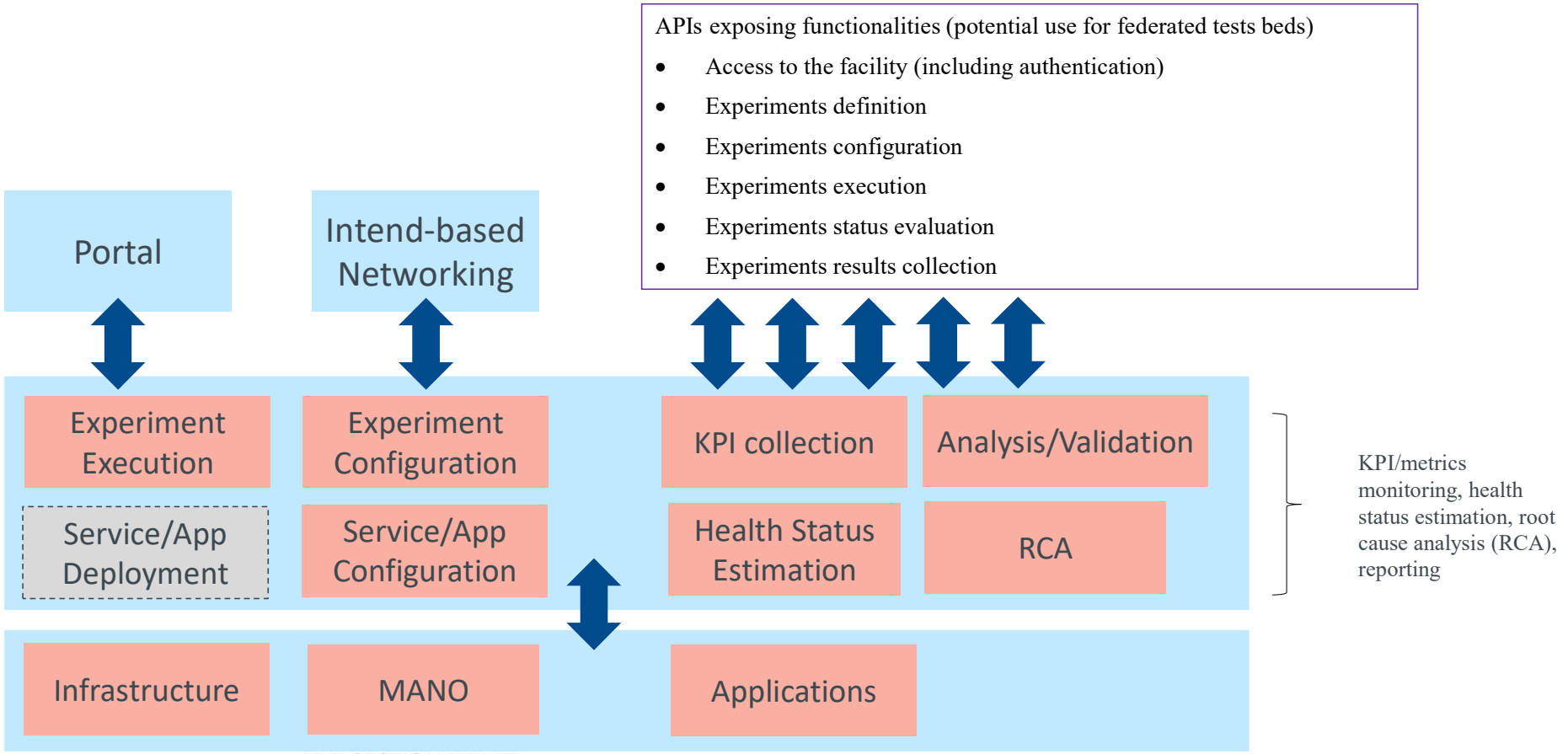
4.3 Recommendations
4.3.1 General
4.3.2 Validation Framework
4.3.2.1 Capabilities
4.3.2.1.1 5G Capabilities & Enablers
4.3.2.1.2 Testing and Validation Environment
4.3.2.2 Processes
4.3.2.3 KPI Mechanisms

ETSI INT WI 00170: platform network capabilities



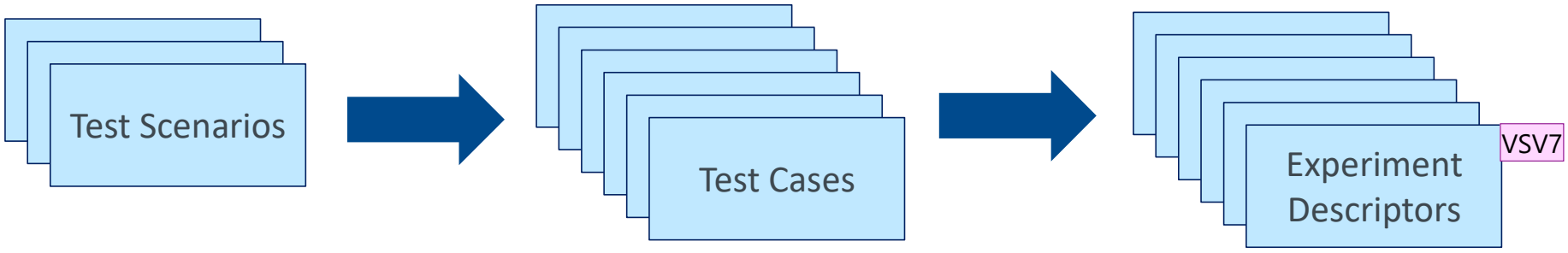
Platform to evolve alongside technology

ETSI INT WI 00170: Testing and Validation Environment



ETSI INT WI 00170: Test processes

Recommendations on Test Scenarios, Test Cases, Experiment Descriptors



Describe: different network conditions, operation modes, configurations

Ensure: the coverage of all the relevant conditions that can impact the performance results of the experiment

Describe: KPIs, configuration, procedures, measurement points and calculation formulas

Ensure: experiment repeatability, regardless of the test equipment and the entity performing the certification

Describe: all information for running the experiment

Ensure: formalization of the experiment for easy assessment/comparison of the outputs

VSV7 The formalization of the experiment is an important step for the assessment/comparison of the outputs obtained during the execution for the experiment. The experiment descriptor should be well-structured and formalised. To this end, all the required information for running the experiment is recommended to be included in the experiment descriptor

Veronica Sanchez VEGA; 05/03/2021

The importance of experiment descriptors

```
{
 ExperimentType: Standard/Custom/
 Automated: <bool>
 TestCases: <List[str]>
 UEs: <List[str]>  UEs IDs

 Slice: <str>
 NSs: <List[Tuple[str, str]]> (NSD Id, Location)
 Scenario: <string>

 ExclusiveExecution: <bool>
 ReservationTime: <int> (Minutes)

 Application: <str>
 Parameters: <Dict[str,obj]>

 Remote: <str> Remote platform Id
 RemoteDescriptor: <Experiment Descriptor>

 Version: <str>
 Extra: <Dict[str,obj]>}
```

Example of a potential experiment descriptor

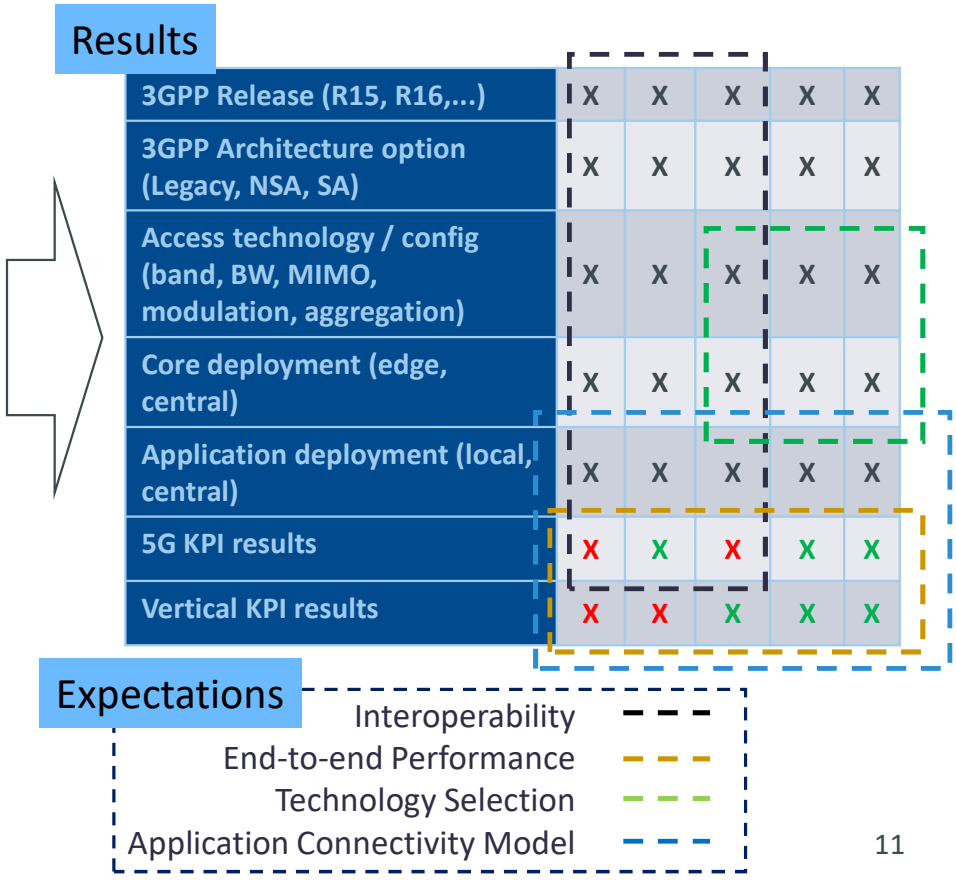
- Type of experiment
- Test cases to execute
- UEs to use

- Configures and deploys:
- 5G slice
- Network services
- Scenarios

- Experiment scheduling

- Application deployment (optional)

- Distributed experiments (optional)



Conclusions

- Vertical industry needs to experiment and pilot their “5G enabled” business case before moving to commercial.
- There is a need to standardize a **generic 5G and beyond Application testing and validation framework** which **validates the vertical application** in a systematic manner under different 5G technology choices. Vertical needs to be involved in the design and result evaluation phase. This is beyond current CSPs network testing paradigm.
- The ETSI INT is currently producing a **Technical Report which captures recommendations on such validation framework and methodologies,** leveraging the experience from EU 5G PPP trial projects. The next standardization steps are under discussion.
- The generic vertical validation framework will expose **APIS to enable federation with other platform/testbeds**
- **ETSI INT TR to be released in June**, ETSI member participation is welcome.. stay tunned!!

References

ETSI INT TC WI180 TR draft: https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=59575

TMV: 5G PPP TMV WP, White Paper: "Validating 5G Technlogy Performance – Assessing 5G architecture and Application Scenarios", https://5g-ppp.eu/wp-content/uploads/2019/06/TMV-White-Paper-V1.1-25062019.pdf

5G EVE deliverables:

- Deliverable with capabilities D1.3: https://doi.org/10.5281/zenodo.3628333
- Deliverable with KPI monitoring D3.4: https://doi.org/10.5281/zenodo.3946323
- Deliverable with KPI validation, reporting and performance diagnostics D5.5: https://doi.org/10.5281/zenodo.3946255

5G-VINNI: Deliverables on Testing Methodologies and Test as a Service Platform definition

- Deliverable D4.1 and Deliverable D4.2 https://doi.org/10.5281/zenodo.3345626

5GENESIS deliverables:

- Deliverable with API description D3.77D3.8 https://5genesis.eu/wp-content/uploads/2019/10/5GENESIS_D3.7_v1.0.pdf
- Deliverable with experimentation methodology https://5genesis.eu/wp-content/uploads/2020/07/5GENESIS_D2.4_v1.0.pdf
- Deliverable with monitoring and analytics https://5genesis.eu/wp-content/uploads/2019/10/5GENESIS_D3.5_v1.0.pdf

Thank you!