



6G SANDBOX:

Supporting Architectural and technological Network evolutions through an intelligent, secure and twinning enabled Open experimentation facility



Michael Dieudonne – Project Coordinator

June 3, 2024

6G-SANDBOX – Project overview

6G-SANDBOX: Supporting Architectural and technological Network evolutions through an intelligent, secured and twinning enabled Open experimentation facility



[SNS experimental Infrastructure: HORIZON-JU-SNS-2022-STREAM-C-01-01](https://6g-sandbox.eu/)



✓ *The 6G-SANDBOX project is about the definition and the development of a pan-European 6G experimentation infrastructure*



17
Partners

8
Countries

Project Coordinator: Michael Dieudonne (Keysight)
Technical Manager: Pedro Merino Gomez (UMA-ITIS)
Deputy Technical Manager: Dimitris Tsolkas (Fogus I&S)

<https://6g-sandbox.eu/>

Project Information

6G-SANDBOX

Grant agreement ID: 101096328

DOI

[10.3030/101096328](https://doi.org/10.3030/101096328)

Start date

1 January 2023

End date

31 December 2025

Funded under

Digital, Industry and Space

Overall budget

€ 8 546 551,53



EU contribution

€ 8 039 821,26

Coordinated by

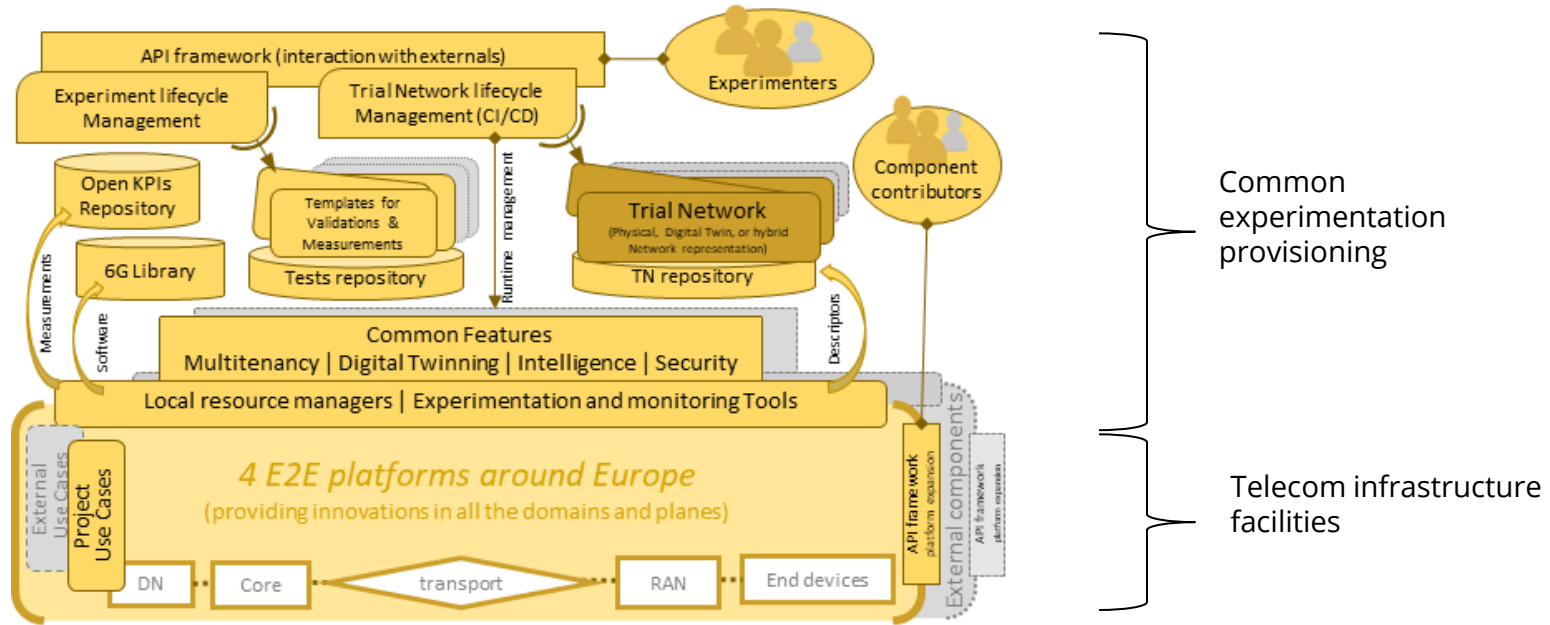
KEYSIGHT TECHNOLOGIES BELGIUM

Belgium

FINANCIAL SUPPORT IN THE FORM OF GRANTS
AWARDED AFTER A CALL FOR PROPOSALS



6G-SANDBOX Concept



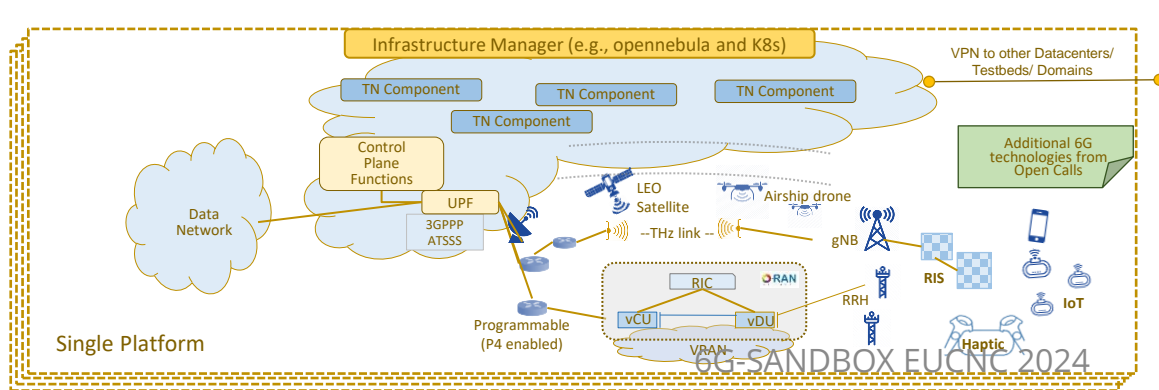
(6G-SANDBOX) TRIAL NETWORK: fully configurable, manageable and controllable network which *combines digital and physical nodes* and provides services for 6G *technology validation* and 6G *KPI measurements*

- the experimenter can manage the lifecycle of the experiment and the trial network
- the open calls target both experimenters and component contributors

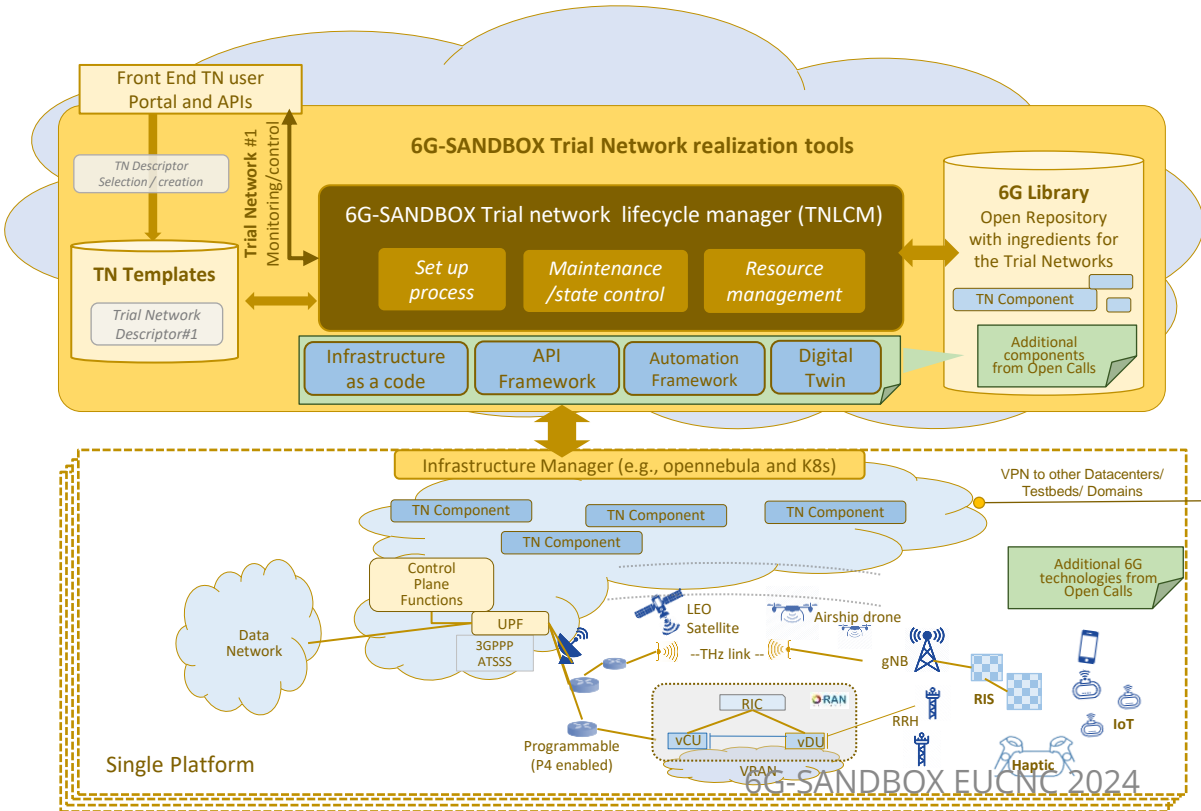
6G-SANDBOX - The Architecture

The basis (lower layer) of the architecture is the compute and connect infrastructures:

- 4 experimentation platforms well distributed around Europe
 - MALAGA | ATHENS | BERLIN | OULU
- Rich set of access technologies (RIS, O-RAN), high coverage, satellite links, network core (open-source and commercial), experimentation-specific hardware..
- Management and orchestration capabilities (based on Opennebula services) make the platforms *“Trial Network -ready”*
- The platforms are being expanded with components brought by Open Call projects

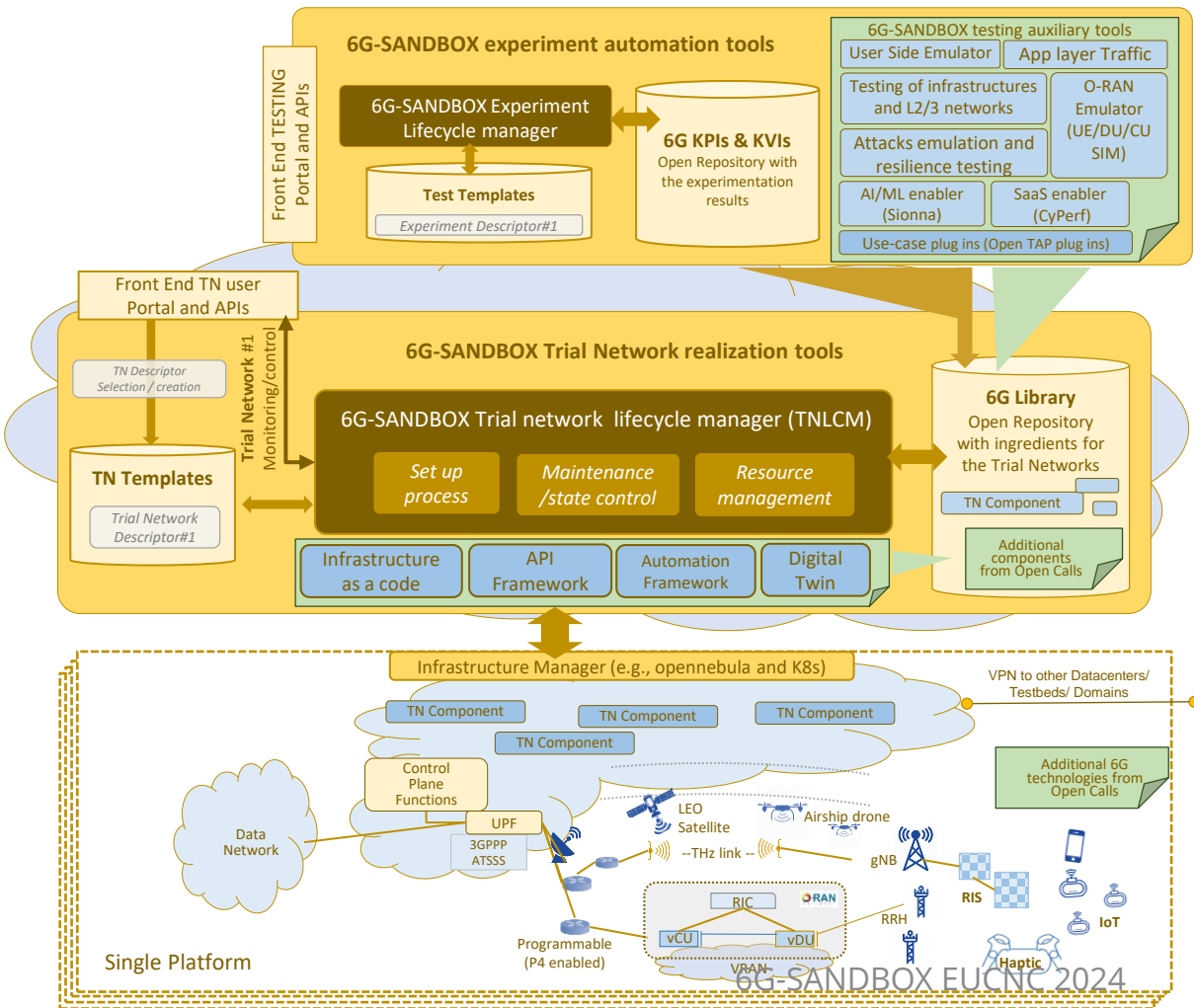


6G-SANDBOX - The Architecture



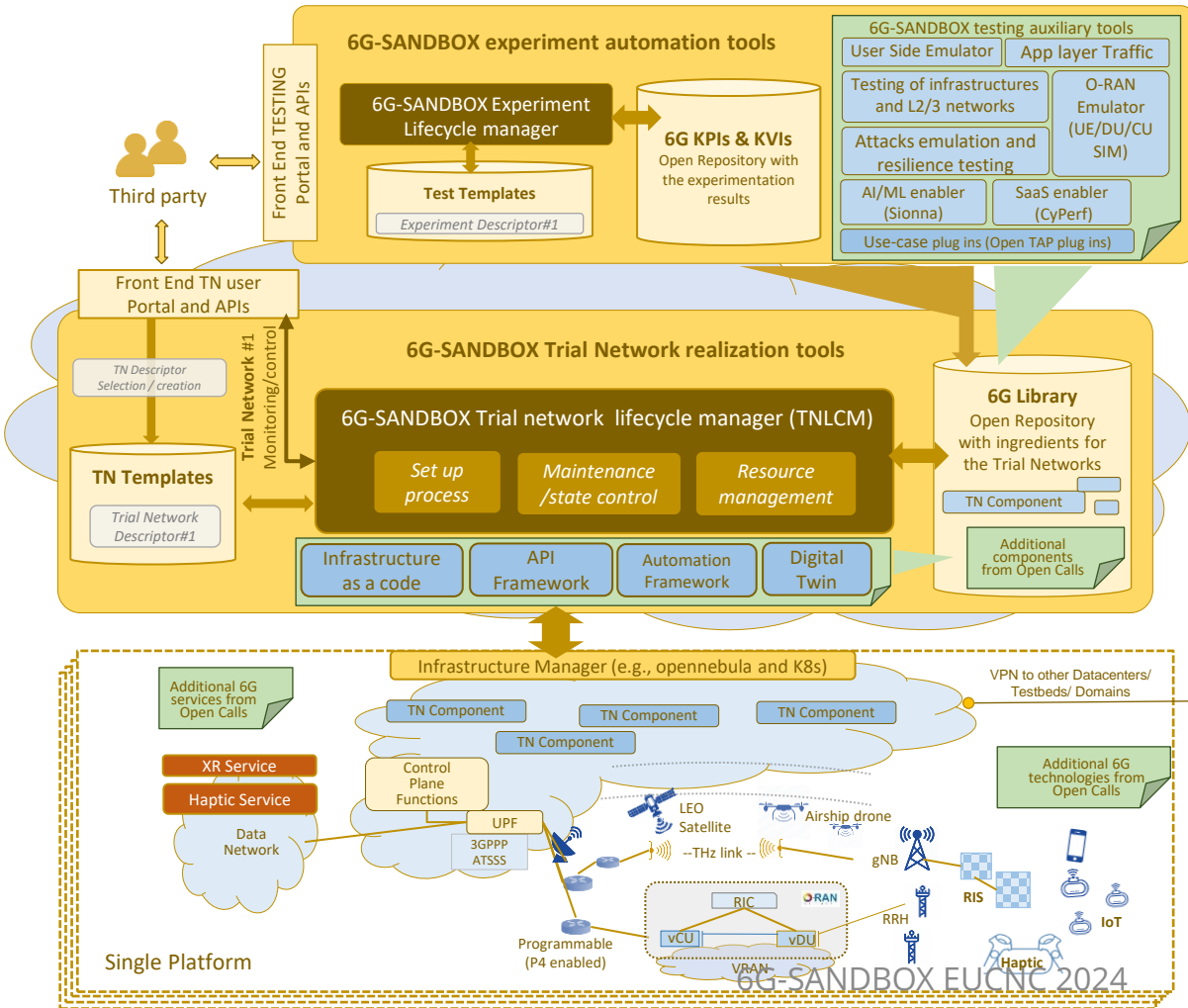
The heart of the architecture is the components that realize the TN concept:

- The TN portal
- The TNLCM (see [D4.1](#))
- The 6G library and the API framework (see [D3.1](#))
- The Network Digital Twin
- Additional software components from OC are hosted in the Library



Experimentation tools are also treated as TN components:

- Fundamental
 - ELCM
 - Experimenters' portal
 - 6G KPI/KVI data repository
- Auxiliary
 - A very rich toolbox for testing / measurement campaigns is available from Keysight



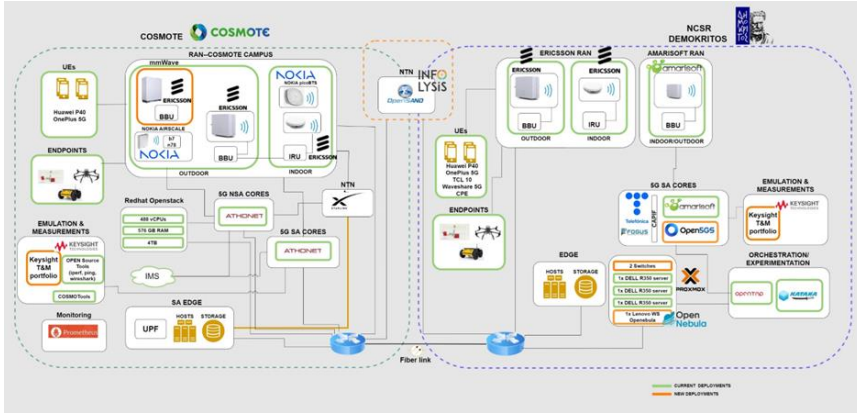
Third parties can play various roles in the 6G-SANDBOX facility

- Experimenter
- TN-user
- TN-Operator
- Third party Technology Provider
- Third party 6G-SANDBOX host

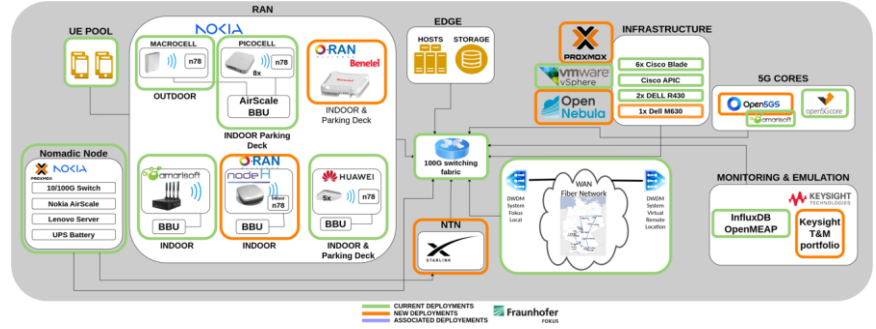
Any vertical use case can be hosted for experimentation

- An XR/Haptic use case is developed as PoC
- OCs bring new 6G use case

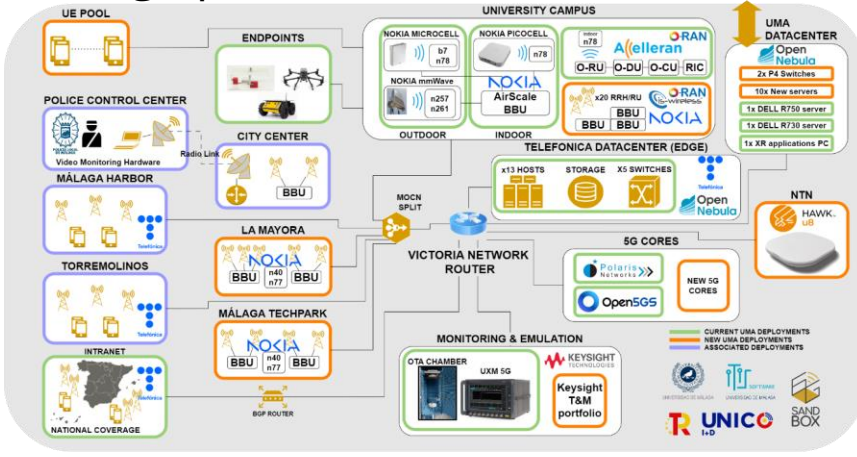
Athen platform



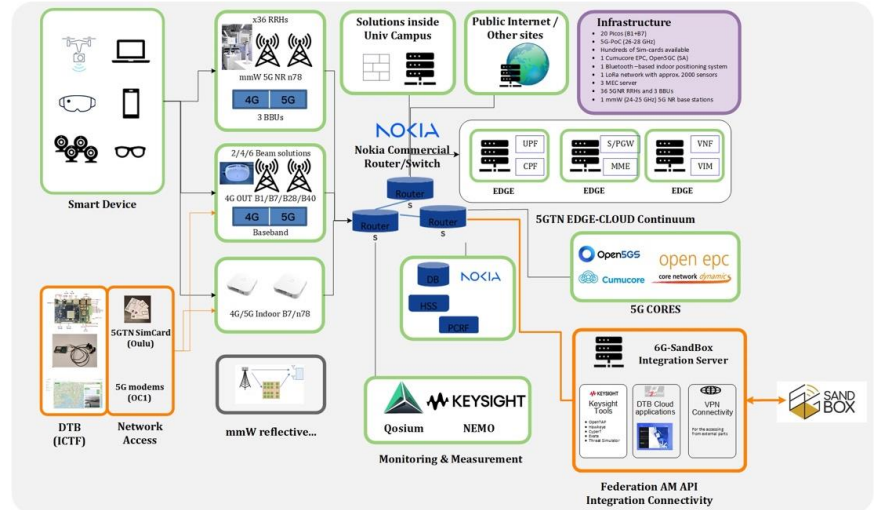
Berlin platform



Malaga platform



Oulu platform



6G-SANDBOX – Trial Networks

Key challenges in experimentation over compute and connect infrastructures:

- The experimenter is not able to access internal configuration of the network components
- Manual (re)configuration and provisioning of the setup is applied for medium- or long-term experiments as well as for concurrent experiments on the same resources

Trial Network: fully configurable, manageable and controllable network which combines digital and physical nodes and provides services for 6G technology validation and 6G KPI measurements

Middle-ware for enabling network set up by third party

Experimentation infrastructure as a code



- ✓ Instances of Trial Networks might be offered by targeting specific network domains and technologies
- ✓ End-to-end Trial Networks will be offered by the **four experimentation platforms** within the project

6G-SANDBOX - The M.O.R.I.S approach

(MODULARITY)

Trial Network is composed from a chain of TN components that we can pick and deploy automatically from the **6G library**

(OPENNESS)

Provide experimenters with a **standardized API framework** for interoperable and secure access.

(REUSABILITY)

Common testing methodologies and templates towards reusable tests and **comparable KPI/KVI results**

(INNOVATION)

Incorporate innovative technologies end features at connectivity, management and application level (**project Ambitions**)

(SUSTAINABILITY)

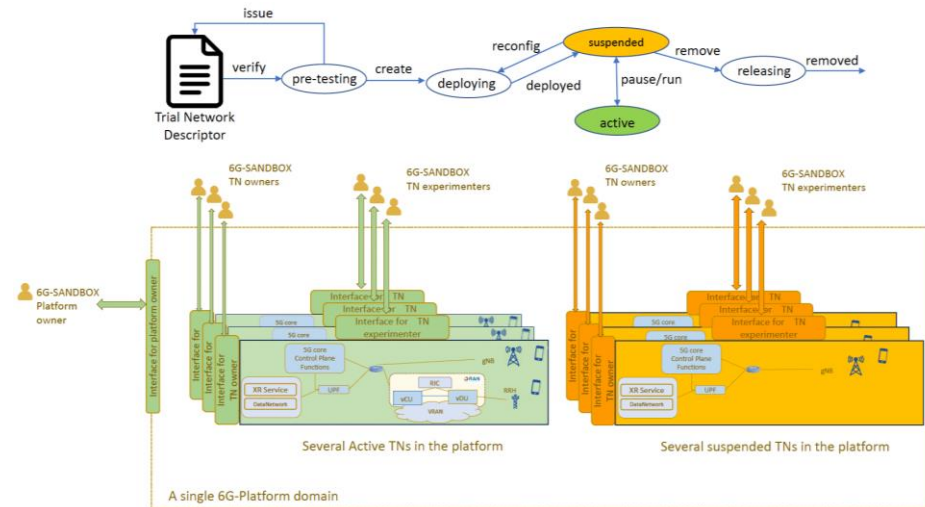
Evolution that holds beyond the project lifetime through **collaborations within SNS JU** and other fora (**e.g., MoUs**)

Becoming a 6G-SANDBOX facility!

- Announcing the 6G-SANDBOX Toolkit at EUCNC 2024, First release July 2024.
- Software package that transforms your infrastructure into a 6G-SANDBOX facility enabling the Trial Network concept via a fully automated environment deployment

Main components of the Toolkit

- TNLCM + automation tools (Terraform, Ansible, etc.)
- 6G-Library with all the models of the components
- Some implementation of components
- Tools for experimentation (ELCM, Campaign Manager, ..)
- .. and documentation for platform operators, component providers, and experimenters





Thank you!

Questions?