



The Pan-European 6G federated infrastructure flagship project

'Sustainable federation of Research Infrastructures for Scaling-up Experimentation in 6G'

6GSNS Call 2 webinar

Prof. Christos Verikoukis



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Co-Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. <https://smart-networks.europa.eu/>



14/03/2024



Propose a scalable, open and standards-compliant approach to experimentation and vertical application deployment in a **pan-European Federation of 6G infrastructures, that provides access to a comprehensive library of 6G enablers.**

This approach, leveraging and extending APIs from the Camara Initiative and GSMA OPG, provides a clear roadmap to 3GPP compliance and future Stream-D deployment.

Key participants from:
Stream C Phase-1 projects
Other SNS Phase-1 projects
National 6G initiatives
SLICES-RI,
as well as industrial partners
with a proven
standardization record and
participation in the Camara
Initiative, to co-develop,
deploy and test the
SUNRISE-6G solution.



About SUNRISE-6G



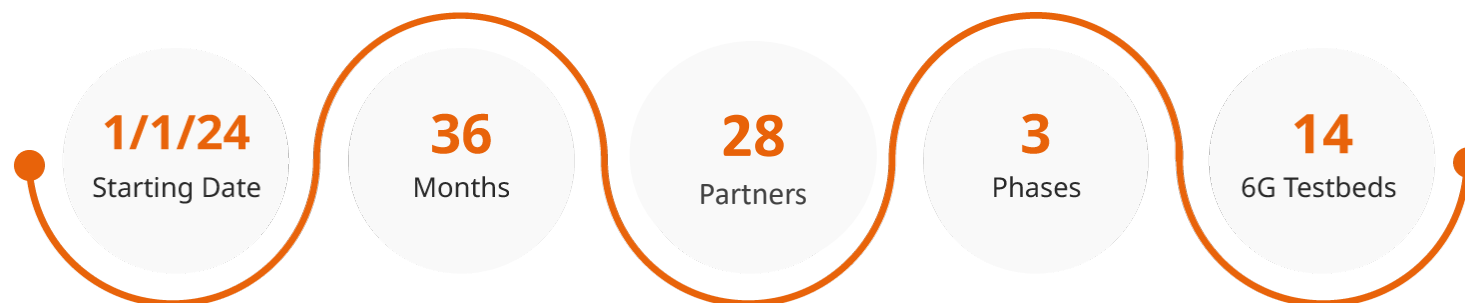
**Pan-European 6G Federated
Infrastructure Flagship project**

A graphic of a globe with a blue and white color scheme, overlaid with a network of blue lines and hexagonal nodes, representing a global 6G network. The text "6G" is prominently displayed in white over the globe.

6G

European 6G Flagship Infrastructure Project

- ✓ **Grant Agreement:** 101139257
- ✓ **Call:** HORIZON-JU-SNS-2023-STREAM-C-01-01: Complementary SNS experimental Pan-EU federated Infrastructure
- ✓ **Total budget:** 13,918,710.63 Euros
- ✓ **EC funding:** 13,120,676.76 Euros



✓ **Project Coordinator:**

- ✓ Prof. Christos Verikoukis (ISI/ATH)
- ✓ Dr. Theodora Tsapikouni (ISI/ATH)

✓ **Technical Manager:**

- ✓ Dr. Konstantinos Ramantas (IQU)
- ✓ Dr. Adriana Fernández (I2CAT)

✓ **URL:** www.sunrise6g.eu

✓ **Total PMs:** 1573,75

✓ **Project Officer:** Mr. Pavlos Fournogerakis



- **Sustainable approach to the federation of 6G research infrastructures, inspired by the “Network of Networks” vision.**
 - Standards compliant Federation of IT and networking resources
 - Cross-domain vertical deployment
 - Federation of the AI Plane
- **Streamlined experimentation by third party experimenters**
 - User-facing enablers (“6G Library”)
 - AI assisted workflows (“E2EAI framework”)
 - Intent-Driven Experimentation



A truly scalable and 3GPP compliant Federation solution.



14 testbeds in 8 EU member states federated under a common Experimentation Plane.



New 6G enablers.



Federated AlaaS and MLOPS AI plane.



3 testbeds from the large scale ESFRI SLICES-RI project.

SUNRISE-6G Objectives



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1

Deliver a pan-European 6G experimentation facility, supporting cross-domain vertical application deployment and testing via a decentralized management plane

2

Implement an Open Federation Framework supporting vertical use-case deployment at the Federated Facility via standardized Camara Service APIs

3

Ensure the evolvability of the facility, offering streamlined test-bed on-boarding work-flows, and providing a clear roadmap to 3GPP compliance and large-scale trials

4

To validate the Federated facility via advanced UCs, showcasing cross-test-bed vertical deployment, and seamless on-boarding of third-party test-beds

5

Offer a 6G Library of breakthrough components, devices and frameworks covering the complete device-to-cloud value chain, which is externally accessible for experimentation

6

Facilitate Intent-Driven Life-cycle Management of experimentation processes through MLOps-driven Native AI integration

7

Dissemination, standardization and exploitation

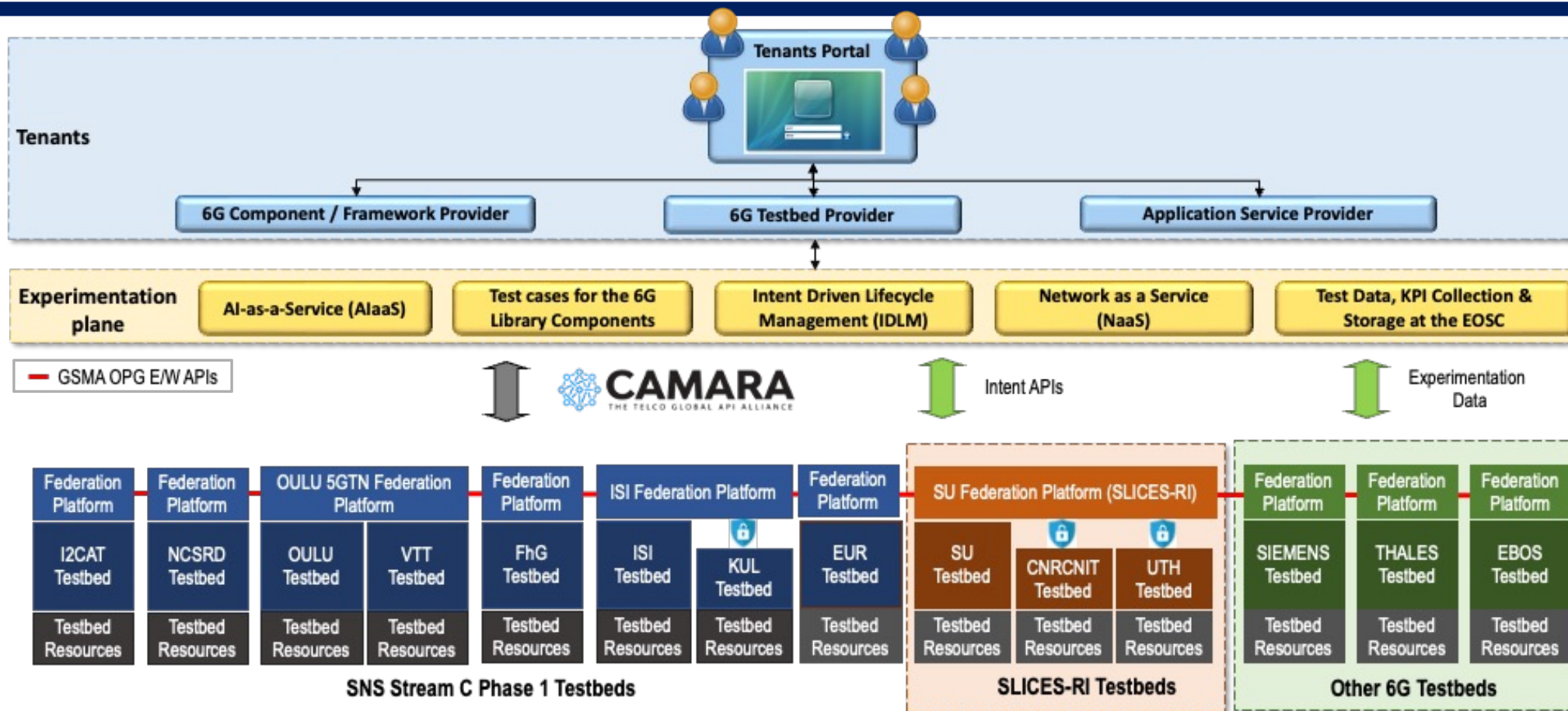
SUNRISE-6G Architecture



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Implement CAMARA Service APIs & GSMA Operator Platform Group for portability (and replicability) of applications and services across different federated facilities.

Expose in Testing-as-a-Service manner all project testbeds as a sustainable Facility; Pan-European experimentation during the SNS programme.

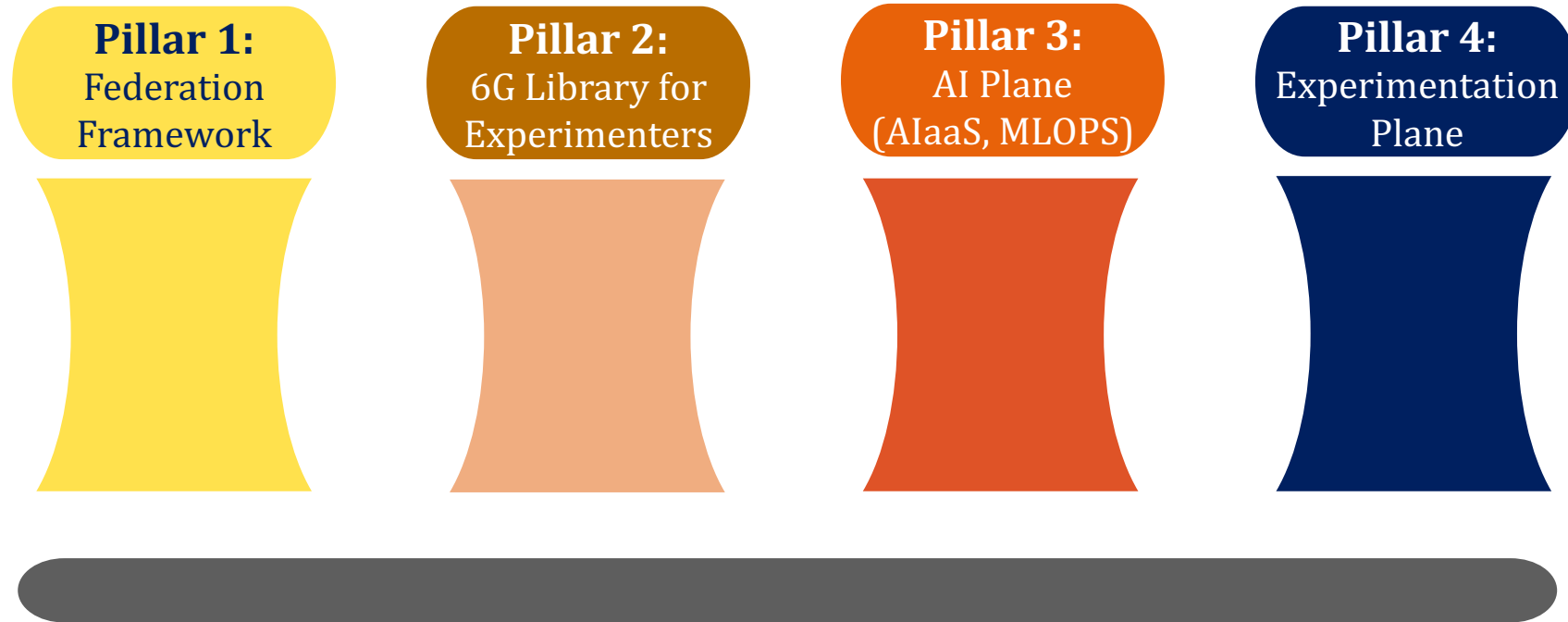
SUNRISE-6G Innovation Areas

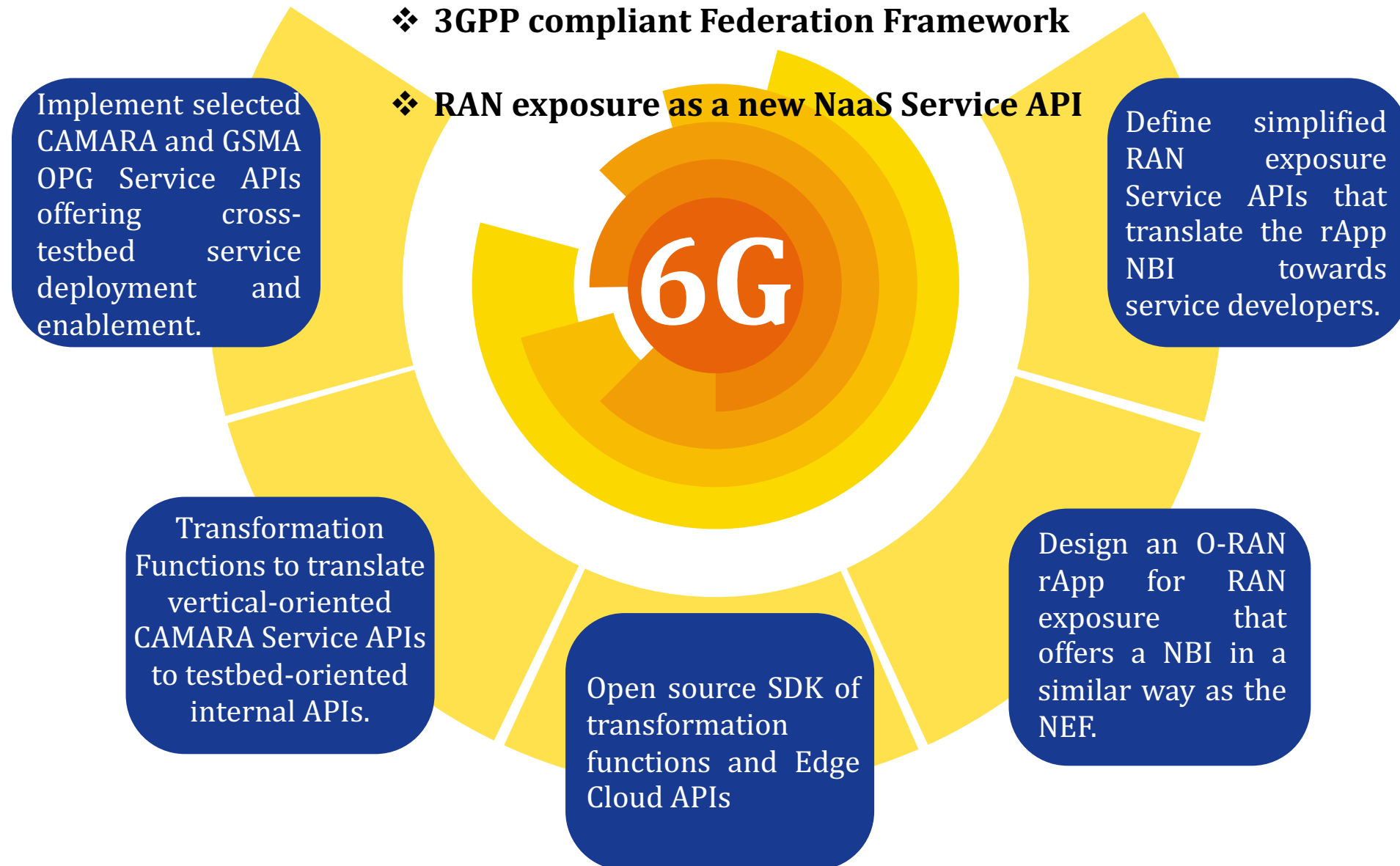


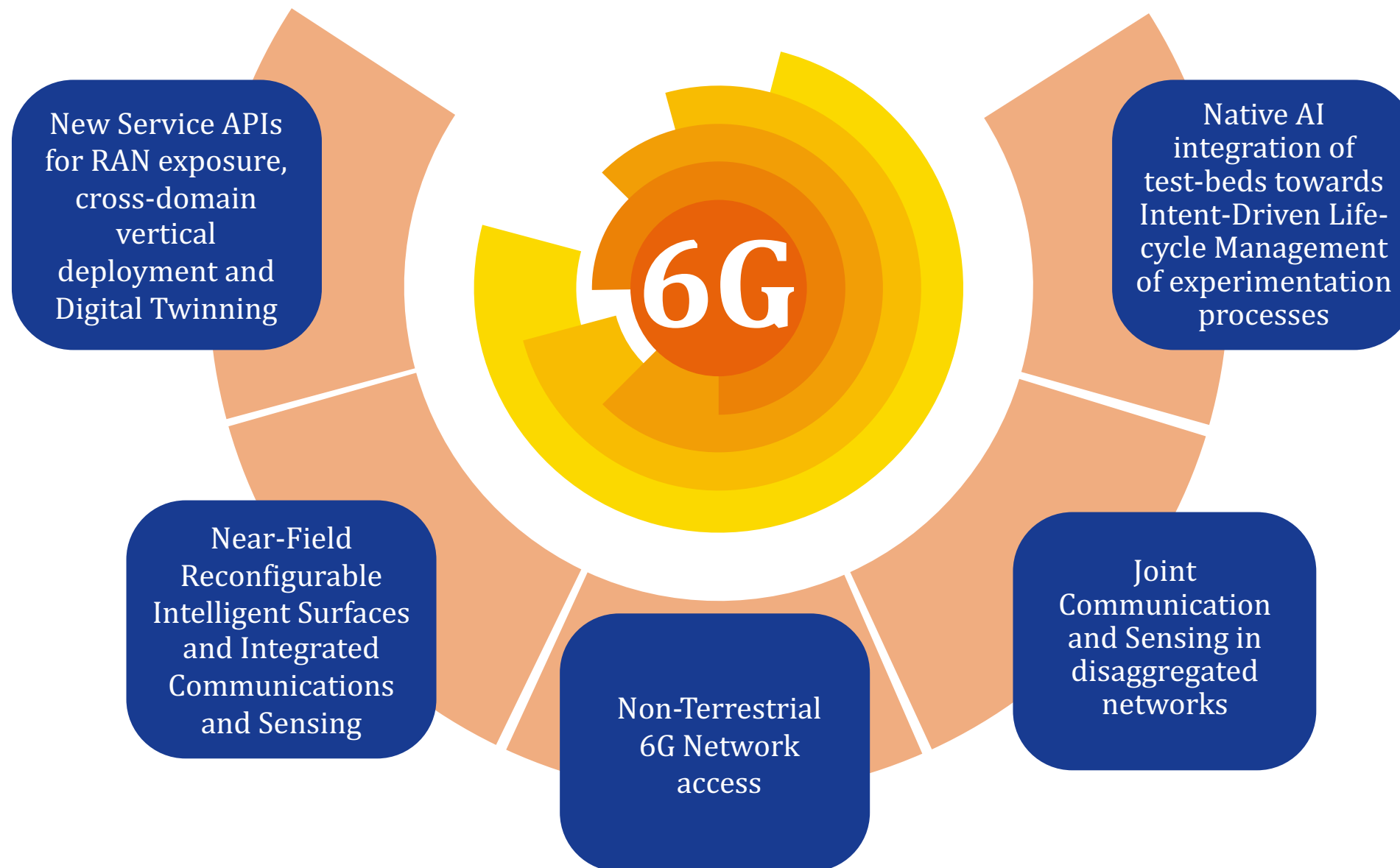
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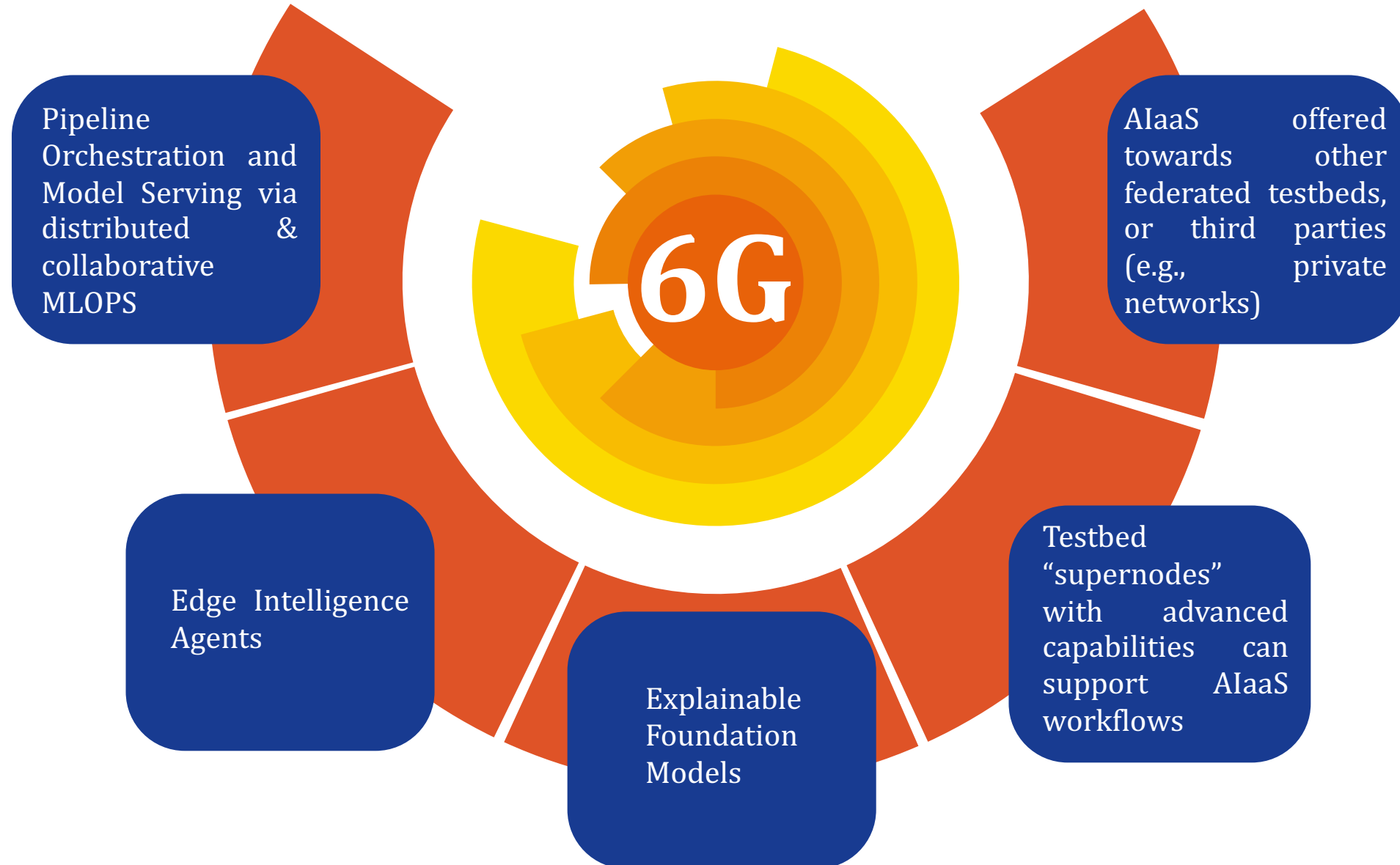
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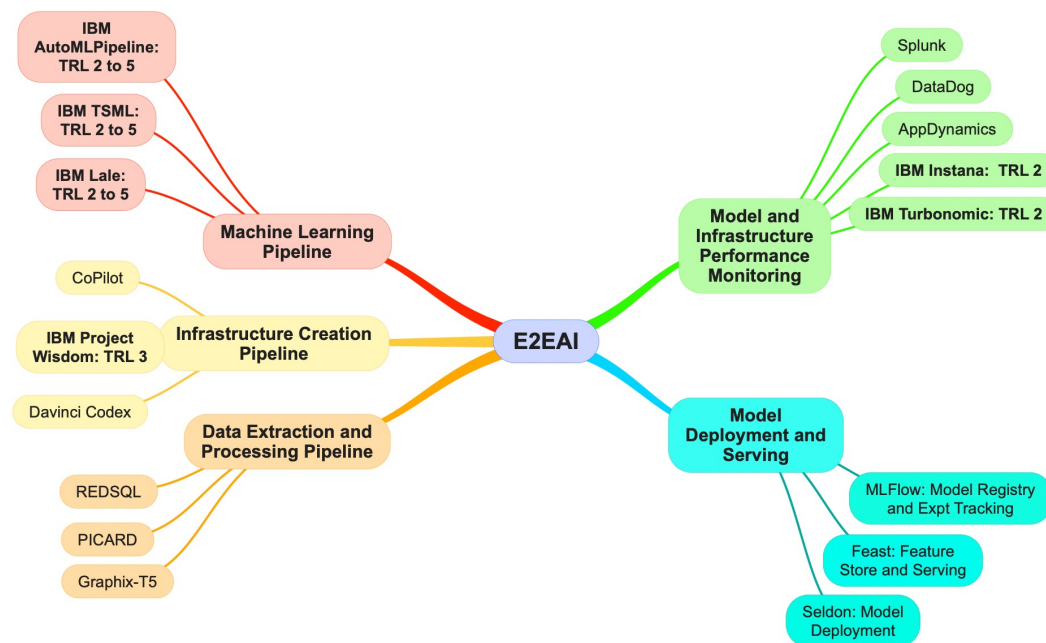
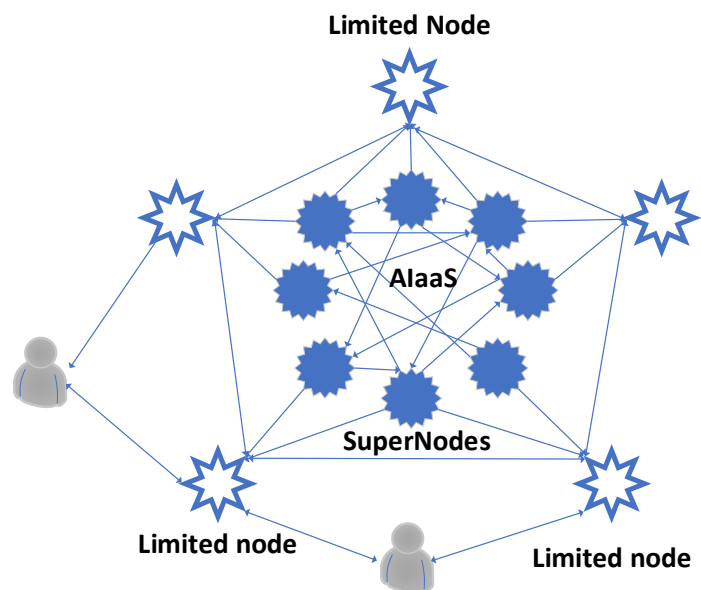


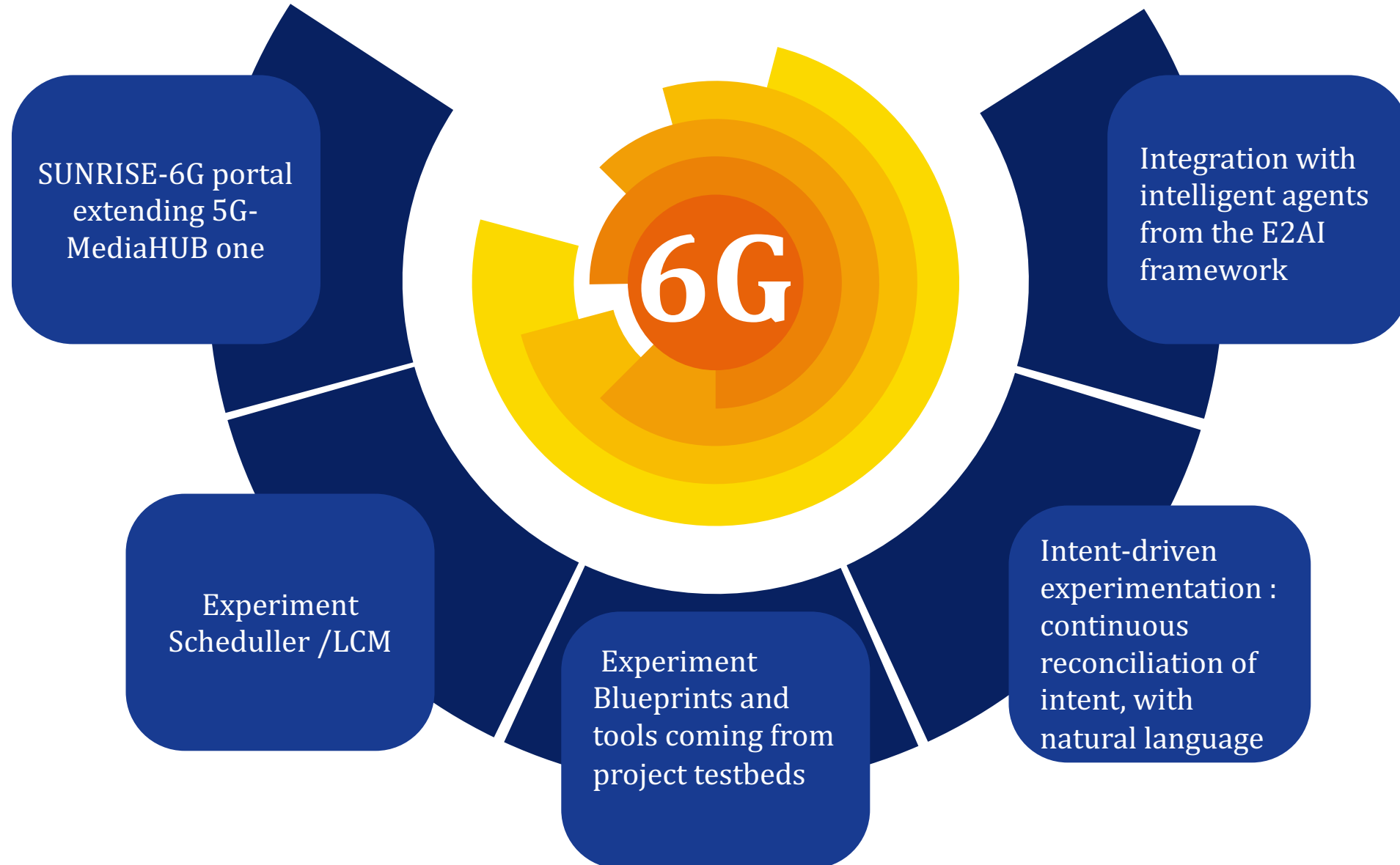






Offer an integrated E2EAI toolkit, cross-testbed MLOPS pipelines and experimentation workflows to perform prediction/classification and anomaly detection tasks applied to common datasets and AI models. Moreover, allow testbeds to also share computational (e.g., vGPU) resources (AlaaS paradigm)





SUNRISE-6G Validation



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UC1: Federated Metaverse



Realistic multiuser holographic comm platform to enable cross-domain Metaverse-like services

UC2: Collaborative Robots for Mining



Inspection missions of a mining infrastructure, by multiple autonomous vehicles in a collaborative approach

UC3: Federated NTN



PoC1: mobility scenarios with static and mobile heterogeneous compute nodes in a federated NTN system

PoC2: Multi-connectivity and inter-PLMN handover scenarios

- 12 Functional Tests for all 6G Library components, remotely accessible by experimenters.
- **Showcase Federation with Non-EU testbed (s). Consider different RICs (open-source, compliant with O-RAN), designed in Europe and in the US**
- Showcasing Federation with at least 2 EU cooperating testbeds
- Demonstrate the federation of third-party testbeds outside SUNRISE-6G consortium, showcasing its potential of future expansion and scale-up --> open to all testbeds from STREAM A and B projects.
- Open Datasets from all Functional Tests and UCs.

SUNRISE-6G Standardization



**Pan-European 6G Federated
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A graphic of a globe with a blue and white color scheme, overlaid with a network of blue lines and hexagonal nodes, representing a global communication network. The text "6G" is prominently displayed in white over the globe.

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STD body	Specific WG	SUNRISE-6G contribution
ITU-T	ITU-T Q.4068 (open APIs for interoperable testbed federations); WP 5D	Common Interfaces and APIs, Data Models and Formats, Reference Architectures (e.g., ITU-T Q.4068). Path towards impacting IMT 2030 developments.
ETSI	RIS ISG, NFV ISG, MEC ISG, ZSM ISG ENI ISG	Project outcome to RIS; Contribute Federation and IDLM solutions; Lead the creation of a new ETSI SDG to oversee the Open Federation framework
3GPP	WG RAN1, WG SA1, SA2, SA5	SA1 for use cases and requirements outcome of the NTN communication; SA2 for integration into architectures of existing mobile communication networks; SA5 for operations and management of NTN and NTCS in 6G.

STD body	Specific WG	SUNRISE-6G contribution
CAMARA	API backlog and Commonalities WGs	Offering unified developer APIs towards SUNRISE-6G use-cases and components
TM-FORUM	Open API DG	Application of TMF OpenAPIs for the SUNRISE-6G capability exposure, feasibility checks, tests across testbeds.
OpenWhisk	DevOps	Share actions, triggers, and runtimes with specific use-cases for 6G technology
CNCF	DevOps	Share paradigm, protocols, and implementations of declarative APIs target end-to-end automations of infrastructures and services.
O-RAN	WG1, WG2, WG3, nGRG	Distributed cell-free synchronization, and RIS integration; contribute to nGRG research streams

SUNRISE-6G Standardization

First achievements



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Partner	Summary
Lenovo	SUNRISE-6G proposes a new technical solution titled "ATSSS with Offloaded Non-3GPP Access", which enables multi-access communication between the UE and UPF but without the need to deploy an N3IWF or TNGF on the non-3GPP access path.
Lenovo	Proposes a solution that specifies a new ATSSS steering functionality, called Multipath QUIC-IP (MPQUIC-IP) steering functionality, which supports IP traffic transmission (both TCP and UDP) over HTTP/3 and QUIC.
Lenovo	Proposes a solution that allows the 5G network to calculate the energy consumed for servicing a UE (or a group of UEs) and expose this information to 3rd parties, such as verticals or experimenters.

Thank you for your attention!



<https://www.linkedin.com/company/sunrise6g/>



<https://www.youtube.com/@SUNRISE6G>



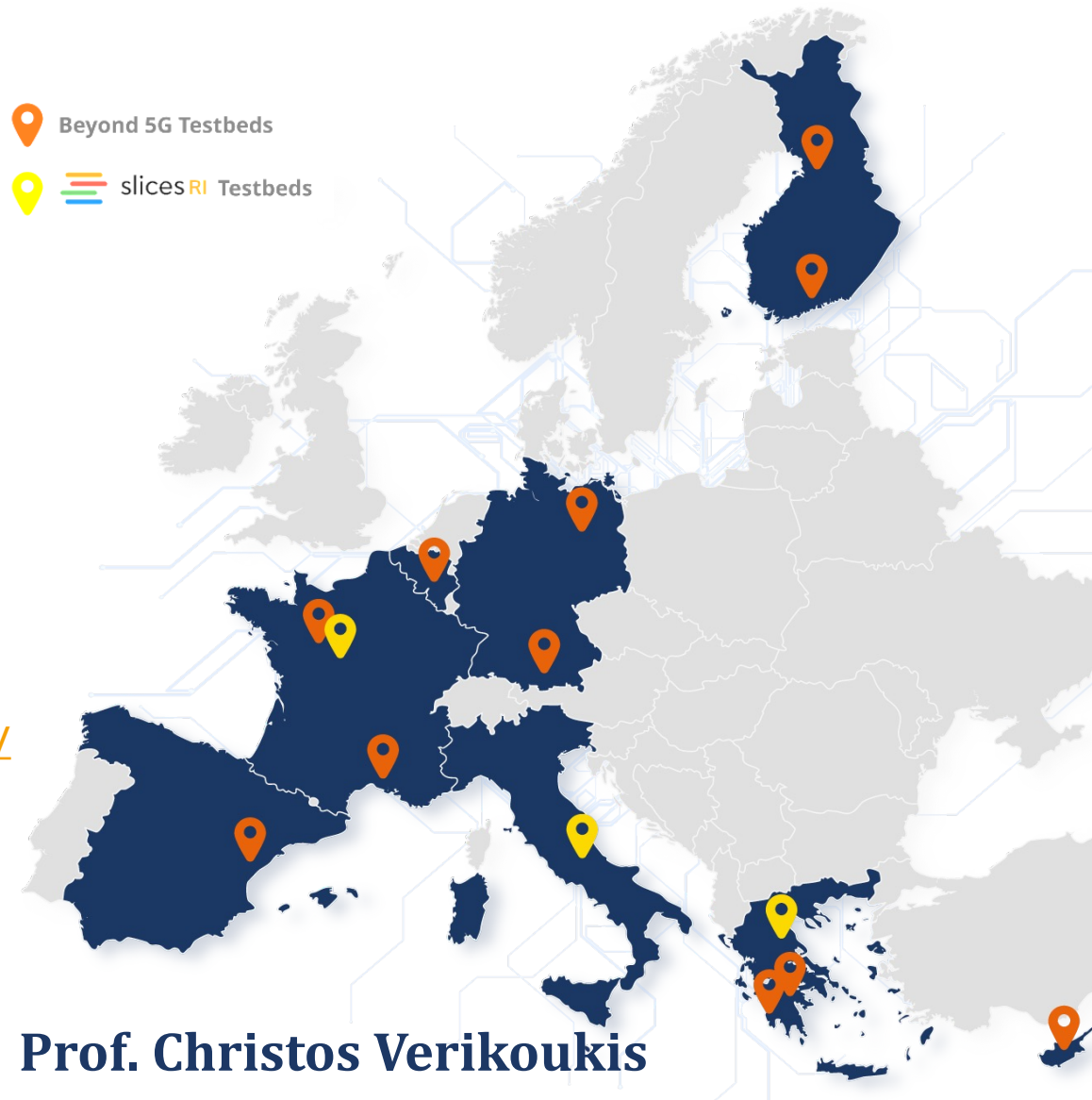
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