DETERMINISTIC6G

Deterministic End-to-End communication with 6G

Dhruvin Patel

6G IA webinar, 23rd February 2023

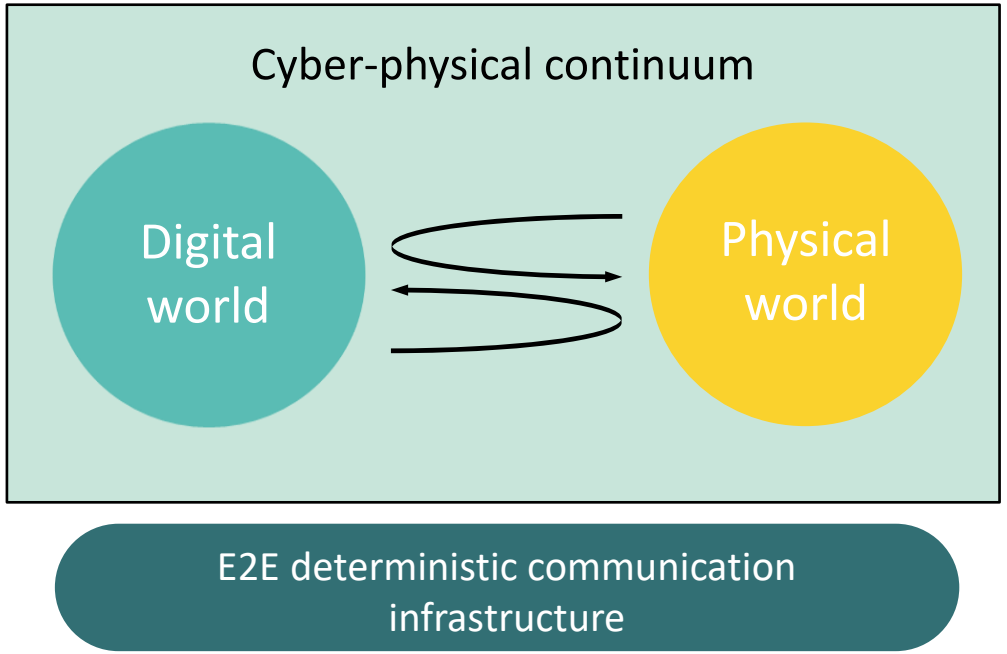
The DETERMINISTIC6G has received funding from the European Union's Horizon Europe programme under grant agreement No 10109504.

Outline

- Introduction
- Vision
- Objective
- Consortium
- Summary

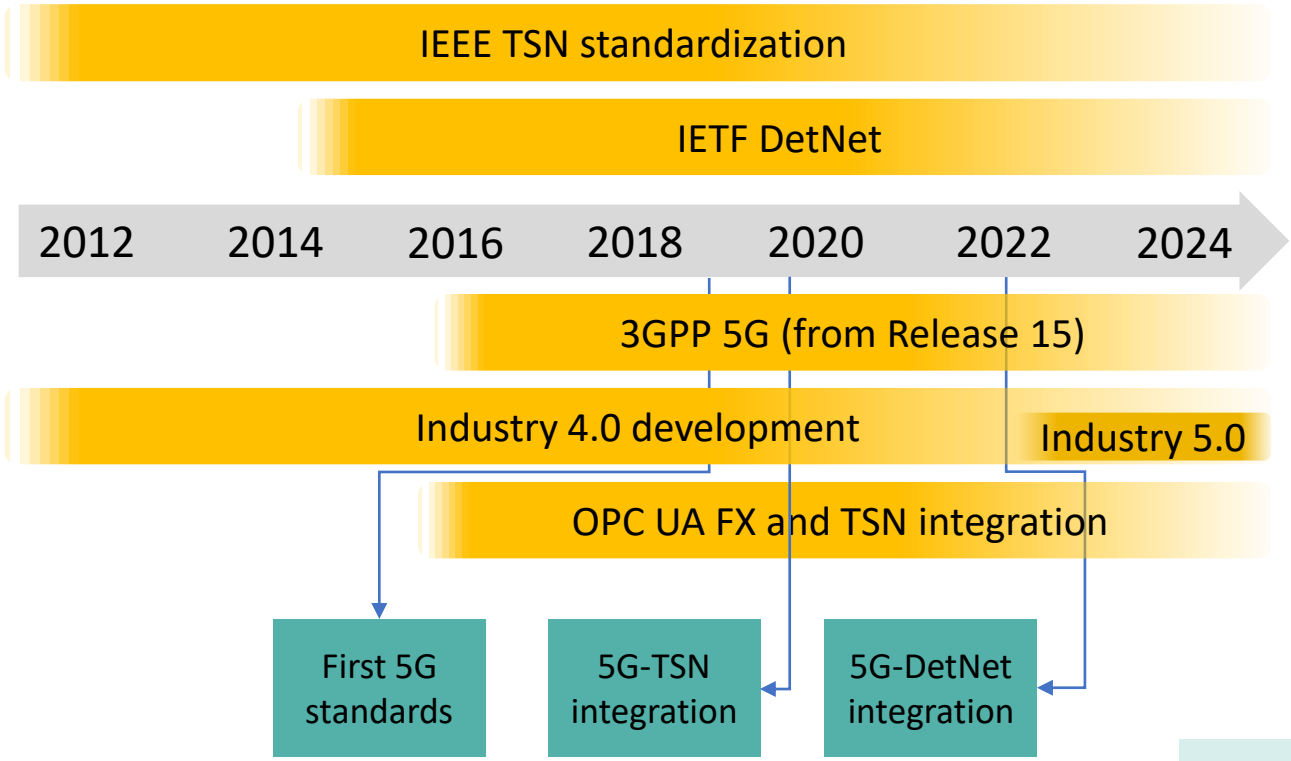
Moving towards a Cyber-Physical Continuum

- The digitalization is driving the transformation of the society and industries
- New forms of interactions will lead to a converged cyber-physical continuum spanning different communication technologies
- End-to-End (E2E) deterministic communication infrastructure is a necessary requirement to support such interactions



Today's Deterministic Communications Arena

- Over the last decade, the major pivot of the communications community has been towards low-latency and reliability
  - Digitalization of automation systems as a main driver
- Several communication technologies (TSN, DetNet, 5G, OPC UA) are independently evolving towards the support for wired/wireless deterministic communication
  - So far only limited interworking (e.g., recent 5G-TSN integration architecture)

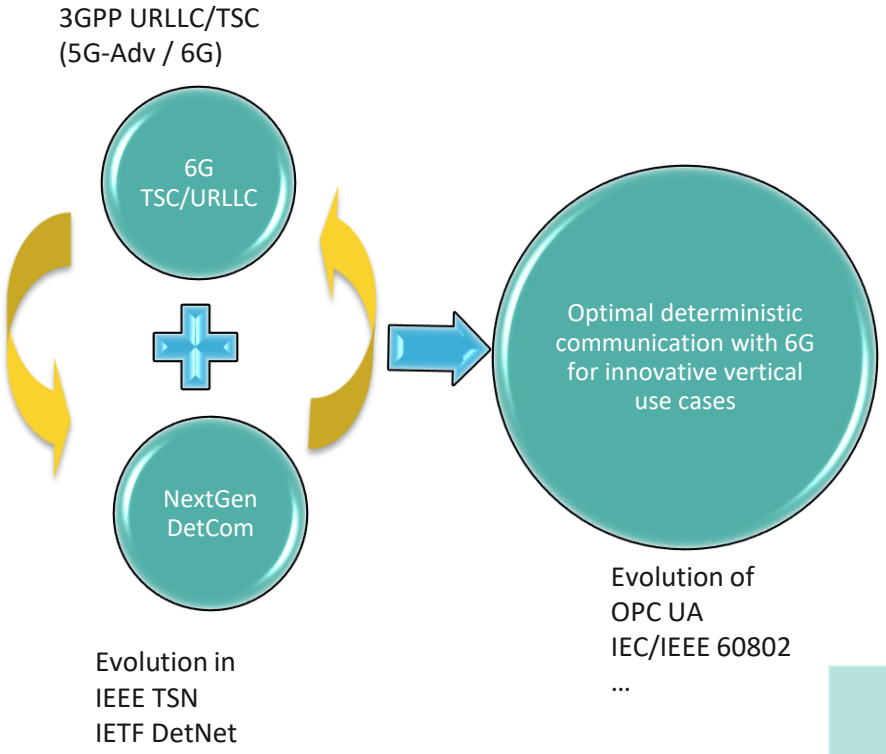


TSN : Time-Sensitive Networking
OPC UA : OPC Unified Architecture
DetNet: Deterministic Networking

DETERMINISTIC6G Vision

The DETERMINISTIC6G vision is to set the foundation for future global communication standards enabling 6G deterministic communication for visionary use cases

- New concepts, features and solutions to
  - Evolve TSN (&DetNet) to become more wireless-friendly
  - Improve 5G-Advanced/6G to be better suited for deterministic communication
  - Align with the main application middleware for deterministic communication: OPC UA (with its features on OPC UA FX (Field eXchange) and the usage of TSN)



URLLC: Ultra-reliable and low-latency communications
5G-Adv: 5G-Advanced
TSN : Time Sensitive Networking
TSC: Time Sensitive Communication
DetNet: Deterministic Networking

DETERMINISTIC6G objectives

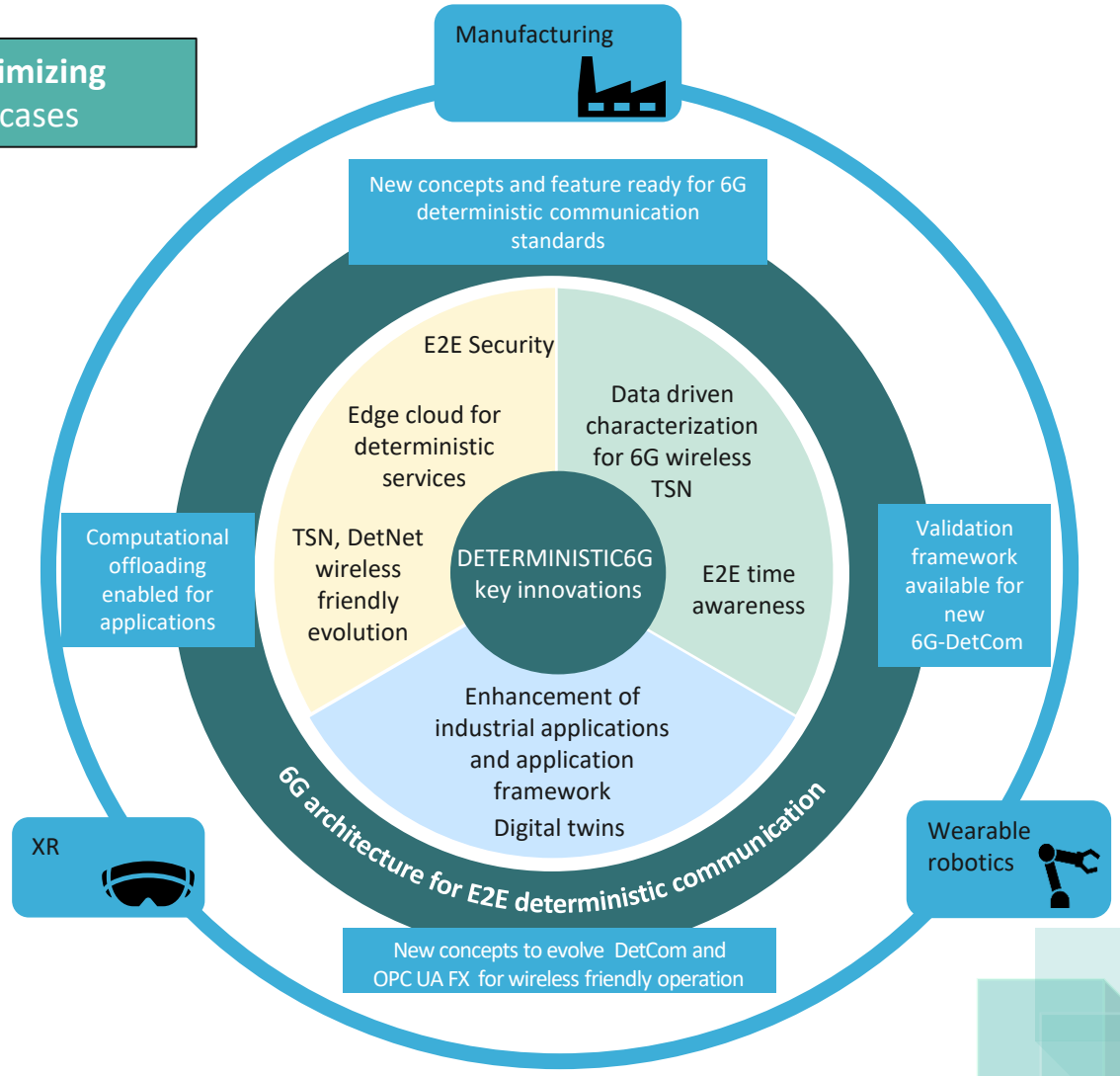
The DETERMINISTIC6G objective is to develop a **new architecture optimizing deterministic** E2E communication with 6G to enable innovative use cases

- The three pillars of DETERMINISTIC6G:

Architectural aspects for E2E deterministic communication

Awareness for providing E2E deterministic communication performance

Anticipation for assurance and control of E2E deterministic performance guarantees



TSN : Time-Sensitive Networking
OPC UA : OPC Unified Architecture
DetNet: Deterministic Networking

DETERMINISTIC6G Consortium

Industrial application players bringing 6G visionary use cases

Key industrial players in 6G research and development

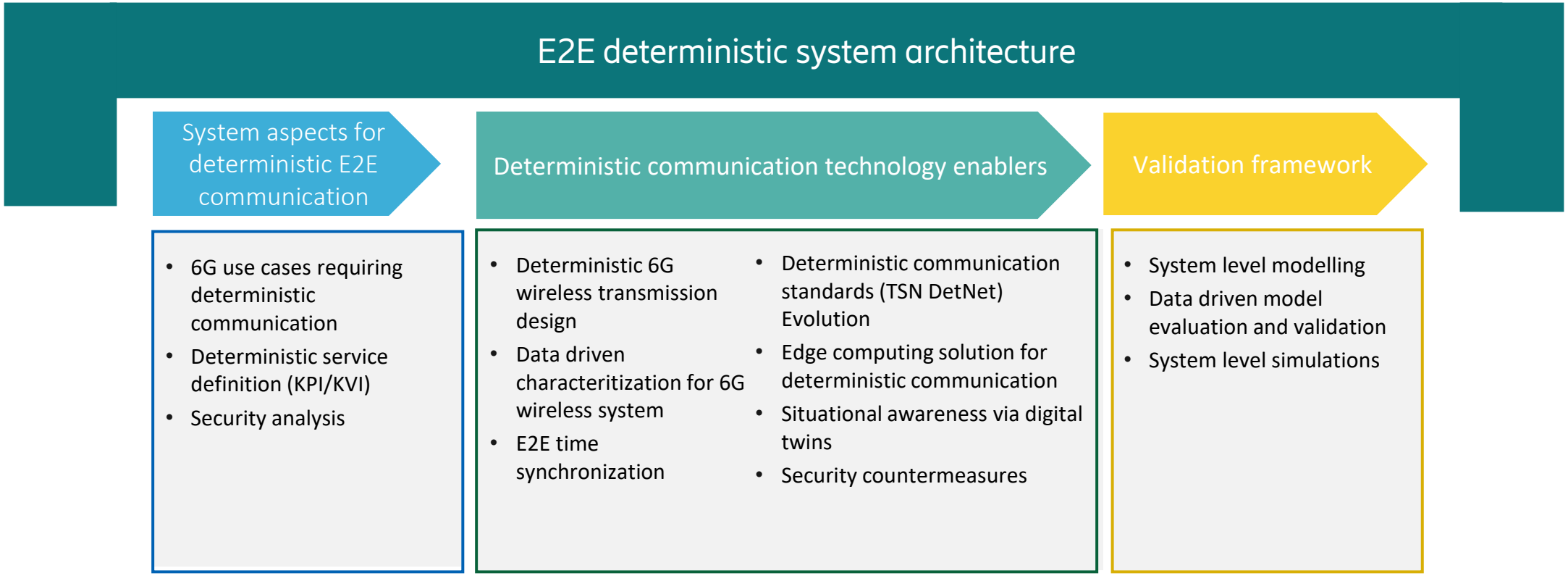
Key university and research institutes at the forefront for 6G fundamental research

12 partners (Coordinator: Ericsson GmbH)

Jan 2023 – Jun 2025 (30 months)

€ 5.8 M€

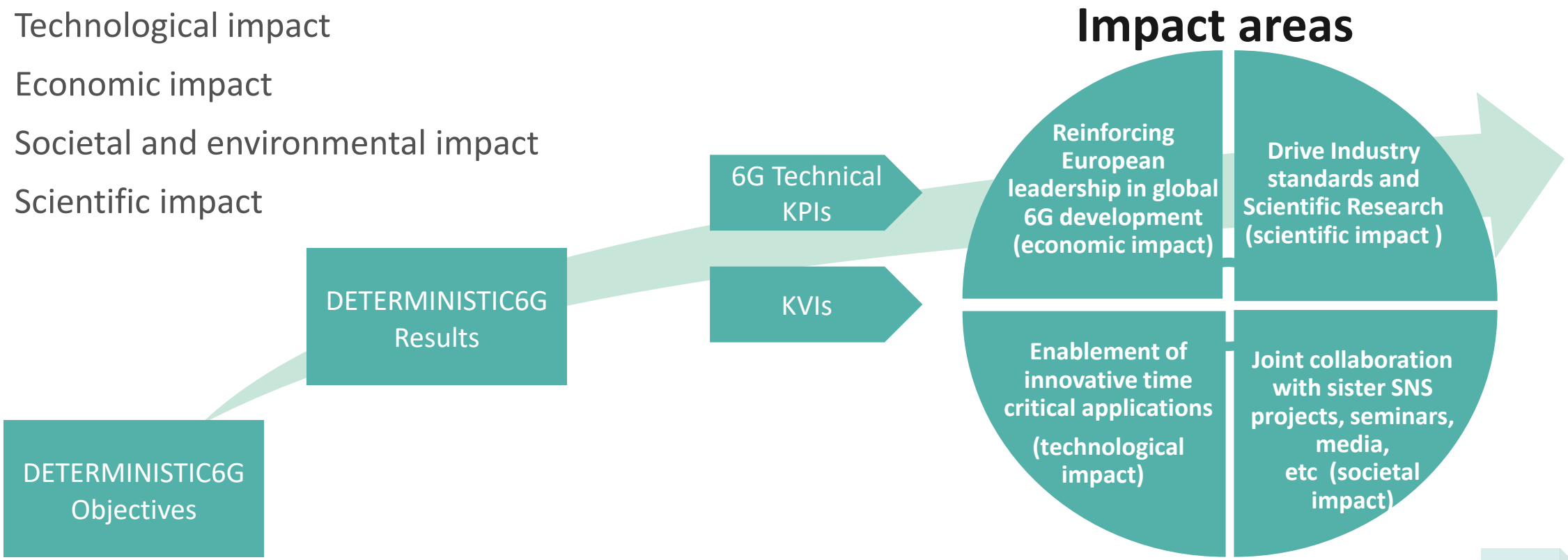
Project overview



KPI : Key Performance Indicators
KVI : Key Societal Value indicators

Impact creation towards 6G

- Technological impact
- Economic impact
- Societal and environmental impact
- Scientific impact



DETERMINISTIC6G

Deterministic E2E communication with 6G

Project coordination: Ericsson, Technical coordination: KTH, Project start: January 2023, Project duration: 30 months, Contact: coordinator@deterministic6g.eu, deterministic6g.eu

E2E deterministic system architecture

6G challenges and vision

System aspects for deterministic E2E communication

- 6G use cases requiring deterministic communication
- Deterministic service definition (KPI/KVI)
- Security analysis

Deterministic communication technology enablers

- Deterministic 6G wireless transmission design
- Data driven characterization for 6G wireless system
- E2E time synchronization
- Deterministic communication standards (TSN, DetNet) Evolution
- Edge computing solution for deterministic communication
- Situational awareness via digital twins
- Security countermeasures

Validation framework

- System level modelling
- Data driven model evaluation and validation
- System level simulations

Beyond DETERMINISTIC6G

DETERMINISTIC6G has received funding from the Smart Networks and Services Joint Undertaking (SNS JU) under grant agreement No.101096504. The SNS JU receives support from the European Union's Horizon Europe research and innovation programme

ERICSSON B&R SAL SILICON AUSTRIA LABS IUVO University of Stuttgart Germany montimage Cumucore orange

Summary

DETERMINISTIC6G vision is to set the foundation for future deterministic communication technology standards by developing

- Deterministic service definition that includes KPI and KVI for innovative 6G use case
- E2E deterministic system architecture built upon new DETERMINSITIC6G enablers
- Open-source validation framework

KPI: Key Performance Indicator
KVI: Key Value Indicator

DETERMINISTIC6G Grant Agreement No. 101096504

The DETERMINISTIC6G project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101096504.

If you need further information, please contact the coordinator:

Dhruvin Patel, ERICSSON

E-Mail: coordinator@deterministic6g.eu

or visit: www.deterministic6g.eu

@DETERMINISTIC6G DETERMINISTIC6G