



# PREDICT 6G

## PREDICT-6G

The importance of determinism in 6G networks

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# The vision

## Building a deterministic 6G network



### RELIABLE

Availability  
Low packet  
Failure resilient



### TIME SENSITIVE

Bounded latency  
Low jitter



### PREDICTABLE

Use of AI to predict events,  
states, demands, resources  
Autonomous proactive actions  
based on predictions

# The mission

**PREDICT-6G aims to design, create and validate end-to-end (E2E) 6G solutions providing deterministic services over multiple interconnected domains and technologies (incl. wired and wireless).**



**PREDICT-6G**

## 3 pillars

- To **extend the reliability and time sensitiveness features** of IEEE 802.11 and 3GPP networks, including APIs for the monitoring and control of such capabilities, enabling predictability.
- To **develop a multi-technology multi-domain Data-Plane** jointly with an AI-driven multi-stakeholder inter-domain Control-Plane (AICP)
- To **enhance the predictability** of the network through artificial intelligence, enabling the forecasting of the occupancy of network resources and the effect of accepting a new flow into the network

## 3 use cases

1. **Smart manufacturing**
2. **Multi-domain deterministic communications**
3. **Critical communications**



# Innovations

## Specific innovations

- 1 Improvement of L2 deterministic capabilities of IEEE 802.11 and 3GPP
- 2 Emulate deterministic network capabilities on top of non-deterministic network segments
- 3 Data-plane integration of multiple deterministic and non-deterministic domains
- 4 User, resource, and function mobility under deterministic constraints
- 5 Highly configurable monitoring platform for multi-technology deterministic networks
- 6 Cross-domain E2E deterministic service management automation
- 7 Predictability through Network Digital Twinning

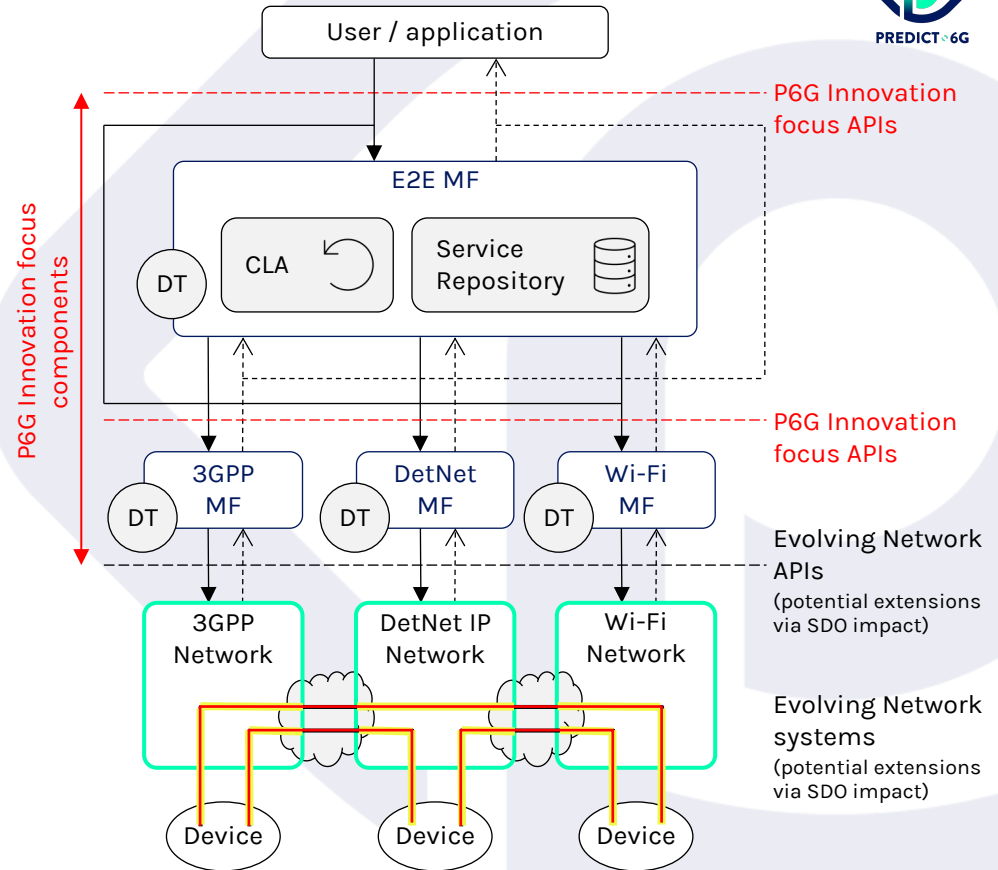
# Architecture overview

PREDICT-6G management scope

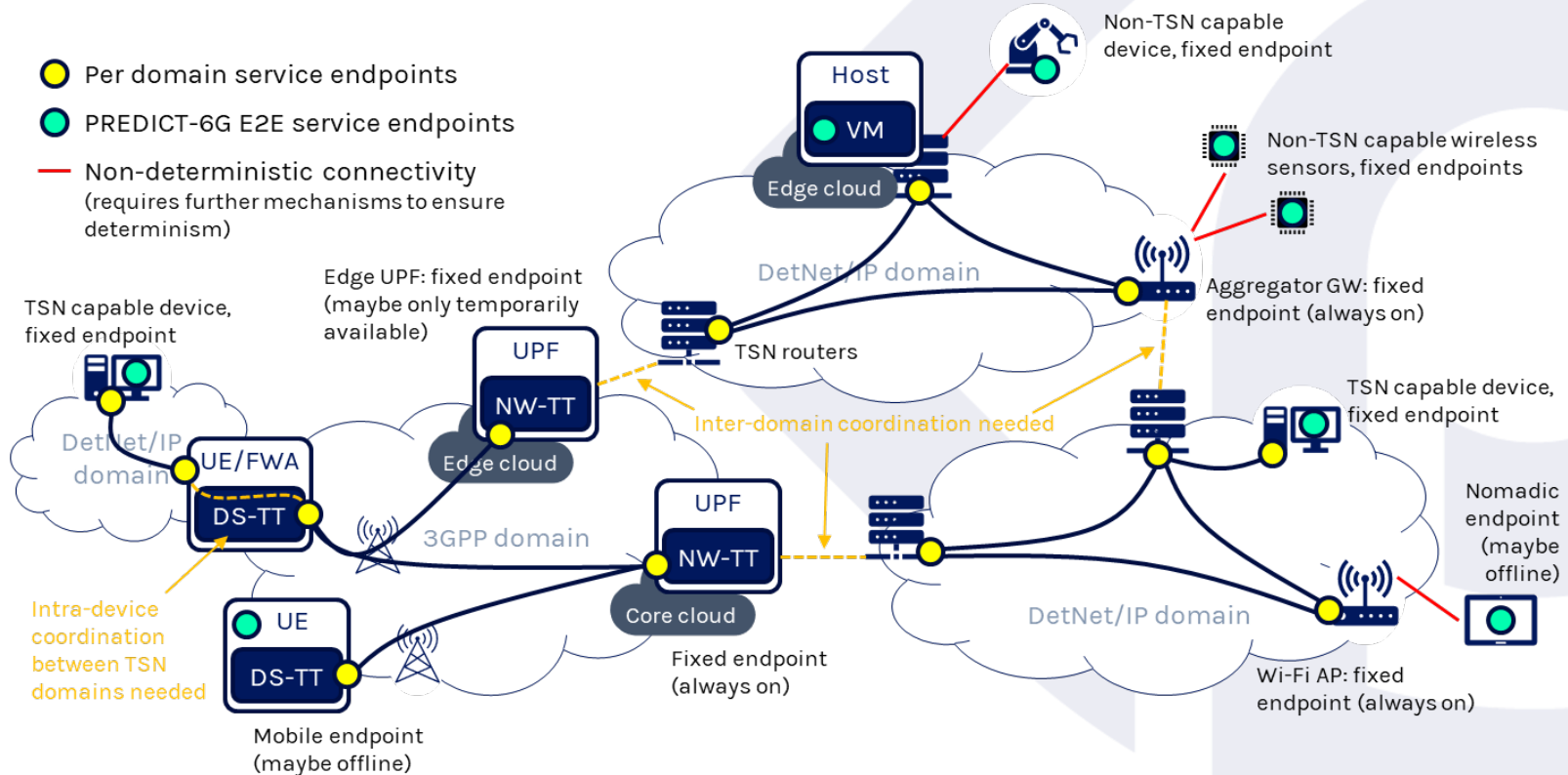
- Networks (e.g., PM/CM)
- Network services within one network (e.g., connectivity, det. SLA)
- E2E services over multiple networks (e.g., between devices attached to different networks)

These are **Managed Entities (ME)** for the PREDICT-6G framework.

- E2E deterministic service flow (MDP)
- ▶ Request / configuration (AICP)
- Measurement / status / insight (AICP)



# Multi-technology multi-domain DP architecture



# Key achievement so far

Technical output produced on time and with good quality

- **D1.1 - Analysis of use cases and system requirements** (June 2023)
  - ✓ Definition of use cases, KPIs, architecture baseline
- **D2.1 - Release 1 of PREDICT-6G MDP innovations** (August 2023)
  - ✓ First drops of user plane mechanisms
- **D3.1 - Release 1 of AI-driven inter-domain network control management and orchestration innovations** (September 2023)
  - ✓ First version of the AICP architecture concept work – will receive updates according to the integration (WP4) and open API (Cross WP2-WP3) work

Overall, we are close to have been created the foundations of the PREDICT-6G system.



# Ongoing technical activities

## MDP

- **Concept**
  - Cross-domain integration (horizontal integration across different tech. domains in MDP)
  - Non-deterministic domains
- **Implementation**
  - Implementation of selected innovations (according to D2.1 roadmap)
- **Cross WP2-WP3 work**
  - OpenAPI: integration between selected networking technologies (part of MDP) and the domain specific Management Services (part of AICP)
  - Critical for the success of the project!
- **Deliverable in 2023: D2.2/M11 (UC3M)**

# Ongoing technical activities

## AICP

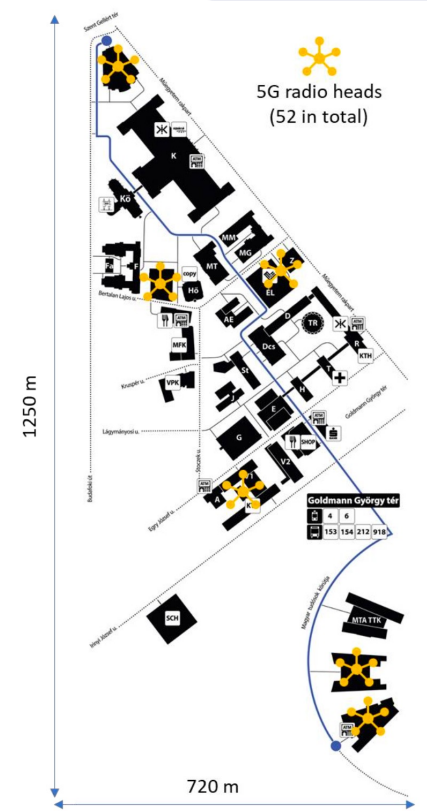
- **Concept** (liaison with WP1)
  - Progress the work on procedures
  - Update the AICP service APIs (E2E and domain specific MSs)
  - Include information elements in the AICP service APIs
- **Implementation**
  - Implementation of selected innovations
- **Cross WP2-WP3 work**
  - OpenAPI: integration between selected networking technologies (part of MDP) and the domain specific Management Services (part of AICP)
  - Critical for the success of the project!
- **Deliverable in 2023: D3.2/M12 (NXW)**

# Experimentation plans and testbeds

- 3 key use cases
  - Deterministic services for critical communications
  - Multi-domain deterministic communication
  - Smart Manufacturing
- 2 main testsites
  - Budapest Open Lab
  - Madrid Open Lab (5TONIC)



EuCNC WS - Future deterministic programmable networks for 6G



# Summary

- **PREDICT-6G considers networks need to be enhanced to become more deterministic** (i.e., predictable, reliable and time sensitive) to cope with emerging use cases
- **The 6G network will be composed of multiple heterogeneous networks merged together.**
  - Not a single L2 solution will solve the problem
- PREDICT-6G proposes two main innovations in this area:
  - **Multi-technology multi-domain Data-Plane (MDP)**
    - Enhance L2 technologies
    - Integrate them into a single E2E data plane
    - Expose APIs for control and monitoring
  - **AI-driven Multi-stakeholder Inter-domain Control-Plane (AICP)**
    - AI-based network control plane framework
    - Network digital twins for predictability
    - Monitoring platform

# Meet our team



17 partners from seven EU countries have joined forces





**PREDICT 6G**

# Thank you!



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