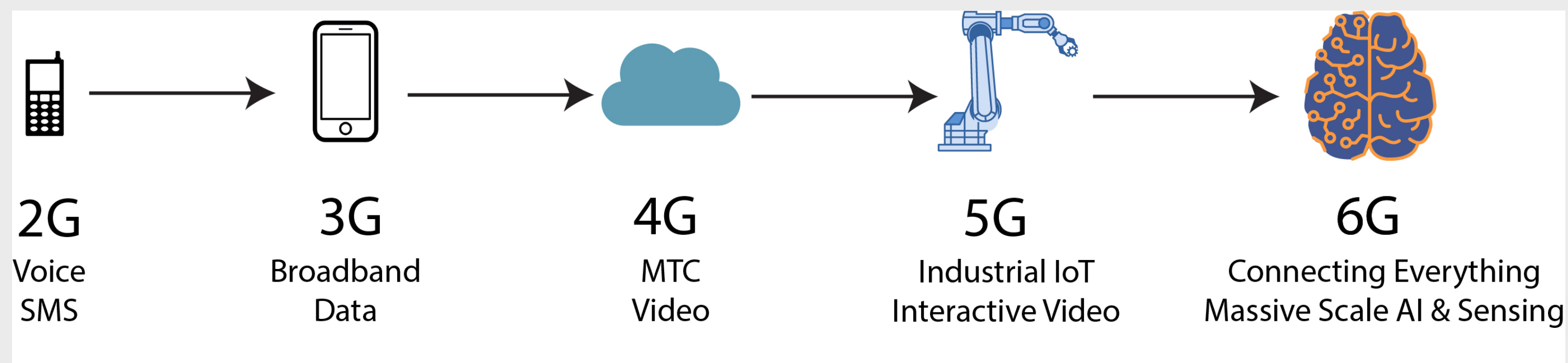


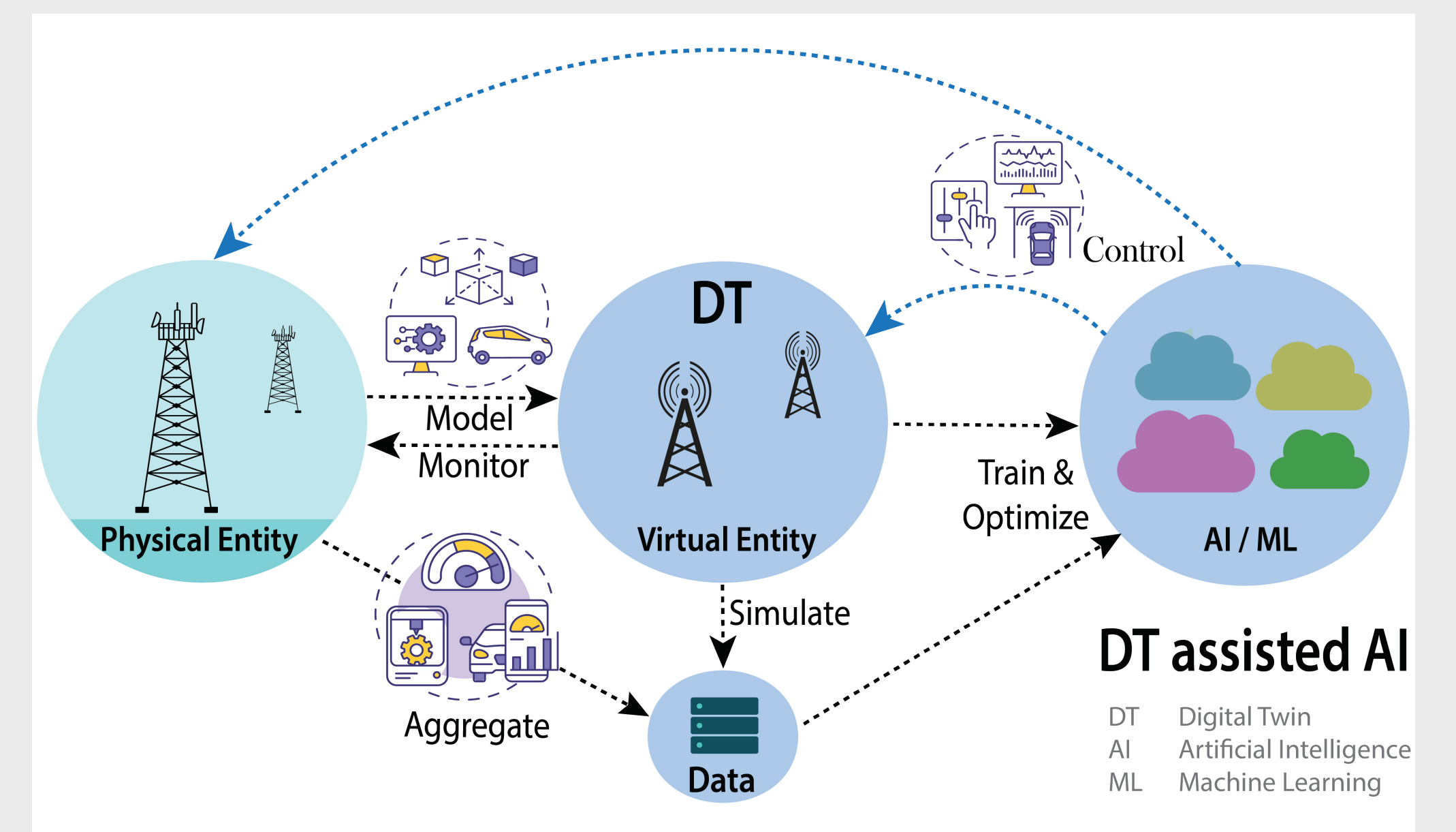
A data-driven Road to 6G: Motivation and Challenge



AI Artificial Intelligence, IoT Internet of Things, MTC Machine Type Communication, SMS Short Message Service

- Motivation:** Future wireless networks will support a wide variety of services
- Challenge:** Design for extreme flexibility while taming the inherent complexity
- Goal:** Achieving flexibility through awareness, adaptation, and optimisation based on AI

Digital Twins in Telecommunications



Virtual replica of a physical object, service, or system

Project in a Nutshell

Digital Twin assisted Artificial Intelligence enabling sustainable network-wide data-driven optimization of shared resources and environmental sensing

1. Develop DT model of a wireless cellular air interface
2. Identify and collect real-world reference data for ML assisted DT methods
3. Implement federated cooperative ML framework



Fig. 1: Dynamic Optimization



Fig. 2: Static Reference

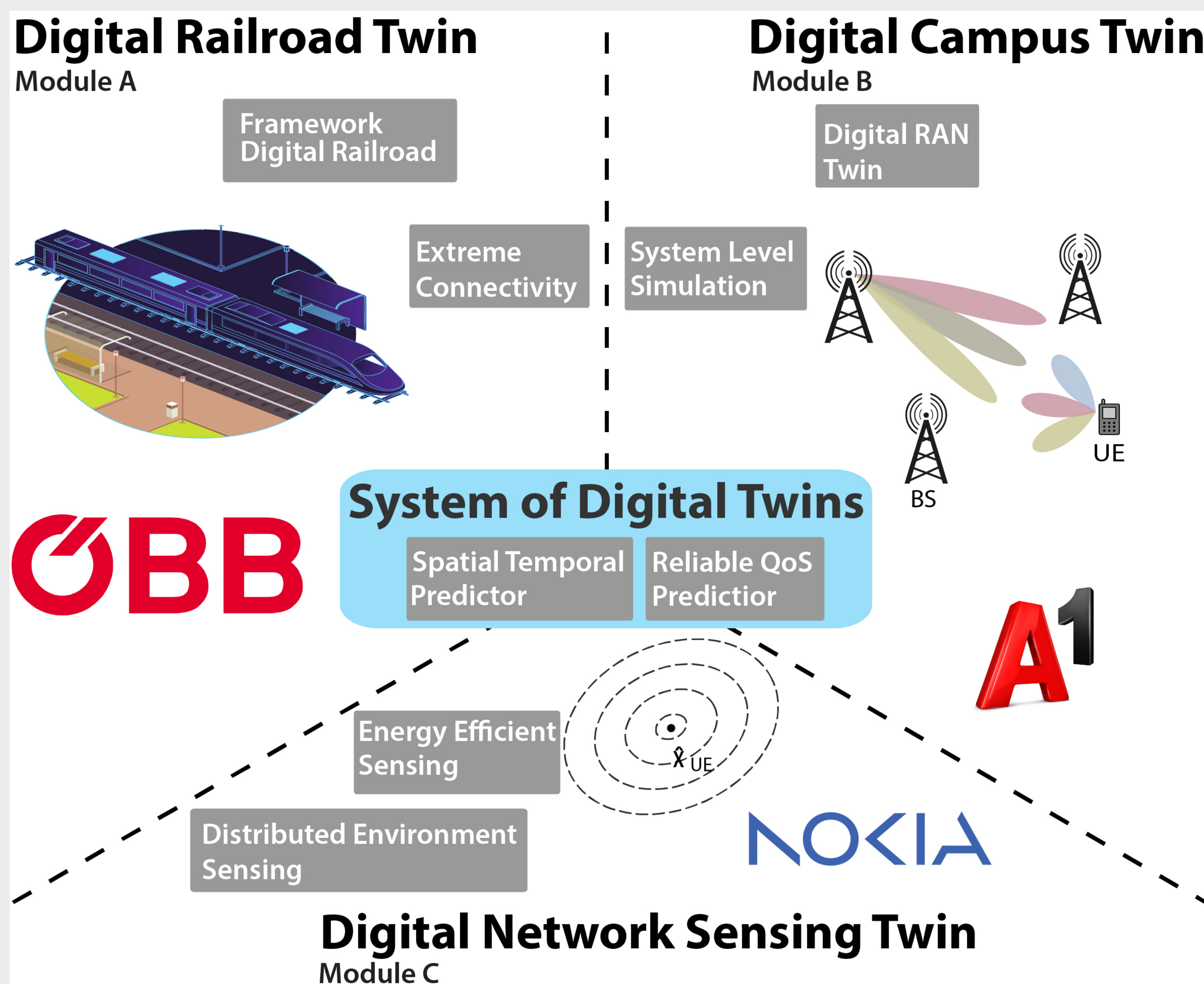


Fig. 3: Modules in the CD-Laboratory

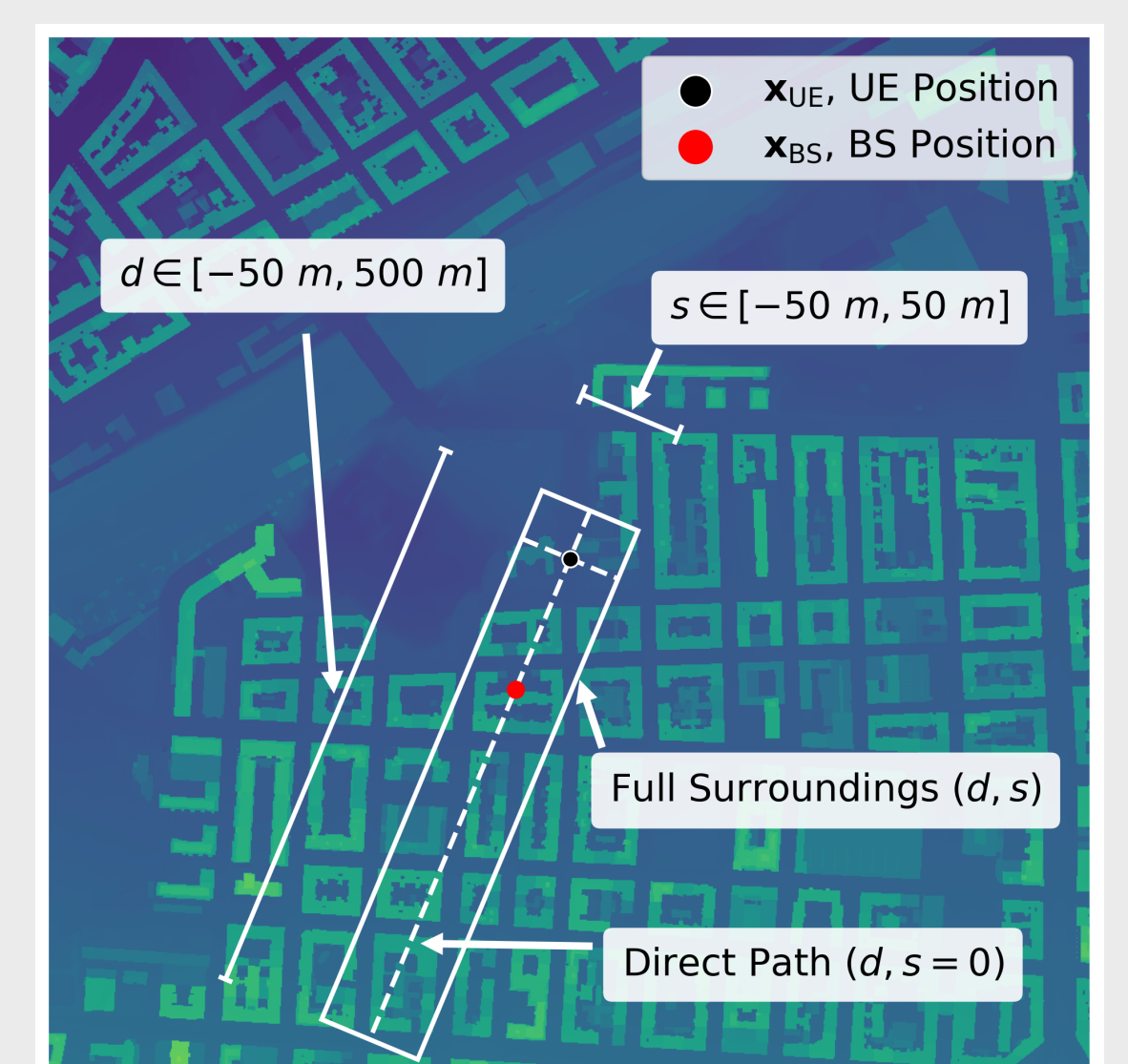


Fig. 4: Digital Twin assisted Deep Learning

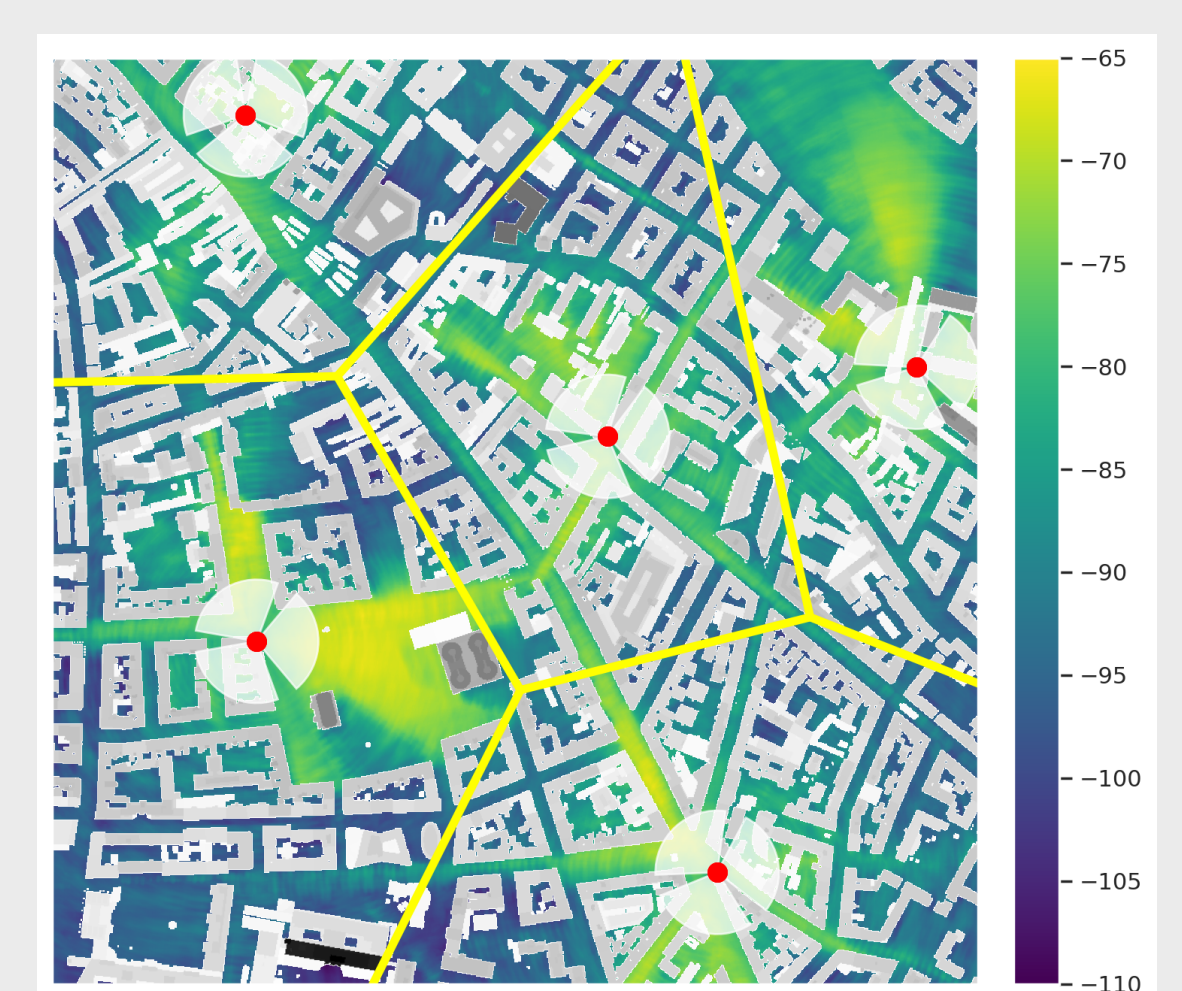


Fig. 5: Deep Learning base Network Planner

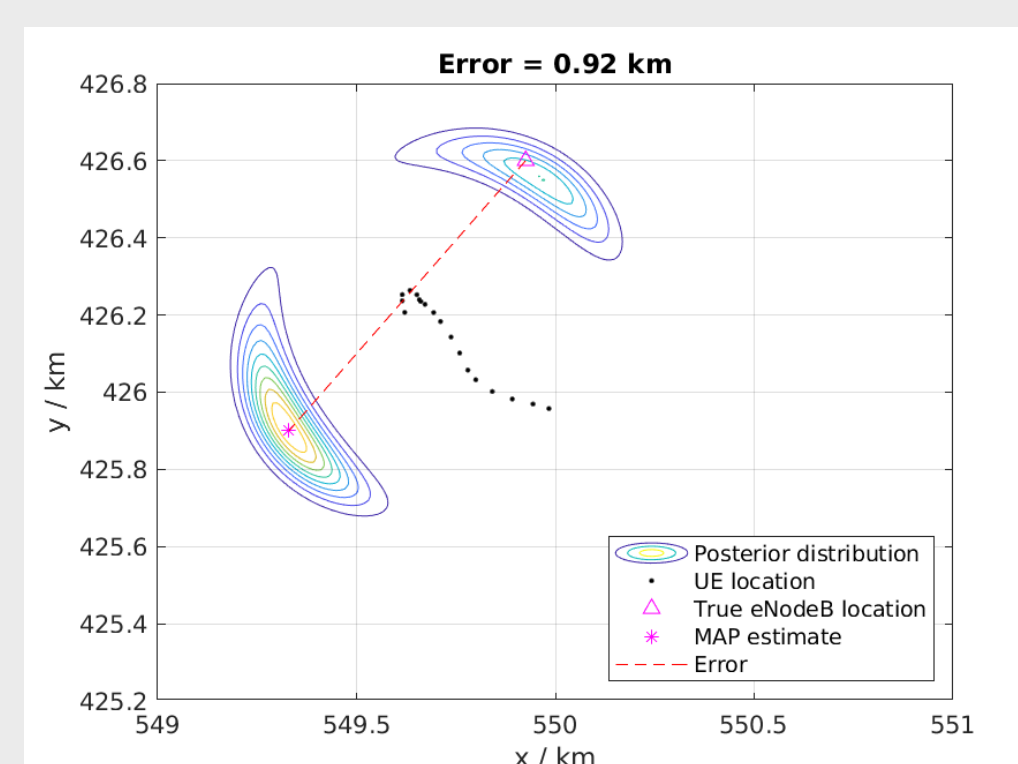
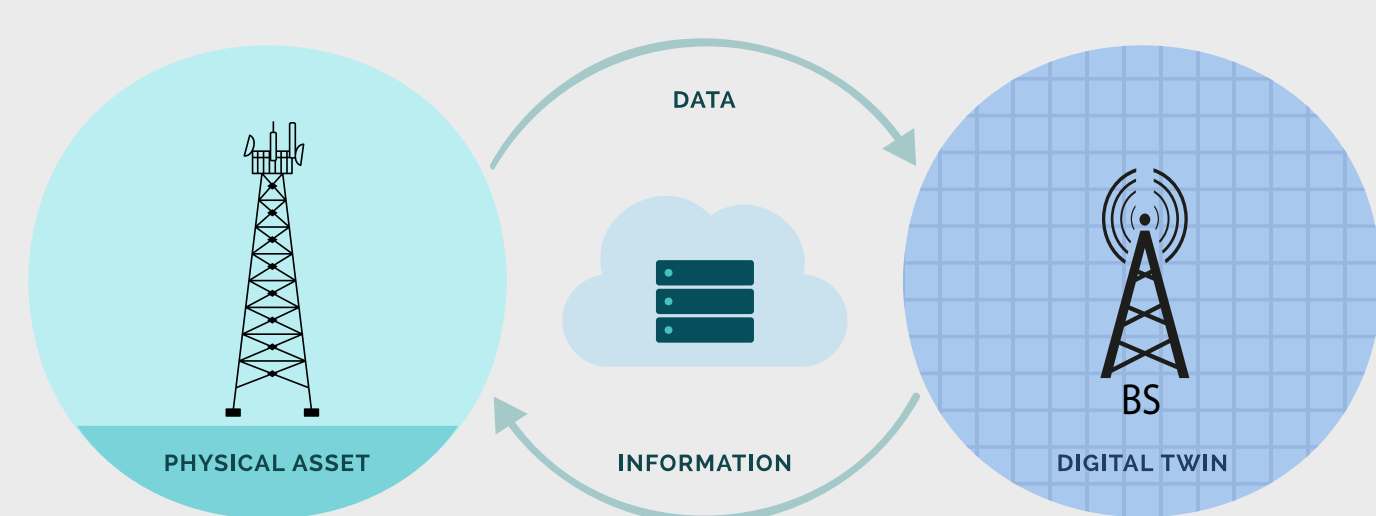
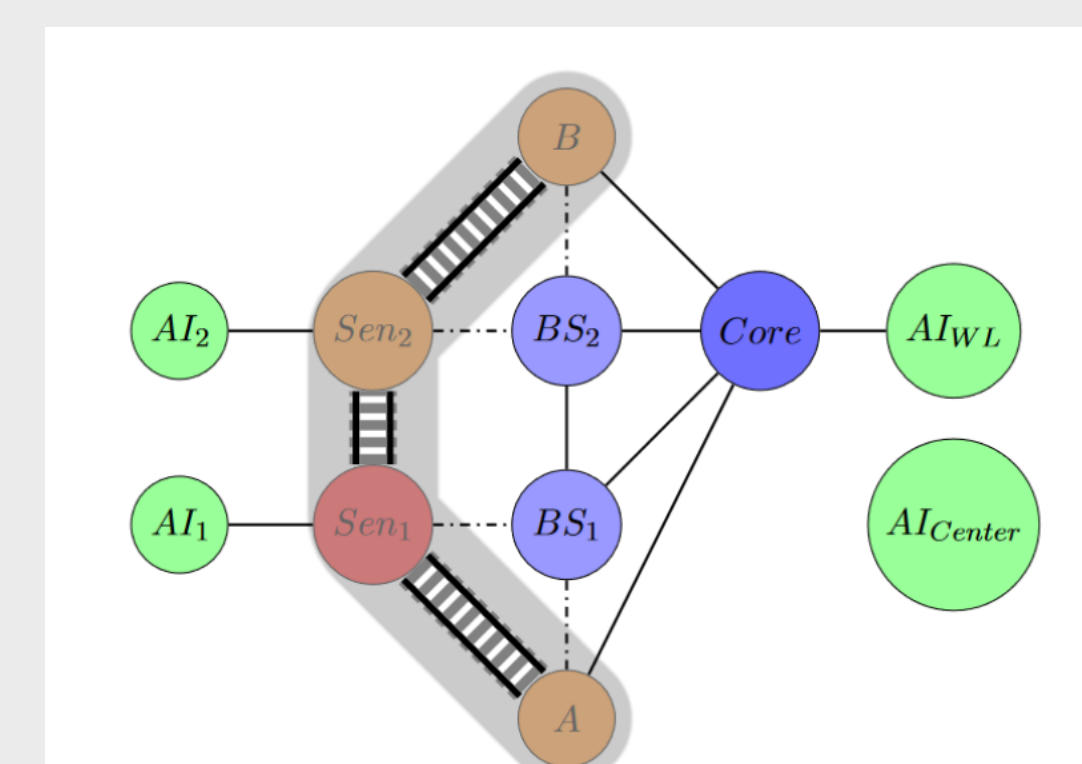


Fig. 6: Network Sensing



Methods and Goals

- Data-driven DT creation for centralized, local, and distributed AI
- Design and conduct large-scale measurement campaigns
- Distributed cooperative reinforcement learning for online resource optimization
- Preserve explainability across all DTs

Partners

- ÖBB-Personenverkehr AG
- A1 Telekom Austria AG
- Nokia Solutions and Networks Deutschland GmbH & Co KG