# AI4 REALNET

## AI FOR REAL-WORLD
## NETWORK OPERATION

## 6 USE CASES

**Air Traffic Management**
— Airspace sectorisation assistant
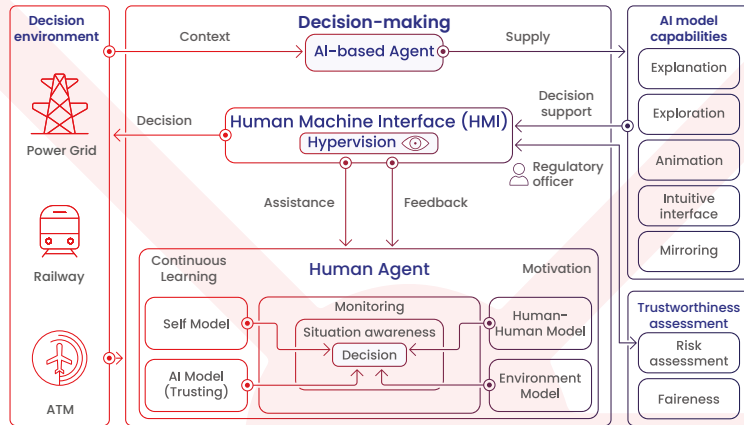— Flow and airspace management assistant

**Railway Network**
— Automated re-scheduling in railway operations
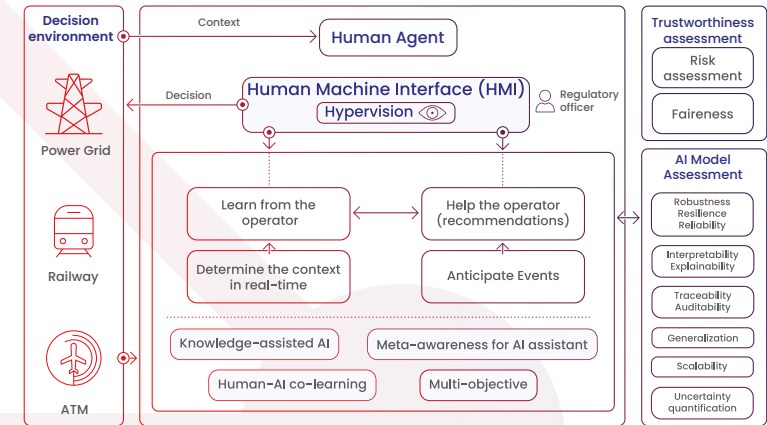— AI-assisted human re-scheduling in railway operations

**Electricity Network**
— AI assistant supporting human operators' decision-making in managing power grid congestion
— Sim2Real, transfer AI-assistant from simulation to real-world operation



Decision making from human perspective in proposed conceptual framework



Decision making from AI perspective in the proposed conceptual framework

## FRAMEWORK VALIDATION

To apply and demonstrate AI-based decision systems in industry use-cases demonstrating tangible additional value, the AI4REALNET framework will be validated in 6 uses cases driven by industry requirements, across 3 three infrastructures with common properties (Electricity, Railway, Air Space).

The selection of these use cases was driven by:

— focus on critical challenges and tasks of network operators, considering strategic long-term goals, e.g., decarbonization, digitalization, and resilience to disturbances

— reproduce real operating scenarios with human operators

— formulate the use cases in a unified sequential decision problem where a large number of AI and non-AI algorithms can be applied.

## PROJECT CONTRIBUTION

Existing AI frameworks provide valuable insights into AI integration for critical infrastructures but often operate in silos. A unified framework is needed to balance technical, ethical, and human factors. AI4REALNET proposes a novel approach that bridges human control and AI automation, enhancing rather than replacing decision-making.

It fosters human-AI systems that are technically robust, ethically aligned, and adaptable.
By integrating transparency, trust, and accountability, the framework improves both social and technical performance, ensuring safer, more effective decision-making in dynamic operational environments.

# INESC TEC

- 🌐 ai4realnet.eu
- ✉ ai4realnet@inesctec.pt
- in @ai4realnet-project
- 𝕏 @AI4REALNET
- ▶ @AI4REALNET
- 🐙 github.com/AI4REALNET

TUDelft

Digitale Schiene
####-##Deutschland

enliteAI

POLITECNICO
MILANO 1863

UNIVERSITY OF AMSTERDAM

n|w  University of Applied Sciences and Arts Northwestern Switzerland
School of Applied Psychology

FLATLAND

Fraunhofer
IEE

Rte  Le réseau
de transport
d'électricité

LI.U LINKÖPING
UNIVERSITY

NAV
PORTUGAL

INESC TEC

TenneT

Zurich University
of Applied Sciences

SBB CFF FFS

UNI KASSEL
VERSITÄT

Intelligent
Embedded Systems

System×

zh
aw