



AI4 REALNET

AI FOR REAL-WORLD NETWORK OPERATION



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6 USE CASES



Air Traffic Management

- Airspace sectorisation assistant
- Flow and airspace management assistant



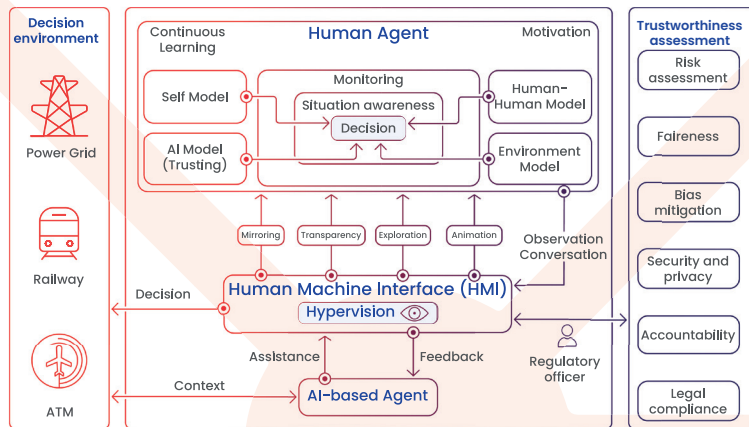
Railway Network

- Automated re-scheduling in railway operations
- AI-assisted human re-scheduling in railway operations

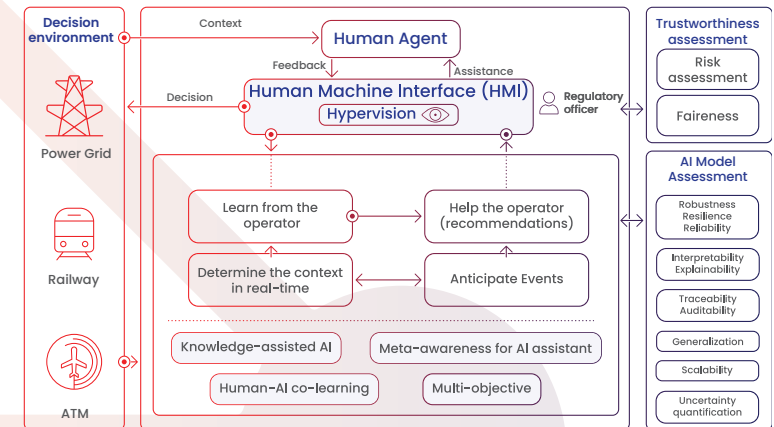


Electricity Network

- 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 use cases driven by industry requirements, across 3 infrastructure types 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.

11 OPEN SOURCE RESULTS

