FACTS AND FIGURES

STARTING DATE
1/12/2020

BUDGET
€ 1,7 M

DURATION
30 MONTHS

COORDINATOR
UNIFE

GRANT AGREEMENT
N° 101008913

11 PARTNERS
6 EU COUNTRIES

The European railway network includes more than 300.000 km of tracks, connecting pervasively all cities and towns and representing a key asset in the European transportation ecosystem.

Such impressive network provides in fact a safe, affordable, accessible and sustainable transport system to millions of European citizens. To keep and improve such performance level, it is essential the role of maintenance practices and the capability to improve them.

The European Shift2Rail (S2R) Joint Undertaking (JU) has established in its Multi Annual Action Plan (MAAP) that for "delivering the capabilities to bring about the most sustainable, cost-efficient, high-performing, time-driven, digital and competitive customer-driven transport mode for Europe," among other characteristics, intelligent maintenance should be introduced to increase capacity and availability and to reduce maintenance costs.

The DAYDREAMS project overall goal is to move forward from the current state-of-art towards the integration and use of data and artificial/human trustworthy intelligence together with context-driven HMI for prescriptive Intelligent Asset Management Systems (IAMS).

CONTACT US

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PROJECT WEBSITE
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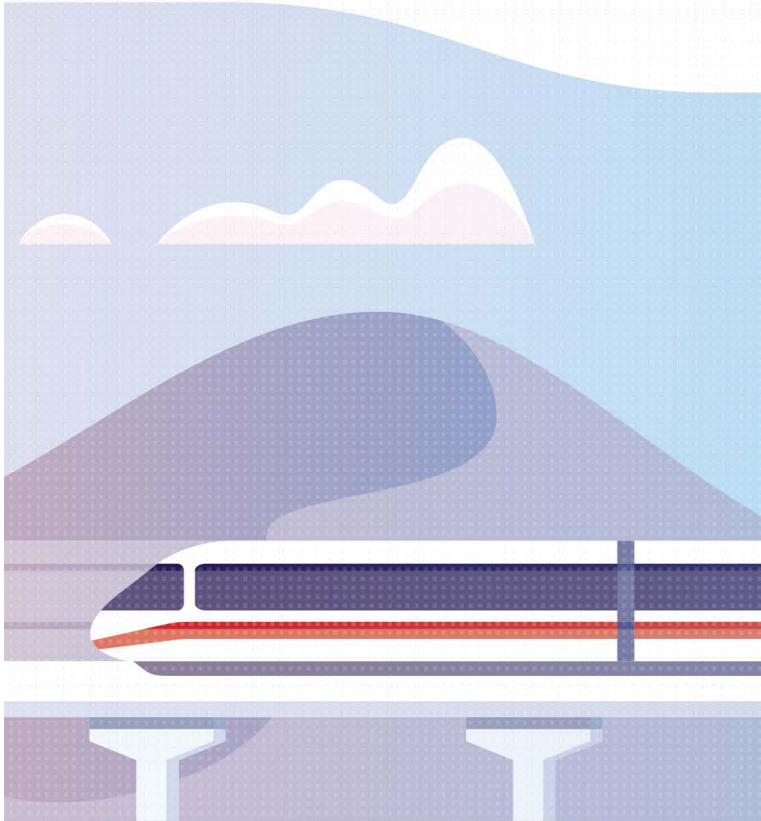
DAYDREAMS CONSORTIUM

University of Bristol – Smart Internet Lab
Cefriel – Politecnico di Milano
IASA
Universität Konstanz
RFI – Rete Ferroviaria Italiana – Gruppo Ferrovie dello Stato Italiane
RINA
stimo
TRAINOSE – A company of the FS Group
unife – The European Rail Industry
Università degli Studi di Genova
ZenaByte – Artificial Intelligence & Data Analytics

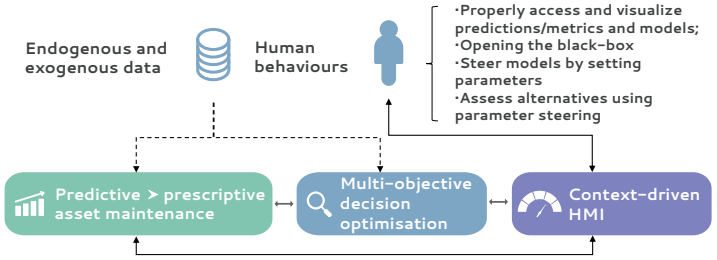
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008913.

DEVELOPMENT OF PRESCRIPTIVE ANALYTICS BASED ON ARTIFICIAL INTELLIGENCE FOR IAMS

DAYDREAMS



PROJECT OBJECTIVES



The DAYDREAMS project will achieve its scope through the following main objectives:

1. Advancing in maintenance approach by moving from preventive and predictive asset management towards prescriptive asset management;
2. Largely improving the decision-making process by developing multi-objective decision optimisation approaches thus taking into account all possible (often conflicting) implications of IAMS decisions in the railway environment (e.g., on Traffic Management System, Energy, Freight, etc.);
3. Reinforcing the role of the person-in-the-loop by designing and developing advanced context-driven Human Machine Interfaces (HMIs) to allow context- and risk-aware multiple-options decision-making processes supported by the information on data sensitivity and robustness. The HMI will allow the person-in-the-loop to:

- Properly access and visualise predictions/metrics and models;
- Assess why and how the model predicts something ("opening the black-box");
- Steer models by setting parameters;
- Evaluate alternatives using parameter steering and extending this process through speculative execution.

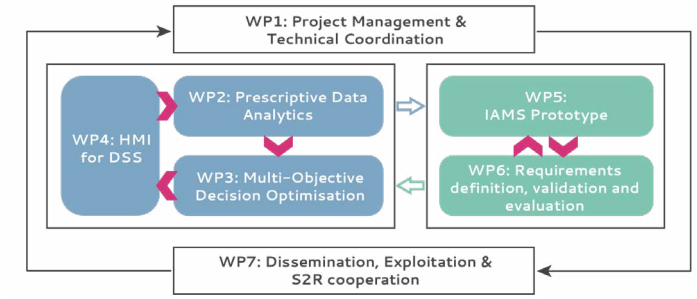
TECHNOLOGICAL PILLARS

DAYDREAMS will reach its objectives through the design, development, and integration of three technological pillars:

- **AI and Machine Learning** for asset management prescriptions based on asset status nowcasting and forecasting. These technologies will be targeted to model the entire maintenance process, through the use of both endogenous and exogenous (e.g., environmental) data, including asset-related physical models of the phenomena and human behaviour/decisions/actions, which holistically describe or affect the asset management process;
- **Multi-objective Optimisation** (including AI- and stochastic-based methods). These technologies will be targeted to prescribe optimal decisions to railway stakeholders, by ranking a list of possible options, together with related risks and uncertainties, taking into account both stakeholders' and maintenance process metrics and constraints, taking into account stakeholders' KPIs, preferences, and constraints.
- **Context-driven HMI.** These technologies will allow improving the effectiveness of information transfer (e.g. prescribed action with associated KPIs and uncertainties) to decision-makers and will allow the collection of stakeholders' behaviour, as to obtain an effective risk-aware human-in-the-loop integrated system.

PROJECT STRUCTURE

The project is therefore structured into seven different Work Packages (WPs), where WP2, WP3 and WP4 will cover the main technological pillars (AI, MOPs and context-driven HMI) that are described above, while WP5 and WP6 will cover the implementation of the IAMS Prototype and its evaluation and validation, respectively. The figure below illustrates how the project is organised:



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