

CoSMo Asset Investment Planning for Rail Infrastructure Managers

UIC Digital Awards 2016

Project overview:

CoSMo launched the Asset Investment Planning (AIP) for Rail project together with SNCF Réseau in 2016 with the goal of delivering an application that would enable railway infrastructure managers to optimize their maintenance and renewal strategies, enhance their network and service quality, and minimize costs. Experts from SNCF Réseau, France's railway infrastructure management company, worked closely with CoSMo teams to develop a prototype of the application.

CoSMo AIP for Rail uses a transformational technology enabling the integration of different subsystems of a railway network coupled with models for service quality, ageing, maintenance, finance in an integrated complex model. Other models or systems such as HR and stocks can be integrated in future versions.

SNCF Réseau applied the application on 2 strategic routes in mid-2016. The company was able to simulate and compare different maintenance and renewal strategies and evaluate their impacts on the network's overall health, service quality, and cost. Through the process of simulation SNCF Réseau compared different strategies to deploy across different routes. The software tool allows the assessment of an investment plan in under 15 minutes for a single route, where it would usually take several weeks. The ergonomics of the tool and its computing efficiency permits the Asset Managers to explore a much wider range of possibilities to ensure that the decision maker makes the optimal decision.

CoSMo AIP, the application at the core of CoSMo AIP for Rail, is already used with other large network operators for AIP where efficiencies and savings have been demonstrated to rise to 15%. After finalizing the development of the prototype of the CoSMo AIP for Rail application, future development will focus on integrating new Asset Management topics (technical domains, HR resources,...) and improved models/parameters (for the perimeter of 1st version).

CoSMo AIP for Rail application is the world's first AIP solution dedicated to railway network operators. Powered by a transformational technology emerging from decades of research in complexity science, CoSMo AIP for Rail fundamentally changes the means by which rail infrastructure managers operate, improve performance across key performance indicators for accessibility, safety and reliability, while controlling current and future investment.

Benefits for rail industry:

CoSMo AIP for Rail is the first systemic AIP application for rail infrastructure managers.

Before the development of CoSMo AIP for Rail there existed no systemic AIP application designed specifically for rail infrastructure managers. In the past rail infrastructure managers were reliant on general asset management software or in-house solutions that considered

different parts of the network in individual silos. With CoSMo AIP for Rail, however, CoSMo's expertise in complex industrial systems was coupled with SNCF Réseau's expertise in rail network operations to develop an industry-specific application that is adapted to the demands, constraints, components and functional architecture of a rail network system.

CoSMo AIP for Rail empowers rail infrastructure managers to identify optimal strategies to minimize costs and improve service delivery.

The prototype application deployed with SNCF Réseau helps to identify optimal strategies to implement so as to minimize expenditure while maintaining service quality. By helping executives at SNCF Réseau to minimize operational and maintenance costs (OPEX) and investments in the rail network (CAPEX) CoSMo AIP for Rail can deliver immediate financial benefits to the company. In addition, CoSMo AIP for Rail helps to identify the optimal strategies to pursue so as to meet key performance indicators for cancelled trains, delayed trains, safety, and customer service so that the attractiveness of the rail network is maintained and even increased.

CoSMo AIP for Rail empowers rail network operators to overcome the approaching wall of investment.

Rail infrastructure managers face a significant and fast-approaching investment wall wherein significant portions of older infrastructure across their networks will need replacement in a short period of time. CoSMo AIP for Rail enables rail infrastructure managers to identify this investment wall, helps to prioritize investment needs and then optimize their maintenance and expenditure strategies to minimize the risk and impact of this investment wall, and maintain operational performance across a period of significant development and change in the rail network.

CoSMo AIP for Rail captures and retains the expertise in rail infrastructure manager teams.

Any industrial company is always at risk to lose key staff and experts which means that there is a significant risk of institutional knowledge being lost from the network. CoSMo AIP for Rail was developed in collaboration with SNCF Réseau's Experts and part of their knowledge in rail network operations was locked into the application and remains available to the Asset Managers.

CoSMo AIP for Rail is transparent, auditable, and simulations are repeatable.

Unlike some competing technologies, CoSMo AIP for Rail offers transparent and auditable results. Simulations are repeatable which means that operators are armed with the evidence and analyses that they need to justify infrastructure and economic strategies to regulators, governments, and other stakeholders.

Technological research:

The transformational technology that powers CoSMo AIP for Rail is the product of decades of research in complex systems at two of France's premier laboratories: ENS de Lyon and CNRS. The fundamental research in complexity science would be augmented by the development of a proprietary modeling language (the Complex Systems Modeling Language, or CoSML) and a simulation studio for complex industrial systems.

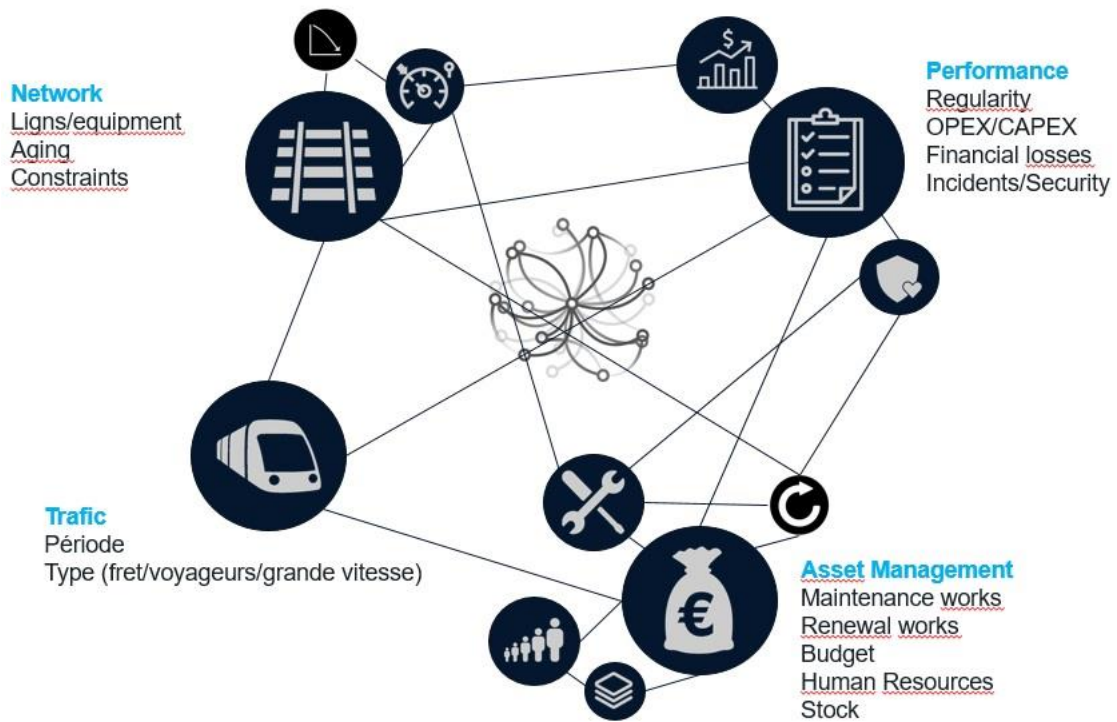
With a team of researchers including world-renowned leaders in complexity science, experts in physical, biological, and social complex systems, expert modelers, and computer scientists The CoSMo Company developed its first application for industrial systems, CoSMo AIP, for the energy sector. After successfully launching CoSMo AIP for energy utilities, a specialized AIP application for rail network operators was an obvious next step.

CoSMo AIP for Rail was developed to answer to a complex question and required an approach based on the emerging science of complex systems optimization. It is informed by the latest advances in understanding complex systems which are then applied to AIP strategies in the rail sector. Where traditional approaches are based on a siloed, atomistic approach to network optimization, CoSMo AIP for Rail allows to map, model, and represent all of the dependencies between elements within a complex rail network. As a result, the impacts of any strategic decision can be simulated across the entire infrastructure, human, and technology network and executives can make decisions with full confidence in the expected outcomes.

In an international environment that is increasingly interconnected, and where those connections mean systems and subsystems are becoming further interdependent, both within organisations and across borders, only approaches that enable assessment of systems as a whole are going to be effective for overcoming the challenges ahead. CoSMo AIP for Rail allows rail infrastructure managers to understand the impacts of complexity on their systems and extract the value in this complexity.

Demonstrated additional value:

CoSMo AIP for Rail was created in collaboration with SNCF Réseau, which used the application to simulate the impact of its planned maintenance and renewal strategies on 2 major routes until 2030. Results provided by the application will contribute to reinforce and/or confirm decision maker choices. CoSMo AIP for Rail will help optimize the operating and capital expenditures of SNCF Réseau. What is more, with CoSMo AIP for Rail empowering SNCF Réseau to optimize their strategies to meet service quality, operations, and quality performance indicators, too, SNCF Réseau expects to consolidate and improve its reputation as the preferred transport for both public and freight.



CoSMo Asset Investment Planning for Rail – Conceptual Modal