OPTIRAIL

Development of a Smart Framework based on Knowledge to Support Infrastructure Maintenance Decisions in Railway Corridors

Funding: European (7th RTD Framework Programme)
Duration: Oct 2012 - Sep 2015
Status: Complete with results
Total project cost: €3,916,343
EU contribution: €2,700,000

Call for proposal: FP7-SST-2012-RTD-1
CORDIS RCN: 104890

Background & policy context:

In a context of wide use of transport, it is necessary to increase efficiency of the different transport modes as well as their interaction. To that effect, rail transport will play an important role in the future by increasing its capacity. Thus, it would be necessary to strength the competitiveness of railway ensuring a sustainable, efficient and safe service.

In that sense, it is essential to improve the interoperability and safety of national networks in order to promote a single European Rail Market. Nevertheless, there are still several barriers to overcome as a consequence of the lack of a common definition of standards at European level.

Objectives:

Within this framework, the main objective targeted by the OPTIRAIL project aims at developing a new tool, based on Fuzzy and Computational Intelligence techniques and validated through two case studies, that will enable the better cross-border coordination for decision making of railway infrastructure maintenance across the European railway corridors.

Methodology:

The project will specifically aim:

- To develop a comprehensive tool, based on Fuzzy and Computational Intelligent techniques, to manage all the elements that are relevant for track maintenance, predicting future conservations needs with optimal allocations of resources.
- To ensure a more effective planning of the management and activities of infrastructure maintenance based on expert knowledge accumulated over years of experience and to the information stored in the monitoring and maintenance management systems.

In order to be able to achieve its objectives, the project Consortium is comprised of a well-balanced group of 9 partners from 6 European countries with complementary skills and expertise, including all the necessary profiles to deal with the scheduled project work plan. Furthermore, non-participant railway administrators have shown their interest and commitment to the project.

Parent Programmes:
FP7-TRANSPORT - Transport (Including Aeronautics) - Horizontal activities for implementation of the transport programme (TPT)

Institute type: Public institution
Institute name: The European Commission
Funding type: Public (EU)

Lead Organisation:
Vias Y Construcciones Sa

Address:
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Organisation Website:
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EU Contribution: €396,704

Partner Organisations:

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Address:
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Organisation Website:
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EU Contribution: €485,900

Evoleo Technologies Lda

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EU Contribution: €159,253

Stiftelsen Sintef

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Norway

Organisation Website:
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EU Contribution: €509,059

Universidad De Granada

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18071 GRANADA
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Organisation Website:
http://www.ugr.es

EU Contribution: €317,400

Ostfalia Hochschule Fuer Angewandte Wissenschaften Hochschule Braunschweig Wolfenbuttel

Address:
Technologies:

- Computer-aided design and engineering
- Fuzzy rule based models for railway infrastructure and components

Development phase: Research/Invention

Key Results:

**Smart tool for rail maintenance**

An EU project developed new smart tools, based on artificial intelligence, that will help to optimise railway maintenance operation ensuring higher railway availability, better cross-border coordination and improved efficiency. This promises to deliver higher levels of safety and service in railway infrastructures.

Europe’s planned increase of rail services will also mean more maintenance. The challenge will be to expand rail usage without disrupting services.
To that end, the EU-funded project http://www.optirail.eu (OPTIRAIL) aims to develop a new maintenance tool. Based on fuzzy and computational intelligence, the tool will enable cross-border coordination of decisions affecting rail maintenance. The nine-member group began in October 2012 and concludes three years hence.

After a depth analysis of railway maintenance requirements regarding regulations, standards or specifications, around Europe, and the study of transferability of maintenance tools or techniques from other critical infrastructures as the electricity networks, the conceptual design of OPTIRAIL framework was completed. This is based on an open concept of "Serviced Oriented Architecture" where aspects such as identification of data, information or knowledge must be considered. Information from the ICT systems used by the different railway infrastructure managers can therefore be processed and accessible.

Once the criteria were set, fuzzy rule-based systems and models based on Computational Intelligence methods were developed.

Deterioration models together with maintenance operation effect models make it possible to model the behaviour of the track and to predict future quality measurements, across different scenarios for possible intervention.

A multi-objective optimisation framework then allows us to use this knowledge to find maintenance plans optimised for specified objectives, such as minimising intervention cost and maximising capacity, and, at the same time, guaranteeing safety.

Finally, integration to develop open package software will enable every interested party to check OPTIRAIL solutions, tested in two European railway corridors.

OPTIRAIL will yield a tool for the optimisation of rail maintenance in Europe, allowing minimal disruption of services. The system will help to integrate the European economy.

Documents:
- Periodic Report Summary 1 - OPTIRAIL
- Final Report Summary - OPTIRAIL (DEVELOPMENT OF A SMART FRAMEWORK BASED ON KNOWLEDGE TO SUPPORT INFRASTRUCTURE MAINTENANCE DECISIONS IN RAILWAY CORRIDORS)

STRIA Roadmaps: Infrastructure
Transport mode: Rail transport
Transport sectors: Passenger transport, Freight transport
Transport policies: Digitalisation
Geo-spatial type: Other