Public Summary of D5.2

Smart strategic energy management system software development report

What is MERLIN?

MERLIN is a collaborative project funded under the European Commission's 7th Framework Programme on Research and Development. MERLIN started on 1st October 2012 and will last 39 months.

MERLIN's main aim and purpose is to investigate and demonstrate the viability of an integrated management system to achieve a more sustainable and optimised energy usage in European electric mainline railway systems.

What are the issues at stake?

Energy management is a key issue for railway systems and this situation will continue to be prominent for the foreseeable future. Multiple operational scenarios add complexity to the development of suitable and appropriate energy management solutions. Moreover, existing assessment tools lack an integrated approach, and tend to omit the variation in emission levels, energy usage and associated costs resulting from differing traffic peaks.

Given that the railway system is a complex and interconnected system, a single supplier, operator or infrastructure manager (as large as they may be) cannot tackle the energy management issue for the entire network alone. Hence, only through a collaborative approach such as **MERLIN** can effective solutions for this issue be developed. Appropriately, the **MERLIN** consortium brings together the key rail stakeholders from across Europe.

What are MERLIN's main achievements?

- Proposals for technical recommendations (UIC/UNIFE TecRec) on Specification and verification of energy and power consumptions of railway systems and on Energy and power related information protocols at operational level;
- Future business models & recommendations (smart energy management, cost saving);
- Optimised solutions for current and future business models;
- Reference architecture and interfaces related to a strategic support tool and operational energy management tool which supports real time suggestions to network actors.

Public summary:

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The overarching aim of the MERLIN project is to investigate and demonstrate the viability of an integrated management system to optimise energy use. One of the key elements of this management system is a Strategic Decision Making Tool (SDMT), intended to be a decision support system for design or modification of railway systems, specifically targeting the strategic decisions required when designing new railway systems or carrying out significant modifications to existing systems, such as timetable changes, new rolling stock, electrification infrastructure, energy storage systems or revising contractual arrangements for the supply of electricity.

Following the specification defined in Deliverable D5.1 and based on the draft architecture proposed in Deliverable D2.2 this Deliverable has implemented it by developing three new modules, namely:

- Core module ;

- Contractual arrangements module (CA) ;

- Optimisation algorithm (OA)

The core module is central to the SDMT effectively providing the user interface and data interfaces for all the functionalities provided by the SDMT performing tasks such as:

- Visualise the trade-off between indicators associated with the four missions;

- Display the parameters describing the calculated configurations, and collect any additional user-defined configurations for the next iteration;

- Write a set of input files for the next iteration, with the objective of analysing the effects of changes to the system design and finding configurations with better performance, as well as ruling out configurations that would violate constraints

As the name suggests, the optimisation algorithm module implements a genetic algorithm aiming to describe a Pareto front of optimal system configurations.

The contractual arrangement module main task is to explore the impact of parameter optimisation in the cost of operating each configuration of the railway system referenced to a defined timetable.

More information
To know more on the MERLIN project, please visit http://www.merlin-rail.eu.