



Linear infrastructure efficiency improvement by automated learning and optimized predictive maintenance techniques

INFRALERT Deliverable D7.1

Summary Sheet

DELIVERABLE TITLE:

D7.1 Architectural and Functional Definition of eIMS

WORK PACKAGE:

WP7. Development of the expert-based Infrastructure Management System (eIMS)

- **T7.1.** Definition of eIMS architecture and functionality
- **T7.5.** Security and privacy

Deliverable Leader:

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Contributing Partners:

CEMOSA, DMA, Fraunhofer IVI

EXECUTIVE SUMMARY:

INFRALERT aims to develop an expert-based information system to support and automate linear asset infrastructure management from measurement to maintenance. This enfold the collection, storage and analysis of inspection data, the deduction of interventions to keep the performance of the network in optimal condition, and the optimal planning of maintenance interventions.

The project aims are divided and managed by Work Packages (WP) and the deliverable D7.1 is part of the WP7 – Development of the expert-based Infrastructure Management System (eIMS)

The work package consists of five tasks, with the first focusing on design and the remaining four on the implementation.

- Task 7.1 – Definition of eIMS architecture and functionality
- Task 7.2 – Implementation of eIMS Framework and Presentation Layer
- Task 7.3 – Implementing Expert-based Toolkit features
- Task 7.4 – Development of Integration Gateway
- Task 7.5 – Security and privacy

Results from this Deliverable D7.1 are related to Tasks 7.1 and 7.5, these contains the following subtasks:

- Create a detailed list of actors, use cases and functionalities.
- Study candidate technologies for the implementation and select the optimal ones.

They must ensure that the resulting eIMS will be entirely cloud based. The selection should also give preference to open-source technologies over proprietary ones.

- Study external systems to specify feasible integration technologies and data content of external systems available for integration.
- Define the overall system architecture.

The eIMS system requires the execution of various toolkits which may easily need high computation

power. Also the eIMS system must be cloud-based. In order to fulfil these tasks as much as possible a system composed of easily scalable microservices would be developed instead of having one big monolith application. To make all these pieces work together the suggested middleware architecture is Spring Cloud based on Java. Spring Cloud is open source, provides tools to build common patterns in distributed systems.

The Hibernate ORM is the planned and suggested mapping framework for accessing eIMS Data Farm which is open source industry lead object-relational mapping framework for Java. It is database independent, highly scalable, reliable, configurable and highly extensible. Non-relational databases will be accessed through Spring Data, which supports numerous NoSQL databases.

The Presentation layer or frontend will be a Single Page Application (SPA) and developed in the brand new Angular 2 framework based on HTML5.

Supporting interoperability with existing systems, eIMS has to provide diverse ways of integration. Among others, web services and API's are being developed to support other systems to interoperate with eIMS. Furthermore, eIMS must have components that are able to invoke other systems' web services when such feature is available in an external system.

The methodologies and approaches presented in this document may be subject to revision during the progress of INFRALERT in order to be in tune with the requirements from all WPs in the Project. Therefore, the information, specifications, and techniques outlined herein might suffer modification, and extensions, which will be updated and collected in further documents.

ACKNOWLEDGEMENT:



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636496.

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