INFRALERT

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

INFRALERT Deliverable D1.1 **Summary Sheet**

DELIVERABLE TITLE:

D1.1 Requirements and targets of the INFRALERT subsystems

WORK PACKAGE:

WP1. Project framework and requirements

- **T1.1.** Analysis of existing procedures for data management, data analytics and decision support on Maintenance & Renewal and New construction of transport infrastructures
- **T1.2.** Requirements for the INFRALERT subsystems
- **T1.3.** Quality parameters and thresholds for the alert generation

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EXECUTIVE SUMMARY:

The aim of this deliverable is to set up the common project framework and requirements that should guide the INFRALERT technical developments. To achieve this general goal, several tasks have been carried out.

First, the State of the Art of existing infrastructure management systems have been analysed and the drawbacks that shall be overcome by the INFRALERT system have been identified. This review includes the perspective of the members from the External Advisory Board (EAB), who are relevant actors in the road and rail sectors with real-world experience in the use of asset management systems.

Second, the functional and technical requirements of the INFRALERT subsystems have been defined to achieve a useful tool able to provide a step enhancement of maintenance management capabilities of existing systems. These requirements have been defined for every expert-based toolkit, as well as for the whole system.

Based on the aforementioned results, the drawbacks of existing tools and the features required for the INFRALERT system have been analysed from external and internal perspective, identifying the positive and negative aspects. The SWOT methodology has been applied to identify the strengths, weaknesses, opportunities and threats of the INFRALERT system, as well as a preliminary strategy for development and exploitation. The outcome of this analysis is the SWOT matrix of the INFRALERT project, presented in the following figure.

	Positive	Negative
Internal	**Strenghts** • Effective data management • Able to evolve and adapt to changing inputs and requirements • AI techniques for data analytics • Integrated RAMS&LCC optimisation • Risk-based maintenance planning • Cloud-based, easy to implement • Compatible with existing asset management solutions	**Weaknesses** • Needs large amounts of data to run the algorithms and probabilistic analysis. • Results from data analytics are not trivial. The user has not chance to check them using manual methods. • Security issues in cloud-based service • Very technical interface, needs external GIS and asset management software for reporting.
External	**Opportunities:** • Asset owners from several countries are joining the rail and road management in the same company. It will boost the use of generic linear asset management solutions. • New sensing technologies are more and more data producers. • Wide variety of data formats (from different sensor manufacturers) require standardization before feeding the management system. • Big data and cloud computing have recently achieved good performance at low cost. • Rapid spread of PPP contracts were the builder has to manage (and maintain) the infrastructure for many years. It will increase the importance of risk-based decisions.	**Threats:** • Another software solution for maintenance planning. • Difficult implementation in large companies. • Lack of confidence on automated decision making. • Not useful for simple corridors (e.g. road concessions)

Figure 1. SWOT matrix of the INFRALERT project

Finally, in order to provide a common framework for the quality assessment of the infrastructure, the main quality parameters considered by the international regulations in rail and road sectors have been analysed. The system shall keep the infrastructure condition between the thresholds in order to fulfil the existing regulation, but it shall be also flexible enough to shift these values when there are sufficient arguments. With the aim of enabling the future implementation of generic parameters for any type of linear infrastructure, the quality parameters have been grouped into functional quality and structural quality categories.

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