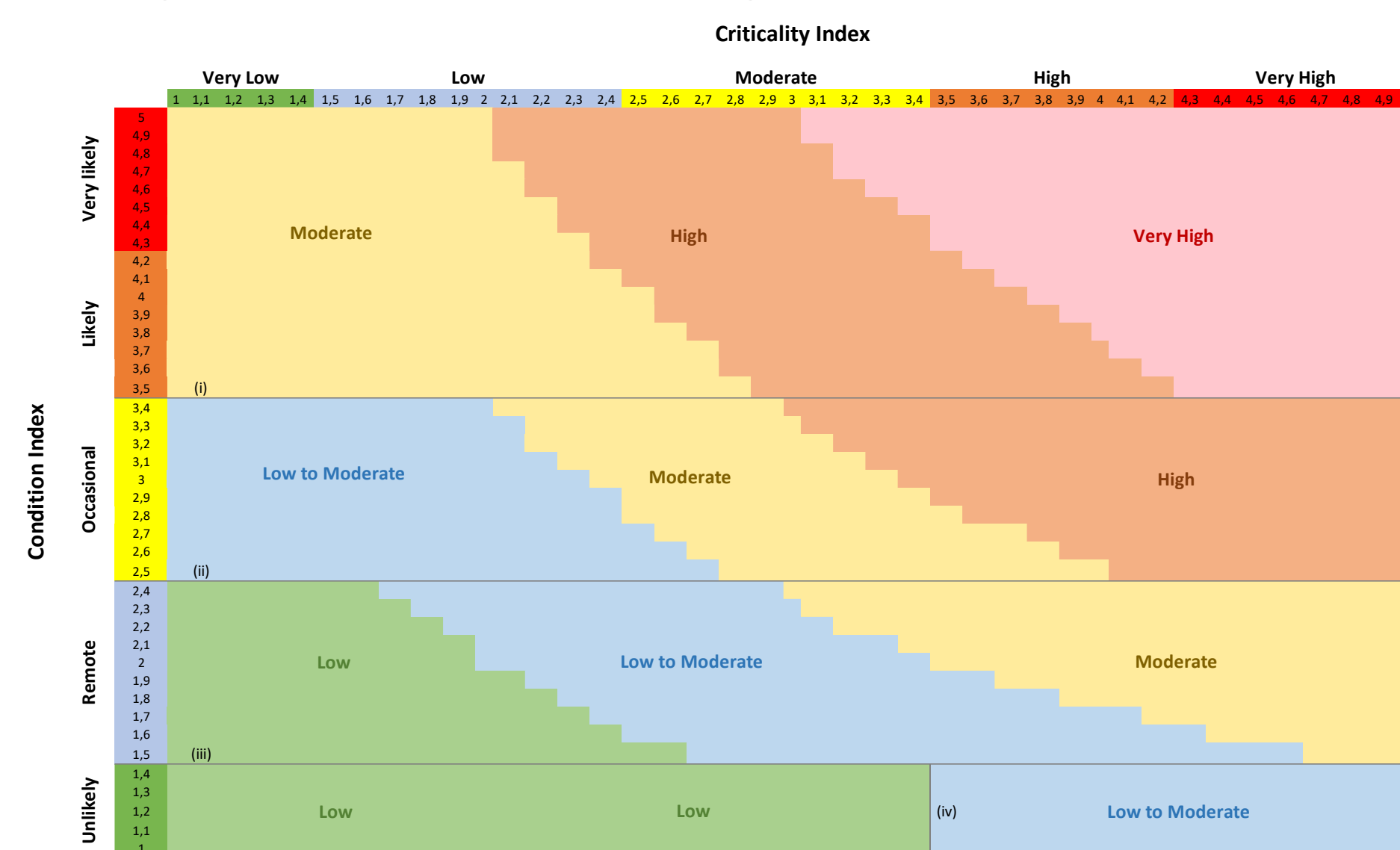




Tools for performance management of earth retaining structures

CONDITION AND CRITICALITY

Conflicting priorities are analyzed making use of two different indexes, related with the condition and criticality of each asset. The condition index mirrors the likelihood of a failure, based on a classification obtained mainly through principal inspections and structural health monitoring. The criticality index traduces the consequence of a failure, making use of physical characteristics of each structure and its functional location. Likelihood and consequence are combined through a risk matrix resulting in different levels of risk.



INTRODUCTION

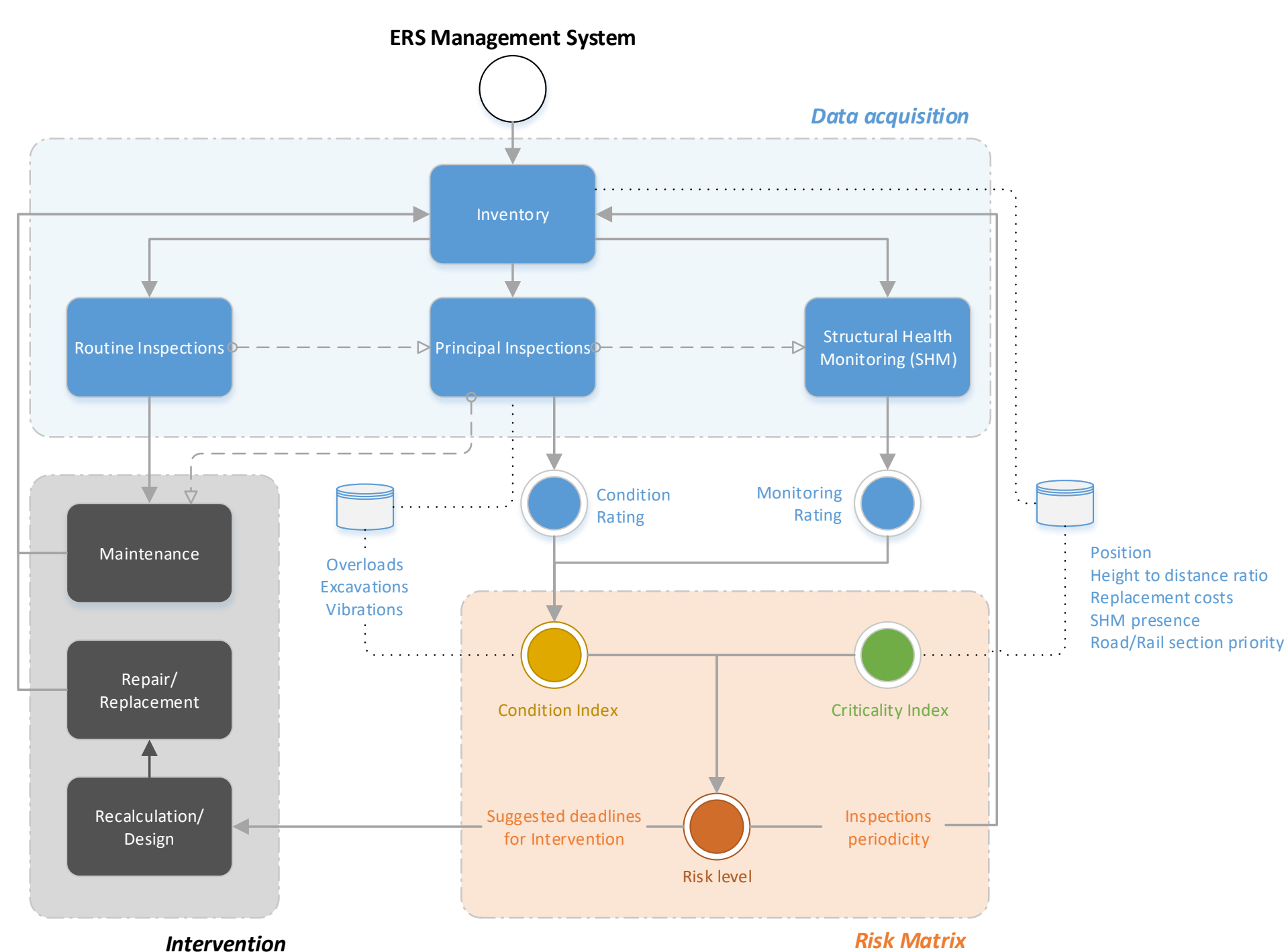
Infraestruturas de Portugal S.A. (IP) is a public company that holds the long-term concession for the national road and rail network, managing more than 16,500 kilometers of roads and rails. As an asset-intensive organization IP supports its activities on detailed knowledge of their networks, systems, components, and elements.

THE PROJECT

Recognising the need for a systematic performance assessment of the earth retaining structures (ERS) integrated into its road and rail networks, the company implemented in 2018 a long-term project aiming to develop a management process that includes inventory, condition assessment, monitoring strategies, therefore assisting informed decision making.

STRATEGIC MODEL

The framework for the correlation of all the management activities was developed as a collaboration process, with specific participants, interrelated activities, specific inputs, and standard outputs. As main objectives and overall results, the system provides the prioritisation of maintenance and investment needs, as well as the definition of inspection frequencies.



DATA AQUISION

Data acquisition activities have been tested and implemented making use of several different technologies such as lidar, photogrammetry and 360° photographs. A satellite-based technique (InSAR) is also being explored to monitor long term deformations.

MANAGING RISK

The adoption of risk levels allows translating condition and criticality of each ERS into specific actions for a given time frame, namely inspection intervals and the maintenance or investment priorities.

Risk Level	Inspection Intervals	Maintenance/Intervention time frame
Low	Routine inspections up to 2 years Principal inspections upon request	No actions beyond annual routine maintenance
Low to Moderate	Routine inspections up to 2 to 4 years Principal inspections up to 6 years	Actions to be planed under maintenance contracts
Moderate	Routine inspections up to 2 to 4 years Principal inspections up to 4 years	Medium-term intervention needed
High	Routine inspections up to 2 years Principal inspections up to 2 years	Medium-term intervention needed. Risk mitigation measures in the short-term
Very High	Principal inspections up to 1 year	Short-term intervention needed. Risk mitigation measures including immediate circulation restrictions

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