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## Cross-asset risk assessment on network level

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### Abstract

The CEDR-project “X-ARA – Cross-Asset-Risk-Assessment” aims at the development of a comprehensive framework for the network level assessment of asset risks and impacts. A literature review on risk assessment in road asset management has been carried out and several European road administrations have been interviewed on the current practice of risk assessment in their asset management procedures. Based on asset-specific risk assessment considering pavement, structures, drainage, tunnels, road furniture and geotechnical assets, a procedure for the transformation and accumulation of these risks onto network level is an essential part of the project. X-ARA will enable a road administration to execute a risk-based assessment and comparison of different maintenance strategies on network level, and then “overlay” the effects of broad influencing factors to assess “what if” outcomes. In considering a bottom-up-approach (from object level to network-level) the risk can be calculated and finally cumulated by using asset-specific information, which are available for most of the European road administrations.

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## 1. Introduction

### 1.1. Introduction and project goals

This paper presents an outline of the research project “X-ARA – Cross-Asset-Risk-Assessment” which is funded in the CEDR Transnational Road Research Programme Call 2013 “Ageing Infrastructure Management”.

The increasing importance of the road infrastructure leads to an increasing responsibility in maintaining the road infrastructure assets and terms like availability, safety, sustainability, environment-friendliness, etc. express the expectations of the different stakeholders, which have to be taken into consideration to the highest possible extent. Over the last years, asset management became a complex task in finding the optimum solution in form of a balance between the expectations (from the different stakeholders), the technical needs and, of course, the budgetary constraints under the condition of an acceptable risk. Thus, an essential improvement of road infrastructure maintenance is the integration of risk analysis into the asset management processes on different levels.

The main objective of the project X-ARA is the development of a comprehensive risk assessment framework including a set of guidelines and a practical software tool (X-ARA risk tool) for the network level assessment of asset risks and impacts. X-ARA considers different asset categories and the cross-asset risk on network level. A working tool fit for use by National Road Administrations around Europe is to be delivered at project end. The output of the tool is a visual representation (map) showing “heat maps” (i.e. a colouring scheme) of the network (as shown as example in Fig. 1) that visually represents the overall maintenance risk for each section and therefore allows a visual comparison of sections.

By applying “what-if” scenarios, the impact of high-level influencing factors is calculated and can then be compared to the baseline scenario. This will be visualized by changing of the colours.

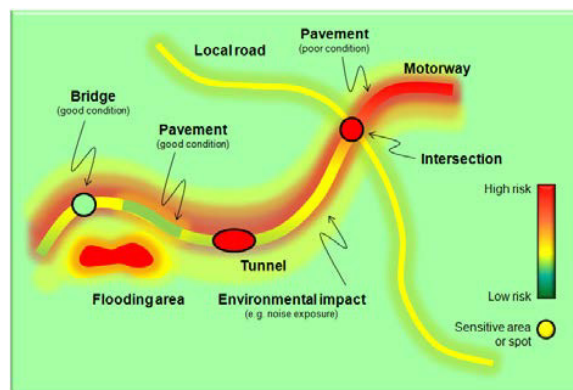


Fig. 1. Visualisation of maintenance risk on the network. Additional information like “flooding area” is shown for illustrating influencing factors.

### 1.2. Project approach

The project started with an initial desk study that put together the current status of risk assessment in the field of road asset management. A literature review using various sources (PIARC library, Reports of the FHWA, Reports from EraNet Road/CEDR projects, IEEE/IEL Electronic Library, Thomson Reuters Web of Science, ScienceDirect and Documents from governmental and other organizations members of the project team were aware of) has been carried out.

To reflect current practice, a workshop and consecutive interviews with road operators have been conducted.

Road operators in Austria, Denmark, Hungary, Slovenia, The Netherlands and United Kingdom have been consulted using a set of questions about how they implement risk management in their asset management processes. The results of the desk study are outlined in chapter 1.3.

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