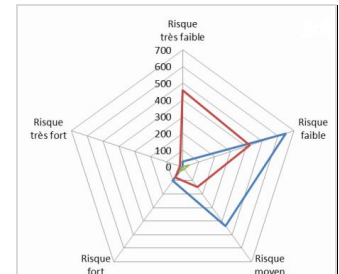


## Analysis of sensitivity of engineering structures of the APRR motorway network due to fatigue



**Client:**  
APRR

**Project manager:**  
APRR

**Contractors:**  
Not applicable

**Years:**  
2013 - 2014

**Principle features:**  
Number of roadways: **2,773**  
Period of construction of roadways: **1957 – 2007 (50 years)**  
Regulatory period: **1906 – 2002 (96 years)**

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### Background

Structural fatigue verification has been recently introduced into the calculation rules relating to engineering structures. A not insignificant number of engineering structures have therefore been designed and built without this issue being formally taken into account.

Accordingly, following a request by the network licensor, the motorway network manager, under the 2009-2013 planning contract, APRR had to check the extent to which the structures within its network were affected by the problem of fatigue in engineering structures.

APRR's stock of structures consists of 2,773 roadways built between 1957 and 2007.

### DIADES' task

APRR tasked DIADES with investigating the issue of fatigue in the engineering structures using a representative sample from its network, for it to base its investigations on:

- Bibliographical study on the feedback on incidents of fatigue noted on engineering structures,
- Study of the different calculation rules for reinforced concrete, pre-stressed concrete and metal over various periods in order to analyse the sensitivity of the APRR's engineering structures which were built during these periods and to determine objective classification criteria,
- Analysis of the uncertainties of the APRR network in relation to the problem of structural fatigue,
- Development of a risk assessment matrix based on the different levels of vulnerability and uncertainties found within the APRR network.

Assessment of risk of ruin of structures in the APRR network through fatigue

Analysis of APRR's stock of structures and classification of all the structures in the network in order of risk "high to low" on the basis of simple characteristic information about the structure.