

Re-Gen

risk assessment of ageing infrastructure

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ISSUE 1

PICTURE: KICK OFF MEETING

ABOUT THE Re-Gen PROJECT

Re-Gen is a research project funded under the CEDR programme. CEDR is an association of road directors from across Europe. One of the objectives of this association is to fund research projects in Europe.

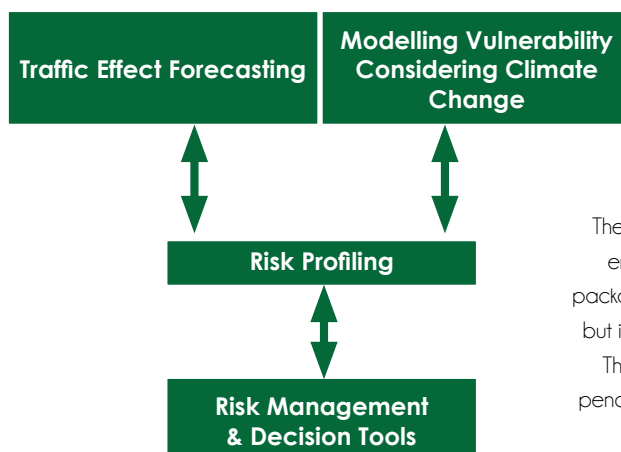


The objective of the Re-Gen project is to provide Road Owners/Managers with best practice tools and methodologies for risk assessment of critical infrastructure elements, such as bridges, retaining structures and steep embankments. The output will provide Owners/Managers with the facility to optimise budgets/resources from the perspectives of minimisation of cost, i.e. considering alternative rehabilitation strategies for maximised service life performance. The Re-Gen consortium consists of members from Ireland, Slovenia, France, Denmark and The Neth-

erlands. The consortium consists of two SMEs, one large enterprise and three leading European research institutes, each with particular expertise and complementary skills key to the success of the project. The primary objective for the consortium is to demonstrate to road owners/managers across the EU how probabilistic risk based techniques may be widely applied to optimise performance for minimised cost whilst maintaining the minimum specified safety level as required by National Authorities and/or Codes of Practice.

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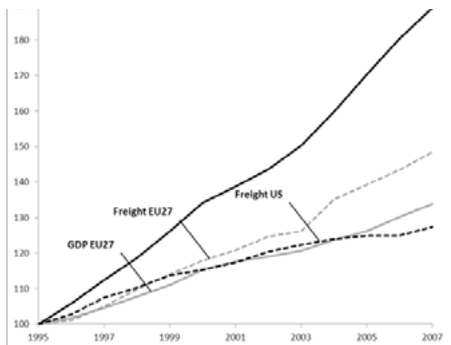
WORK STREAMS

The project is divided into different work packages. Each work package is led by a single partner but involves a number of partners.

These work streams are interdependent and all contribute to the final risk assessment tool.

TRAFFIC EFFECT FORECASTING

Both freight traffic and traffic in general, are constantly increasing in Europe. At the same time, in most European countries, the majority of bridges that were designed and built in times when traffic loading was considerably lower. Many of these bridges will need to be posted or strengthened to carry greater load. However, the system can be optimised if the true safety of the bridge is known. This can be achieved through better quantification of bridge traffic loading.



Recent research has found that only a few European NRAs exploit the benefits of realistic traffic loading in bridge safety assessment. Even countries with well-developed and regulated bridge assessment procedures, like the UK, rely on counting rather than on weigh-in-motion (WIM) data but these traffic counts can be extremely misleading. Partners from France, Netherlands and Slovenia are all intensively collecting WIM data and using it for bridge assessment. Ireland has just started a weighing campaign and has developed some of the most advanced traffic modelling procedures.

MODELLING VULNERABILITY



The primary objective of this aspect of the project is to determine the vulnerability of key elements of the road infrastructure due to climate change effects. The effect of climate change on critical elements of the infrastructure is the main focus as failure or damage to these elements is likely to have a dramatic impact on road operability.

To examine vulnerability, different road infrastructure elements will first be classified into different vulnerability categories based on previous European research findings. Bridges and steep embankments can be considered the most critical nodes as reactive maintenance is difficult, costly and usually has significant impact on the end-user.

Once the critical elements have been identified, the primary deterioration mechanisms which affect these elements will be identified and the influence of climate change on these mechanisms will be assessed. A range of climate change scenarios will be used to do this. This will allow the likely failure responses of the road infrastructure to be assessed



As part of the Re-Gen project, a state-of-the-art report will be compiled on the availability of WIM data in partners' countries and throughout Europe. It will identify countries that collect WIM data and will evaluate those data with respect to bridge applications (according to technologies, quantity of

data and accuracy of results). It will also provide examples of good practice of using WIM data for bridge assessment and guidelines on how NRAs can collect and use it.

RISK PROFILING



A risk framework for assessing the overall risk associated with critical road infrastructure elements will be developed. Different definitions of road infrastructure failure will be investigated to determine what exactly failure is. Models will be investigated and further elaborated in order to calculate the probability of road infrastructure failure. Apart from numerical models, analytical probability models will also be addressed. Sensitivity analysis regarding the size of the network and characteristics of the components will be carried out.

The main input quantities for the risk framework will be the relationship between climate change and deterioration of the critical road infrastructure elements, and the relationship for the long term traffic growth. Models for the failure probability of road infrastructure elements will be investigated, as well as the consequences of the failure of road infrastructure. The consequences are not limited to direct structural consequences, but also to indirect consequences such as reputational risk. The risk framework also incorporates the implementation of structural and non-structural safety measures in order to reduce the risk to acceptable risk levels. An important element of the work is to determine what is an acceptable level of risk.

RISK MANAGEMENT

This represents the ultimate step of the proposed framework in which optimal decisions are to be made, to ensure that the reliability of structural systems is maintained or improved. This approach will integrate a probability-based approach for understanding the effect of technological, environmental, economical, social and political interactions on the life-cycle performance and cost of engineering infrastructure. The proposed tool will be tested on real case studies. This will enable the development of a tool which can be understood and used by all the relevant and interested parties and will address their practical requirements.

THE OBJECTIVES ARE TO:

- Effectively integrate in the decision process the performance assessment due to degradation of structural models and loading effects,
- Determine optimal management strategies,
- Ensure safe and long-term performance of road infrastructures under different scenarios of climate change and traffic forecasts,
- Offer infrastructure managers a practical predictive view of cost, safety, and condition.

PROJECT NEWS

- **Deliverable 1.1 and 2.1 have been submitted. These deliverables are titled 'Quality Assurance Plan' and 'Report of Climate Change Predictions (including key variables)' and can be found at www.re-gen.net.**
- **Re-Gen's proposal for a special session at the IABSE conference in Geneva in September 2015 has been accepted. The session will be titled "Infrastructure Asset Management" and will present work from the Re-Gen project as well as other contributions.**
- **Project Executive Board (PEB) Meetings took place on August 12th and November 5th.**
- **A project meeting will take place on 27th January 2015 in Schipol Airport, Amsterdam.**

KICK OFF MEETING

The Re-Gen Kick-Off meeting took place on 22nd and 23rd of May 2014 in ROD-IS's offices in Dublin. In total, eleven people attended, representing all members of the consortium. The primary objectives of the meeting were to confirm the commencement of the project, discuss the technical and administrative aspects of the project including roles and responsibilities of the partners and facilitate interaction among the partners on a social and professional level. The first day of the meeting focused on discussing the administrative and management aspects of the project. On the second day, the meeting centred on round table discussions of the technical aspects of each work package.



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