

The optimized structural design, construction, maintenance and end-of-life disposal of E-Roads contribute to the improved sustainability at system level

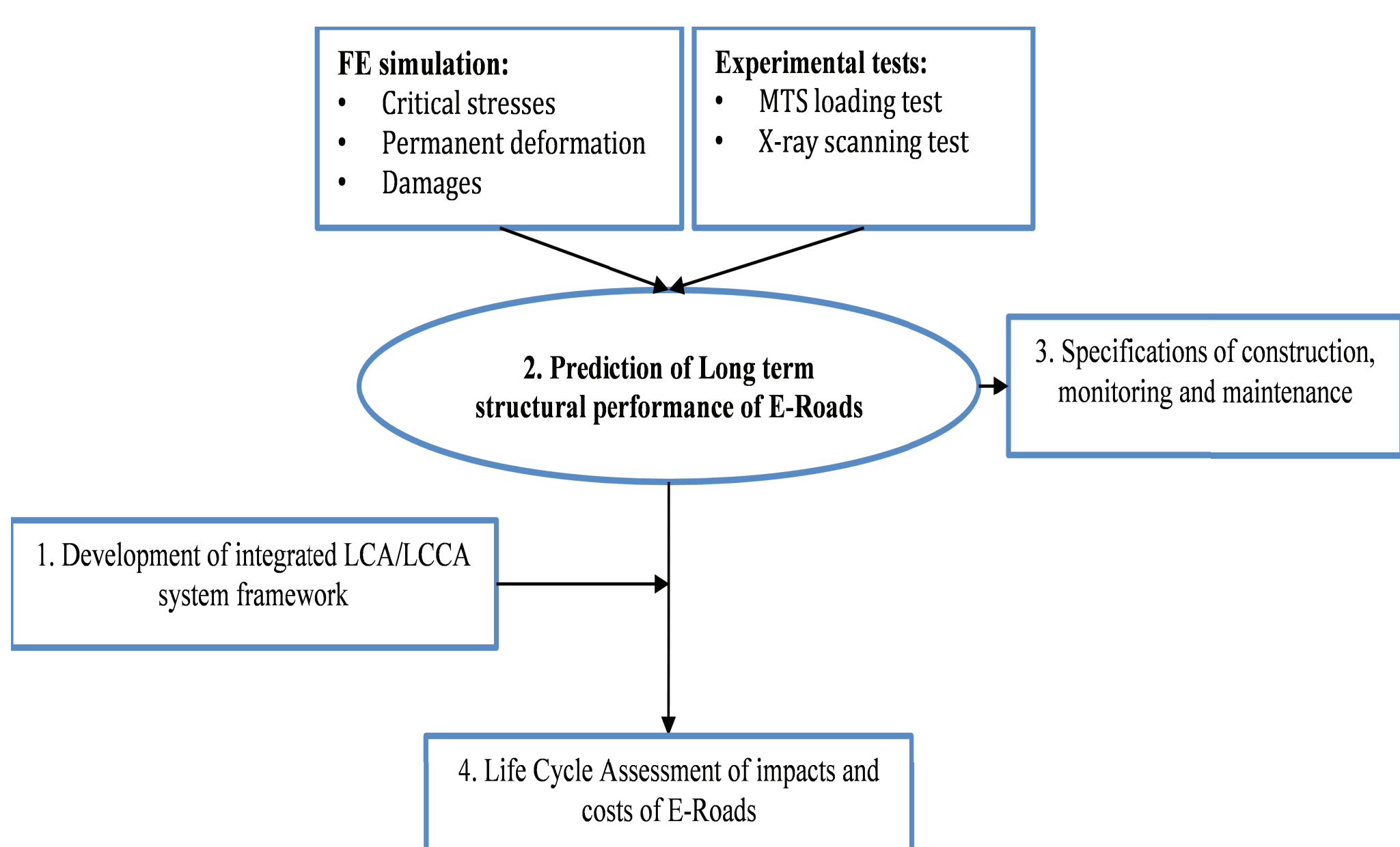
Introduction

A systematic evaluation of the life cycle environmental impacts and economic costs of E-Road infrastructure has been successfully carried out. As a major step of the work, in-depth analyses have been performed over the long term structural performances of E-Roads. These research outcomes would help decision-makers adopt more sustainable E-Road design practices, contributing thus to the improved sustainability of road transport sector through electrification as a whole.

Objectives

- To develop an life cycle analysis framework for E-Roads.
- To predict the long term structural performances of E-Roads via using advanced computational tools and experimental testing facilities.**
- To make a comprehensive evaluation of the E-Road construction procedures, as well as strategies for monitoring, maintaining & operating of E-Roads.
- To estimate the life cycle impacts and costs of E-Roads using integrated assessment framework and developed tools.

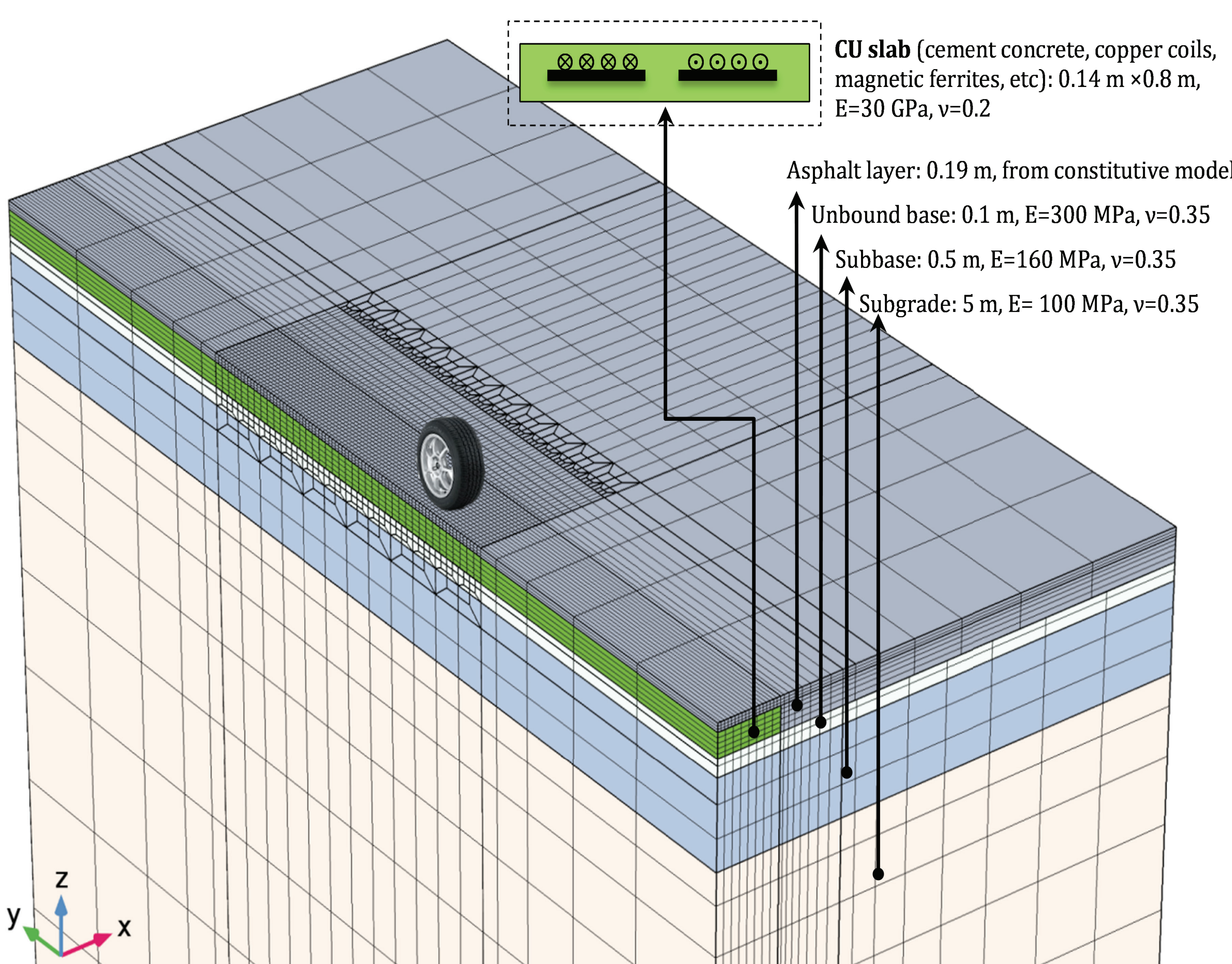
Partners involved



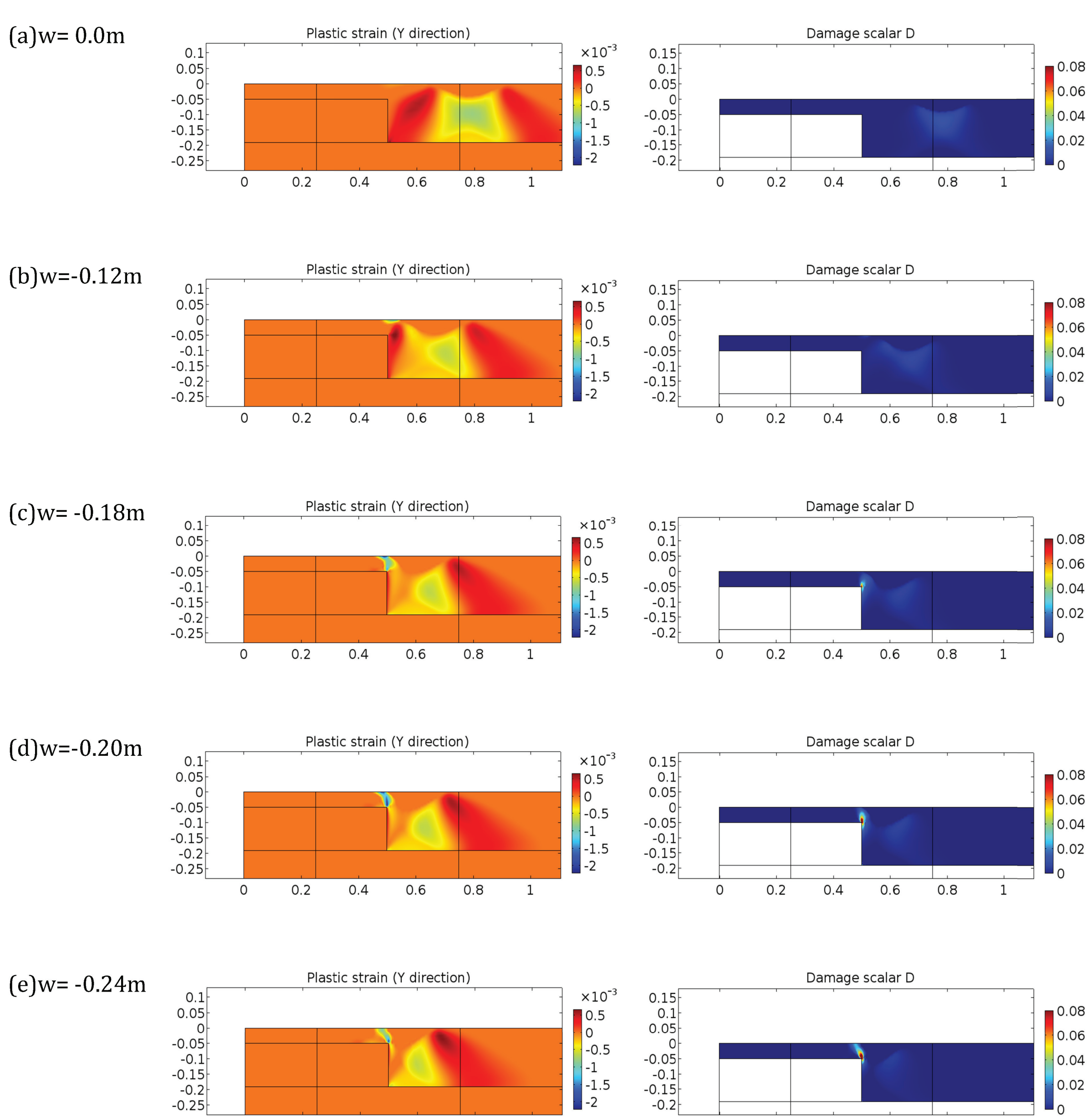
Workflow of assessing the life cycle impacts and costs of E-Roads.

Long term structural performance analyses of E-Roads

The Finite Element (FE) method has been adopted to model and simulate the structural responses of the integrated E-Road structures under typical traffic loading conditions. In laboratory, accelerated mechanical loading tests on small-scale E-Road samples have been further conducted to inquire the damaging potentials within the structure, demonstrated as well via an X-Ray scanning test.



Example of E-Road long term structural performance prediction using FEM

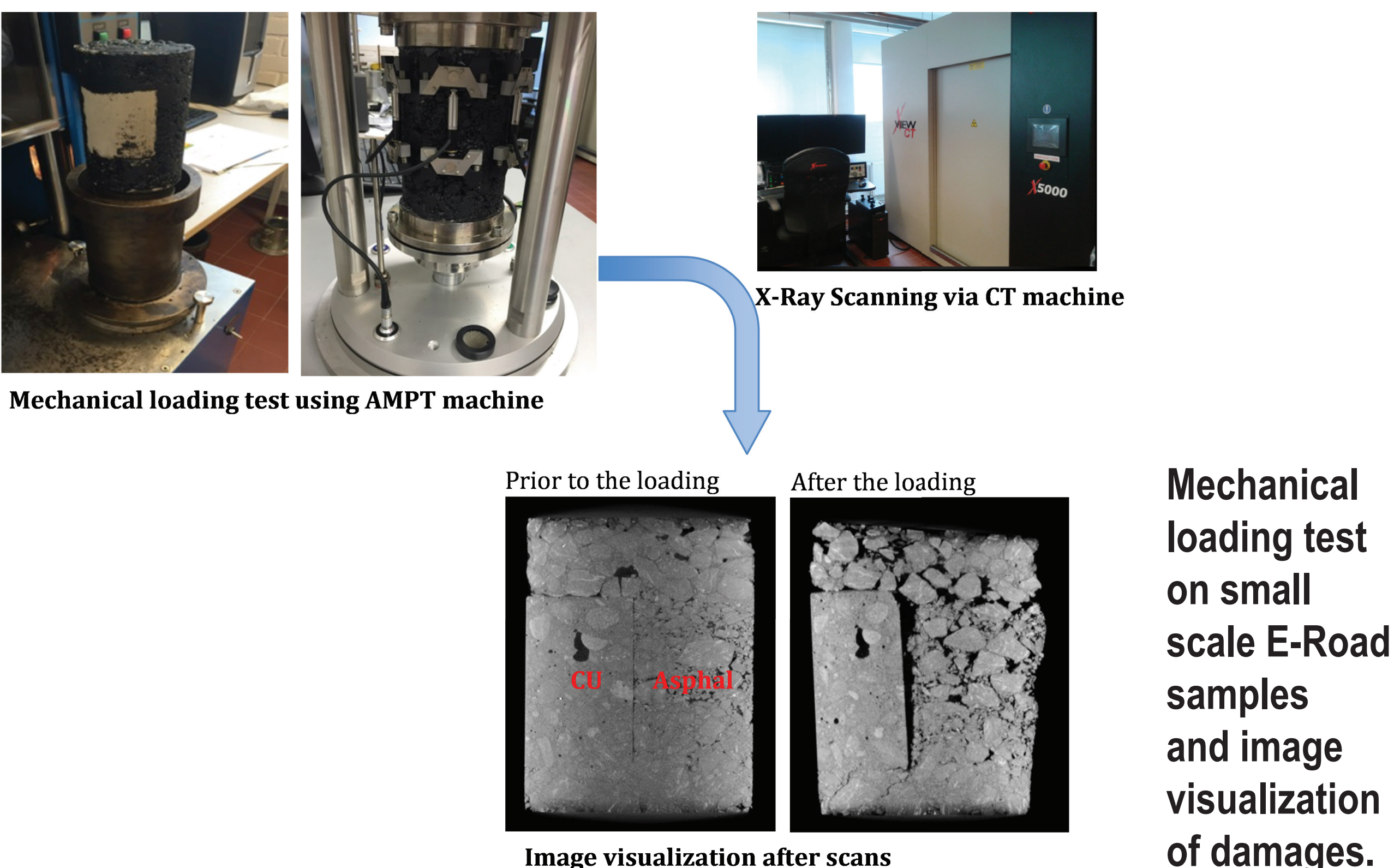


Example of E-Road performance prediction results: Distributions of plastic deformation and damages.

Achievements

The structural performances of E-Roads have been systematically predicted, analysed and optimized. These analyses have provided pioneering insights of the structural behaviors of on-the-road charging solutions, and have been further used to:

- make guidance for developing technical specifications of E-Roads' construction, monitoring and maintenance.
- serve as important boundary inputs for assessing life cycle impacts and costs of the reviewed charging solutions.



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Consortium

Project facts

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