

## GIS Knowledge base

A GIS Knowledge Base has been established as part of the project, which allows users to upload, transform and query data relating to infrastructure components and natural disaster events. The target users of this knowledge base are infrastructure managers. In addition, researchers are potential users (risk management, transportation, civil engineering, natural sciences, etc.), who would benefit significantly from this extensive database.

A Resource Description Framework Schema (RDFS) for infrastructure components and events can be used to formally represent and exchange data between Web applications.

The INFRARISK GIS Knowledge Base is based on DataGraft, a cloud-based service portal for data transformations and data access. The graphical user interface illustrated below demonstrates how data from the GIS Knowledge Base is presented to the user.



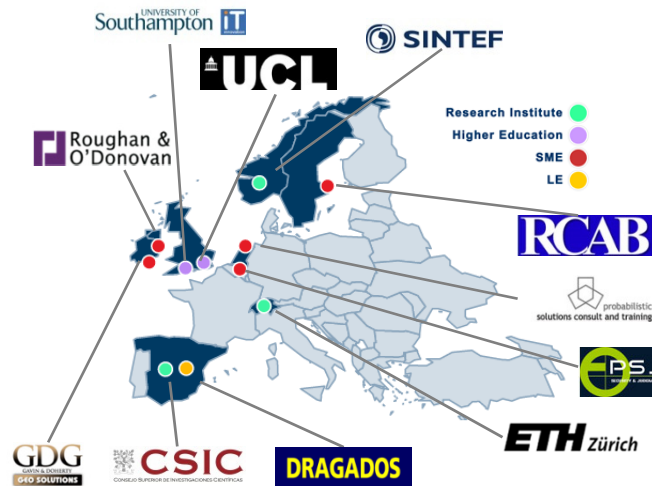
Graphical User Interface application

The INFRARISK project runs from October 2013 until September 2016



## INFRARISK Consortium

The INFRARISK Consortium consists of 11 members from seven different countries. The Consortium represents a well balanced and strong partnership among universities, research institutions, SME's, and large enterprises (LE).



Novel indicators for identifying critical INFRAstructure at **RISK** from Natural Hazards

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The project in 3' at: <http://goo.gl/6v1ONU>

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Novel indicators for identifying critical INFRAstructure at **RISK** from Natural Hazards



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## The challenge

Extreme natural hazard events have the potential to cause significant disruption to critical infrastructure (CI) networks.

The EU-funded INFRARISK FP7 project aims to develop a stress test framework to evaluate the impact of low probability, extreme natural hazards on critical transport infrastructure networks.

The objectives of the INFRARISK project are to:

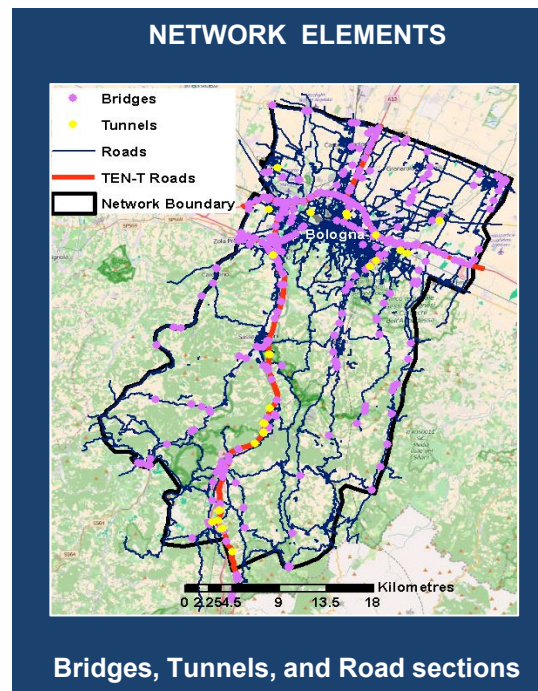
- Develop an operational analysis framework, which considers extreme hazards and their cascading effects, and the impacts on CI transport networks, while considering their geospatial vulnerabilities
- Assist stakeholders in the decision making process with regard to extreme hazard events and CI transport networks
- Provide practical software tools to infrastructure owners and managers, as well as guidelines and training activities.
- Demonstrate the systematic application of the proposed stress test framework through the simulation of European road and rail case studies.

## Road case study

The case study road network is located in Northern Italy along the Scandinavian-Mediterranean corridor of the TEN-T network, which is considered a vital axis for the European economy. The risk to the road network is evaluated due to extreme earthquake hazard scenarios and the associated cascading effects in terms of earthquake-triggered landslides.

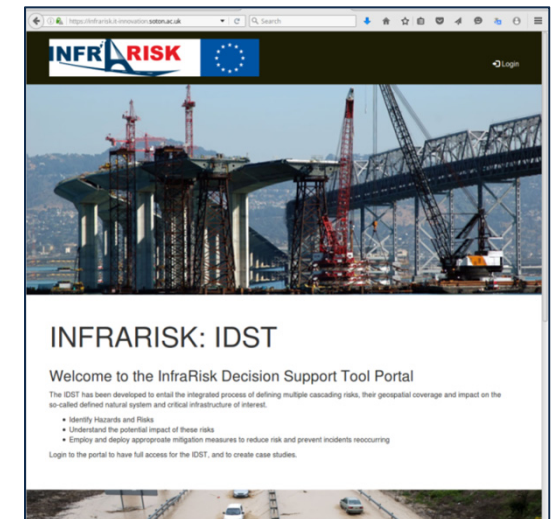
## Italian Road Network

The Italian road network is located in the Emilia Romagna Region and is distributed over an area of approximately 990 km<sup>2</sup> in the vicinity of the city of Bologna. Along this network, 340 bridges (excluding culverts) and 40 tunnels were identified. The seismic vulnerability of the network bridges and tunnels is considered, as well as the vulnerability of road sections to earthquake-triggered landslides. The direct consequences to the network are analysed in terms of physical damage to the network elements. In addition, the indirect consequences to the region are analysed in terms of the additional travel times encountered by road users and the associated economic losses.



## INFRARISK DECISION SUPPORT TOOL

The INFRARISK Decision Support Tool (IDST) is an advanced information system that enables civil engineers, infrastructure maintenance agencies and crisis managers to assess the potential risks due to natural hazards and their associated cascading effects. The hazards considered include earthquakes and floods, as well as their cascading landslide effects.



The IDST hosts specialised databases with supporting scenario simulations for natural hazards and their likelihood of occurrence in relation to CI. Data analytics modules are also supported, providing geographically-mapped-infrastructure vulnerabilities to natural hazards, in terms of structural damage and functionality loss for CI networks.

The IDST is a web-enabled system portal, which is accessible via a user-friendly web browser under multiple client platforms (laptop, tablet, etc.) and operating systems (Windows, Linux, etc.).