Natural Hazards

INFRARISK

The challenge

Extreme low probability natural hazard events have threatened and damaged many different regions across Europe and worldwide. These events, whilst being extremely rare, can have a devastating impact on critical infrastructure (CI) systems. The INFRARISK vision is to develop reliable stress tests to establish the resilience of European CI to rare low frequency extreme events and to aid decision making in the long term regarding robust infrastructure development and protection of existing infrastructure.

Project Objectives

The core objective of INFRARISK project is to develop a stress test framework to tackle the coupled impacts of natural hazards on interdependent infrastructure networks through:

-Identifying rare low-frequency natural hazard events, which have the potential to have extreme impacts on critical infrastructure.

-Developing a stress test structure for specific natural hazards on CI networks and a framework for linear infrastructure systems with wider extents and many nodal points (roads, highways and railroads), though it is anticipated the outputs can be applied across a variety of networks (e.g telecom, energy).

-An integrated approach to hazard assessment considering the interdependencies of infrastructure networks, the correlated nature of natural hazards, cascading hazards and cascading effects, and spatial and temporal vulnerability.

-Facilitate implementation through the development of GIS based and web based stress test algorithms for complex infrastructure networks.

-Testing the framework developed through simulation of complex, case studies.

-Exploitation strategies aimed at disseminating the 'knowledge' and not just the results (e.g training courses to industry, academic and media parties).

At a glance

Title:

Novel Indicators for identifying critical INFRAstructure at RISK from natural hazards - INFRARISK

Instrument:

Colalborative project FP7

Total Cost:

3 658 480.80 €

EC Contribution:

2 802 336.35 €

Duration:

36 months

Start Date:

1 October 2013

Consortium:

11 partners from 7 countries

Project Coordinator:

Prof. Eugene O' Brien, ROUGHAN & O'DONOVAN LIMITED Dublin, IRELAND

Project Web Site:

www.infrarisk-fp7.eu

Key Words:

Environment, Earthquake, Flooding, Landslide, Drought, Hazard Identification, High Impact Low Probability Events, Risk Analysis, Uncertainty modelling, Multi-hazard/Scenario Risk Assessment, Risk Mitigation, Cascading Effects, Interdependencies, Operational Analysis Framework, Harmonisation, Implementation

Research and Innovation

Methodology

The methodological core of the project is based on the establishment of an ‘’overarching methodology’’, to evaluate the risks associated with multiple infrastructure networks for various hazards with spatial and temporal correlation. Interdependnancy will be formalised and damage will be defined in terms of capacity decrements. This will be the basis for the development of stress tests for multi-risk scenarios and will define the general framework, providing a tool for decision making based on the outcome of the stress test. The overarching methodology will capture and incorporate, into a GIS platform, outputs from an extensive profiling of natural hazards and infrastructure, and analysis of single event risk for multiple hazards and space-time variability of a CI network. An INFRARISK strategic decision support tool will be developed to ensure network models and stress test procedures are integrated and used under specific process workflows and modules. Further application to selected case studies to verify the modelling techniques and procedures developed in INFRARISK will be carried out. Dissemination as a crucial aspect of the project will involve several target levels developing focused materials and products to reach the widest audience possible including the formulation of specialized training courses.

Expected Results

-Reliable stress test procedures expanded and adapted to land-based CI leading to resilient infrastructure networks to rare and low probability extreme events.
-Decision making approaches for better protection of existing infrastructure while achieving more robust strategies for the development of new ones.
-Integrated risk mitigation scenarios and strategies using local, national and pan-European infrastructure risk analysis methodologies taking into consideration multiple hazards and risks with cascading impact assessments.
-Robust modelling of spatio-temporal processes with propagated dynamic uncertainties in multiple risk complexity scenarios of Known Unknowns and Unknown Unknowns.
-Operational framework with cascading hazards, impacts and dependent geospatial vulnerabilities and practical software tools and guidelines to provide greater support to the next generation of European infrastructure managers.
-Collaborative integrated platform where risk management professionals access and share data, information and risk scenarios results efficiently and intuitively.

Project Partners	Country
ROUGHAN & O'DONOVAN LIMITED	IE
EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	(Switzerland) CH
DRAGADOS SA	ES
GAVIN AND DOHERTY GEOSOLUTIONS LTD	IE
PROBABILISTIC SOLUTIONS CONSULT AND TRAINING	NL
AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	ES
UNIVERSITY COLLEGE LONDON	GB
PRAK PETER LEONARD	NL
STIFTELSEN SINTEF	(Norway) NO
RITCHEY CONSULTING AB	SE
UNIVERSITY OF SOUTHAMPTON	GB