



Harmonized approach to stress tests for critical infrastructures against natural hazards

Final workshop, Ljubljana, 16 September 2016

STREST project overview

Critical Infrastructures (CIs) provide essential goods and services for modern society; they are highly integrated and have growing mutual dependencies. Recent natural events have shown that cascading failures of CIs have the potential for multi-infrastructure collapse and widespread societal and economic consequences. Moving toward a safer and more resilient society requires improved and standardized tools for hazard and risk assessment of low probability-high consequence events (so-called extreme events), and their systematic application to whole classes of CIs, targeting integrated risk mitigation strategies. The STREST project (2013-2016, www.strest-eu.org) brings together 12 research institutions and six associated industry partners to develop stress tests that are designed to test the vulnerability and resilience of individual CIs and infrastructure systems subject to extreme conditions.

Workshop objectives

The workshop aims at communicating the products developed during the project, namely new research results on natural extreme events and harmonized methods for risk assessment leading to the standardization and implementation in Europe of stress tests for various classes of CIs. It will present the results of applications from a large selection of CIs: petrochemical plants, hydropower dams, oil pipelines, gas networks, port infrastructures and industrial districts. The main innovations presented are related to seismic hazard and risk, coastal and downstream flooding, as well as to the process of domino effects across natural hazards and CI elements. Invited researchers from partner European projects will also present their main findings.

The workshop is addressed to a wide range of stakeholders, including regulators, owners and operators of non-nuclear CIs, civil protection services, and the scientific and technical community.

Participation to the workshop is free of charge.

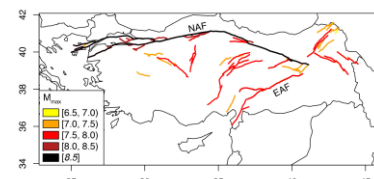
Designing stress tests for critical infrastructures

The main outcome of the STREST project is a harmonized stress-test method for non-nuclear CIs. By the end of the workshop, you will have access to a step-by-step, multi-level, approach that incorporates the latest available scientific achievements in the domain of natural hazard risk analysis, including advances in vulnerability and resilience assessment of CI systems.

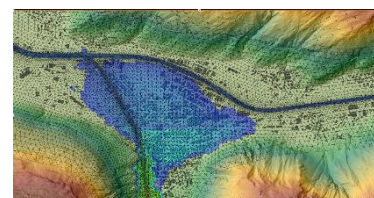
We will discuss about:

- ✓ Extreme events
- ✓ Model uncertainties
- ✓ Site-specific effects
- ✓ Hazard interactions
- ✓ Risk interactions
- ✓ Stress test methods

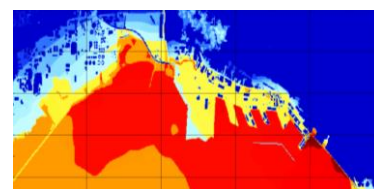
with illustrations in 6 key CIs in Europe.



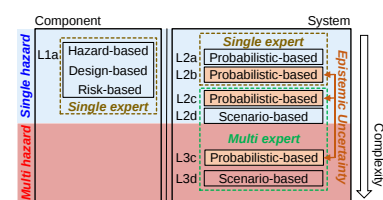
Maximum possible magnitude of earthquakes in Turkey considering the propagation of rupture across segments (Mignan et al., Seismol. Res. Lett., 2015)



Simulation of flood routing downstream of a conceptual dam (Matos & Schleiss, STREST D4.1, 2015)



Tsunami hazard assessment in Thessaloniki harbour (INGV & AUTH, STREST D6.1, 2016)



Stress test concept (Esposito & Stojadinovic, STREST D5.1, 2016)

Exploratory applications to critical infrastructures

The STREST consortium works together with industrial partners to apply the stress-test framework on selected CIs, deemed representative of classes of CIs with different potential for local and regional consequences, degree of interdependencies, and economic and environmental impact. The purpose is to validate the standardized approaches, which could be applied in the future to similar infrastructures. The experience gained from the six exploratory applications of the STREST methodology will be presented at the workshop.

Preliminary programme

- 09:00 - 09:10 Welcome
- 09:10 - 09:30 Overview of the STREST project
- 09:30 - 09:50 Hazard assessment with focus on extreme events
- 09:50 - 10:10 Performance and consequence assessment at CIs
- 10:10 - 10:30 The STREST stress test method for non-nuclear CIs
- 10:30 - 11:00 Coffee break
- 11:00 - 11:30 Application on petrochemical plant in Milazzo, Italy
- 11:30 - 12:00 Application on large dams of the Valais region, Switzerland
- 12:00 - 12:30 Application on major hydrocarbon pipelines in Turkey
- 12:30 - 14:00 Lunch break
- 14:00 - 14:30 Application on gas distribution network in the Netherlands
- 14:30 - 15:00 Application on the port of Thessaloniki, Greece
- 15:00 - 15:30 Application on the industrial district of Emilia, Italy
- 15:30 - 16:00 Coffee break
- 16:00 - 16:30 INFRARISK project (roads and railways)
- 16:30 - 17:00 INTACT project (extreme weather events)
- 17:00 - 17:30 RAIN project (extreme weather events)
- 17:30 - 18:00 Conclusions and vision for risk management in CIs

Venue

University of Ljubljana, Faculty of Civil and Geodetic Engineering, Jamova 2, 1000 Ljubljana, Slovenia

Organising committee

Dr Georgios Tsionis, European Commission, Joint Research Centre
 Prof Matjaž Dolšek, University of Ljubljana
 Dr Arnaud Mignan, STREST Project Manager, ETH Zurich
 Prof Domenico Giardini, STREST Project Coordinator, ETH Zurich

