This project has received funding from the European Union's Horizon 2020 research and innovative programme under grant agreement No 700748.

LIQUEFACT PROJECT

Recent events have demonstrated that Earthquake Induced Liquefaction Disasters (EILDs) are responsible for tremendous structural damages and fatalities, causing in some cases half of the economic loss caused by earthquakes. With the causes of liquefaction being substantially acknowledged, it is important to recognize the factors that contribute to its occurrence, to estimate hazards, and to practically implement the most appropriate mitigation strategy considering the susceptibility of the site to liquefaction, including the type and size of the structure. The LIQUEFACT project, funded by the EU within the H2020 – DRS 2015 call (Research Innovation Action), addresses the mitigation of risks to EILD events in European communities through a holistic approach. The project deals not only with the resistance of structures to EILD events, but also with the resilience of the collective urban community in relation to their quick recovery from an occurrence. The LIQUEFACT project sets out to achieve a more comprehensive understanding of EILDs, the applications of the mitigation techniques, and the development of more appropriate techniques tailored to each specific scenario, for both European and worldwide situations.

liquefACT

Introduction/Aim

Earthquake Induced Liquefaction Disasters (EILDs) occur when ground shaking causes the soil to liquefy and lose much of its strength. Buildings and infrastructure affected by liquefaction slide, tip or sink into the ground causing loss of life and disruption to the critical services (e.g. healthcare systems) needed by the local community to recover from the event. However, the impact of EILDs on communities can be lessened if appropriate mitigation actions are taken prior to an event.

The LIQUEFACT project will investigate the effectiveness of a range of mitigation actions to improve community resilience to EILD events. The outputs from the project will be a range of tools to support decision makers identify the most appropriate mitigation actions for their particular circumstances.

Anglia Ruskin University (ARU) has 2 roles in the project. As Project Coordinator, ARU is responsible for overall leadership and project management of the 40+ researchers from across Europe and Turkey working on the project. As technical leads for 2 academic work packages ARU are also responsible for identifying the relationships between vulnerability and resilience of communities to EILD events and the critical infrastructure they will rely on for their recovery (WP1). As well as developing a Risk Assessment and Improvement Framework (RAIF) that can be used to identify mitigation actions to reduce vulnerability and improve the resilience of the critical infrastructure a community needs for its recovery (WP5).

Method/Theory

Vulnerability: the characteristics of a system that make it susceptible to the damaging effects of a hazard (EILD event).

Resilience: the ability of a system to resist, absorb and recover from a hazard in a timely fashion.

The RAIF integrates vulnerability and resilience into the built asset management process in a way that allows facility managers responsible for critical infrastructure to identify the most appropriate mitigation actions, to reduce vulnerability and improve resilience to EILD events.

The RAIF consists of 6 decisions steps, as demonstrated in the figure below, including:

1. Assessing the antecedent conditions for each asset and identify the level of EILD threat, the impact that an EILD event would have on the asset if the threat was realised, and the level of risk (RAG) that this poses to the asset;

2. Estimating the loss of operational functionality that an EILD event would cause (e.g. full or partial closure of an asset) and the impact that this would have on operational performance levels;

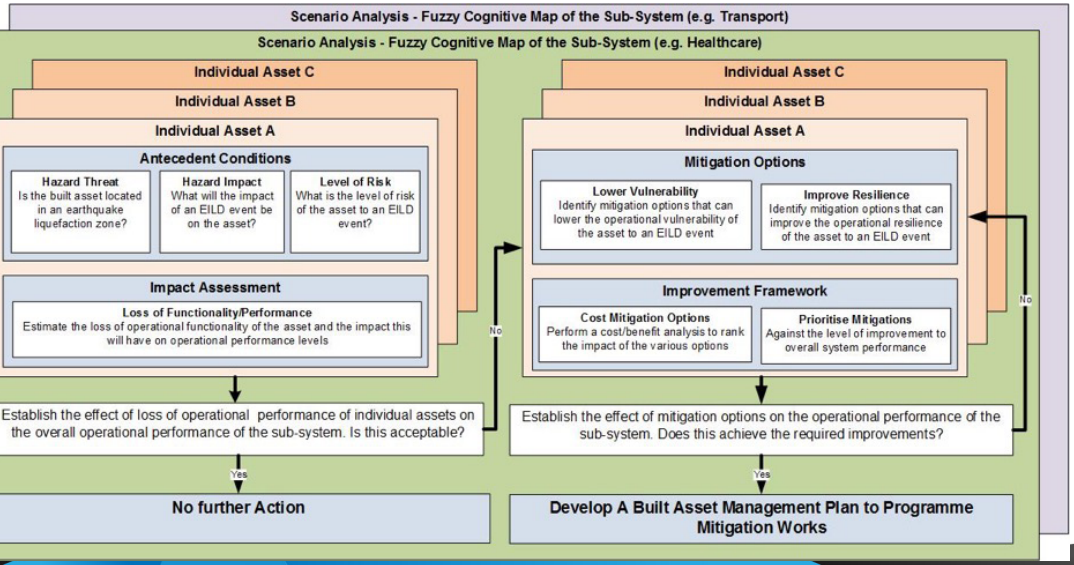
3. Identify possible mitigation options to reduce operational vulnerability and/or improve operational resilience. Mitigation methods could be physical (e.g. building or ground improvements), service level (alternate service delivery models), or a combination of both;

4. Cost and prioritise mitigation options and assess the impact of each on organisational performance and community resilience. Does this achieve the required improvements? If so then...;

5. Develop built asset management plans;

6. Repeat steps 1-5 for all assest within a sub-system (e.g. all healthcare assets in a zone, city or region) to assess overall impact on community resilience.

Repeat steps 1-6 for all sub-systems that would be affected by an EILD event (e.g. transport, power distribution etc.).



Over the next 30 months the LIQUEFACT project partners will continue to work collaboratively to address; liquefaction hazard mapping, structural resilience and vulnerability assessment methodologies, comparative mitigation measures, community resilience and planning, the creation of liquefaction mitigation planning software, regional case study validation approaches and the development Eurocode recommendations. Supporting improved research, development and innovation on EILDs worldwide

Main Partners

website | www.liquefact.eu
twitter | @liquefact_eu
facebook | facebook.com/liquefact
youtube | LiquefactEu