



multi-Risk sciEnce for resilientT commUnities
undeR a changiNg climate

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Politecnico di Torino

PNRR – Missione 4.2 «Dalla Ricerca all'impresa»

Partenariati estesi (14 tematiche) – 36 mesi

- PE3 Rischi Naturali, Ambientali e Antropici

Cosa sono

Programmi caratterizzati da un **approccio interdisciplinare, olistico e problem solving, realizzati da reti diffuse di università, EPR, ed altri soggetti pubblici e privati**, impegnati in attività di ricerca, altamente qualificati e internazionalmente riconosciuti, auspicabilmente **organizzati in una struttura consortile**.

Attività finanziate

- ricerca fondamentale e applicata**, anche attraverso l'utilizzo delle infrastrutture di R&I;
- TT e valorizzazione dei risultati della ricerca**, incluse attività di disseminazione;
- supporto alla nascita e sviluppo di start-up e spin off da ricerca**;
- formazione** condotta in sinergia dalle Università e dalle imprese;
- dottorati di ricerca**.

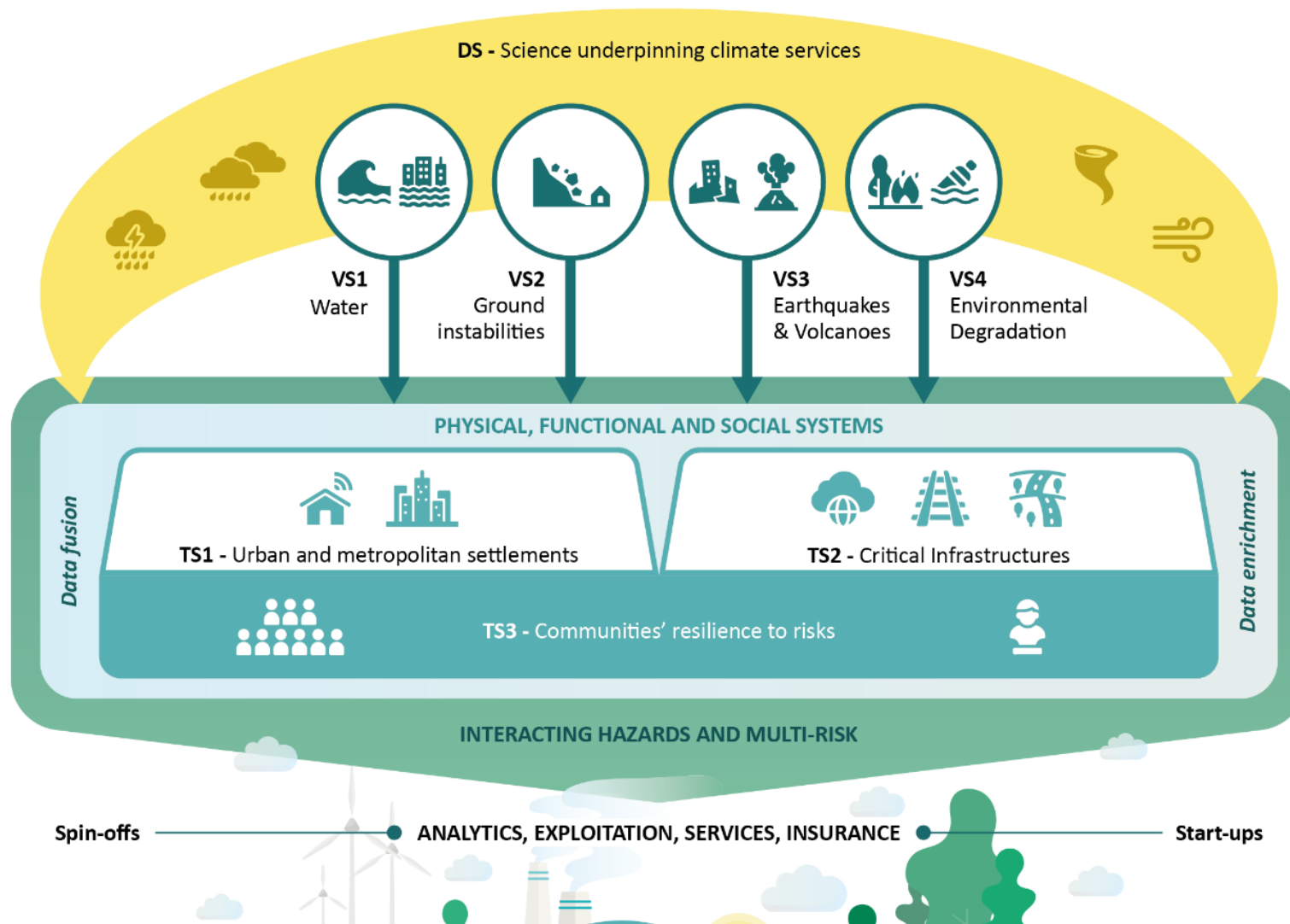
Un nuovo partenariato nazionale

NextGenerationEU – Missione 4.2

- **8 sottoprogetti**
- **~ 350 ricercatori**
- **12 università + 3 istituti di ricerca**
- **4 enti no-profit**
- **6 enti privati**
- **Dipartimento Nazionale della Protezione Civile**

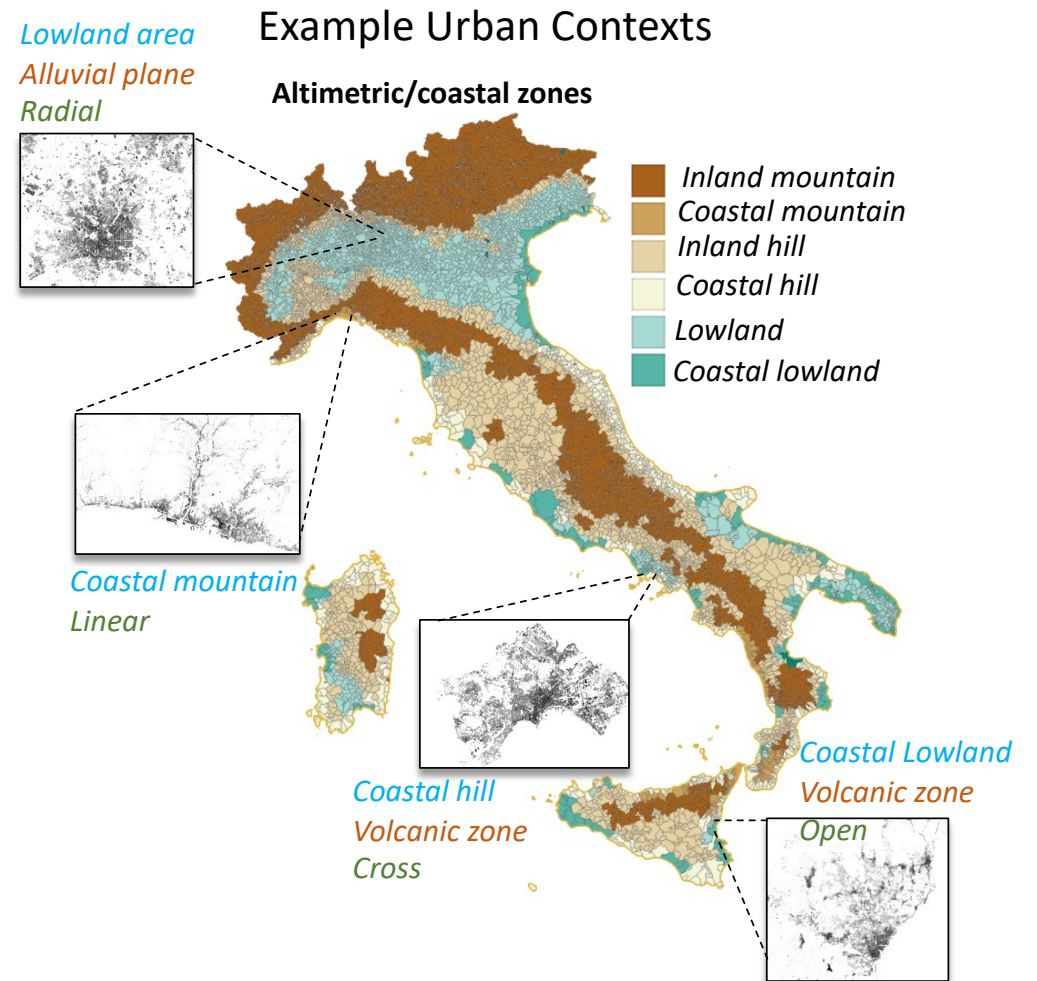
Finanziamento: 120 M€ (22 su cascade funds)

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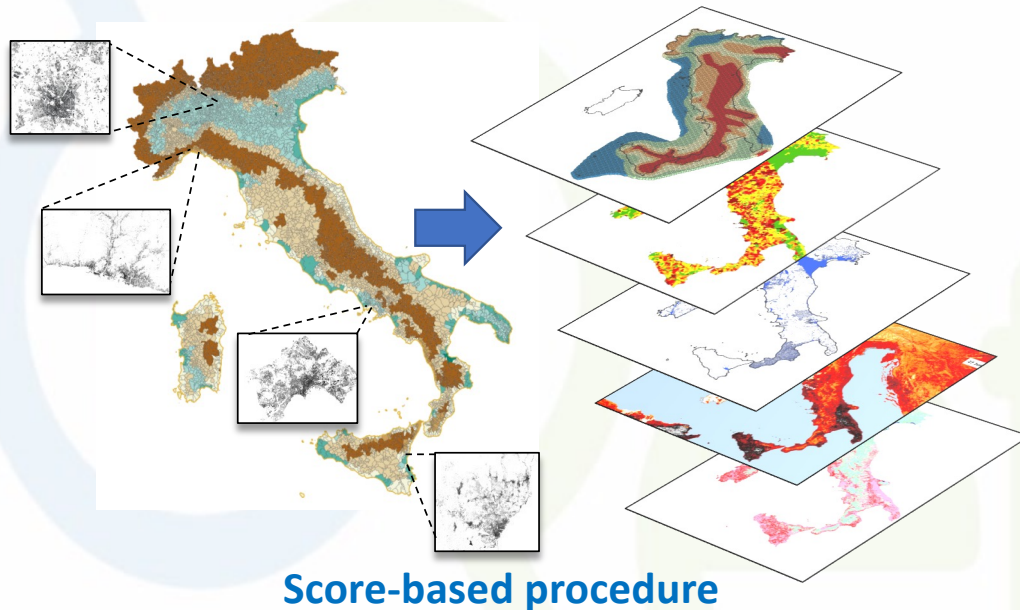
SPOKE TS1 URBAN AND METROPOLITAN SETTLEMENTS

Spoke leader UniNA



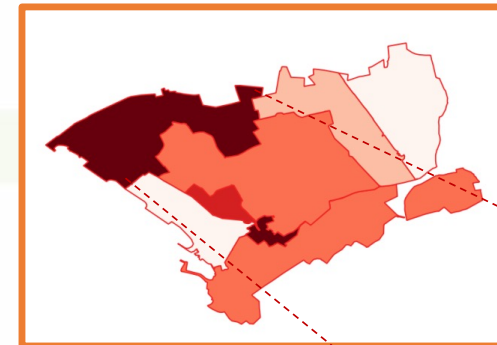
Urban Contexts vs hazards: scoring UCM and critical UCD

URBAN CONTEXTS vs HAZARDS



CRITICAL URBAN CONTEXTS (DISTRICT LEVEL) - CUC

Combining multiple dimensions
multi-hazard + vulnerability + exposure
→ **higher Risk Index** (impacts, loss and damages on resources, assets and people) .



Composite indicators to select CUC

Stakeholders input/check



More details for the area
urban hot-spot





SPOKE TS3

COMMUNITIES' RESILIENCE TO RISKS: SOCIAL, ECONOMIC, LEGAL AND CULTURAL DIMENSIONS

Spoke leader UniFi

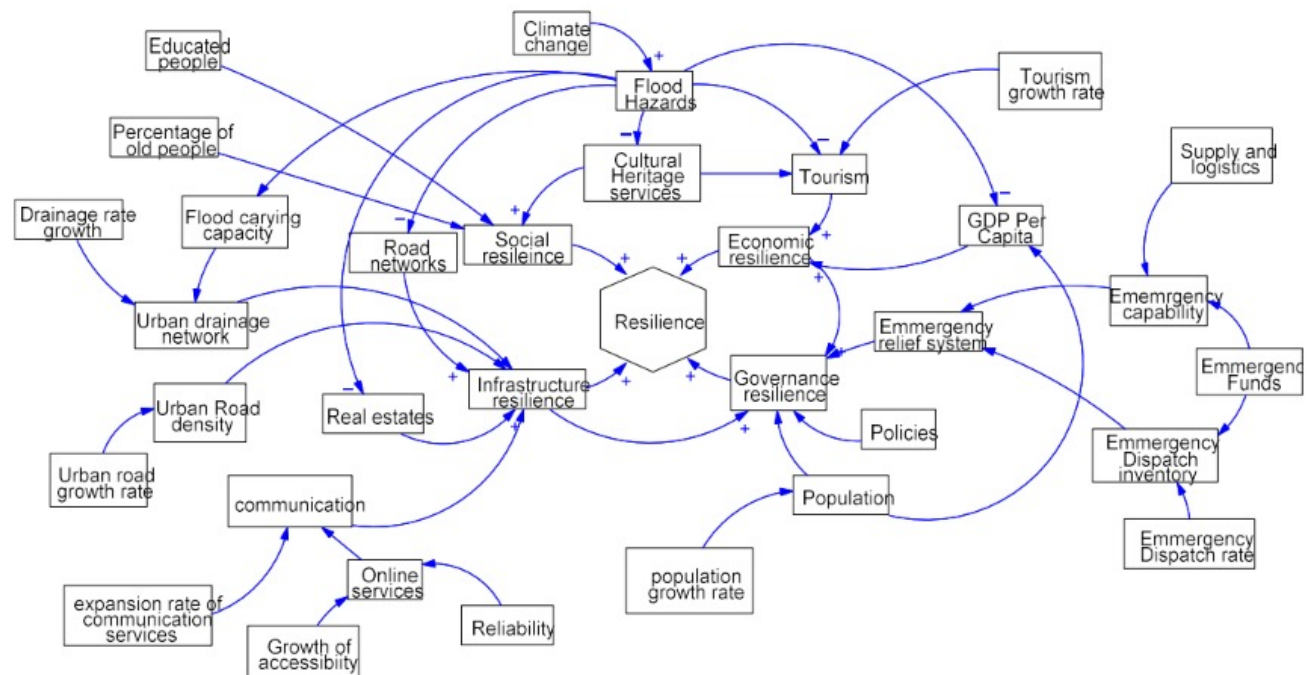


Wp3 Multi Risk (MR) assessment for Cultural Heritage (CH) and role of CH on resilience

Identification of a number of historic buildings and a first set of advanced monitoring parameters with regard to seismic, landslides and flood risks.



Design of a System Dynamics Model of Community Resilience in an Art City



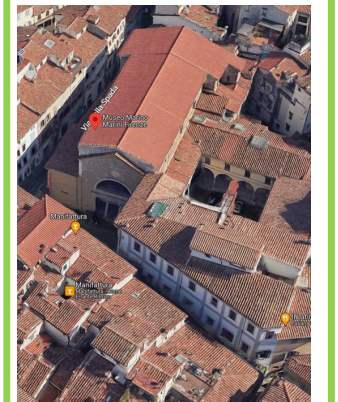
Task 3.2 - Technological advancements for MR-CH monitoring of monumental cultural heritage parameters that indicate their exposure to MR at site and urban scales

- **Direzioni di attività**

- hazard da considerare: *terremoti, alluvioni, frane*
- *I parametri da monitorare nelle analisi multirischio* faranno riferimento al *contenitore* ed al *contenuto*
- Sistemi di monitoraggio: *rete accelerometrica* (sisma), *sensori di allagamento* (alluvione), *inclinometri* (frana)

- **Proof of Concepts**

- analisi *sisma-alluvione*: *Museo Marini* a Firenze (*scala manufatto*)
- analisi *sisma-frana*: (*scala urbana*)

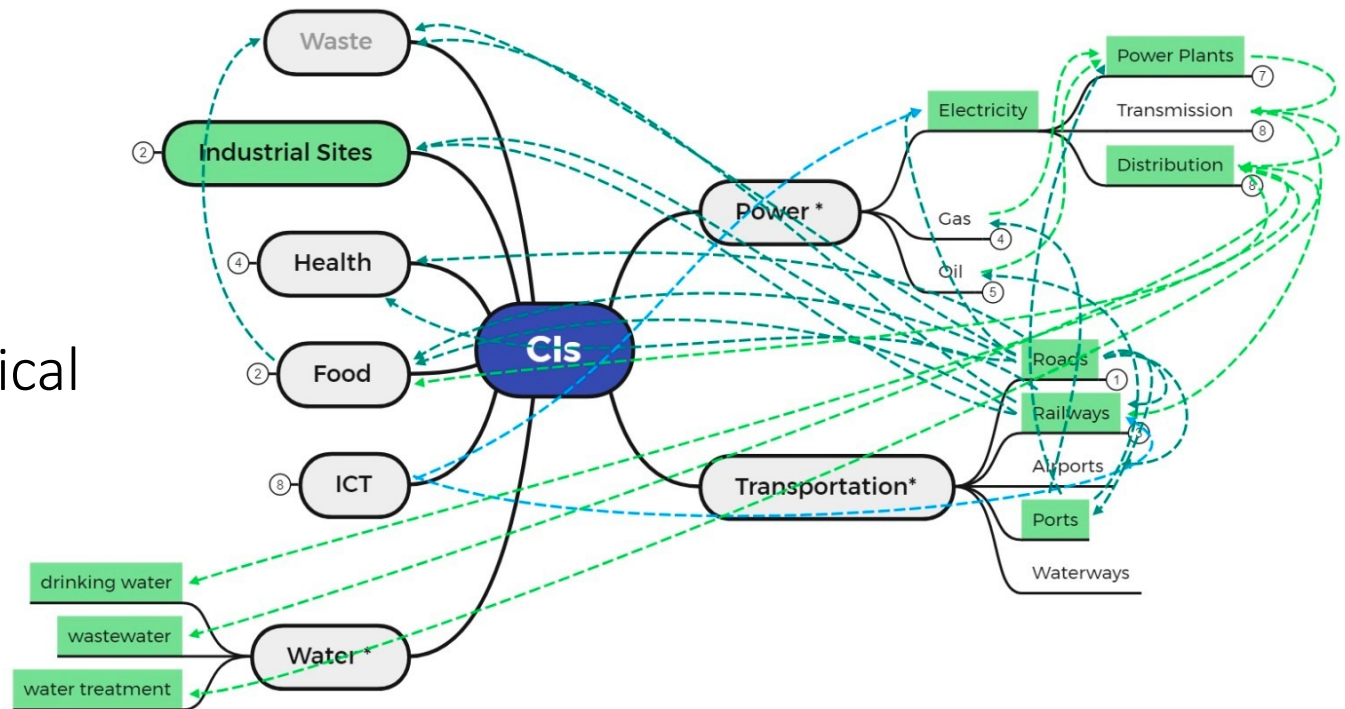


Museo Marini

SPOKE TS2

Multi Risk Resilience of Critical Infrastructures (CI)

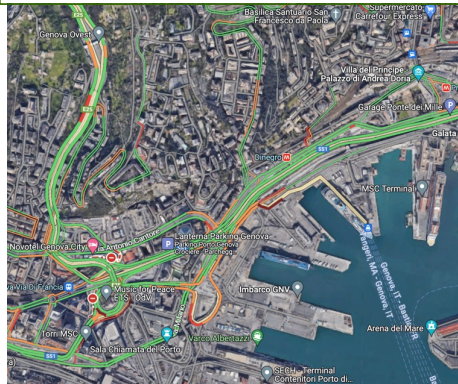
Spoke leader PoliTO



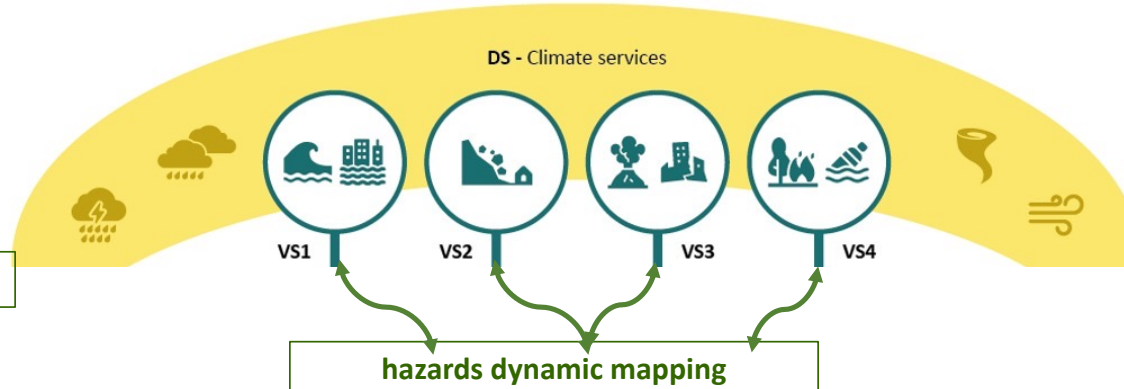
Research directions



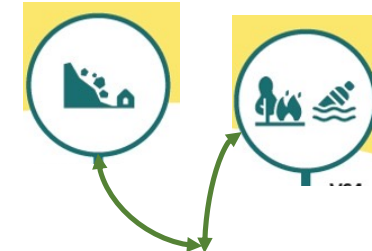
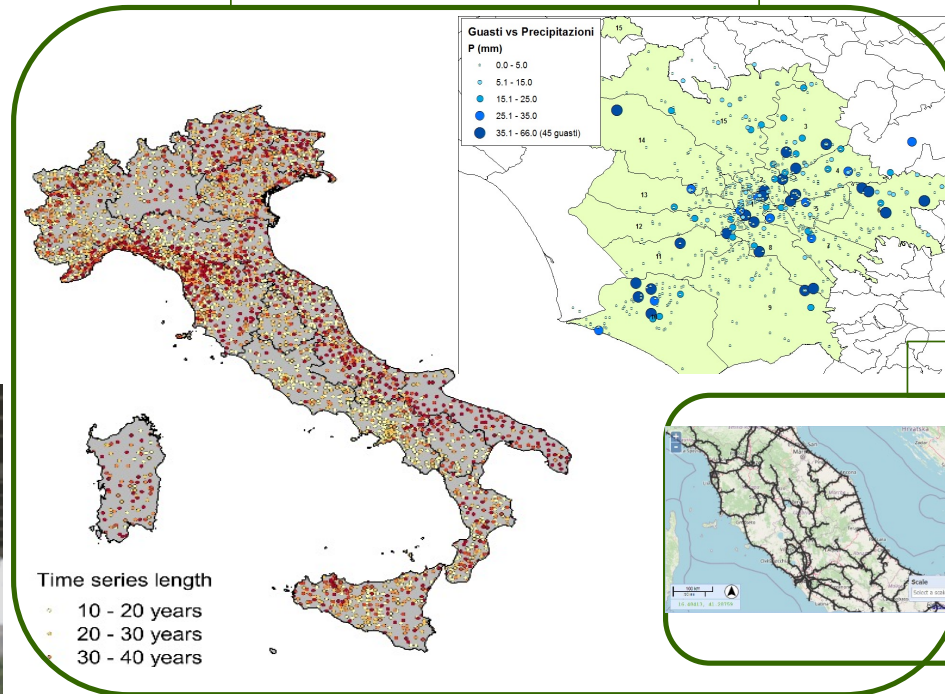
Urban - Coastal Infrastructures



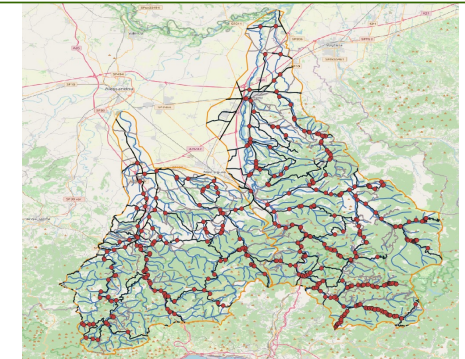
Prevention of Degradation



hazards dynamic mapping



Climatic Risk on CI networks

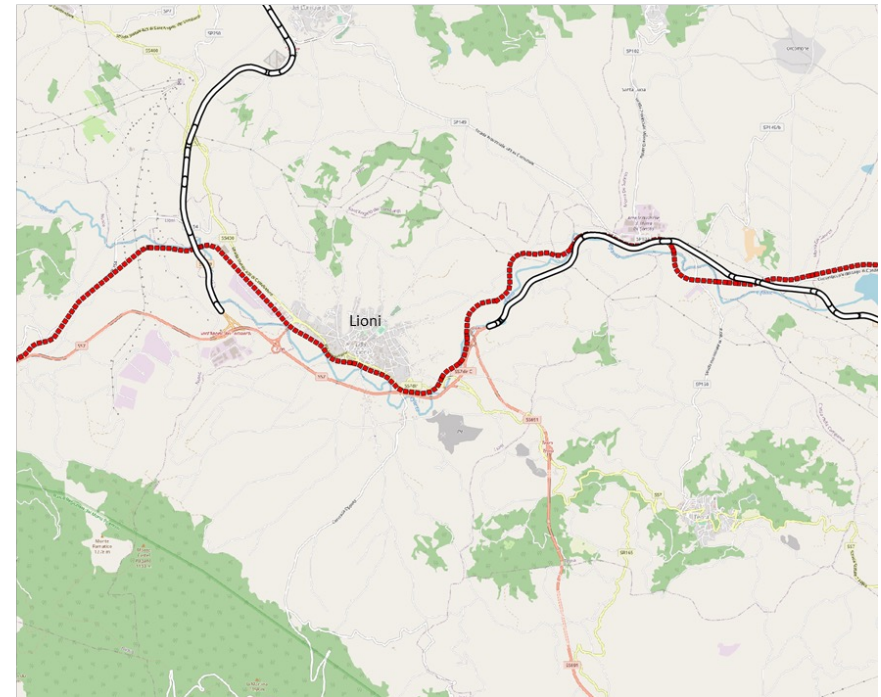
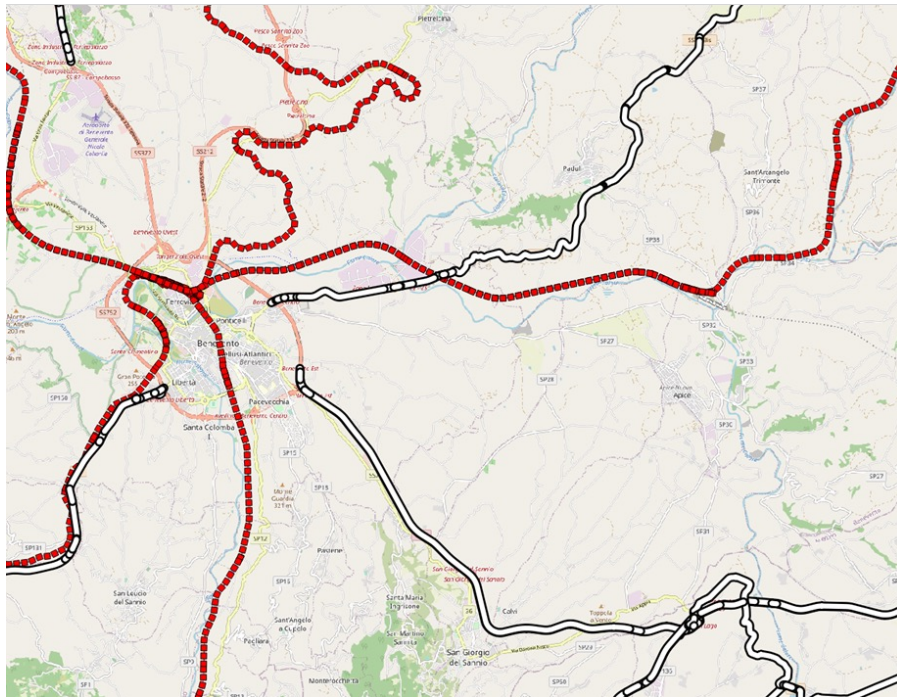


Cascading Effects Mitigation



WP3 Task 3.1. Robust hazard mapping over Network infrastructures

Goal: Increasing the spatial detail of the flood hazard mapping.



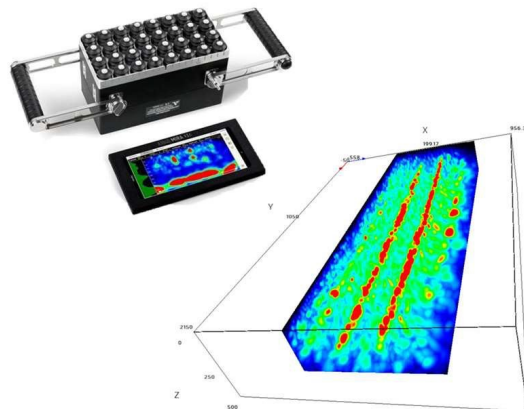
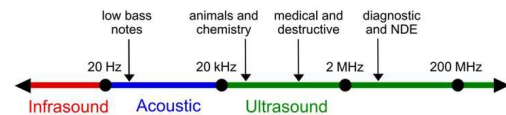
WP4: Modelling and experimental technologies (including AI) for vulnerability assessment



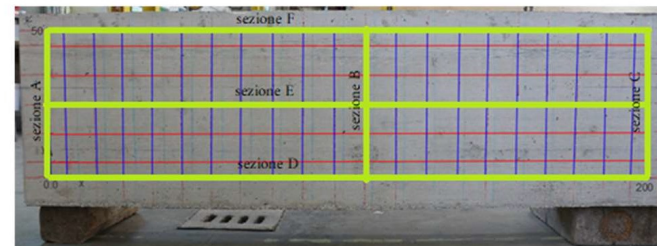
Task 4.1 - Advanced in-situ and laboratory techniques for diagnostics and monitoring



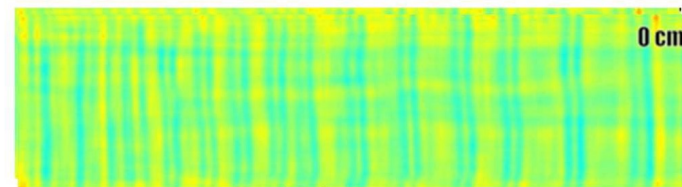
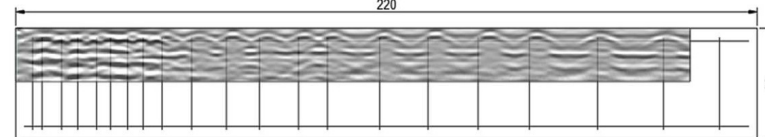
Ultrasonic Tomography (UT)



Beams with Steel Ducts: GPR Scans



GRID Spacing for the acquisition



Time slices

Time slices

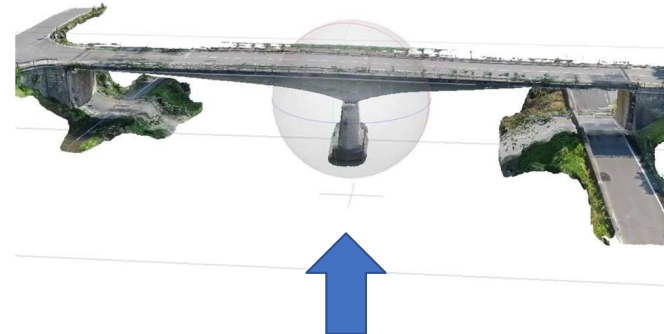
T 4.2 - AI and deep learning systems for intelligent unsupervised surveys



Rilievo con droni



Ricostruzione 3D

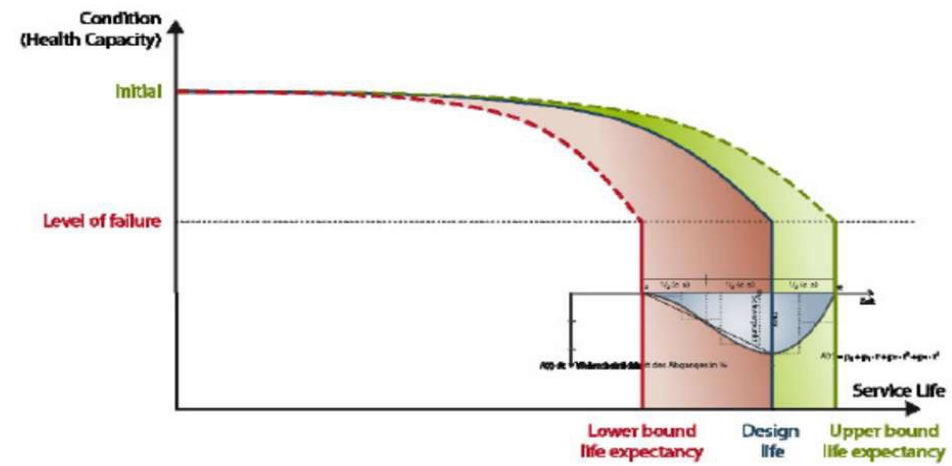


Guida manuale o AI

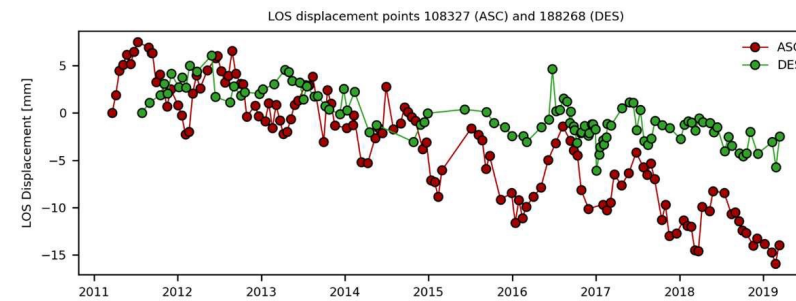


Rilievo visivo di difetti

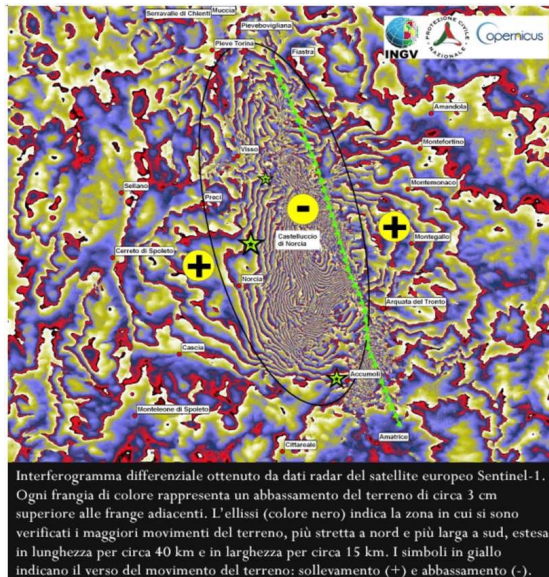




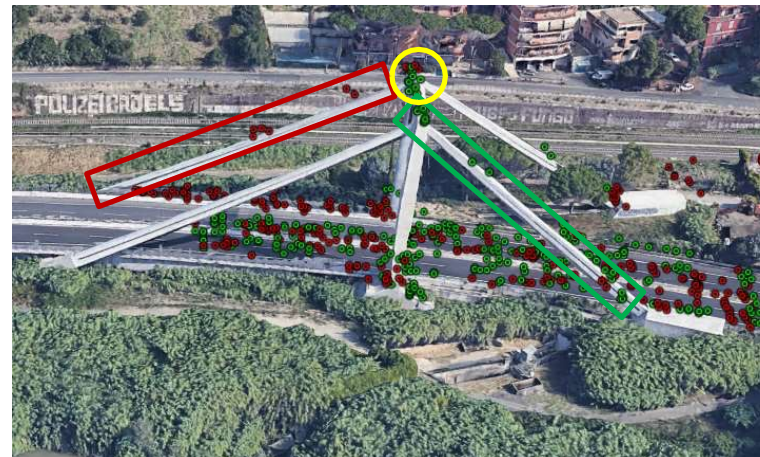
T 4.5 - SAR interferometry and remote sensing for deformation control



Presente



Futuro





WP6: Integrated Technologies and Solutions for Holistic Risk Reduction (Engineering – Al maviva)



sistemi di condivisione con gli utenti delle conoscenze sullo stato dei sistemi/servizi di infrastrutture

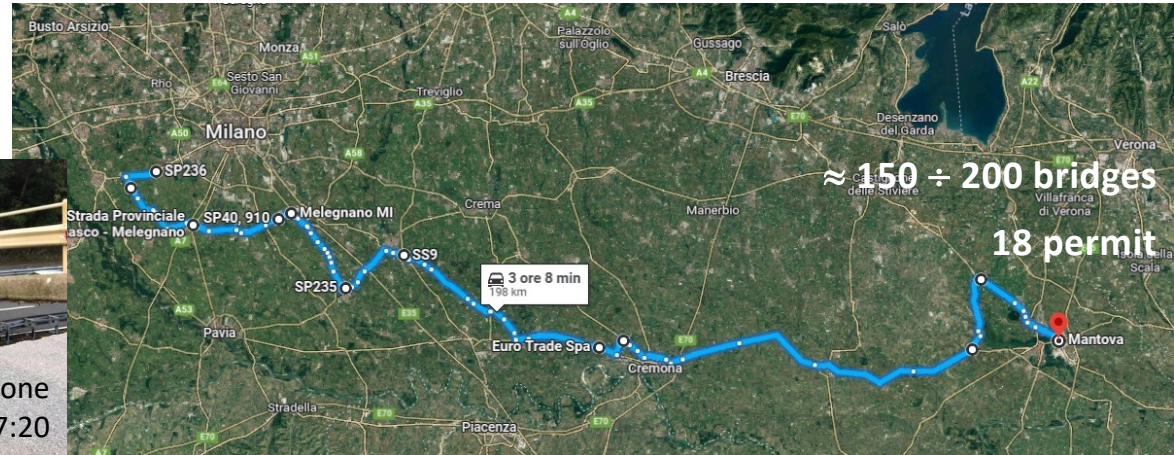


Sistemi di acquisizione di informazioni da veicoli in movimento / sensori / utenti a beneficio di gestori e del sistema di Protezione Civile

AI-Classificazione delle minacce in termini di pericolo, evidenziando quali di esse sono più minacciose per la popolazione civile, le IC e l'ambiente



Proof of Concept: road corridor Milano-Marghera



1) DEFINITION OF OBJECTIVES:

- Identification of a classification of exceptional transports depending on the characteristics of the infrastructures to group the types of convoy.
- Arrange a GPS connection on the convoys; instrument some bridges that can be considered as critical.
- Use the passage of convoys to assess the vulnerability of artifacts over time.
- ...

2) LIST OF ACTION TO BE UNDERTAKEN TO ACHIEVE THE OBJECTIVES

3) GANTT

4) COSTS

5) INTERACTION WITH OTHER PROJECTS

Actions for Start-up/Spin-off/SME/SME young

A significant part of the budget

to strength structure, business and productivity at all levels

Through a collaboration with incubators, accelerators and other entities bridging between research and SME

Objective of this action

Stimulate the creation of new SME in new slots where a relevant economic activities are needed, favourite cooperation between SME and big players, favourite the transformation of new ideas in business products

1) SCREENING AND SCOUTING OF INNOVATIVE IDEAS AND SME WORKING IN SLOTS RELEVANTS FOR THIS PARTNERSHIP

First call for incubators, accelerators, cluster and other entities (**launched the 25th of May**)

<https://www.fondazionereturn.it/bandi/389/avviso-pubblico-per-la-presentazione-di-proposte-di-intervento/>

Total budget: 400.000€ (20k for 20 entities) – September/December 2023