BORIS2

Cross **BO**rder **RIS**k assessment for increased prevention and preparedness in Europe: way forward

Cross-border multi-risk assessment
towards a shared methodology

Maria Polese (CI3R) – Coordinator

Brussels, November 12th, 2024

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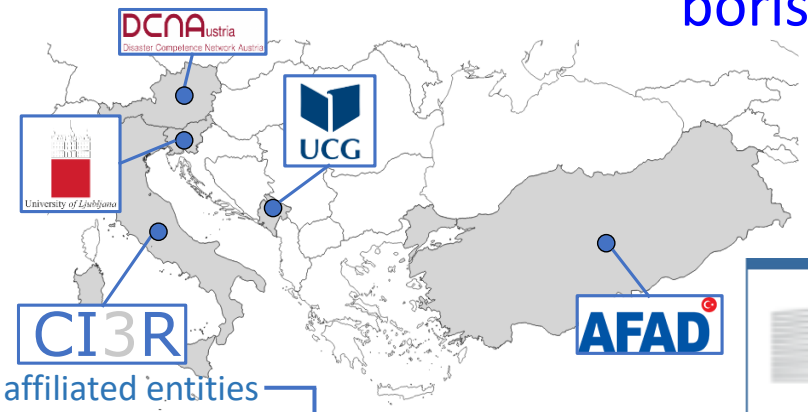
Some words about BORIS

Cross BOrder RISk assessment for increased prevention and preparedness in Europe

borisproject.eu



affiliated entities

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1. Italian Center for Research on Risk Reduction – **CI3R** (Italy)
2. University of Ljubljana – **UL** (Slovenia)
3. Disaster Competence Network Austria– **DCNA** (Austria)
4. Basbakanlik Afet Ve Acil Durum Yonetimi Baskanligi – **AFAD** (Turkey)
5. University of Montenegro Podgorica – **UOM** (Montenegro)

Call: UCPM-2020-PP-AG
Type of Action: UCPM-INT-AG
Acronym: BORIS
Current Phase: Archive
Number: 101004882
Duration: 24 months
GA based on the: UCPM MGA — Multi - 4.null
Start Date: 01 Jan 2021
Estimated Project Cost: €880,203.40
Requested EU Contribution: €748,172.88
Contact: Christian AAGAARD

Area with high **earthquake** and **flood** risks that may be amplified due to the lack of prevention and preparedness with respect to

transboundary

hazard effects

BORIS OBJECTIVES

i. Shared methodology for **single** and **multi-risk** assessment in **transboundary** regions

ii. **Platform** for single and multi-risk assessment and representation

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Risk analysis as a tool for DRM

DRM Cycle and the various management phases

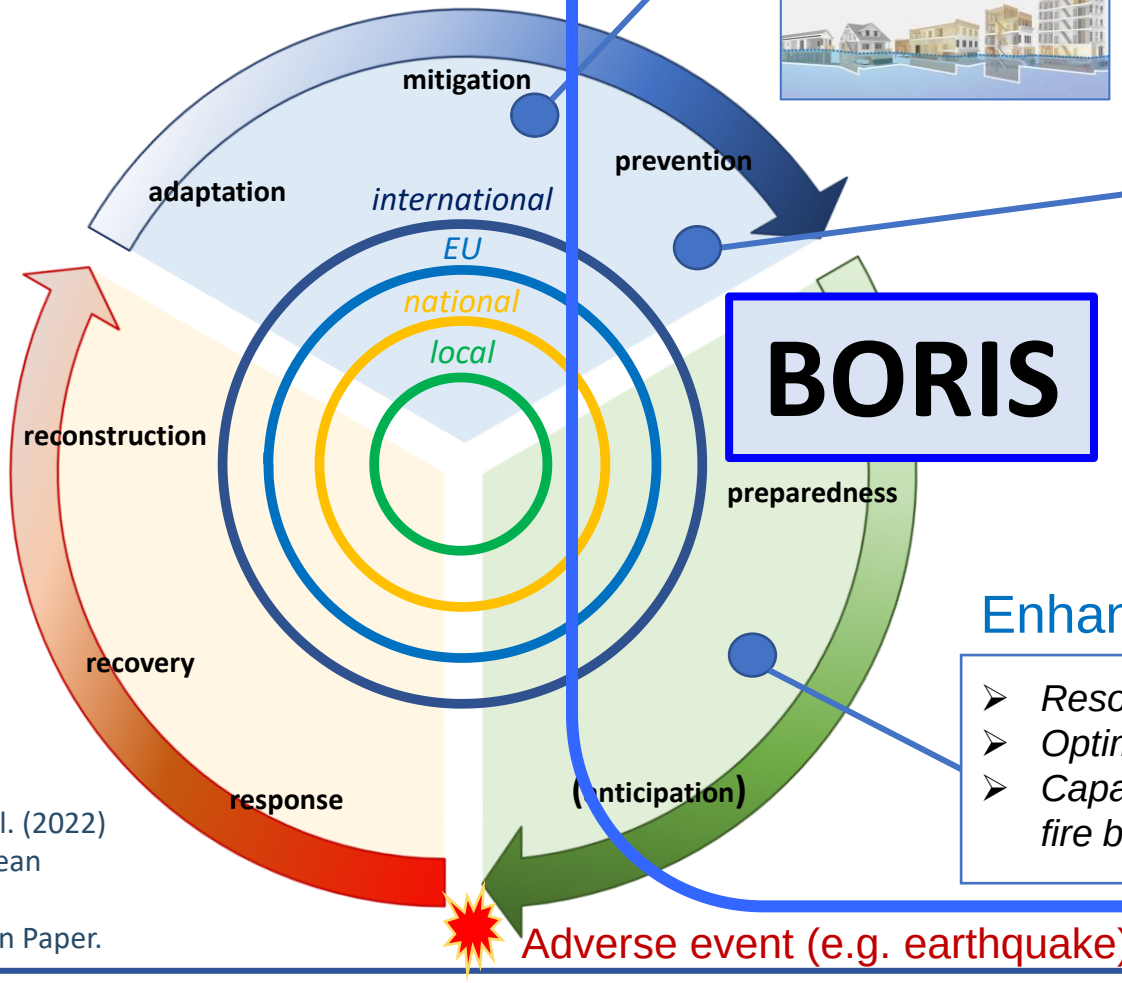

Figure adapted from Di Bucci D., et al. (2022) - Shared basic elements for a 'European Doctrine on Disaster Risk and Crisis Management' - The ROADMAP Vision Paper.

Mitigation strategies

- *Comparing diverse mitigation/adaptation solutions*

RISK ANALYSIS

- Probabilistic

Referring to assigned return periods Tr (conditioned risk) or prefixed interval of time (considering all possible events e.g. in 50 years with their probability…)

Territorial planning

- *Soil use;*
- *Regulatory plan;*
- *Strategical planning in inter-municipal areas*

Enhance Preparedness

- *Resources allocation;*
- *Optimal positioning of COI;*
- *Capacities distribution (e.g. fire brigade stations)*

Some words about BORIS

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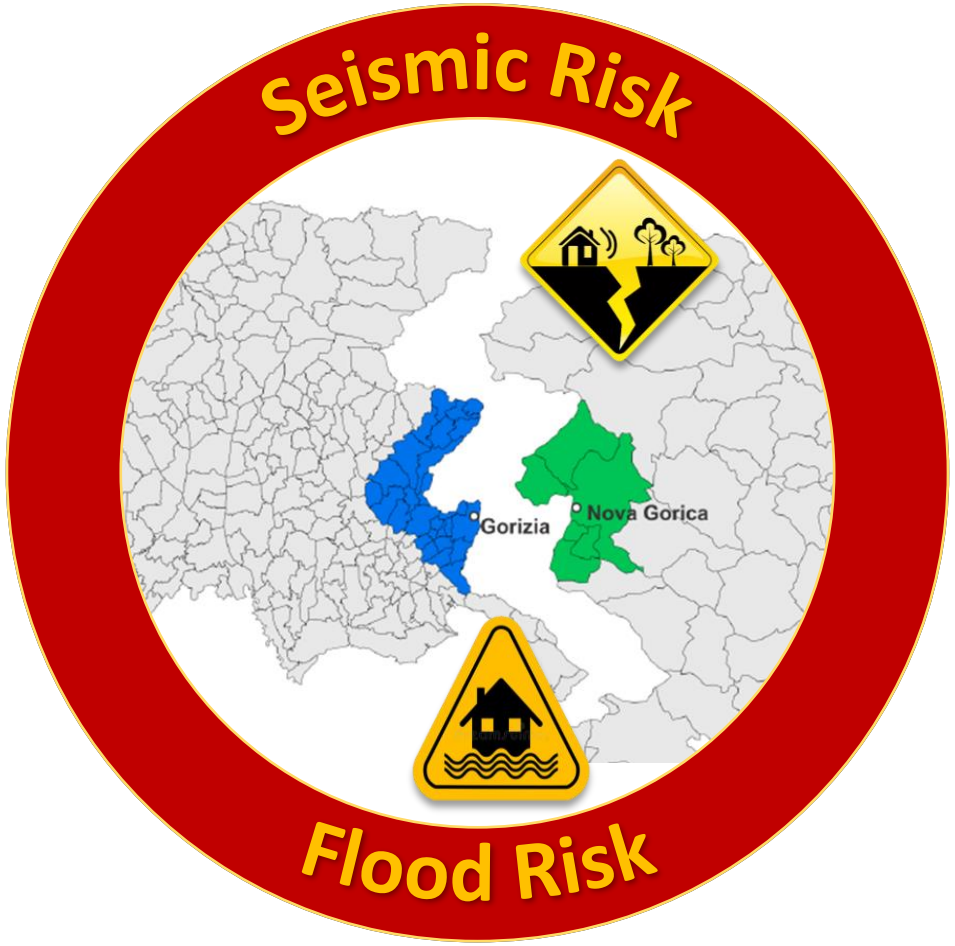
The BORIS strategy ⇨ Harmonized cross-border single risk assessment



HAZARD (INPUT CHARACTERIZATION)

VULNEARBILITY MODELING

EXPOSURE (INVENTORY DATA)

CONSEQUENCE MODEL (DAMAGE/IMPACT EVALUATION)

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Cross-border harmonization for seismic risk

Harmonizing vulnerability models


HAZARD (INPUT CHARACTERIZATION

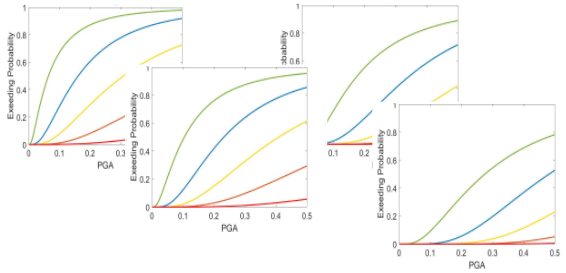

VULNEARBILITY MODELING

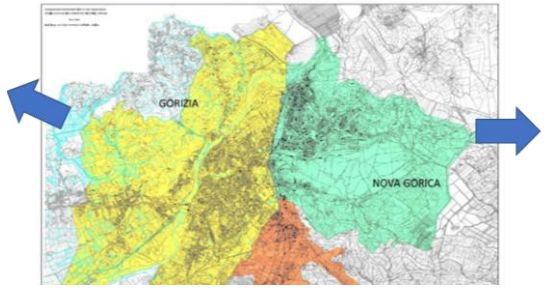

EXPOSURE (INVENTORY DATA)

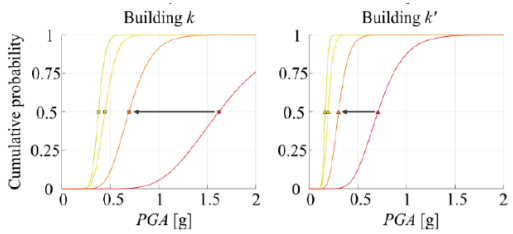

DAMAGE/IMPACT EVALUATION

A replicable approach to other cross-border areas

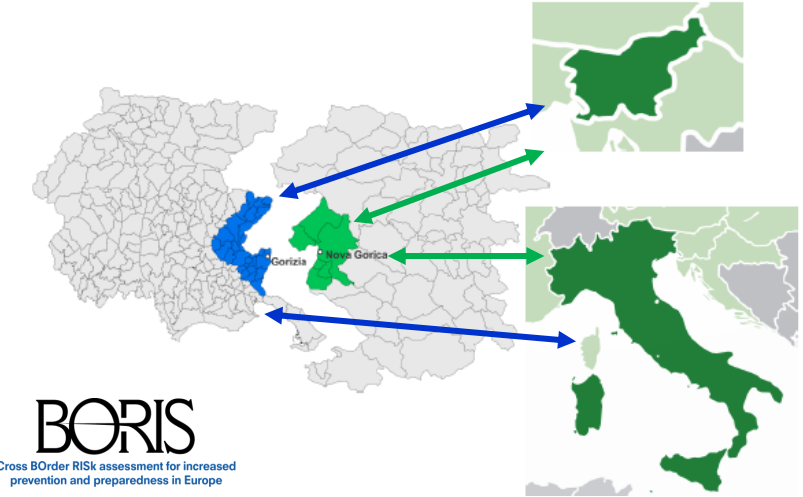
Even for similar typologies national vulnerability models may differ







Heuristic approach for cross-border harmonization of fragility curves



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Starting from:
Fragility curves available at the national level

Derive:
Harmonized fragility curves for 2 sub-areas in cross-border region

$$M_{IT}^{comb} = w_{IT,IT} \cdot M_{IT} + w_{IT,SI} \cdot M_{SI}$$

$$M_{SI}^{comb} = w_{SI,IT} \cdot M_{IT} + w_{SI,SI} \cdot M_{SI}$$

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Cross-border harmonization for flood risk

Harmonizing hazard models


HAZARD (INPUT CHARACTERIZATION


VULNEARBILITY MODELING


EXPOSURE (INVENTORY DATA)


DAMAGE/IMPACT EVALUATION

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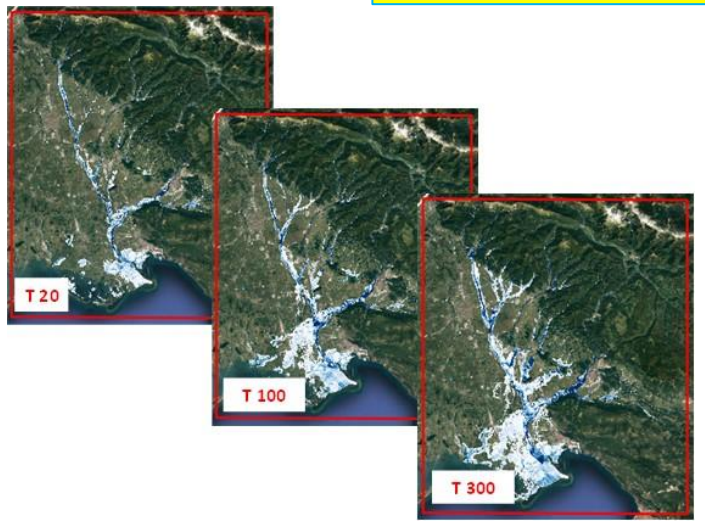
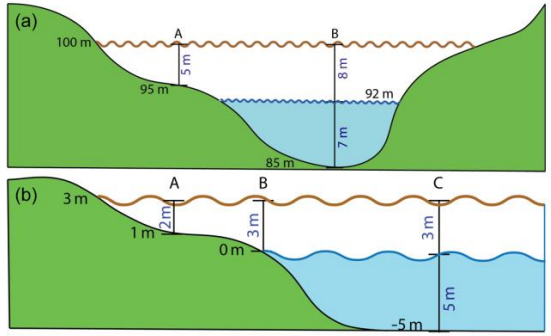
A replicable approach to other cross-border areas



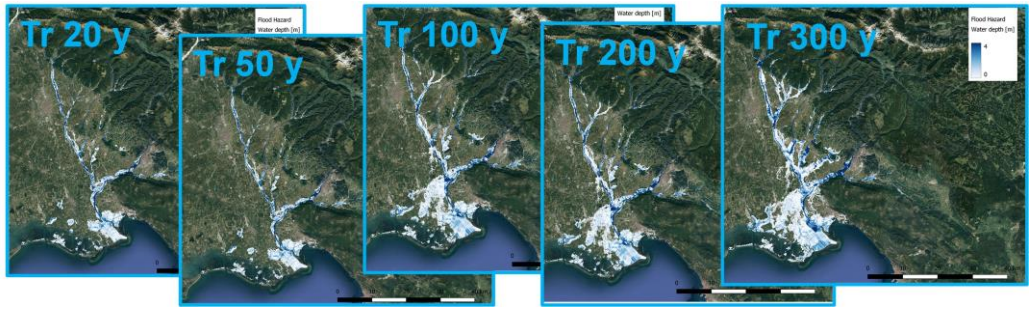
Starting from:
Existing flood inundation maps developed at the national level (from **FLOOD DIRECTIVE**)

1) estimation of the flood water depth associated to the flood extension map, employing existing tools such as FwDET
2) additional flood hazard maps created through an ad hoc interpolation algorithm (e.g., 1 year)

FwDET (Cohen et al., NHESS, 2019)



maps (including flood depth) with comparable return periods for transboundary applications



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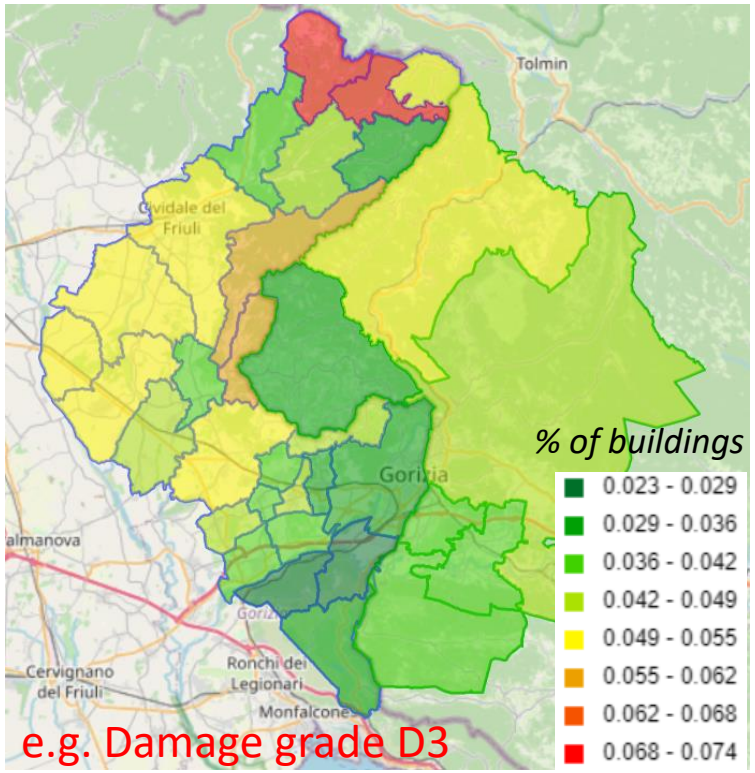
Example - Cross-border seismic risk

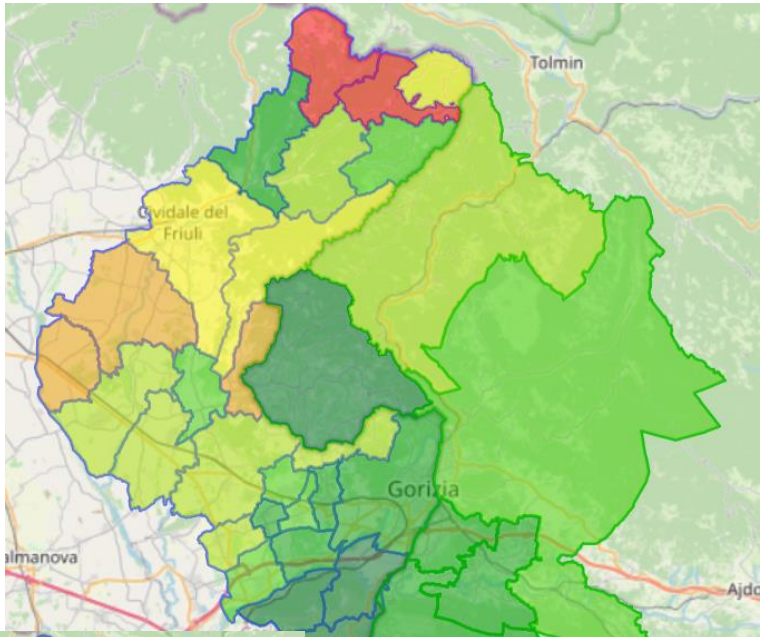
Unconditional damage assessment for a time-frame of 1 year

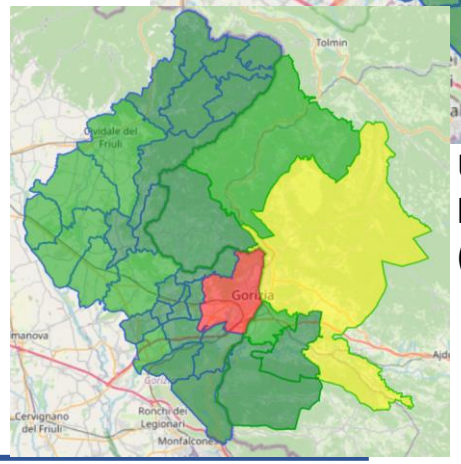


e.g. Damage grade D3

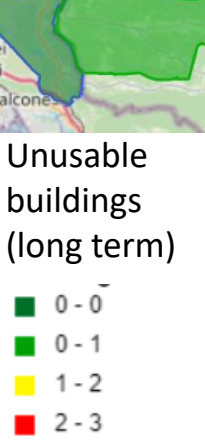
Harmonized consequence models

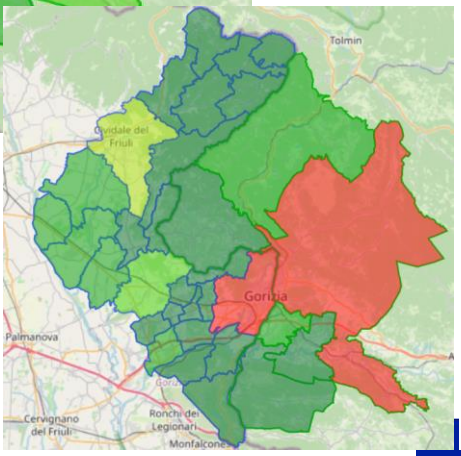
Unconditional risk assessment for a time-frame of 1 year





Unusable buildings (long term)





Displaced people

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Multi-risk (multi-layer single-risk analysis)

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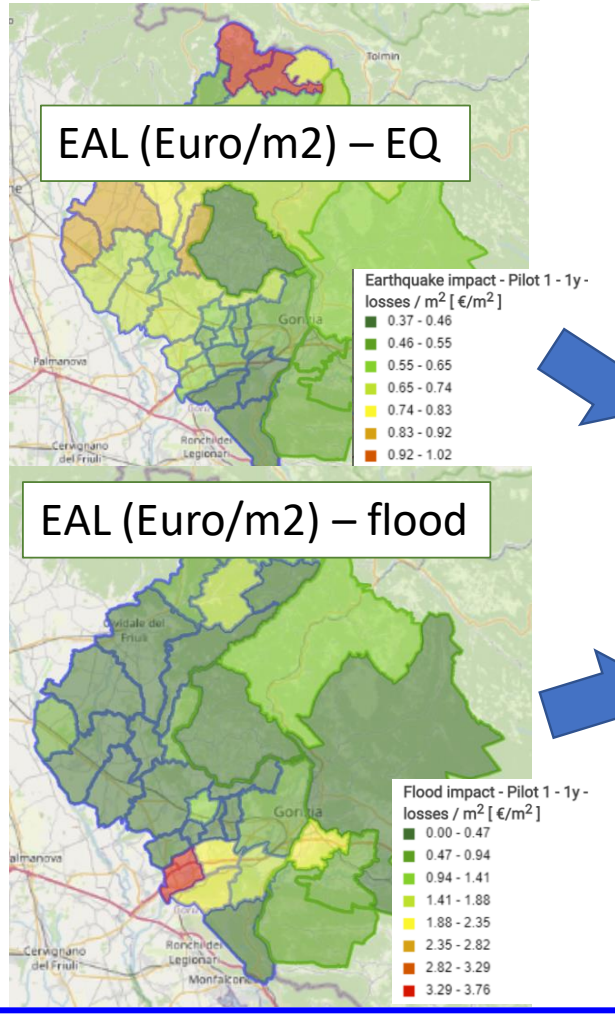
EARTHQUAKE

FLOOD

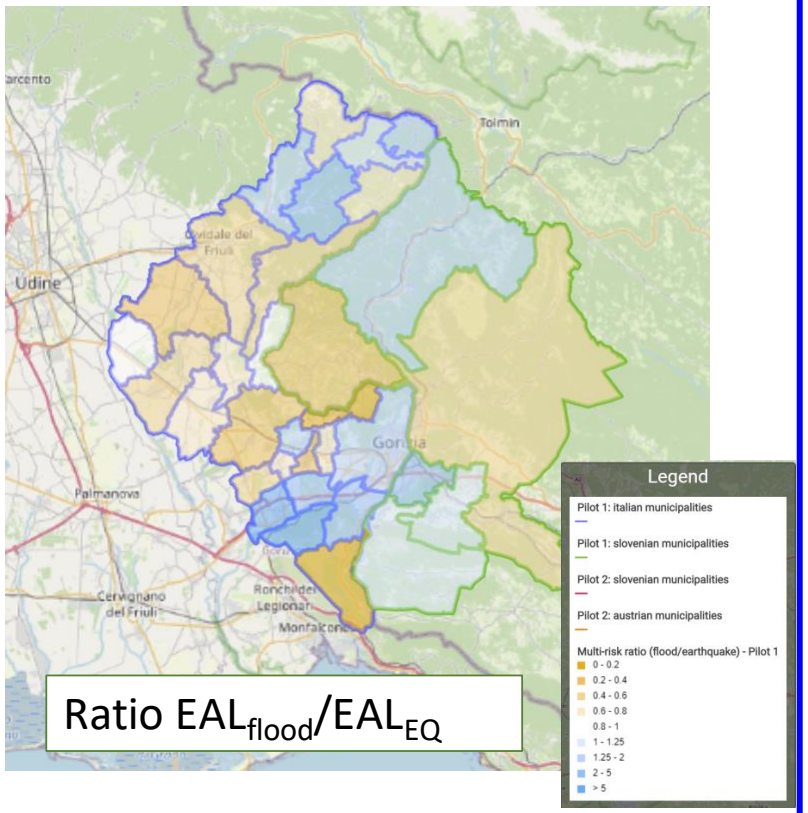
- ✓ ignoring the interactions
- ✓ **harmonising** and **standardising the assessment procedures** among the different perils

- ✓ Same exposed assets
- ✓ Risk assessment with same time-interval (e.g. 1 year)
- ✓ Same metric: Expected Annual Loss (EAL)

Harmonised risk maps



Multi-risk ranking maps



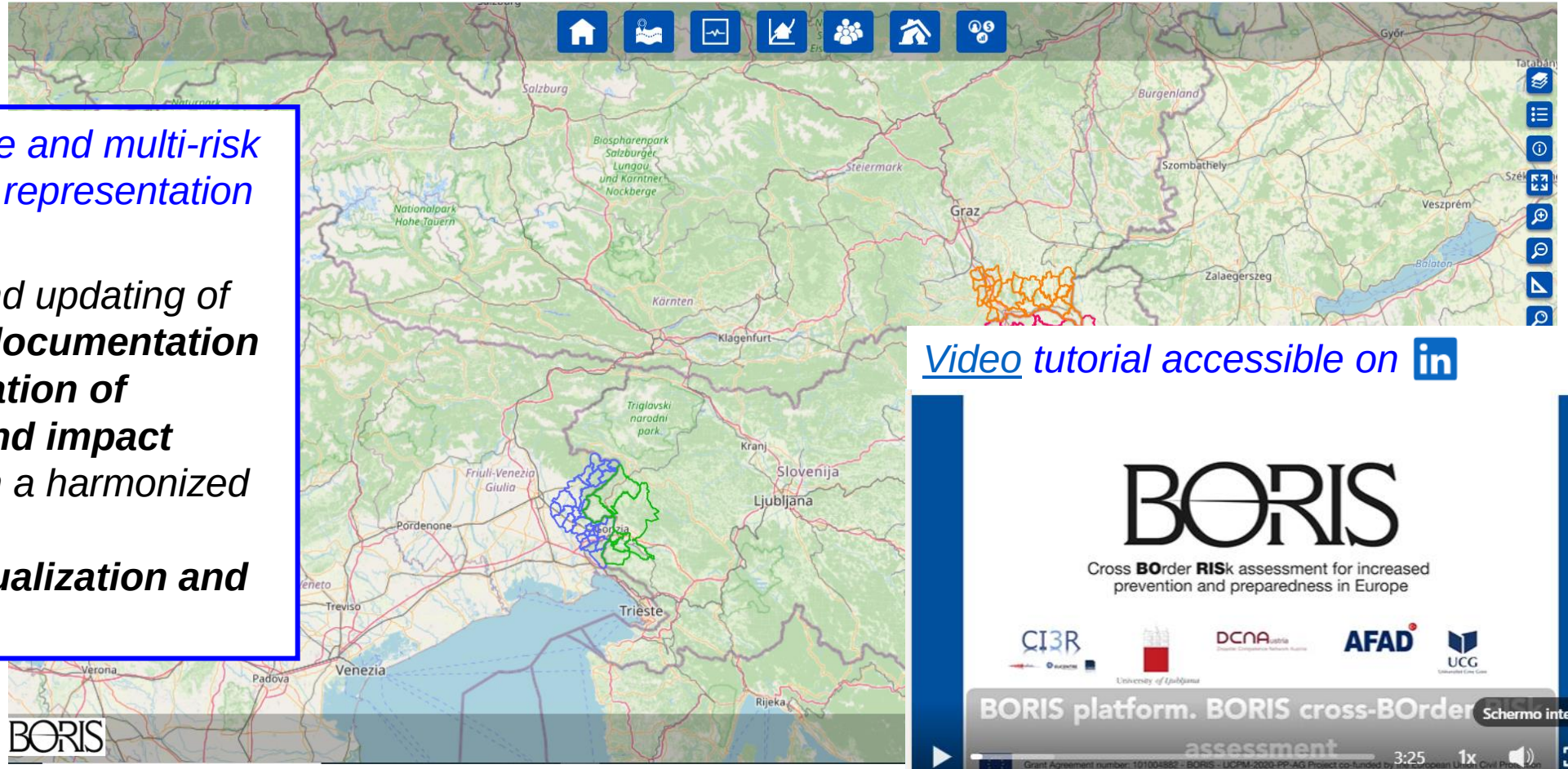
M. Polese, et al. (2024), Multi-risk assessment in transboundary areas: a framework for harmonized evaluation considering seismic and flood risks, *Int. Journal of Disaster Risk Reduction*, https://doi.org/10.1016/j.ijdrr.2024.104275

GA n° 101140181 – BORIS2 - UCPM-2023-KAPP-PV — Knowledge for Action in Prevention and Preparedness

The web-platform

Platform for single and multi-risk assessment and representation

- *The tool allows:*
  - ✓ ***storage** and updating of **data and documentation***
  - ✓ ***representation of damage and impact** results with a harmonized approach*
  - ✓ *results **visualization and sharing***

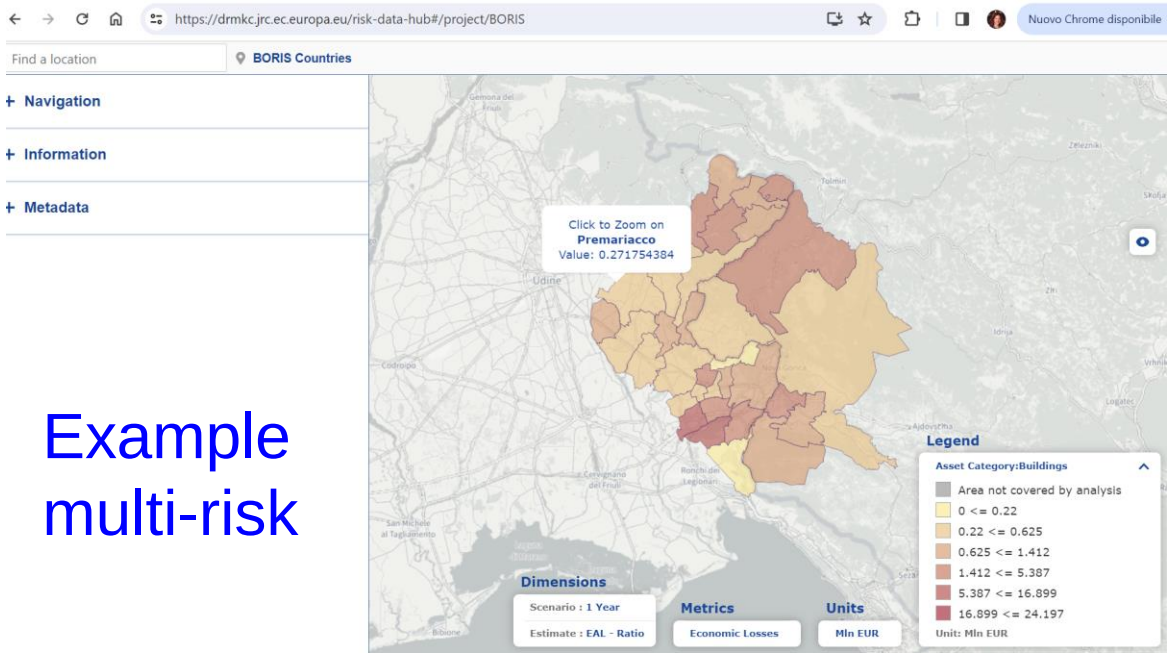


Video tutorial accessible on in

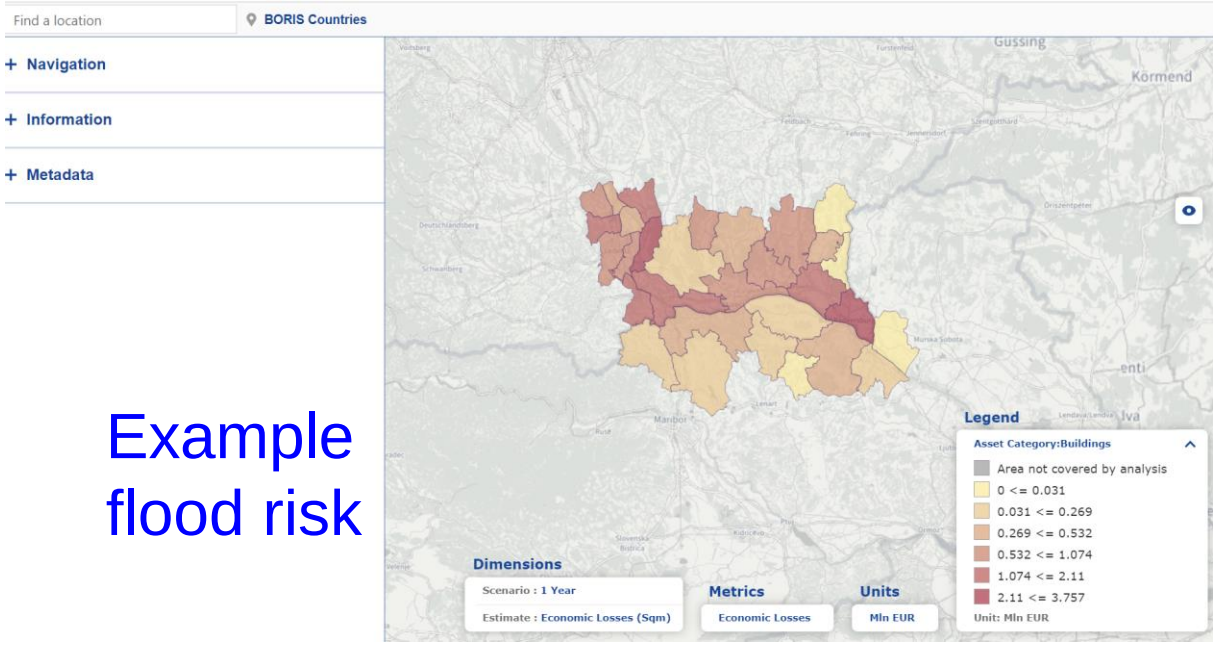
Some words about BORIS

BORIS results on RISK-DATA HUB

Example multi-risk



Example flood risk



https://drmkc.jrc.ec.europa.eu/risk-data-hub#/project/BORIS

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Why BORIS2?

BORIS presented to stakeholders…..

Improvements proposed by stakeholders:

enhance the multi-risk analysis methodology proposed in BORIS

for an effective use **towards emergency planning**

- from municipality scale to a lower *sub-municipality scale* (e.g. census tracts)
- *Scenario-driven* approach
- Include *critical infrastructures* and *connectivity*
- Expand the concept of *Limit Condition of Emergency* to multi-risk

Risk and Scenario analyses as a tool for DRM

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DRM Cycle and the various management phases

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SCENARIOS

- Deterministic

Lower spatial scale (municipal); higher detail on exposed assets: road network; hospitals; infrastructures; etc.

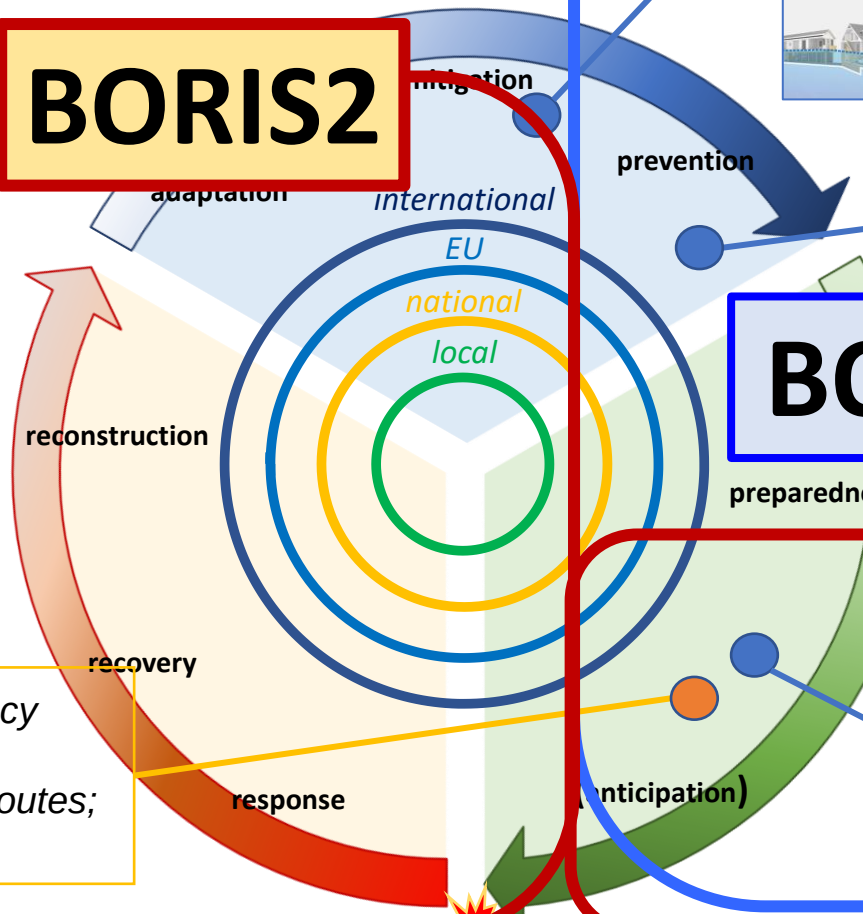
Mitigation strategies

- *Comparing diverse mitigation/adaptation solutions*

RISK ANALYSIS

- Probabilistic

Referring to assigned return periods Tr (conditioned risk) or prefixed interval of time (considering all possible events e.g. in 50 years with their probability…)



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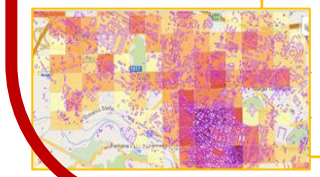
Territorial planning

- *Soil use;*
- *Regulatory plan;*
- *Strategical planning in inter-municipal areas*

Response planning

- *Emergency plans;*
- *Escape routes;*
- *training*



Enhance Preparedness

- *Resources allocation;*
- *Optimal positioning of COI;*
- *Capacities distribution (e.g. fire brigade stations)*

Adverse event (e.g. earthquake)

GA n° 101004882 - BORIS - UCPM-2020-PP-AG - Project co-funded by the European Union Civil Protection

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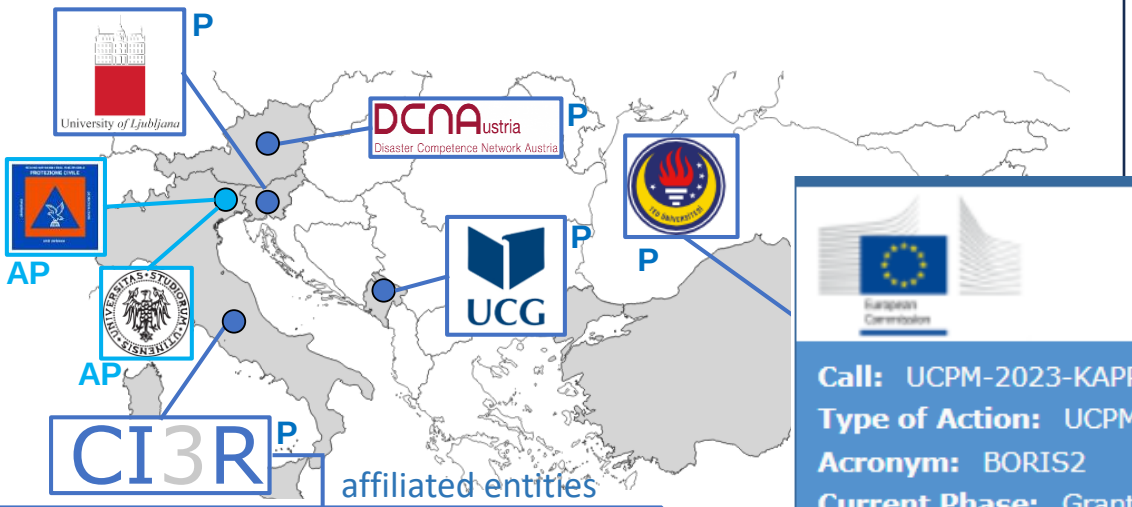
Project and Objectives



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1. Italian Center for Research on Risk Reduction – **CI3R** (Italy)
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3. Disaster Competence Network Austria– **DCNA** (Austria)
4. TED University– **TEDU** (Turkey)
5. University of Montenegro Podgorica – **UOM** (Montenegro)

associated partners (AP): University of Udine – **UNIUD** (Italy); Civil Protection Friuli Venezia Giulia Region – **DPC Friuli** (Italy)

Call: UCPM-2023-KAPP
Type of Action: UCPM-PJG
Acronym: BORIS2
Current Phase: Grant Management
Number: 101140181
Duration: 24 months
GA based on the: UCPM MGA — Multi & Mono - 1.null
Start Date: 01 Jan 2024
Estimated Project Cost: €1,004,897.99
Requested EU Contribution: €854,163.21
Contact: Christian AAGAARD

BORIS2 OBJECTIVES

i. Shared methodology for single risk and **multi-risk** assessment of **urban settlements**

ii. Tool to **evaluate the emergency condition** for urban settlements in a multi-risk framework as a support for DRM planning

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The BORIS2 strategy

WP1
Project Management

manage

re

End user procedural requirements

WP5
Multi-country and cross-border pilot applications

Methodology

WP2
Context analysis and needs assessment

WP4
Harmonized framework for urban multi-risk assessment

Data requirements

data

End user technical requirements

WP3
Platform and tool for cross-border multi-risk assessment

Rules and guidelines

Standard procedures and barriers

Engage and Disseminate

Goals and target values

Engage and Disseminate

test & feedback

Share & disseminate

WP6
Dissemination & Stakeholders engagement

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BORIS2 Platform

Tool to evaluate and represent the emergency condition for urban settlements in a multi-risk framework

Harmonized exposure databases:
- Residential buildings
- Critical assets
- Infrastructures

Harmonized vulnerability databases for DRM-relevant assets

Hazard Input for flood and earthquake

Pilot application

Scenario Maps:

- Single risk **Hazard scenario maps** for earthquake and floods events showing the spatial distribution of relevant intensities (e.g. PGA for earthquake or water depth for flood) to support risk assessment and DRM planning tool
- Single risk and multi-risk **Damage scenario maps** for urban settlements to support emergency conditions

The Platform will be integrated using **Open Source software** for both the front-end and back-end architecture and for the application servers, ensuring that all the included technologies and libraries are distributed under licenses that comply with the definition of Open Source (OSD)

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Engaging with stakeholders

Interviews → to tailor on requirements

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Networking with other projects

Interreg Italia-Slovenija
Cofinanziato dall'Unione europea
Sofinancira Evropska unija

- Meeting planned for November 18th, 2024
- IN4SAFETY will have local exercise at cross-border site (June 2025)
- We are exploring possibility to cooperate at pilot site (Gorizia-Nova Gorica) to support in preparation of cross-border Scenarios

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Thank you!

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