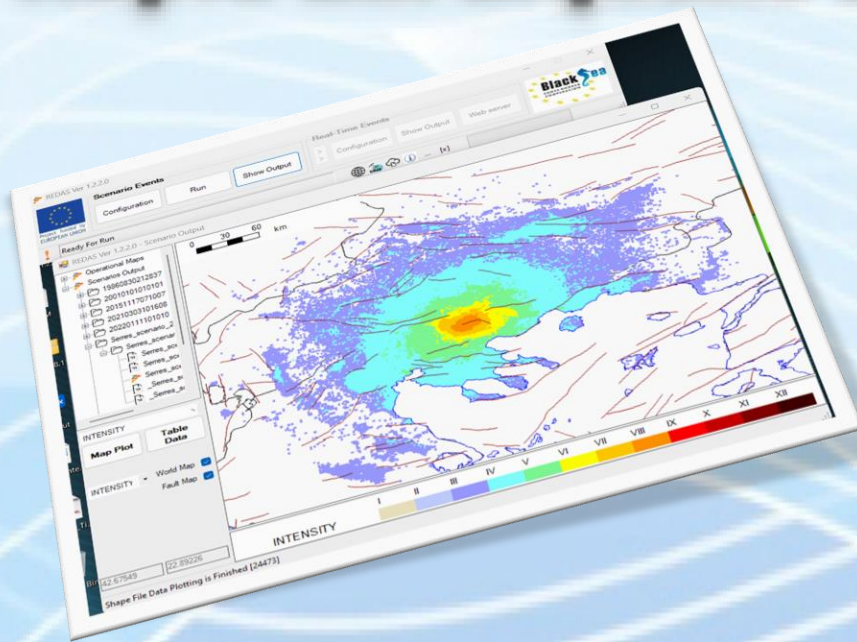




Project funded by
EUROPEAN UNION



Rapid Earthquake Damage Assessment Consortium



Konstantinos Papatheodorou
REDACT project Coordinator
Serres, 24 November 2023

Common borders. Common solutions.



Project funded by
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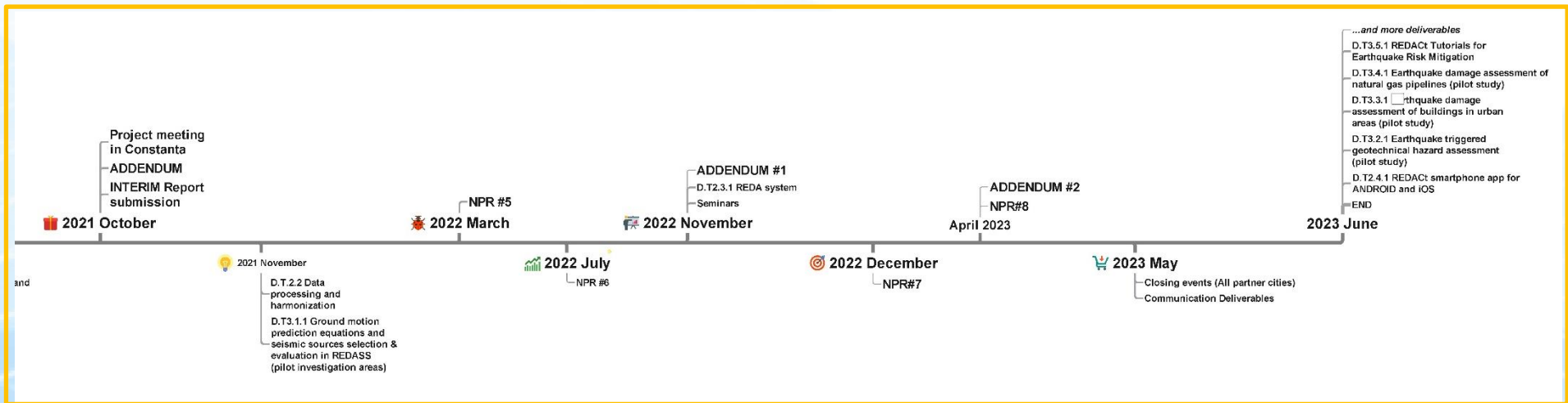
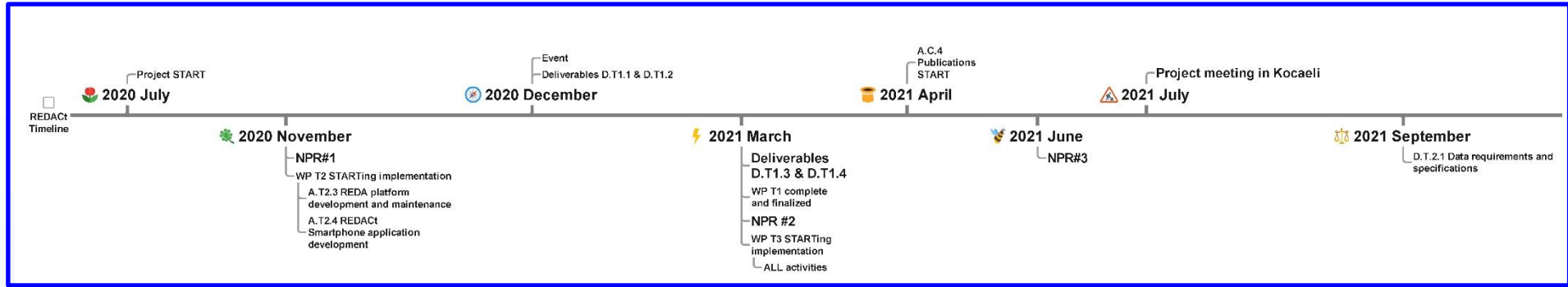
Common borders. Common solutions.



- Funding Programme: **Black Sea Basin Joint Operational Programme 2014-20**
- Budget: **974.860,00 € (ENI 896.871,20 €)**
- Duration: **1 July 2020 – 30 June 2023** (initially 31 December 2022)
- Grant Contract: **N° 88712/26.06.2020, eMS BSB-966**

Common borders. Common solutions.

Project Timeline



Common borders. Common solutions.

Project Timeline

Activity	Starting	End	Deliverables	Deliverable DATE	2022												2023											
					J1	A1	M1	J2	A2	M2	J3	A3	M3	J4	A4	M4	J5	A5	M5	J6	A6	M6	J7	A7	M7	J8	A8	M8
M Management	17/2020	31/12/2022		Responsible: IHU																								
A.M.1 Project coordination and management	17/2020	31/12/2022	D.M.1.1 Progress reports D.M.1.2 Interim report D.M.1.3 Final report	D.M.1.1. Months: 05, M9, J13, O16, F20, J24, O28 D.M.1.2. Months: S15 D.M.1.3. Months: 3 months AFTER the END																								
A.M.2 Financial management	17/2020	31/12/2022	D.M.2.1 Procurements D.M.2.2 Financial report (Interim) D.M.2.3 Financial report (Final)	D.M.2.1. J8 D.M.2.2. M12 or J13 D.M.2.3. 3 months AFTER the END																								
A.M.3 Project meetings	17/2020	31/12/2022	D.M.3.1 Kickoff meeting in Serres (Greece) D.M.3.2 Project meeting in Istanbul or Kocaeli (Turkey) D.M.3.3 Project meeting in Constanta Romania D.M.3.4 Project meeting in Chisinau (Moldova) D.M.3.5 Final meeting in Thessaloniki (Greece)	D.M.3.1. F8 D.M.3.2. J12 D.M.3.3. JO16 D.M.3.4. O28 D.M.3.5. J36 (please check the comment on the column title)																								
A.M.4 Expenditure verification and audit control	17/2020	31/12/2022	D.M.4.1 Expenditure verification report (interim) D.M.4.2 Expenditure verification report (final)	D.M.4.1. S15 D.M.4.2. 3 months AFTER the END																								
WP T1 A harmonized approach for Rapid Earthquake Damage Assessment	17/2020	31/12/2021		Responsible: OUC																								
A.T1.1 REDA: Current status assessment in partners' countries	17/2020	31/12/2020	D.T1.1.1 Evaluation of REDA Capabilities in each partner country	D.T1.1.1. Month D6																								
A.T1.2 Feasibility study of available methodologies for REDA	17/2020	31/12/2020	D.T1.2.1 Available methodologies for REDA	D.T1.2.1. D6																								
A.T1.3 System specifications for a harmonized REDA	17/2020	31/12/2021	D.T1.3.1 System specifications for a harmonized REDA	D.T1.3.1. M9																								
A.T1.4 REDA system operational requirements	17/2020	31/12/2021	D.T1.4.1 REDA system operational requirements	D.T1.4.1. M9																								
WP T2 Development of the Rapid Earthquake Damage Assessment System (REDAS) and of a smartphone application to disseminate data and information	17/2020	31/12/2021	Main Outputs	RESPONSIBLE: GTU																								
A.T2.1 Data requirements and specifications	12/2021	30/8/2021	D.T2.1.1 Data requirements and specifications	D.T2.1.1. A14																								
A.T2.2 Data processing and harmonization	12/2021	30/10/2021	D.T2.2.1 Data processing and harmonization	D.T2.2.1. J36																								
A.T2.3 REDA platform development and maintenance	1/11/2020	30/10/2022	D.T2.3.1 REDA system	D.T2.3.1. J36																								
A.T2.4 REDACT Smartphone application development	1/11/2020	30/10/2022	D.T2.4.1 REDACT smartphone app for ANDROID and iOS	D.T2.4.1. J36																								
WP T3 Implementation of REDA system (pilot studies)	1/3/2021	30/10/2022	Main Outputs	Responsible: ITSAK																								
A.T3.1 Ground motion prediction equations and seismic sources selection & evaluation for pilot investigation areas	1/3/2021	31/10/2021	D.T3.1.1 Ground motion prediction equations and seismic sources selection & evaluation in REDASS (pilot investigation areas)	D.T3.1.1. O16																								
A.T3.2 Earthquake triggered geotechnical hazard assessment (pilot study)	1/3/2021	31/10/2022	D.T3.2.1 Earthquake triggered geotechnical hazard assessment (pilot study)	D.T3.2.1. J36																								
A.T3.3 Earthquake damage assessment of buildings in urban areas (pilot study)	1/3/2021	31/10/2022	D.T3.3.1 Earthquake damage assessment of buildings in urban areas (pilot study)	D.T3.3.1. J36																								
A.T3.4 Earthquake damage assessment of natural gas pipelines (pilot study)	1/3/2021	31/10/2022	D.T3.4.1 Earthquake damage assessment of natural gas pipelines (pilot study)	D.T3.4.1. J36																								
A.T3.5 REDACT Educational Hub	1/3/2021	31/10/2022	D.T3.5.1 REDACT Tutorials for Earthquake Risk Mitigation	D.T3.5.1 J36 (please check the comment on the column title)																								
C Communication	17/2020	31/12/2022		Responsible: IHU																								
A.C.1 Digital activities	17/2020	31/12/2022	D.C.1.1 Project website creation and maintenance D.C.1.2 Social Media posts and presentations D.C.1.3 Visibility & Dissemination material (videos, presentations)	D.C.1.1. 1st Deliverable S4, 2nd (update) J8, Final J36 D.C.1.2. J36 D.C.1.3. J36																								
A.C.2 Promotional material	17/2020	31/12/2022	D.C.2.1 Leaflets and brochures D.C.2.2 Posters	D.C.2.1. J36 D.C.2.2. J36																								
A.C.3 Public Event(s)	1/9/2022	31/12/2022	D.C.3.1 Seminars D.C.3.2 Visibility events	D.C.3.1. J36 D.C.3.2. J36																								
A.C.4 Publication(s)	1/4/2021	31/12/2022	D.C.4.1 Publications	D.C.4.a. J36																								

LEGEND	
	Current duration (Notification #8) AF_B5B 999_REDACI_20220502_193101
	Requested implementation period Extension

Actors

- ✓ Civil Protection Authorities at National, Regional and Local levels
- ✓ Volunteers
- ✓ The Public

Problems

Prevention & Preparedness phases

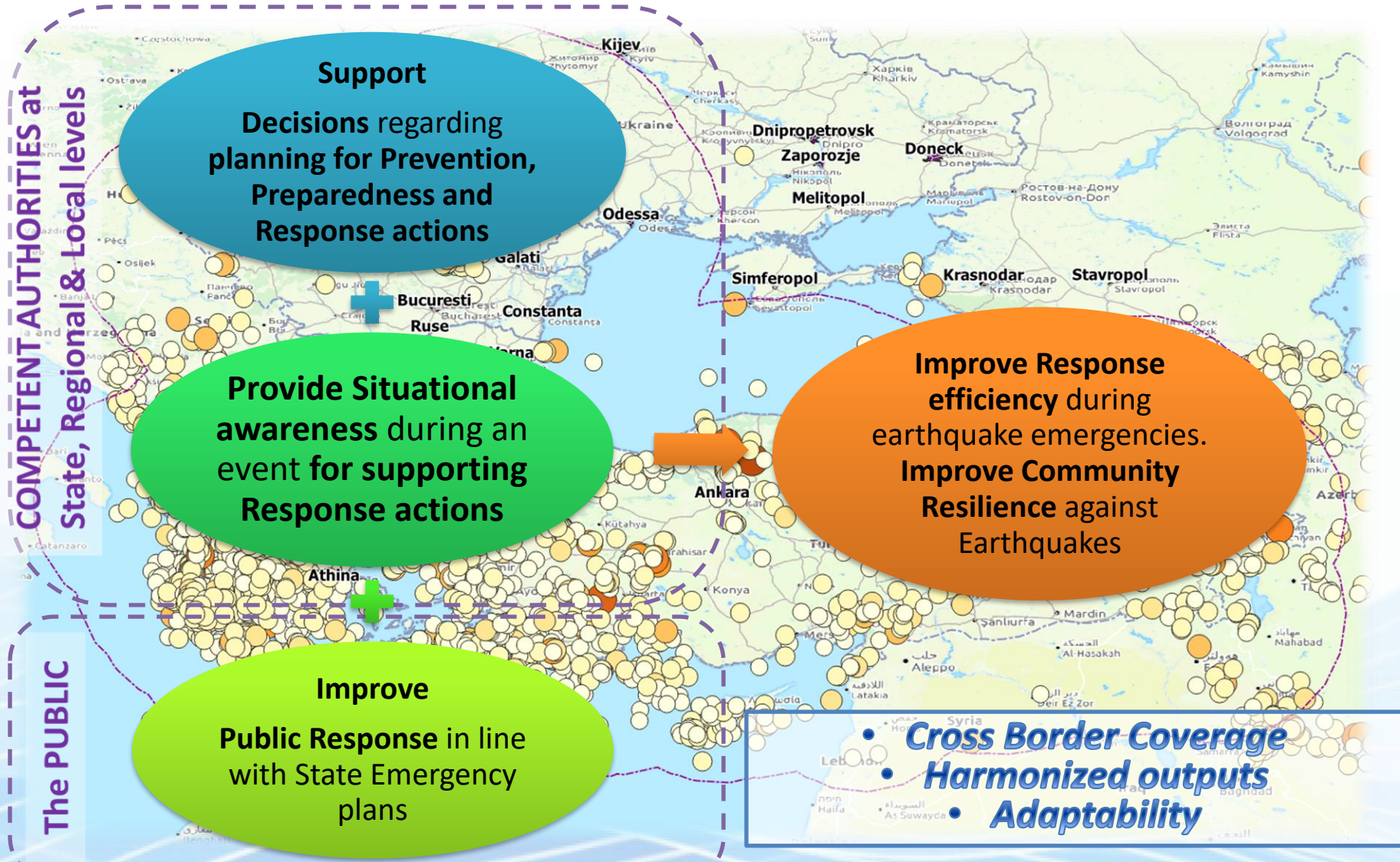
- ✓ Need for Improved Prevention and Preparedness planning (based on informed decisions and on Realistic Scenarios)
- ✓ Poor Preparedness status of the Public
- ✓ Poor Response of the Public during emergencies

During Emergency Situations – Response phase

- ✓ Civil Protection authorities
 - ✓ Lack of Situational Awareness
 - ✓ Difficulties of making decisions
- ✓ Poor Public Response
 - ✓ Panic,
 - ✓ Traffic Jams
 - ✓ Unknown safe (refuge) areas and unknown routes towards them

Common borders. Common solutions.

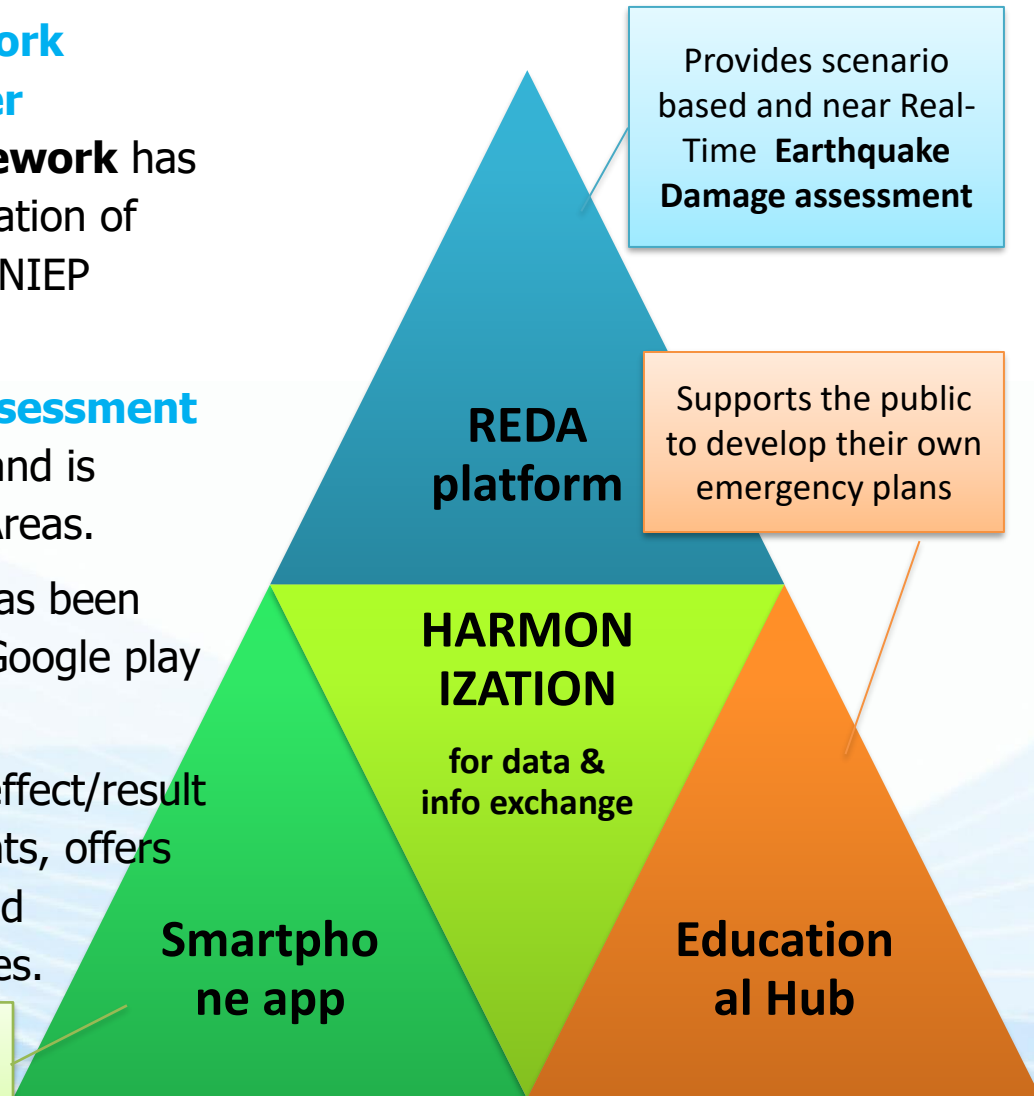
Problems seeking solutions



Common borders. Common solutions.

- ✓ **T.1. A harmonization REDA framework development, based on cross-border exchange of information.** The framework has **jointly** been developed with the cooperation of competent Authorities at National level (NIEP Romania, AFAD Turkiye, EPPO Greece).
- ✓ **T.2.1 Rapid Earthquake Damage Assessment System.** It has been jointly developed and is operational fully covering Cross Border Areas.
- ✓ **T.2.2. REDACT smartphone app.** It has been developed and it's made available over Google play and Apple store.
- ✓ **T3.2. REDAS Service.** The combined effect/result of the use of REDACT product/components, offers an added value and leads to an enhanced Community resilience against earthquakes.

Provides an interface with the Public (event related info, guidelines, allows for "felt" report submission.

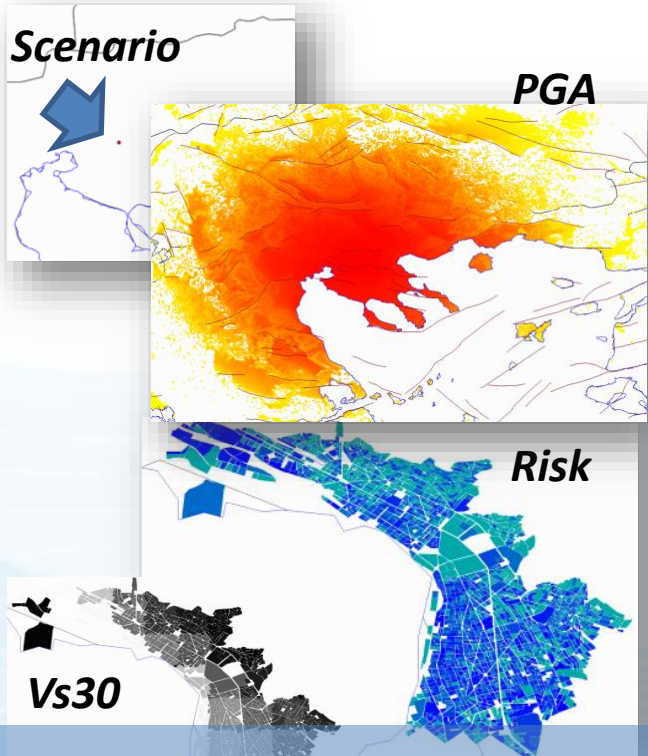


Common borders. Common solutions.

- ✓ **Joint Earthquake Hazard and Risk assessments** over the pilot implementation areas have been implemented producing fully harmonized outputs for the entire area.
- ✓ **Earthquake triggered Geotechnical hazard assessments** over the pilot implementation areas have been implemented based on the selected models that have been incorporated into the REDA platform.
- ✓ The Educational Hub has been developed and populated with tips, guidelines, tutorials, popularized documents and maps of safe locations (Anatoliki Makedonia & Thraki only).
- ✓ An assessment of the service **safe areas** provide in major cities of Anatoliki Makedonia & Thraki has been done so, their spatial distribution can be evaluated and optimized.
- ✓ **Seminars** for stakeholders have been carried out in all partner cities. Additional meetings have been organized with stakeholders.
- ✓ Numerous **presentations** in International Conferences have been made to disseminate the project outputs and receive feedback by the scientific community.

Common borders. Common solutions.

The Rapid Earthquake Damage Assessment platform



The Smartphone app

Earthquake event Reports

Quick Feedback Report

Safe Areas

Map of Safe areas

The Educational Hub

Help improve Community resilience

In and out of home

Outside the House

Κοινοποίηση θέσης με το WhatsApp

Location sharing with WhatsApp

Map of Safe areas

Solutions to problems related to Public Response

- Earthquake Damage Assessment**
- Scenario based and
 - Near Real-Time

<https://www.redact-project.eu/>

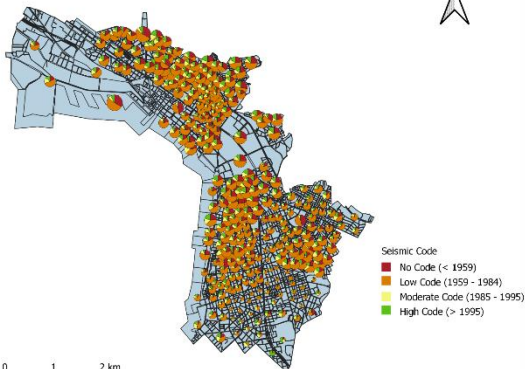
- ✓ A common reference framework to all participating countries and for uniform results to facilitate joint development and implementation.
- ✓ Ground Motion Prediction Equations fit for the entire cross border area were selected (Greece and Turkey: Boore et al. with bias, 2001; Boore et al. without bias, 2001; Chiou and Youngs, 2014).
- ✓ Buildings were classified in appropriate typologies based on common **features affecting their seismic response/vulnerability**:
 - ✓ Material (reinforced concrete, carrying masonry, steel, etc.)
 - ✓ Age (existing seismic design regulations)
 - ✓ Height (number of floors)
 - ✓ Seismic loads bearing system (frame etc.)
 - ✓ Abnormalities (if the case)
- ✓ **Building blocks** were considered as the basic **geographical units**.
- ✓ **The Global Earthquake Model - GEM** was adopted and Seismic Risk Management Studies were also considered.

Common borders. Common solutions.

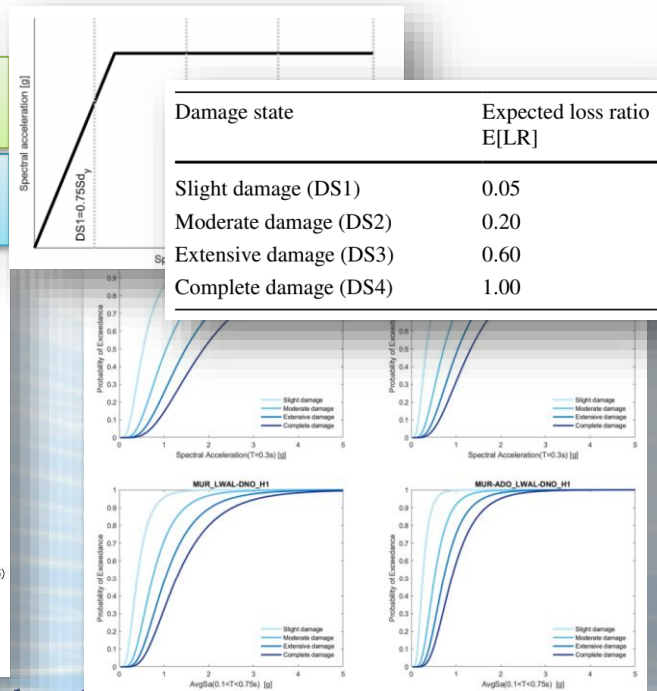
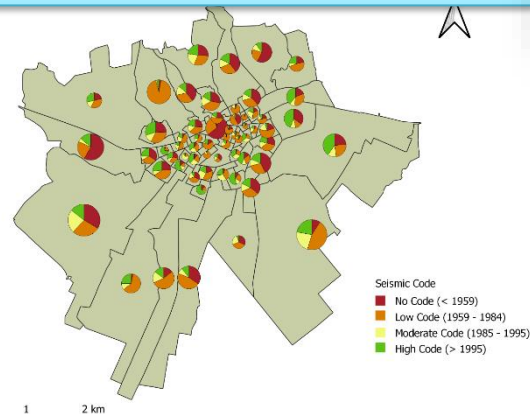
- ✓ Fragility curves proposed by Martins & Silva (2020)
- ✓ Used by the European Seismic Risk Model 2020 (ESRM 2020)
- ✓ Have been widely used and systematically evaluated by numerous research projects
- ✓ They cover satisfactorily the building stock in all REDACT partner countries
- ✓ Consider 4 damage states (DS1: slight, DS2: moderate, DS3: extensive and DS4: complete), defined over economic financial terms (recovery cost to cost reconstruction)

Seismic Design (age of Buildings) - Spatial distribution

Building stock-Thessaloniki municipality



Building stock- Serres municipality



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Rapid Earthquake Damage Assessment platform

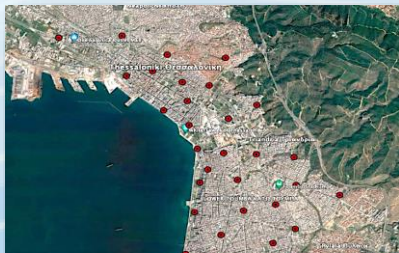
The REDACt platform provides:

- ✓ Scenario based Earthquake Damage Assessment* and
- ✓ Near Real-Time (“Rapid”) Earthquake Damage Assessment* based on data provided in real time by ITSAK (Greece), AFAD (Türkiye) and NIEP (Romania).

* “Damage assessment” refers to **buildings, gas pipelines and geotechnical failures such as landslides and liquefactions, triggered by earthquakes.**

REDA platform outputs were (preliminary) evaluated by comparison to damage statistics of the Thessaloniki 1978 earthquake (Penelis et al., 1984; Leventakis 2003).

The geotechnical hazard outputs were evaluated with actual failure data from Lefkas (2015) and Pinias (2021) earthquakes.



Seismobugs installed into school buildings



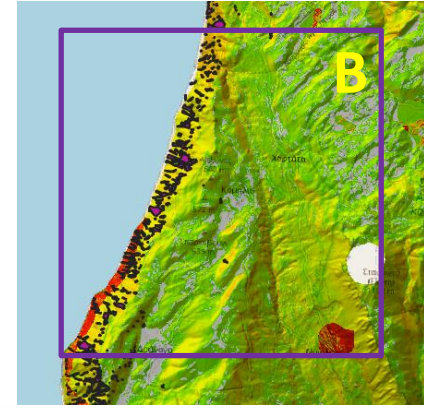
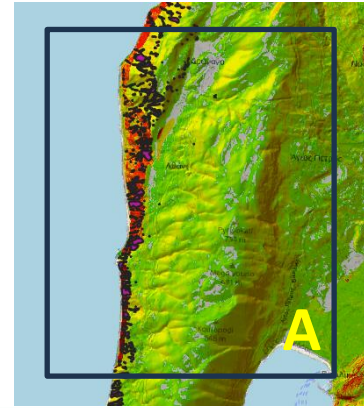
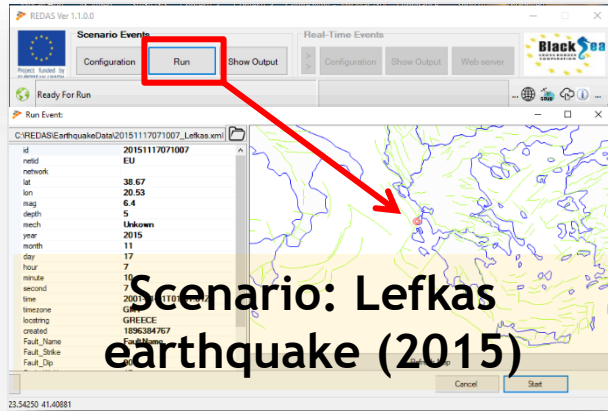
Seismobug©

Comparison of estimated earthquake losses with damage statistics (Thessaloniki 1978 equake)

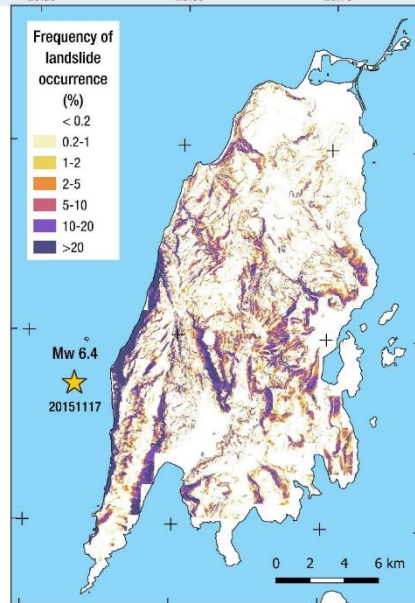
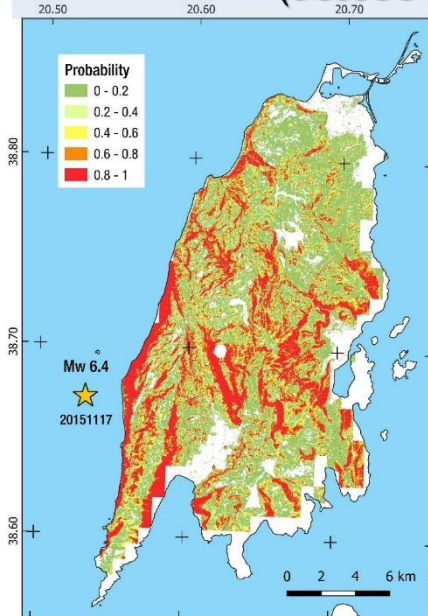
REDACt damage assess		Statistical data	
No	45.95%	Green	74.27%
Small	47.66%	Yellow	19.42%
Moderate	4.96%	Red	6.31%
Extensive	0.96%		
Complete	0.46%		

- ✓ Satisfactory convergence with the statistics of building damage.
- ✓ There is no direct (1-1) matching between the damage states (left) and the damage classification scheme used in 1978 (right).

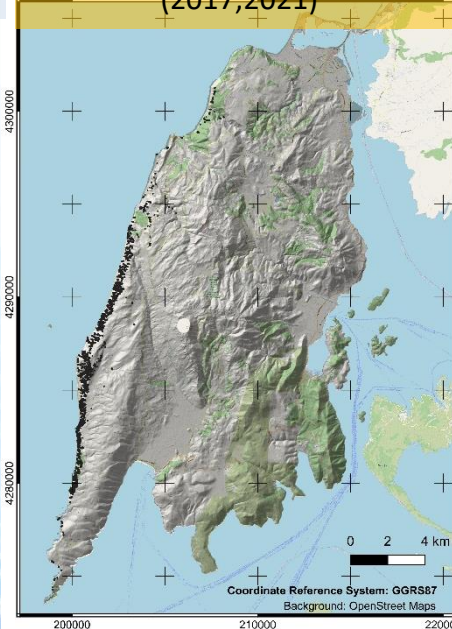
Common borders. Common solutions.



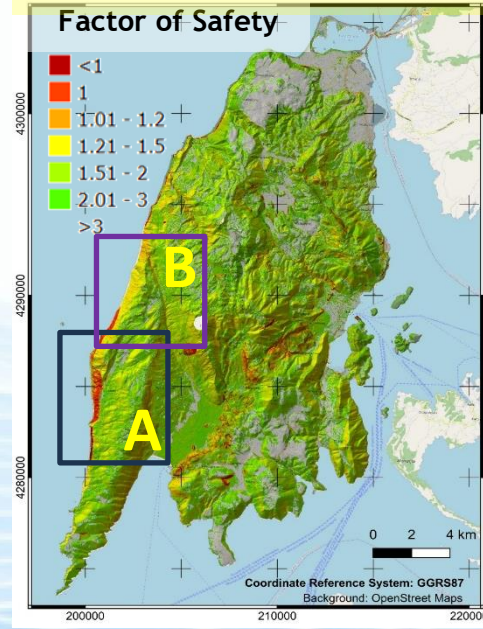
Statistical model of Landslide probability (Jessee et al. 2018)



Recorded Landslides Papathanassiou et al (2017;2021)



Infinite Slope Model, WET conditions



Common borders. Common solutions.

Subjects considered:

- ✓ Emergency response efficiency and Public behavior
- ✓ Compliance to Rules and guidelines
- ✓ Understanding the psychology of Warnings
- ✓ Social Vulnerability or...what is the Public interested in, during emergencies?
- ✓ Emerging problems during emergencies (identified by competent authorities).

Answers to problems - the REDACT Educational Hub (EDU-HUB)

- ✓ Communication during emergencies - How to communicate and share important information (Sharing live location & messages over VOiP).
 - ✓ Education to process the information and to comprehend the Risks - The EDU-HUB content
 - ✓ Popularized Education for Earthquake Risk mitigation
 - ✓ Earthquake preparedness Self assessment - The EDU-HUB Quiz
 - ✓ Navigation capable maps of Safe locations
 - ✓ Safe locations, their service areas and their spatial distribution and coverage
- Common borders. Common solutions.**

Problems identified in respect to Public Response

- Panic
 - Traffic jams
 - Unawareness of safe locations
 - The suitable time people can safely stay there
 - The possible routes towards them
- Personal concerns-
Minimize the reasons
- Provide info
- Provide solutions

Factors affecting Compliance to Warnings!

- Cost of compliance
- Perception of threat/Danger
 - Familiarization
 - Dilution
 - Warning appearance
- Decision making
 - Taking the Risks
 - Control perception & Partial Compliance
 - Social factors



Another way of providing ... tips & guidelines!

Important advice in one place!

Στερεώστε υψηλά έπιπλα στον τοίχο.
Μετακινήστε βαριά αντικείμενα σε χαμηλότερα σημεία.
Απομακρύνετε βαριά αντικείμενα πάνω από το κρεβάτι σας.
Χρησιμοποιήστε τις σκάλες.

If you're not prepared to spend hours locked in an abandoned building without communication, DO NOT use the STAIRS instead!

Εάν δε θέλετε να περάσετε ώρες εγκλωβισμένοι σ' έναν ανελκυστήρα μέσα σ' ένα σκοτεινό και εγκαταλελειμμένο κτήριο, χωρίς δυνατότητα επικοινωνίας, ΜΗΝ τον χρησιμοποιείτε για να εγκαταλείψετε το κτήριο.

In and out of home

Develop a FAMILY plan

- How to COMMUNICATE
- Where to MEET
- How to get to the meeting location

Prepare a Bag with: ESSENTIALS

Prevention

- Fix tall Furniture & heavy items
- Protect yourself against falling objects
- Get under a sturdy table or
- Get in the center of the room and cover your head and neck
- Check home POWER for malfunctions
- Check electricity

MEGA KCEI ΕΞΩ ΑΠΟ ΤΟ ΣΠΙΤΙ

Improve Community Resilience yourselves and Help others

Map of Safe Locations with Navigation capability!

Refuge_Areas_RA.EM...
30 views
Published 5 minutes ago

SHARE

Refuge_Areas_RAEM_Th

All items

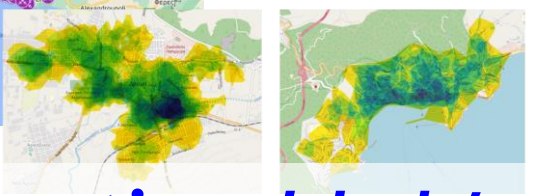
2 X.KB, TOMEA 17 ΔΡΑΜΑΣ

Sharing Live Location!

Location sharing with Google Maps

Location sharing with WhatsApp

Accessibility of Safe Locations



Home The Project Partners Publicity Events News Documents Educational Hub Contact Us



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pose a serious threat to modern life we live in seismically active areas that, in emergency response plans focus on water & power supply, transport & Public? We need to adapt to this fact, we need to improve local citizen capacity, and enhance individual and community resilience.

The REDACT project Educational Hub

- Introduction
- The problem
- The REDACT project contribution
- Open Invitation

Earthquake Disaster Mitigation Competent STATE AUTHORITIES

How to be SAFER – Things TO DO! Help yourselves and Help others as well!

Risk	Prevention (before the event)	Response (during/after a Risk)	Prevention (back)
It rains during Earthquake building	Check alternative exits in case the main is blocked. Evacuate with the building. Monitor and update the procedures.	Check alternative exits in case the main is blocked. Evacuate with the building. Monitor and update the procedures.	Check alternative exits in case the main is blocked. Evacuate with the building. Monitor and update the procedures.

The REDACT project Educational Hub

- Introduction
- The problem
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Location Sharing in Real-Time with Google Maps

Refuge (safe) areas

REDACT

How to be SAFER – Things TO DO! Help yourselves and Help others as well!

How to be SAFER – Things TO DO! Help yourselves and Help others as well!

The REDACT project Educational Hub

- Introduction
- The problem
- The REDACT project contribution
- Open Invitation

Earthquake Disaster Mitigation Competent STATE AUTHORITIES

- Greece O.A.S.P.
- Türkiye A.F.A.D.
- INFP
- Romania IGSU
- Moldova

Comprehending the Risks

Risk	Prevention (before the event)	Response (during/after an event)
Falling objects	Use fall barriers. Move heavy objects to lower places or tie them.	Get under a sturdy desk. If you can't reach for desk, get on your hands and knees.

How to be SAFER – Things TO DO! Help yourselves and Help others as well!

Location Sharing in Real-Time with Google Maps

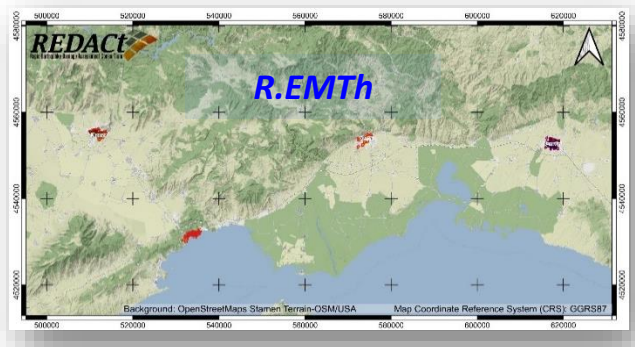
Location Sharing in Real-Time with WhatsApp

Refuge (safe) areas

REDACT

<https://www.redact-project.eu/educational-hub/>

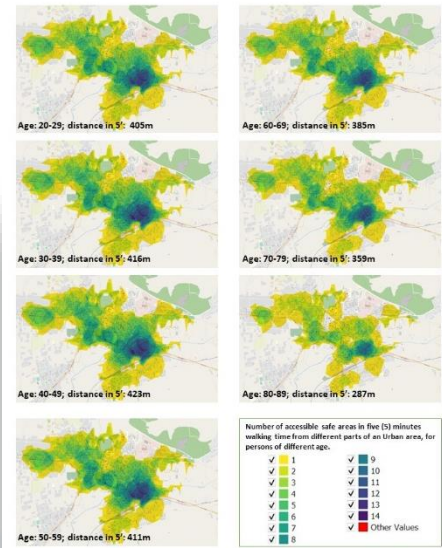
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Locations Reverse Geocoded

ID	Name	Address	City	Country	Postal Code	Latitude	Longitude
1
2
3
4
5
6
7
8
9
10
11
12
13
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18
19
20

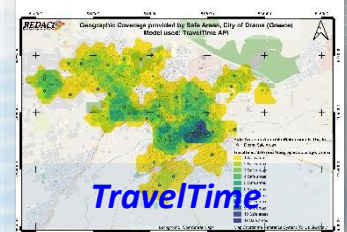
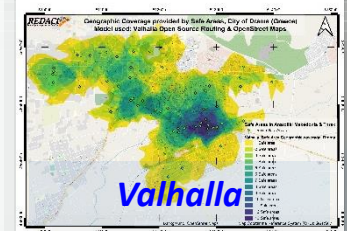
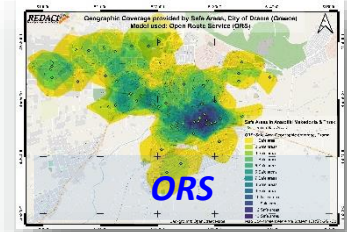
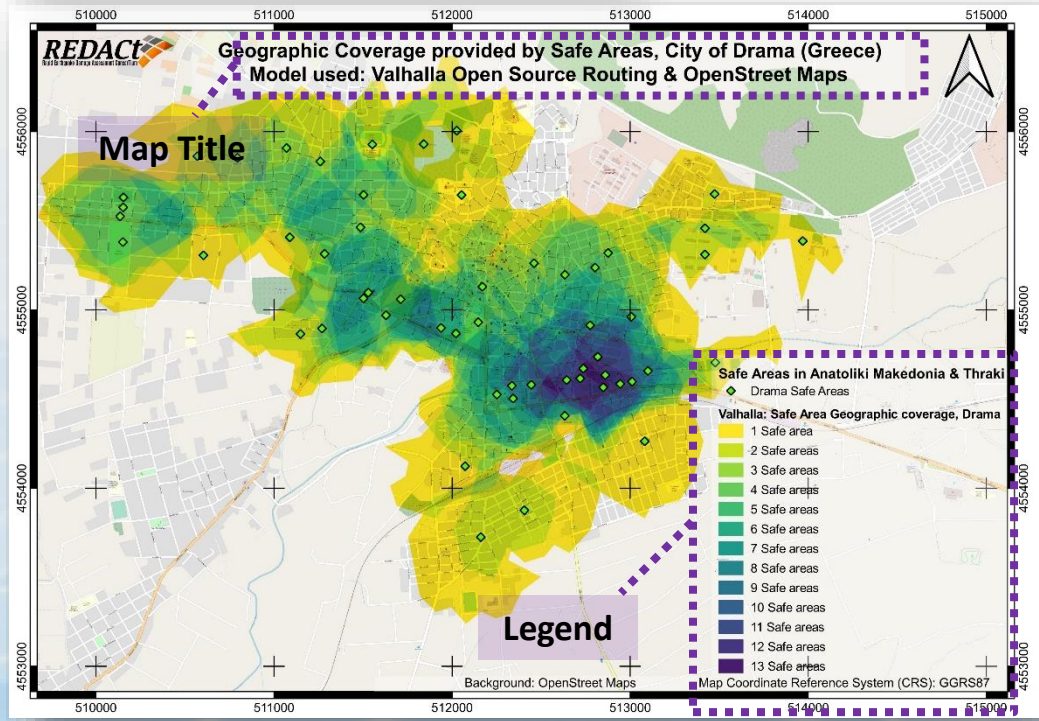
Age and gender were accounted for, to assess walking speed



Various isochrone creation models examined

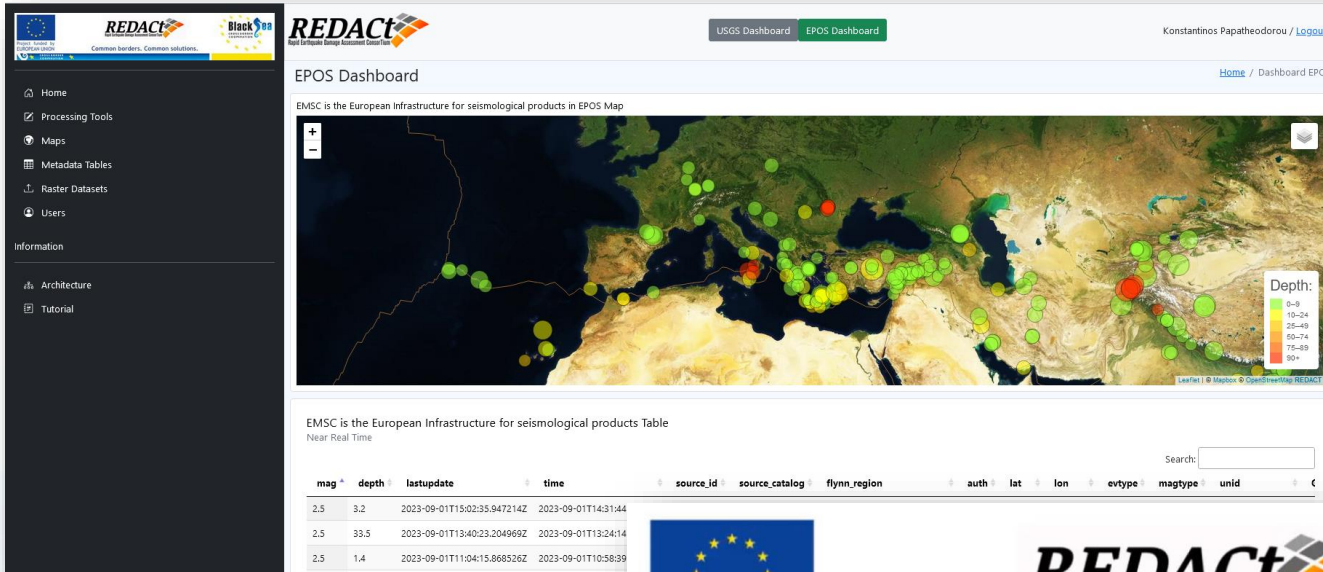


... and applied!



<https://www.redact-project.eu/educational-hub/>

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USGS Dashboard EPOS Dashboard Konstantinos Papatheodorou / Logout

REDACT Rapid Earthquake Damage Assessment Consortium

EPOS Dashboard Home / Dashboard EPOS

EMSC is the European infrastructure for seismological products in EPOS Map

EMSC is the European Infrastructure for seismological products Table
Near Real Time

Search:

mag	depth	lastupdate	time	source_id	source_catalog	flynn_region	auth	lat	lon	evtype	magtype	unid
2.5	3.2	2023-09-01T15:02:35.947214Z	2023-09-01T14:31:44									
2.5	33.5	2023-09-01T13:40:23.204969Z	2023-09-01T13:24:14									
2.5	1.4	2023-09-01T11:04:15.868526Z	2023-09-01T11:05:39									

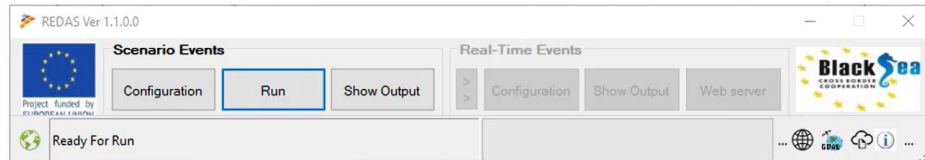


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REDACT
Rapid Earthquake Damage Assessment Consortium

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REDAS Ver 1.1.0.0

Scenario Events

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Configuration Run Show Output

Real-Time Events

Configuration Show Output Web server

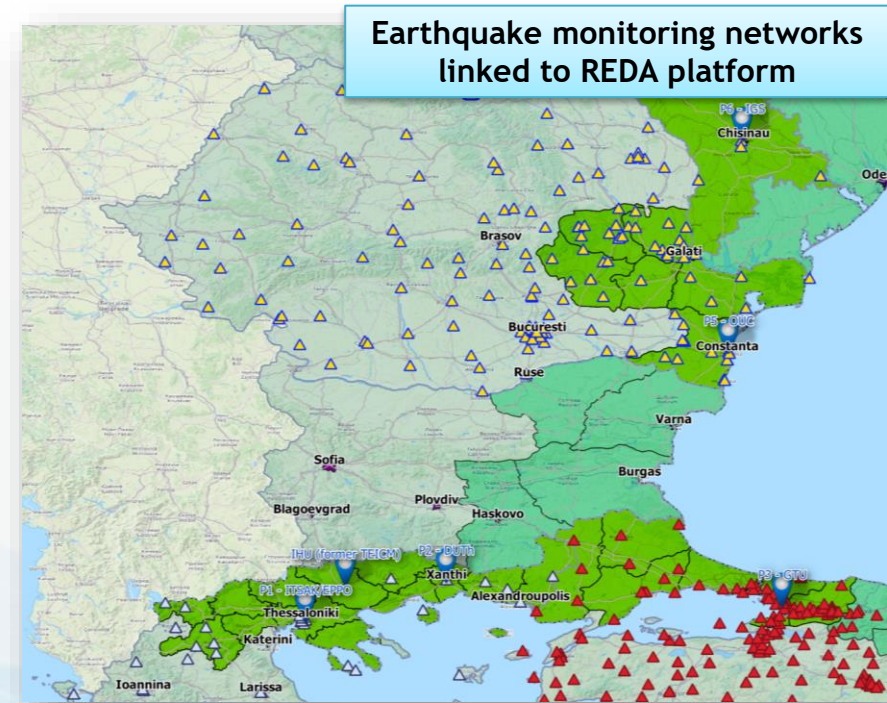
Black Sea Cross Border Cooperation

Ready For Run

<https://www.redact-project.eu/educational-hub/>
Common borders. Common solutions.

REDA platform is receiving real-time data from major earthquake monitoring networks in the area:

- ✓ Institute of Engineering Seismology & Earthquake Engineering (ITSAK), Earthquake Planning Protection Organization (EPPO)
- ✓ Disaster and Emergency Management Presidency -AFAD (Türkiye)
- ✓ National Institute for Earth Physics -NIEP (România)



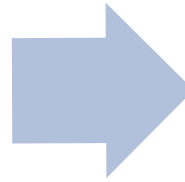
Six (6) identical REDA platforms have been installed into partner Institutions and more will be installed in stakeholder institutions (who want to adopt the platform).

Common borders. Common solutions.

Results, Capitalization, Sustainability

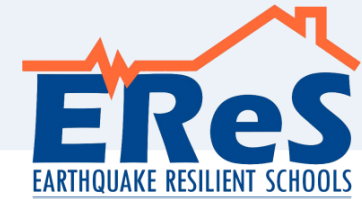
2020-23

BSB JOP 2014-20
Rapid Earthquake Damage
Assessment Consortium-REDACT

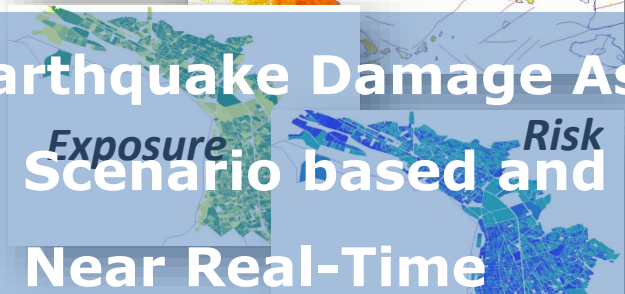
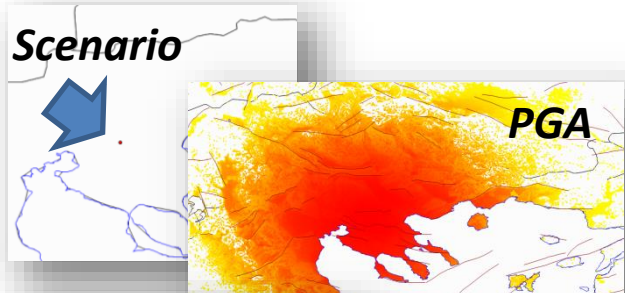


2023-25

Union Civil Protection
Mechanism-UCPM 2022



The Rapid Earthquake Damage
Assessment platform



Earthquake Damage Assessment

- Scenario based and
- Near Real-Time

<https://www.redact-project.eu/>

The Educational Hub

Solutions to problems related to
Public Response





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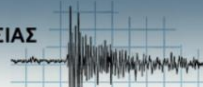
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- Duration: **1 July 2020 – 30 June 2023**
(initially 31 December 2022)



ΟΡΓΑΝΙΣΜΟΣ ΑΝΤΙΣΕΙΣΜΙΚΟΥ ΣΧΕΔΙΑΣΜΟΥ ΚΑΙ ΠΡΟΣΤΑΣΙΑΣ
ΥΠΟΥΡΓΕΙΟ ΥΠΟΔΟΜΩΝ ΚΑΙ ΜΕΤΑΦΟΡΩΝ



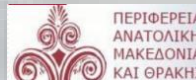
ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
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(ΜΑΚΕΔΟΝΙΑΣ-ΘΡΑΚΗΣ)



ΠΕΡΙΦΕΡΕΙΑ
ΑΝΑΤΟΛΙΚΗΣ
ΜΑΚΕΔΟΝΙΑΣ
ΘΡΑΚΗΣ



ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ
Περιφερειακή Διεύθυνση Α/θμιας & Β/θμιας Εκπαίδευσης Κεντρικής Μακεδονίας



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Διεύθυνση Πολιτικής Προστασίας



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ΤΕΕ
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KOCAELI
BÜYÜKŞEHİR
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Institutul Național de Cercetare -
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CROSS BORDER
COOPERATION





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