Interreg
Danube Region

Co-funded by
the European Union

GeoNetSee

GEONETSEE

An AI/IoT-based system of GEOsensor NETworks for real-time monitoring of unStablE tErrain and artificial structures

GeoNetSee
Project Summary

Project budget: 1.791.280 EUR

Interreg funding: 1.433.024 EUR

Project duration: January 2024 – June 2026

Lead partner: School of Electrical Engineering, University of Belgrade

14 Project Partners + 12 Associate Partners from 9 Danube countries

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GeoNetSee

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Project Partners

- University of Belgrade School of Electrical Engineering, Serbia
- Geological Institute of Romania, Romania
- University of Novi Sad Faculty of Technical Sciences, Serbia
- Geosolutions, Serbia
- Geological Survey of Federation of B&H, Bosnia and Herzegovina
- International Burch University, Bosnia and Herzegovina
- SURVIOT Monitoring, Hungary
- Budapest University of Technology and Economics, Hungary
- nast consulting, Austria
- University of Montenegro Faculty of Civil Engineering, Montenegro
- MoDrone, Montenegro
- VSB Technical University of Ostrava Faculty of Electrical Engineering and Computer Science, Czech Republic
- Geological Survey of Slovenia, Slovenia
- Croatian Geological Survey, Croatia

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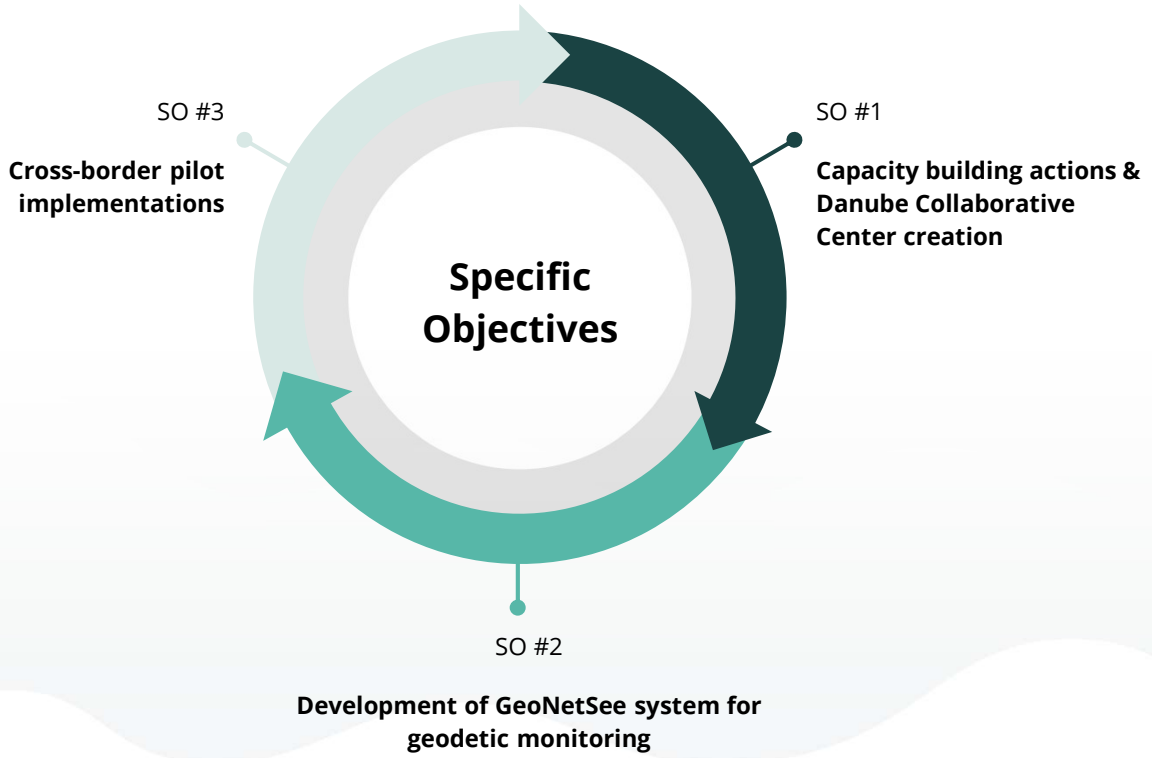
Associated Strategic Partners

- Ministry of Interior, Rescue and Protection Directorate, Montenegro
- Innovation and Entrepreneurship Center Tehnopolis, Montenegro
- Public Water Management Company Vode Vojvodine, Serbia
- Directorate for Emergency Situations, Serbia
- Traffic Institute CIP, Serbia
- Federal Administration for Geodetic and Real Property Affairs, Bosnia and Herzegovina
- Ministry of Natural Resources and Spatial Planning, Natural Disaster Risk Reduction Division, Slovenia
- Microrisc, Czech Republic
- Romanian Space Agency, Romania
- Hungarian State Railway, Hungary
- Hungarian Public Roads Nonprofit Company, Hungary
- Disaster Competence Network Austria, Austria

GeoNetSee
Specific Objectives

GeoNetSee project aims to create an integrated geosensor network and digital platform to monitor displacements and deformations of terrain and artificial structures in the Danube region, enabling real-time data sharing and improving risk management.



SO #1

Capacity Building Actions & Danube Collaborative Center Creation

- Analysis of the current state of innovation in the areas of AI, IoT, and real-time geodetic monitoring
- Development of a roadmap for innovation improvement in the region
- Establishment of the DCC – open access platform for data acquisition, analysis, and knowledge-sharing

SO #2

Development of GeoNetSee System For Geodetic Monitoring

- Creation of system for real-time monitoring of infrastructures based on cost-efficient IoT equipment and sensors, AI and Big data processing
- Collected data will serve to make conclusions on potential risks, such as ground movements, structural deformations, or geotechnical hazards
- The system will provide timely and informed decision-making

SO

#3

Cross-Border Pilot Implementations

- Designed real-time monitoring system and sensors will be implemented and tested on chosen locations (potentially critical landslides, dams and other artificial objects)
- 3 main and 6 mini pilot locations

Impact Assessment of Landslides on Traffic Infrastructure

(courtesy nast consulting, www.nast.at)

Problem

- Landslides can have a severe impact on traffic infrastructure affecting different surrounding areas ranging from a local to an international level. Bearing in mind the current climatic situation several events can take place during a short period of time.
- Consequently, a continuous monitoring is required especially for high-risk sections of roads, railways and waterways.

Zagorje, Croatia

- May 11th 2023
- village of Gornji Jesenje (Zagorje region)
- state road DC74 burried by landslide
- thousands of cubic meters of earth were shifted
- Possible causes:
  - shift of wintertime groundwater
  - seismic disturbance in Croatia

(source: www.total-croatia-news.com)

Weinstraße (Styria), Austria

- Graßnitzberg/Zieregg
- May 15th 2023
- Country road L613 was closed due to landslide
- 600.000 EUR cost to restore the road
- Additional damage to wine yard
- Legal aftermath with wine maker

(source: kleinezeitung.at)

Pians (Tyrolia), Austria

- December 2023
- Country road B 171
- Road closed for more than a week due to landslide
- catch basin prevented the landslide from causing massive damage to the road
- drainage system of the embankment was damaged
- B 171 road had to be partially dug up

(source: tirol.gv.at)

Wachau, Lower Austria

- Aggsbach, June 3rd 2024
- 13,000 m³ of rock thundered onto the B33 country road and a bicycle way
- No one was injured
- Area is closed since June 2024 and a at least until the end of 2024 (no solution found yet)
- Big economic impact as bicycle way is a main tourism hotspot (Donauradweg)
    - special fundings to help tourism businesses affected
    - Special bus transportation for bike tourists

(source: orf.at, diepresse.com, kurier.at)

Landeck (Tyrolia), Austria

- June 3rd 2024
- country road L 312 closed
- Several rocks (boulders) fell onto the road (each approx. 0.25 m³)
- Village cut off from the outside world

(source: unsertirol24.com)

Voitsberg (Styria), Austria

- June 10th 2024
- Landslide with damage to community road
- Road had to be closed for traffic
- Road relocated and drained

(source: meinbezirk.at)

Proleb (Styria), Austria

- June 13th 2024
- Country road L122 closed
- Damage to the road on 50 meter long stretch
- Bus services were no longer possible (3 stops not reachable)
- heavy rainfall in the previous days had softened the ground and triggered the landslide
- Remedial measures
  - 120 m³ of landslide mass and woodland excavated
  - 1.2-metre-high concrete barriers erected

(source: kleinezeitung.at)

Impact Assessment of Landslides on Traffic Infrastructure

(courtesy nast consulting, www.nast.at)

Impact and Severity

Impact (Examples)

- General public
  - Injuries and Fatalities during the event
  - Villages being isolated (requirement of air supplies) after the event
  - Emissions (noise, pollution) due to detour traffic after the event
- Public transport services (Bus/Rail)
- First and last-mile operators (railway operations between terminals)
- Tourism – affected routes could be tourism routes
- Problems based on legal aftermath

Impact Assessment of Landslides on Traffic Infrastructure

(courtesy nast consulting, www.nast.at)

Impact and Severity

High risk sections

<u>Road/Rail with high volumes and frequencies</u>

- International passenger and freight corridors of the TEN-Network
- Additional international and national passenger and freight corridors

<u>Roads with missing alternatives</u>

- Roads through narrow valleys
- Roads with missing opportunities for the detour of heavy vehicles (trailing curves, height and weight limitations)

Impact Assessment of Landslides on Traffic Infrastructure

(courtesy nast consulting, www.nast.at)

Findings

- Examples have shown the impact and severity of different recent events.
- Sections with high risks should be identified, and monitoring should be carried out.
- Prevention, attenuation, remediation measures

Contact Information

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