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TRUSTED
EXTREMELY PRECISE
MAPPING AND PREDICTION
FOR EMERGENCY
MANAGEMENT

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Climate change is leading countries in Europe to experience increasingly frequent and damaging adverse climatic events, such as large fires and flooding. The impact of severe weather events is expected to make Europe increasingly vulnerable due to the magnitude and frequency with which they will occur in the coming years. Natural Disaster Management (NDM) is crucial to prevent these events from becoming life-threatening.

In light of such urgency, and under the advancements in science and technology that have been achieved in recent years, the **TEMA** research project will develop beyond-state-of-the-art methods and technologies to facilitate disaster management procedures, in particular by developing automated means for precise semantic area mapping and phenomenon evolution predictions for Natural Disaster Management in (near-)real-time.

This will be achieved by AI systems that receive multiple heterogeneous data modalities, like geosocial media, topographical, or official meteorological data as input. Using AI technologies and multiple data sources, **TEMA** will provide a map-based emergency decision support system able to make an accurate assessment of an evolving crisis situation while also giving automated response recommendations.

GOALS

1

Improve Natural Disaster Management using new digital technologies and extreme data analytics;

2

Improve and accelerate extreme data analytics, by increasing trustworthiness, accuracy and responsiveness of extreme data analysis algorithms;

3

Improve and accelerate emergency phenomenon modeling, evolution predictions, simulation and interactive visualization.

4 PILOTS RE-ENACTING HISTORICAL SCENARIOS FOREST FIRES AND FLOODS

Central-European Regional Floods (Germany).
Pilot site: Bavaria

Central Europe, due to presence of big rivers, can experience heavy persistent rains that cause regional floods, as happened during July 2021 in the German region of Ahrtal. In this pilot, a flood model will be set-up for the area and calibrated based on information retrieved from historic flood events, including the Ahrtal flood. The objective of TEMA is to provide information to be used to warn the responsible authorities, population and public protection, and provide information about the accessibility of the affected region leading to improved Natural Disaster Management.

Mediterranean Flash Floods (Greece):
Pilot site: Municipality of Mantoudi-Limni-Agia Anna

The geomorphology and hydrological characteristics of Mediterranean catchments render such areas particularly prone to flash floods. The Greek pilot land area is among these, therefore, considering also the mega-fire occurred in August 2021, a flood model will be set up for the area and calibrated based on information retrieved from historic flood events as well as near-real-time information coming from the observations of streamflow gauges. The model will support (near-)real-time flood forecasting and flood warnings and can be used to examine and enhance the relevant Natural Disaster Management procedures.

Mediterranean Forest Fires (Italy):
Pilot site: Montiferru

The Autonomous Region of Sardinia (RAS) faced a severe crisis on July 2021, when a widespread 15.000-hectare forest fire provoked serious damages at Montiferru (central Sardinia). This scenario will be played out in real time for TEMA validation, with available data about the area vegetation, geomorphological data, damage details and safety procedures that have been adopted, output of meteorological models, forecast fire danger bulletins, satellite images, videos from drones filming the burnt area. The TEMA platform will also be used for examining the conditions of post-event territory, with particular regard to the implications for geomorphological risk.

Finnish Forest Fires (Finland)
Pilot site: Kainuu area

Forest fires and the general extreme weather conditions in the Nordic countries, cause concern among Finnish emergency professionals. The pilot will be based on the historical scenario of the 2021 Kalajoki forest fire. This will provide a study case on forest fire management operations through the aggregation of environmental data sources, both existing and collected during the project. These datasets will be enriched with earlier reports on prevention strategies, as well as guidelines of the Finnish authorities for the boreal vegetation environment. By using TEMA solution, it will be possible to examine and improve procedures for managing disasters and for decision making.