beAWARE

Enhancing decision support and management services in extreme weather climate events

What are the benefits of an enhanced decision support system against wildfires?

The case of beAWARE

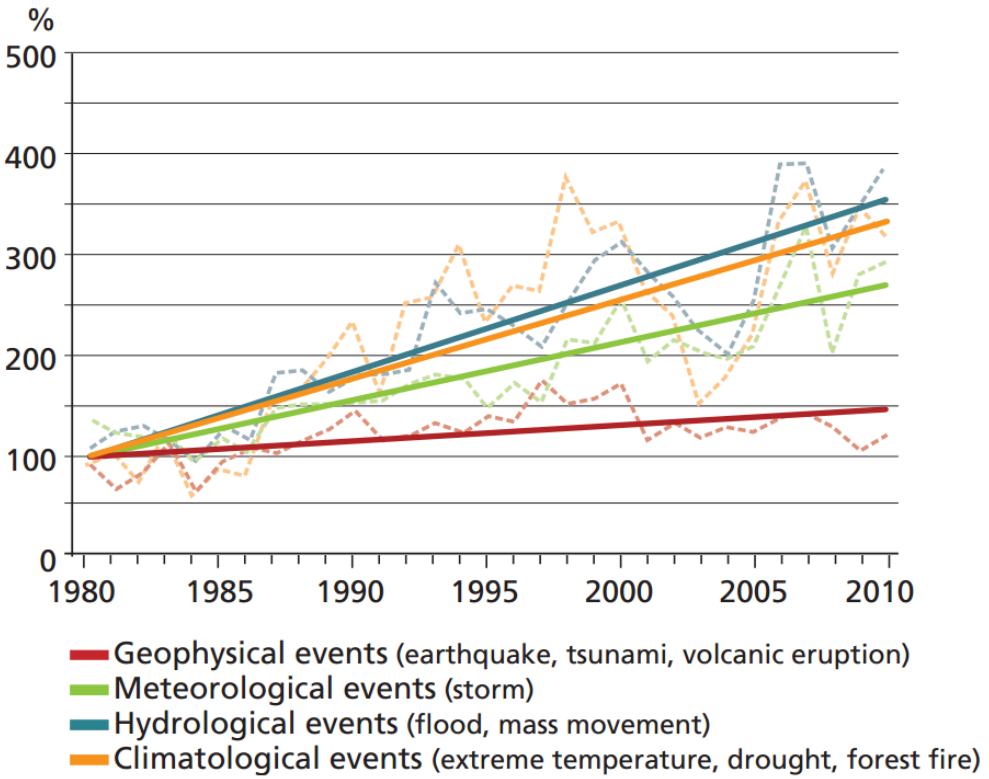
PSCE Conference
Bled, Slovenia 13.12.2018

.....

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

The challenge

- Wildfires are an increasing and continuously more dangerous phenomenon
- Droughts and wildfires show the most pronounced upward trend



Trends in different types of natural catastrophe worldwide, 1980–2012 (1980 levels set at 100%; Munich Re NatCatSERVICE)

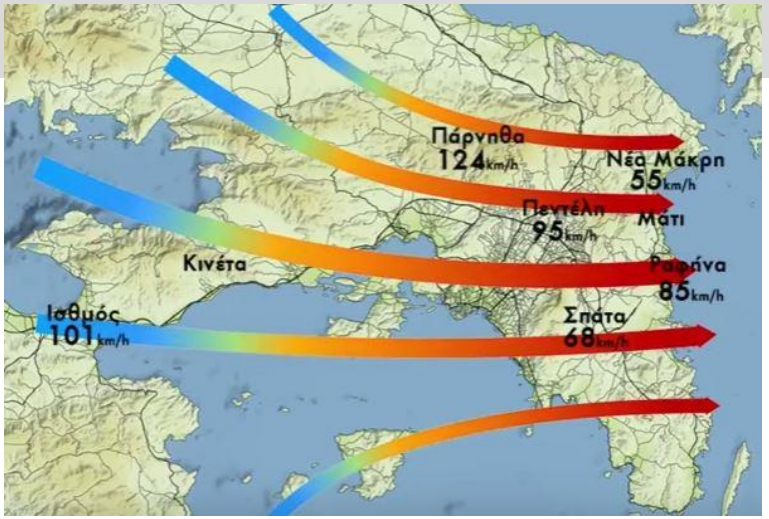
Source: http://www.droughtmanagement.info/literature/EASAC_trends_extreme_weather_events_europe_2013.pdf

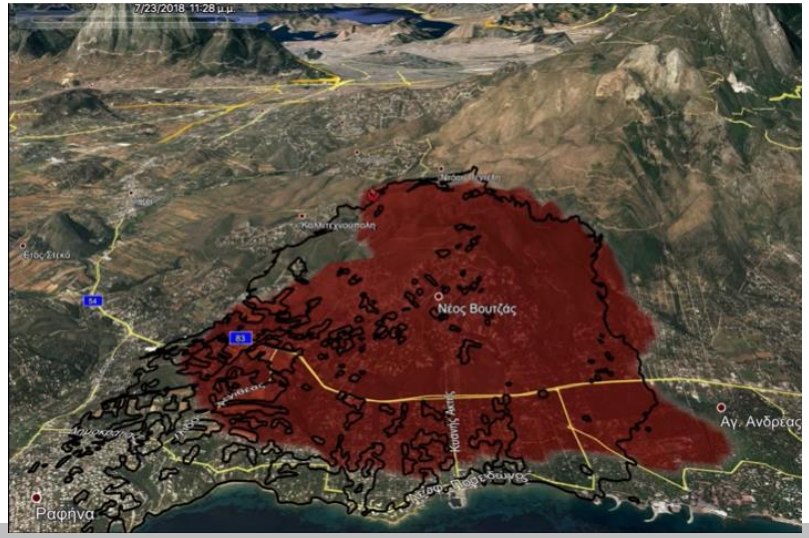
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

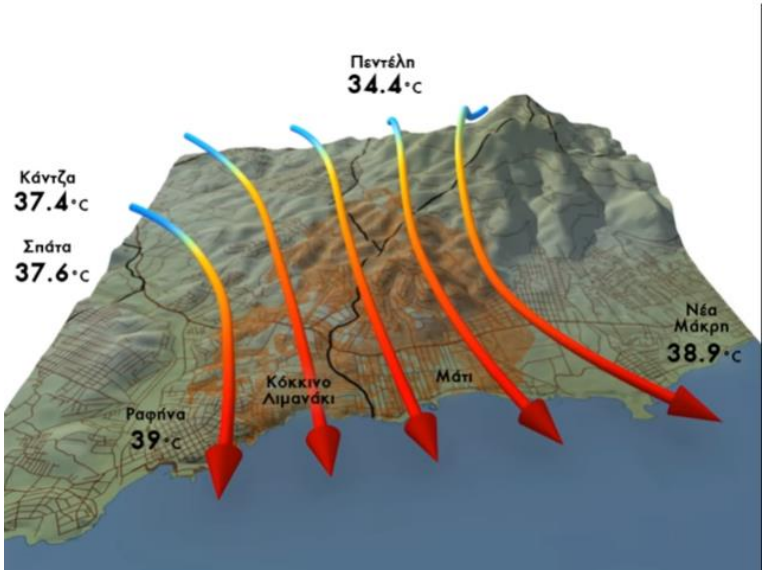
beAWARE

Recent examples - Greece

- Mati (Greece) - 2018:
  - 99 people dead
  - 164 people injured
  - 1.276 hectares destroyed
- Characteristics
  - Extremely strong winds (100-120 km/h locally)
  - Temperatures near 40 ^{o}C







Source: National Observatory of Athens

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

beAWARE

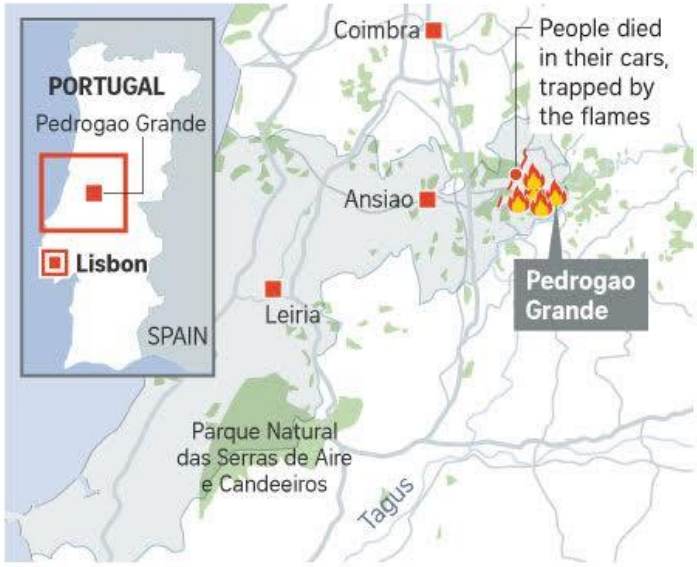
Issues faced

- In the case of Mati the problems that were faced based on reports were:
  - Difficulty in issuing a public alert in order to evacuate the area
  - Coordination and communication issues
  - There was no clear understanding the current status of the situation
  - Many people tried to evacuate using their cars and the narrow streets were jammed → Traffic jam

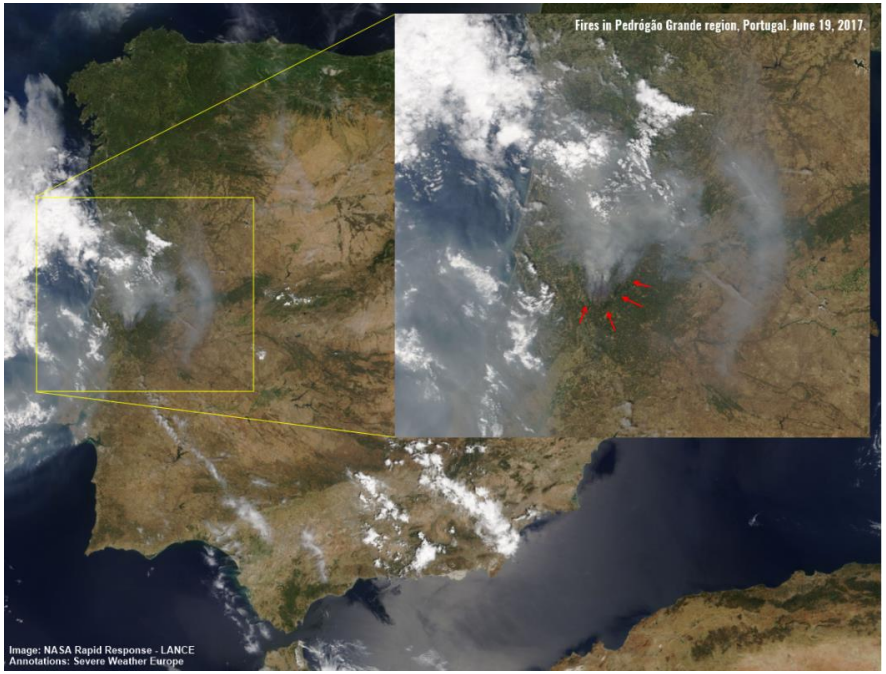
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

Recent examples - Portugal

- Pedrógão Grande (Portugal) - 2017
  - 66 people dead
  - > 200 people injured
  - > 520.000 forest hectares destroyed



Source: AFP, REUTERS
STRAITS TIMES GRAPHICS



Satellite images show the fires (marked with red arrows) burning intensely yesterday, June 19. Image: NASA MODIS.

Source: http://www.severe-weather.eu/news/high-fire-hazard-across-large-parts-of-europe-june-20/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

beAWARE

Issues faced

- In the case of Pedrógão Grande the problems that were faced based on reports were:
  - Absence of an early warning system in place
  - Difficulty in issuing a public alert in order to evacuate the area
  - Coordination and communication issues
  - There was no clear understanding the current status of the situation
    - No pre-positioning of forces
    - No analysis of the evolution of the situation based on the available meteorological information

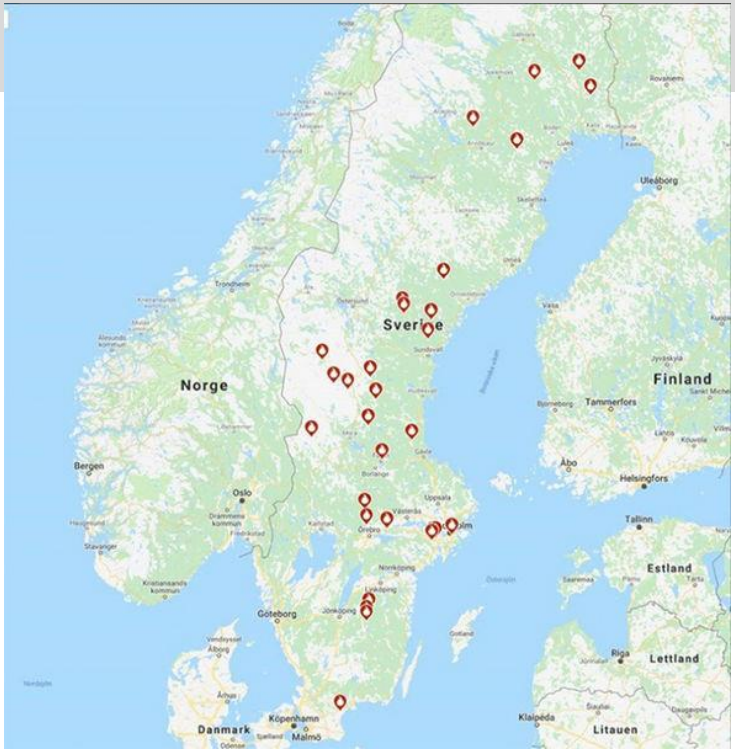
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

Recent examples – Sweden

- Sweden - 2018
  - Total of 250 km^2 of forest area was affected

weden fire satellite MAP: Aeriel picture showing smoke billowing from the Sweden wildfires (Image: GETTY)).

Source: https://www.express.co.uk/news/world/993021/sweden-fire-satellite-map-aerial-pictures-wildfire-norway-sweden



This map shows where fires were burning in Sweden

Image: SOSAlarmSverige).

Source: https://www.express.co.uk/news/world/993472/Sweden-fire-map-Sweden-wildfires-drought-heatwave/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

Issues faced

- In the case of Pedrógão Grande the problems that were faced based on reports were:
  - Absence of an early warning system in place
  - Difficulty in issuing a public alert in order to evacuate the area
  - Coordination and communication issues
  - There was no clear understanding the current status of the situation
    - No pre-positioning of forces
    - No analysis of the evolution of the situation based on the available meteorological information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

Benefits of Decision Support Systems

- In general, the benefits of a DSS can be summarized in:
  - Time saving
  - Early warning
  - Enhance effectiveness
  - Improve interpersonal communication
  - Offer a competitive advantage
  - Increase decision maker satisfaction
  - Promote learning
  - Increase organizational control

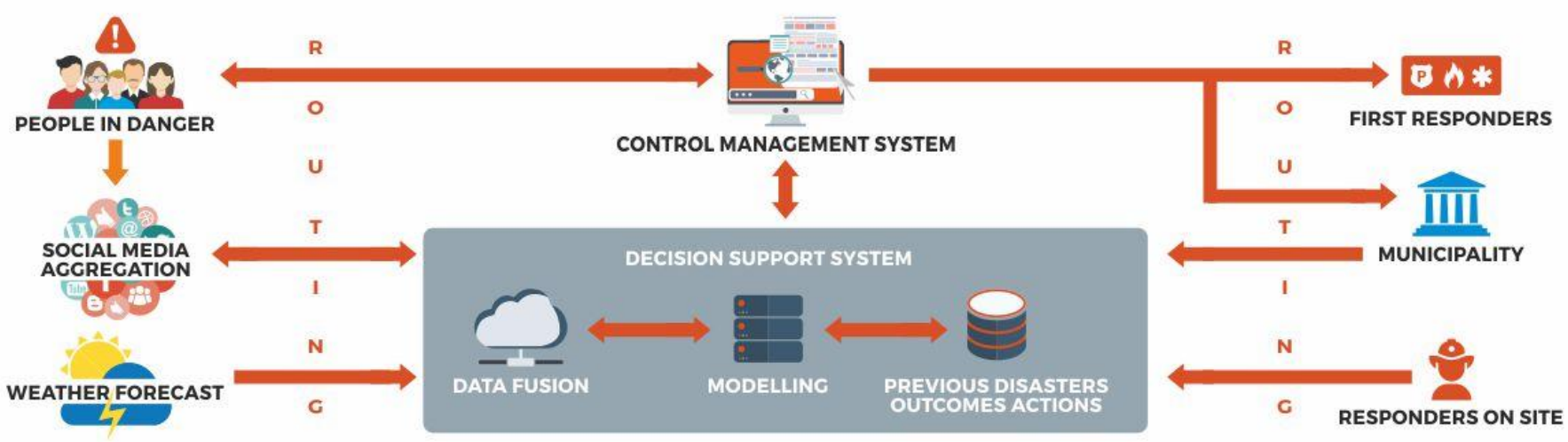
- The goal is to demonstrate how the above can support the management of wildfires

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

beAWARE concept

- **beAWARE** proposes a **holistic approach** to the realization of **crisis management frameworks** supporting **all the phases** in an emergency sequence

- **beAWARE** offers an integrated solution to provide **early warnings**, **risk assessment**, **aggregated analysis of multimodal data** and **decision support** to the authorities in order to **plan** and **coordinate** the most effective response with the available resources



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

beAWARE

Data products

Weather Data

Social Media

Sensors

Drones

Mobile App

Integration

Knowledge Base

Database

EARLY WARNING

REASONING

Technologies

PSAP

Report Generation

Mob. App

Text Analysis

Video Analysis

Crisis Classification

Image Analysis

Audio Analysis

Social Media Analysis

Stakeholders

Citizens

Authorities

PREVENTION

PREPAREDNESS

RESPONSE

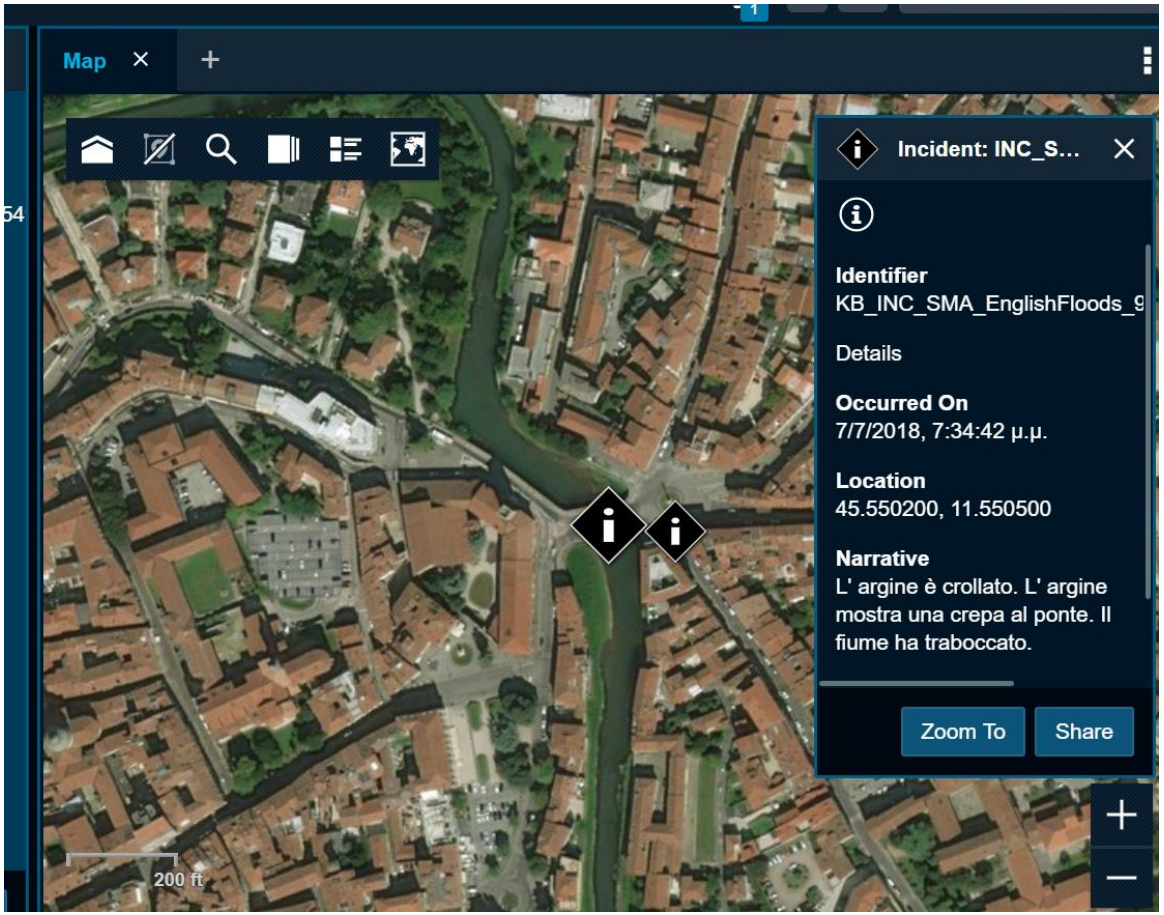
beAWARE tools

- Alert based on meteorological Data (pre-emergency) - Crisis Classification
- Multilingual Text Analysis
- Aggregate Multimodal Information
  - Weather Data
  - Sensor Data
  - Social Media
  - Multimedia
- Image Analysis - Video Analysis - Drones
- Information from sensors
- Task Management
- Report Generation
- PSAP

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

Multilingual Text Analysis

- Analysis from English, Greek, Italian and Spanish texts
  - Text from **tweets**
  - Text from **mobile application** (first responders/people in danger)
  - Text from automatic **speech recognition output**

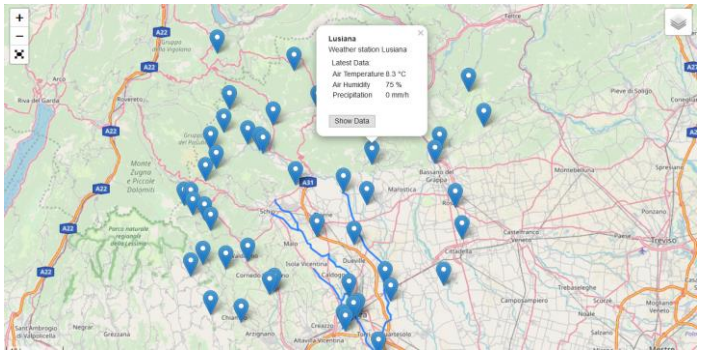


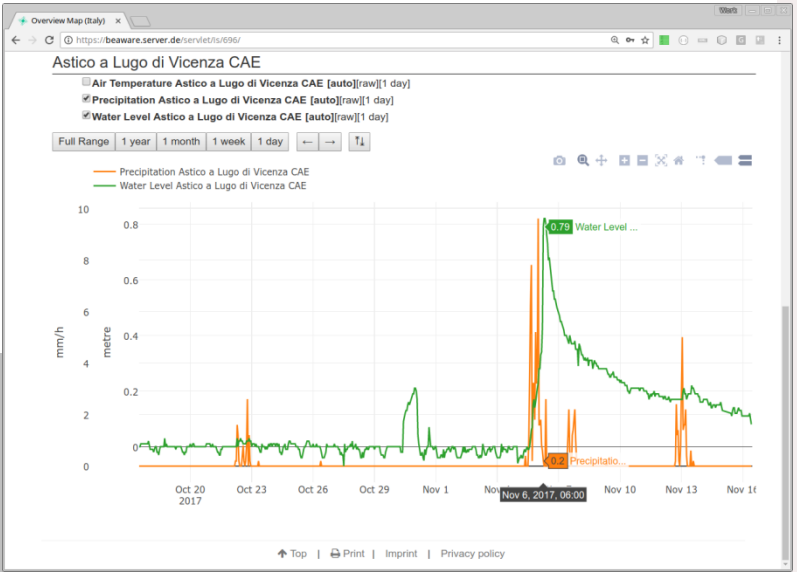
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

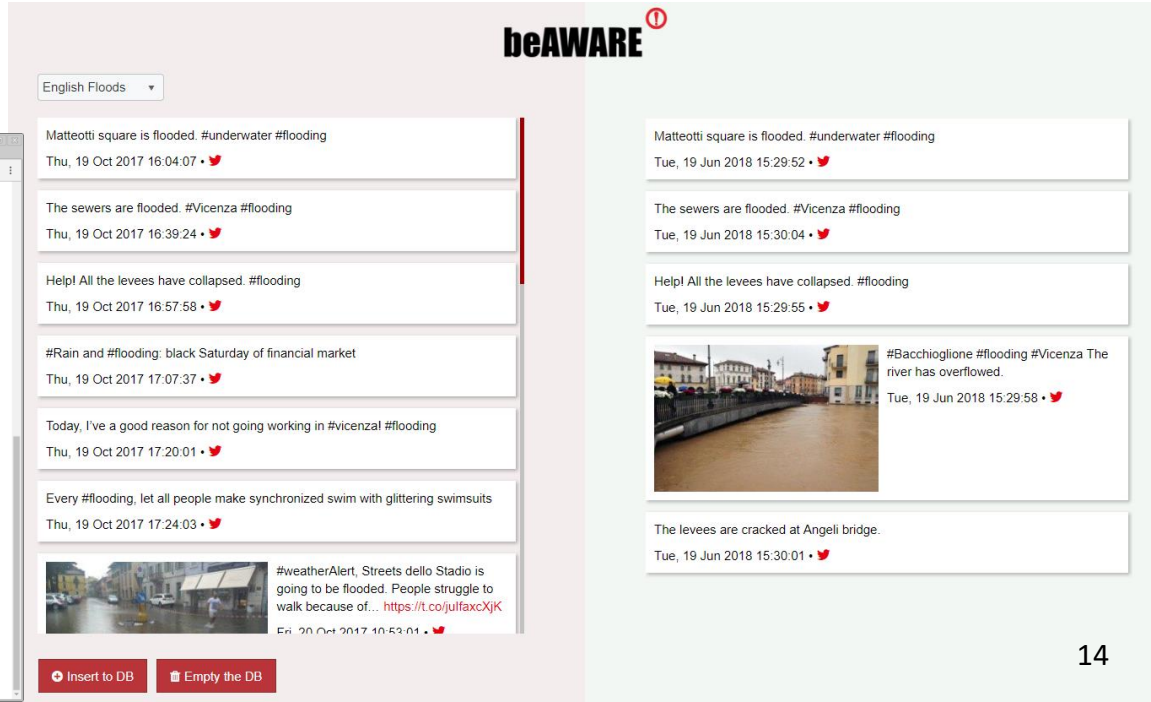
beAWARE

Aggregate Multimodal Information

- **Weather data**
  - Forecast & Current data
- **Sensor data**
  - Sensor-thing server
  - Hydrological and hydraulic modelling
- **Social media**
  - Collection of Tweets for Fire, Flood, Heatwave for English, Spanish, Greek and Italian
- **Multimedia**





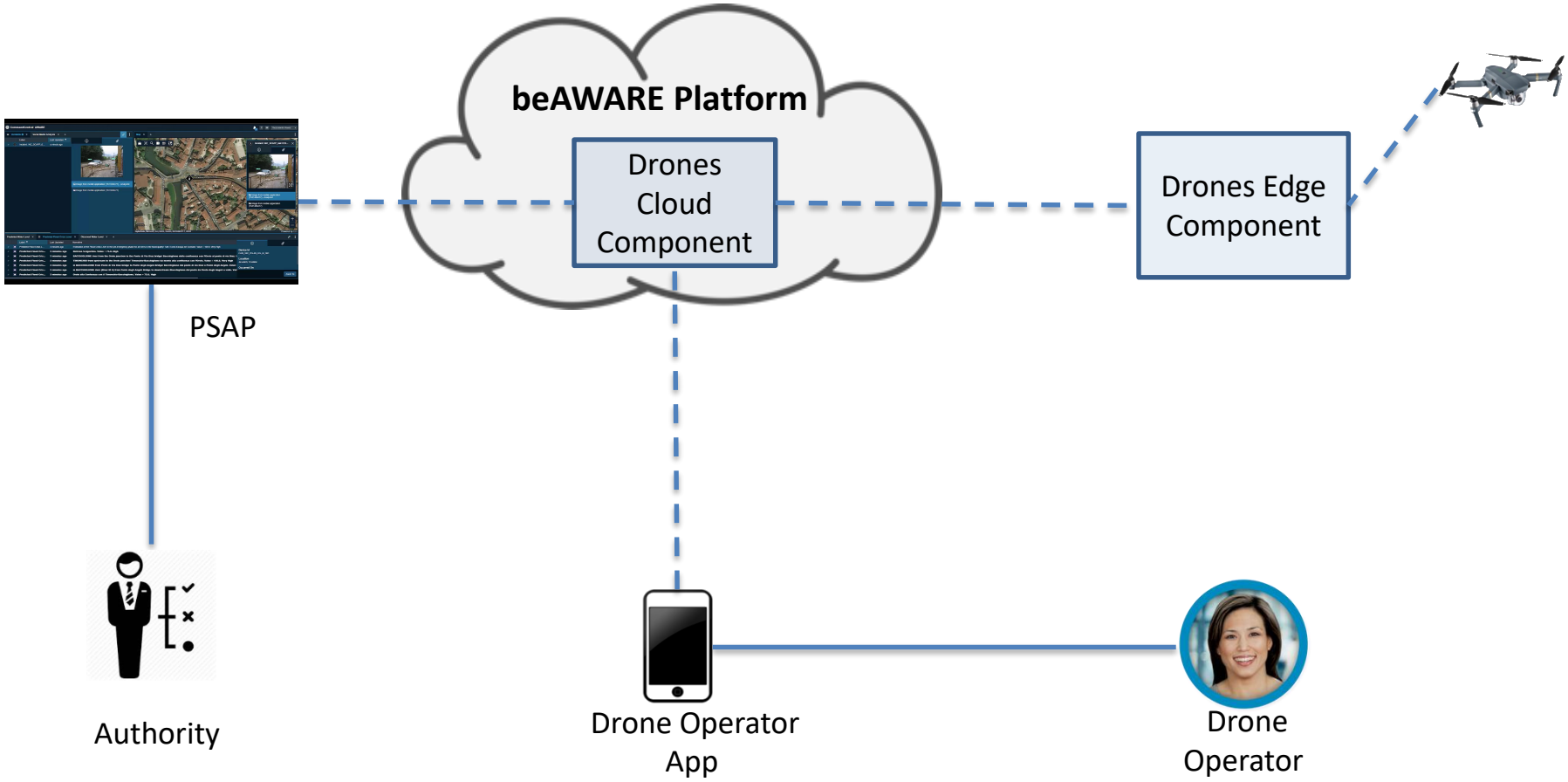


Visual Analysis

- Image, Video and Audio Analysis
  - **Crisis event detection** in images and videos
  - **Traffic analysis** from static surveillance cameras
  - **Automatic speech recognition** component

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

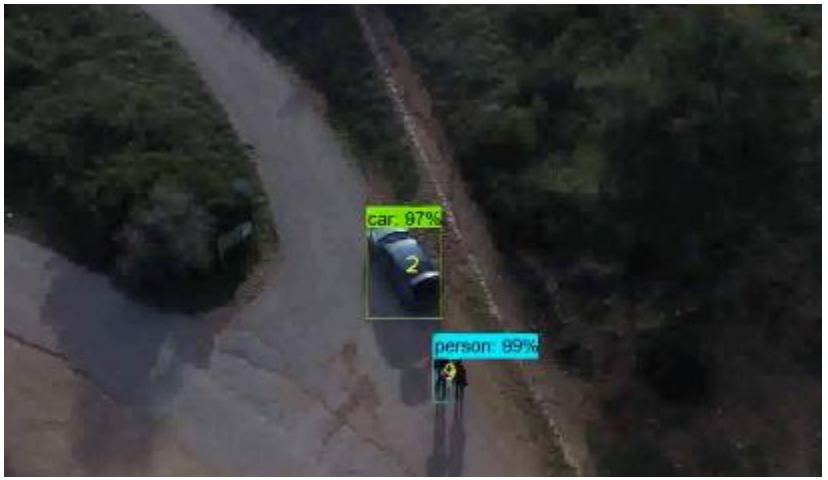
Visual Analysis – use of drones



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

Visual Analysis – use of drones

- Automatic drone route planning using service parameters
- Autonomous drone piloting
- Automatic invocation of drone's on-board equipment (ex., camera)
- Collection of media and events produced by drone
- Data storage using beAWARE infrastructure
- Communication with media analysis components using beAWARE infrastructure
- Drone component dashboard for management and flight monitoring

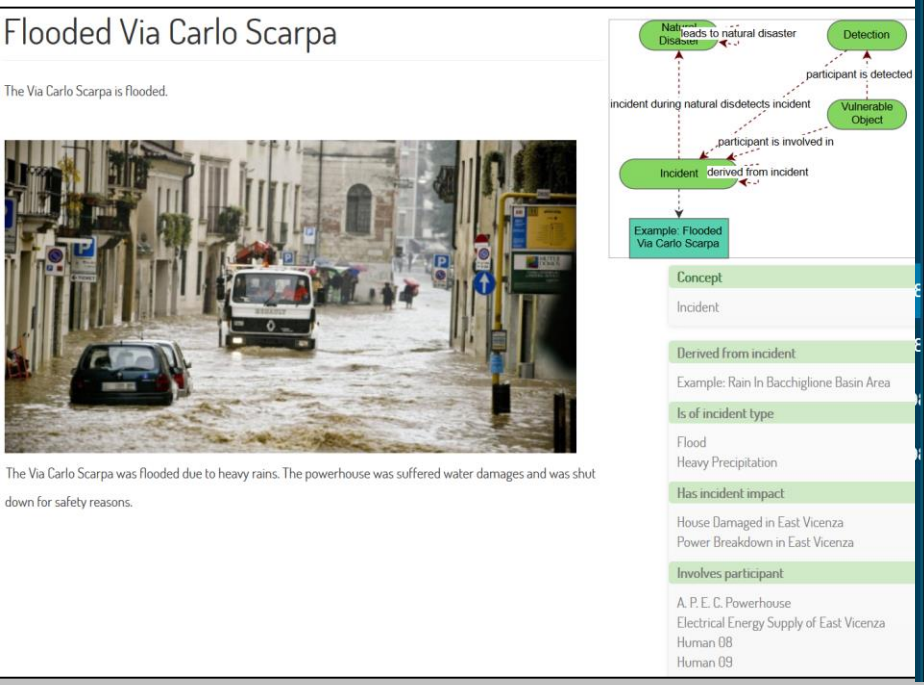


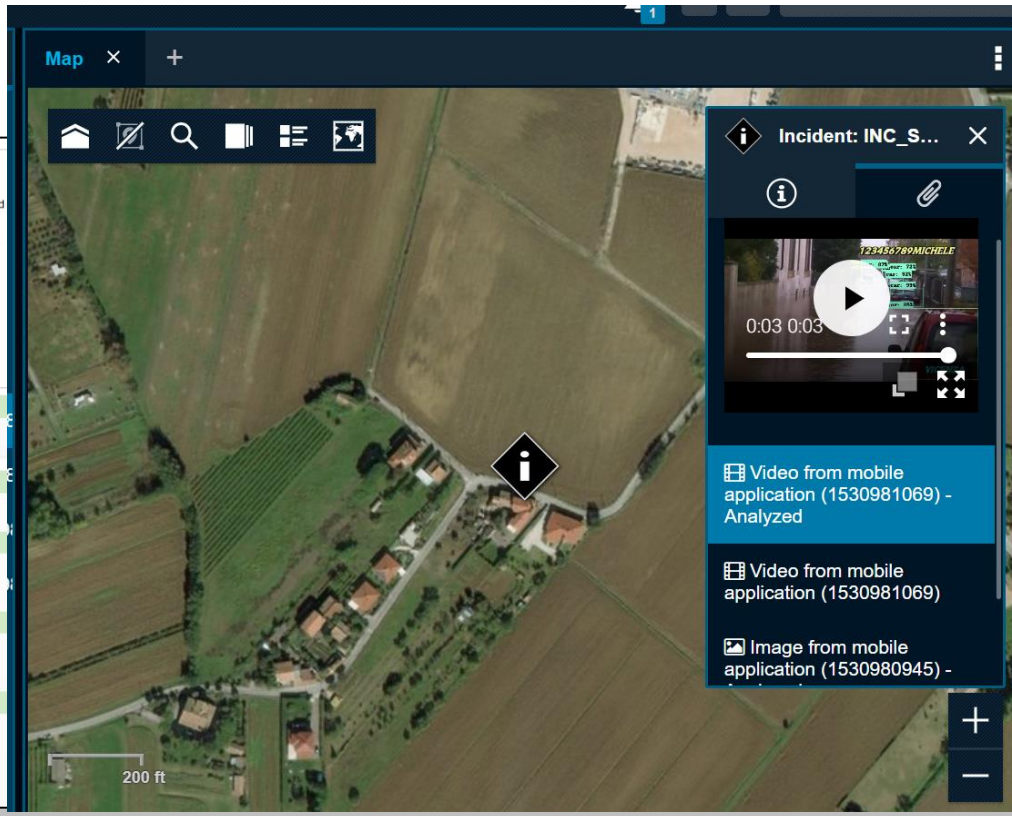
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

beAWARE

Semantic Integration

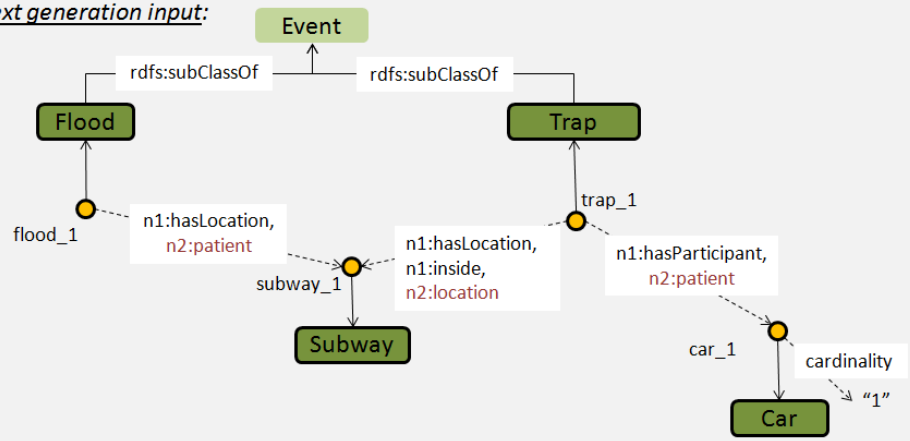
- **Reasoning** based on multimodal input
- **Incidents to PSAP**
- **Clustering of** incidents
- Calculation of incidents' **severity** levels
- Update of the **safe locations** status
- Identify the **crisis type**





Report Generation

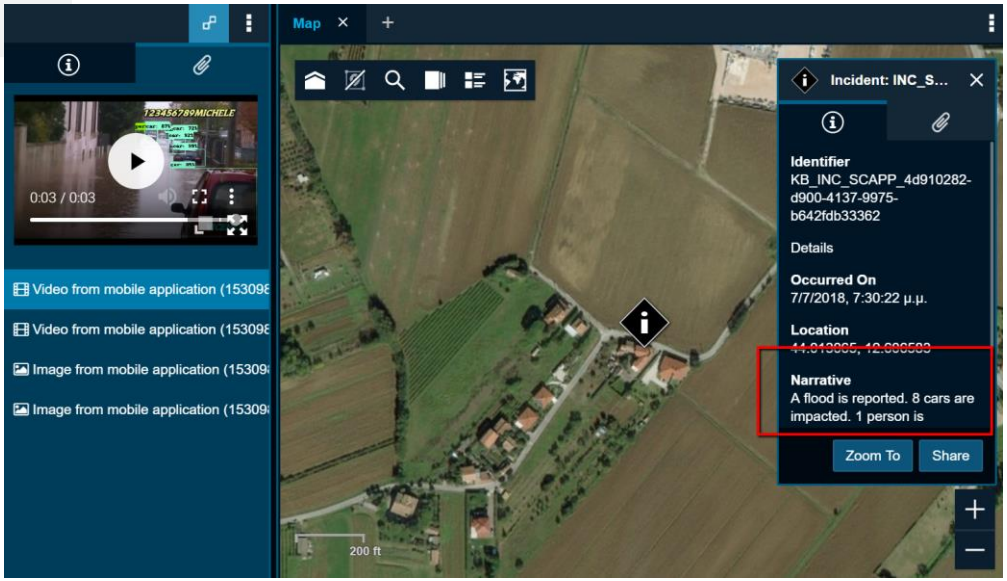
Text generation input:



Text generation output:

- *The subway is flooded. There is a car trapped inside.*
- *A car is trapped in the flooded subway.*
- *A car is trapped in the subway, which is flooded.*
- *The subway, in which a car is trapped, is flooded.*

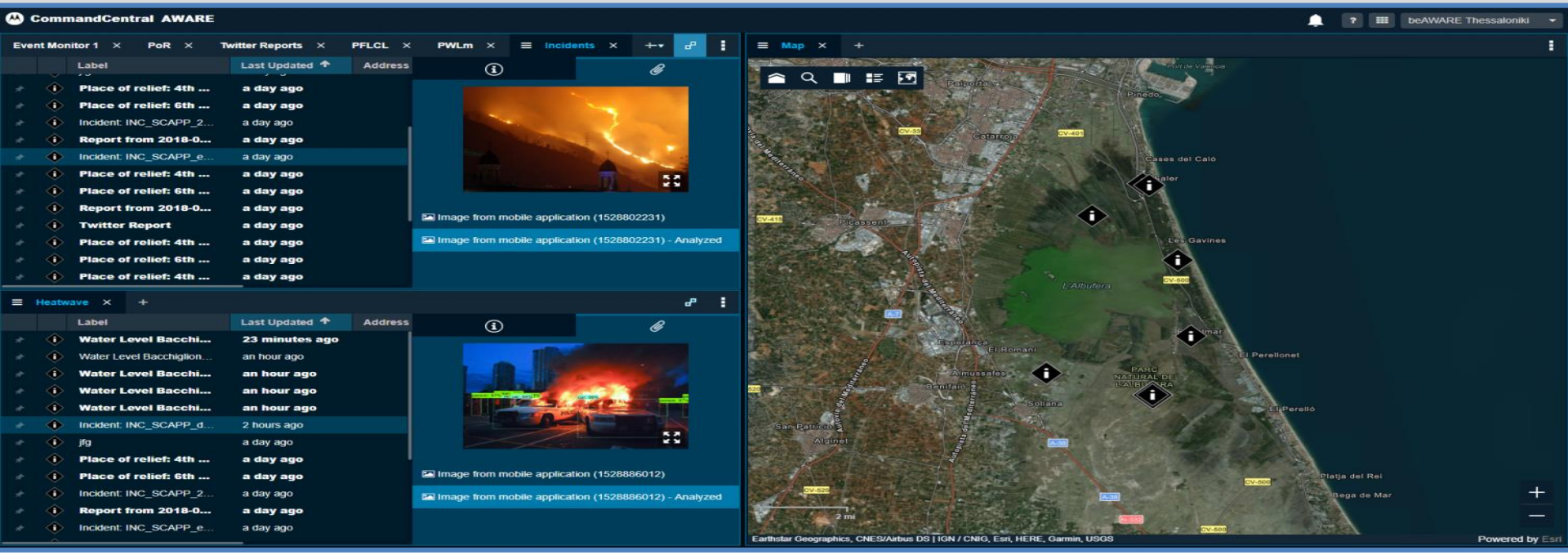
- **Any analysis** output **is an input** to the Report Generation component
- Provide **description/reports** to the authority for **an incident** or for a **cluster of incidents**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

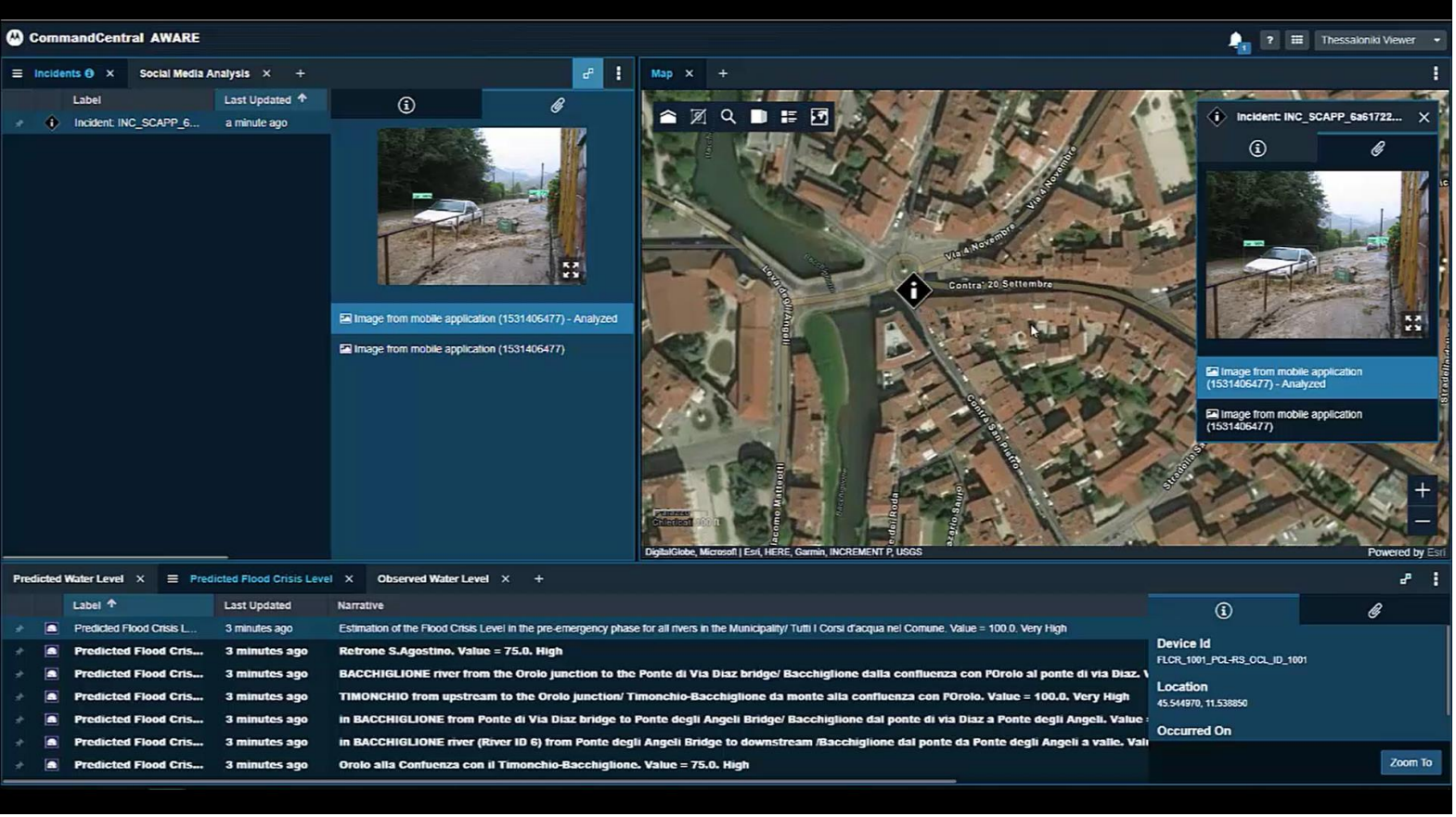
beAWARE

Main Public Safety Answering Point (PSAP)

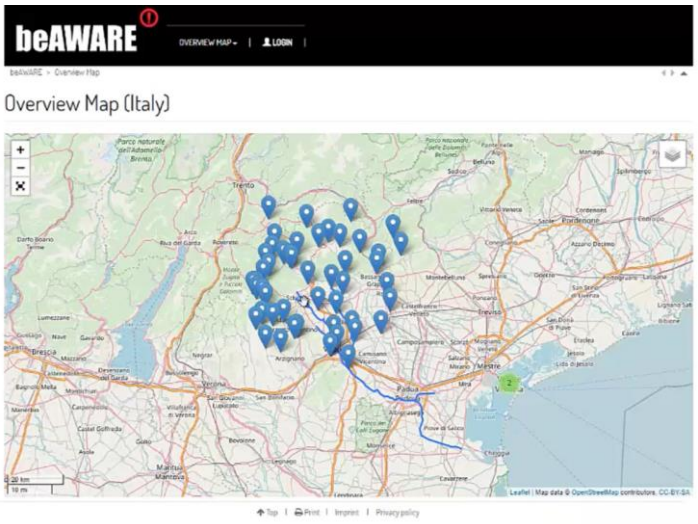


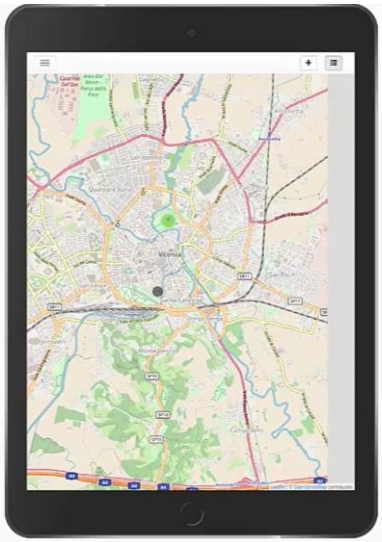
- PSAP main environment
- PSAP dashboard

beAWARE


CommandCentral AWARE
Thessaloniki Viewer
Incidents
Social Media Analysis
Label
Last Updated
Incident: INC_SCAPP_6...
a minute ago
Image from mobile application (1531406477) - Analyzed
Image from mobile application (1531406477)
Map
Incident: INC_SCAPP_6a61722...
Image from mobile application (1531406477) - Analyzed
Image from mobile application (1531406477)
Via 4 Novembre
Contra' 20 Settembre
Contra' San Pietro
Strada Sp
DigitalGlobe, Microsoft | Esri, HERE, Garmin, INCREMENT P, USGS
Powered by Esri
Predicted Water Level
Predicted Flood Crisis Level
Observed Water Level
Label
Last Updated
Narrative
Predicted Flood Crisis L...
3 minutes ago
Estimation of the Flood Crisis Level in the pre-emergency phase for all rivers in the Municipality/ Tutti i Corsi d'acqua nel Comune. Value = 100.0. Very High
Predicted Flood Cris...
3 minutes ago
Retrone S.Agostino. Value = 75.0. High
BACCHIGLIONE river from the Orolo junction to the Ponte di Via Diaz bridge/ Bacchiglione dalla confluenza con POrolo al ponte di via Diaz.
TIMONCHIO from upstream to the Orolo junction/ Timonchio-Bacchiglione da monte alla confluenza con POrolo. Value = 100.0. Very High
in BACCHIGLIONE from Ponte di Via Diaz bridge to Ponte degli Angeli Bridge/ Bacchiglione dal ponte di via Diaz a Ponte degli Angeli. Value
in BACCHIGLIONE river (River ID 6) from Ponte degli Angeli Bridge to downstream /Bacchiglione dal ponte da Ponte degli Angeli a valle. Val
Orolo alla Confuenza con il Timonchio-Bacchiglione. Value = 75.0. High
Device Id
FLCR_1001_PCL-RS_OCL_ID_1001
Location
45.544970, 11.538850
Occurred On
Zoom To

beAWARE


beAWARE
OVERVIEW MAP
LOGIN
Overview Map (Italy)



Impact

- **Security of people**: beAWARE improves the way in which people interact with the authority
- **Emergency working routines**: the early warning, the DSS and the reasoning mechanism
- **Society:** new communication channels (social media)
- **First responders:** a larger number of emergencies can be detected more quickly and efficiently
- **Policies:** beAWARE contributes to the EU disaster management policies by proposing new strategies and technologies.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

Next plans - In Field Demonstrations

- From Nov 2018, **3 field** demonstrations will be carried out (one for each beAWARE prototype) with the participation of end users, decision makers and first responders

FLOOD
Vicenza, Italy
Mar2019

FIRE
Valencia, Spain
Nov2019

HEATWAVE
Thessaloniki, Greece
20.11.2018

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475

beAWARE

beAWARE

Enhancing decision support and management services in extreme weather climate events

Thank you!

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475