beAWARE

Enhancing decision support and management services in extreme weather climate events

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

Vision

In every disaster and crisis, incident **time** is the enemy, and getting accurate **information** about the scope, extent, and impact of the disaster is critical to creating and orchestrating an effective disaster **response and recovery** effort.

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Goal

The main goal of beAWARE is to provide **support in all the phases of an emergency incident**. More specifically, it is proposed an integrated solution to support forecasting, early warnings, transmission and routing of the emergency data, aggregated analysis of multimodal data and management the coordination between the first responders and the authorities.

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Objectives (1)

1. Perform a research study on the **requirements** for emergency services.

2. **Multilingual** speech and written communication **analysis** in emergency calls.

3. **Aggregate multimodal information** from sensor networks, meteorological stations, and social media for decision support, validation purposes and issue early warnings.

4. **Visual context analysis** during emergency calls.

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Objectives (2)

5. **Semantic integration** of multimodal information from the emergency calls, M2M/IoT.

6. **Multilingual report** generation from aggregated emergency data.

7. Research & development of Main Public Safety Answering Point (PSAP) for **emergency multimedia enriched calls**.

8. Design and execute **3 large scale pilots**.

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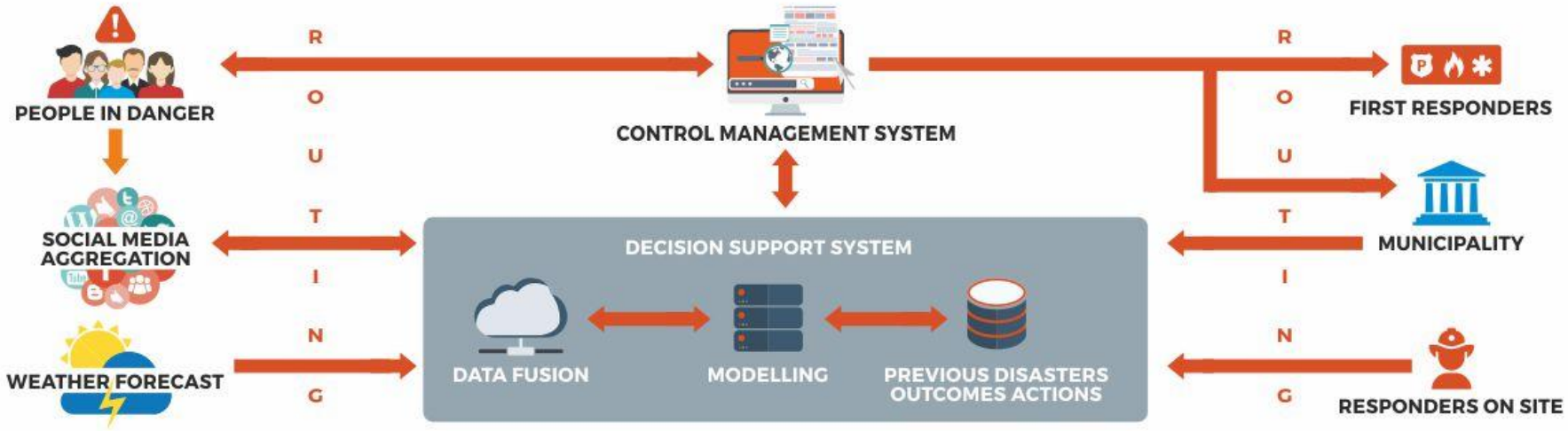
beAWARE concept & approach

- **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



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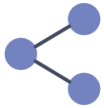
Data products

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 taxonomy (from CAP standard)

- ✓ “Geo” - Geophysical (inc. landslide)
- ✓ “Met” - Meteorological (inc. flood)
- ✓ “Safety” - General emergency and public safety
- ✓ “Security” - Law enforcement, military, homeland and local/private security
- ✓ “Rescue” - Rescue and recovery
- ✓ “Fire” - Fire suppression and rescue
- ✓ “Health” - Medical and public health
- ✓ “Env” - Pollution and other environmental
- ✓ “Transport” - Public and private transportation
- ✓ “Infra” - Utility, telecommunication, other non-transport infrastructure
- ✓ “CBRNE” – Chemical, Biological, Radiological, Nuclear or High-Yield Explosive threat or attack
- ✓ “Other” - Other events
- ✓ **Allowed values**: Observed, Likely, Possible, Unlikely, Unknown

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beAWARE – Public alerts´ format (CAP)

Since CAP is the standard for distributing warnings to citizens throughout **various channels** this offers the **possibility to connect other warning systems to beAWARE in the future** without much effort.

All topics in beAWARE share a common **header**. The purpose of this header is to include, in a well-defined and consistent way, all the common and critical information for identifying, managing, and processing the messages.

The header is based on the Common Alert Protocol (CAP) v1.2. CAP is a standardized format for distributing alerts, warnings, and notifications, especially in emergency-related systems.

Since CAP is in principle an **XML standard**, we created a **JSON template** for our header that corresponds to the **XML Schema Definition (XSD) of CAP alerts**.

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Expected results

1. Develop a new enhanced **decision support and early warning services** based on aggregated analysis of multimodal data and previous crisis management records.

2. Establish shorter reaction time and **higher efficiency** of reactions.

3. Provide **improved coordination** of emergency reactions in the field, including the use of adapted technologies.

4. Contribute to the **European Policy** regarding disaster risks and crises management

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Pilot I

Floods

beAWARE will develop an environment capable of creating analysis and exploration tool that allows decision makers to **track and understand events, behaviours and trends** at the micro (i.e. user) or macro (crowd dynamics) scale.

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Pilot II

Fire

beAWARE technologies will **help in the early stages** of the development of fires and **support decision makers** in the emergency management system.

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Pilot III

Heatwave

beAWARE system will offer an **early warning** regarding the upcoming phenomenon, as well as assist all relative engaged organizations in taking the **necessary measures** in order to avoid past problems and address the heatwave more efficiently.

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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** (Public Safety Answering Point)

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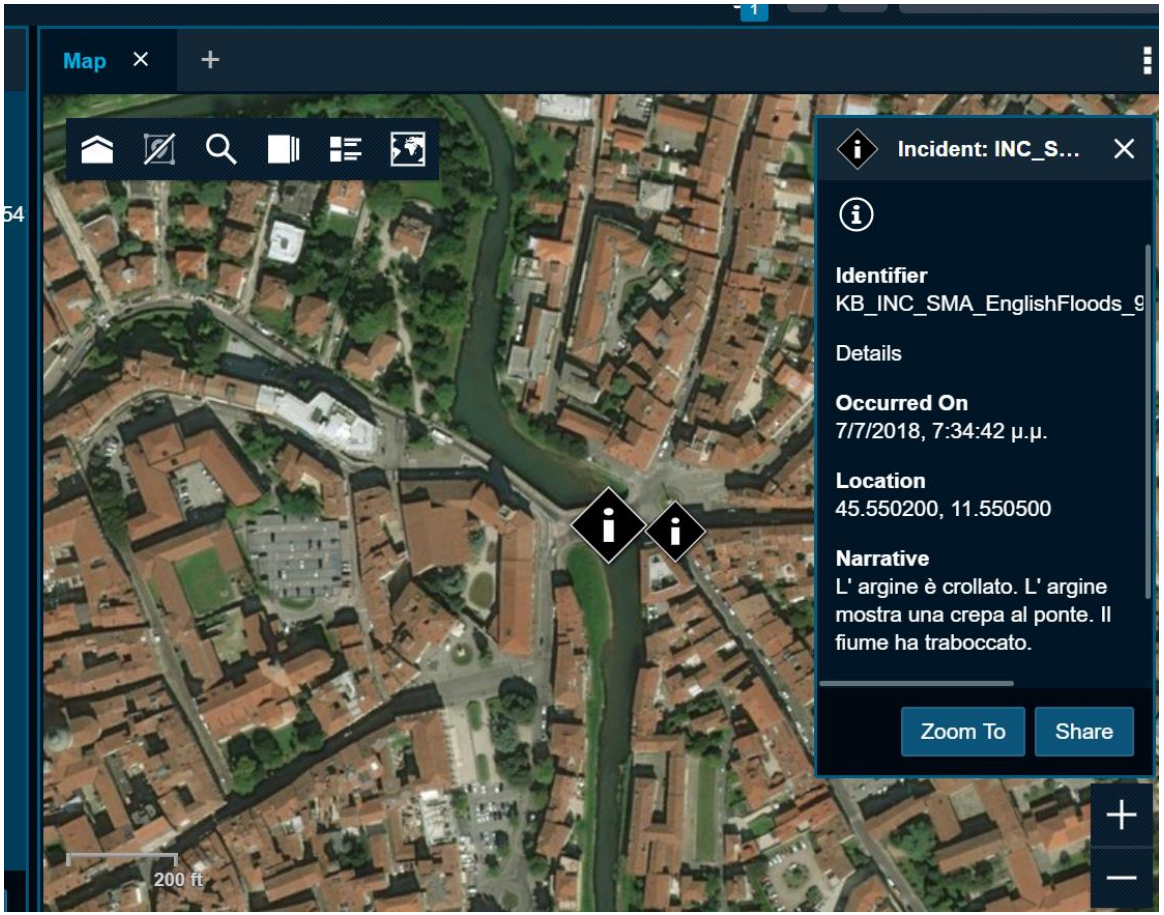
Multilingual Text Analysis

- 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**



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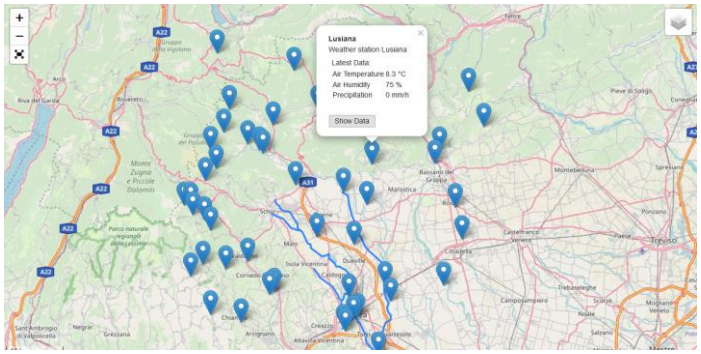
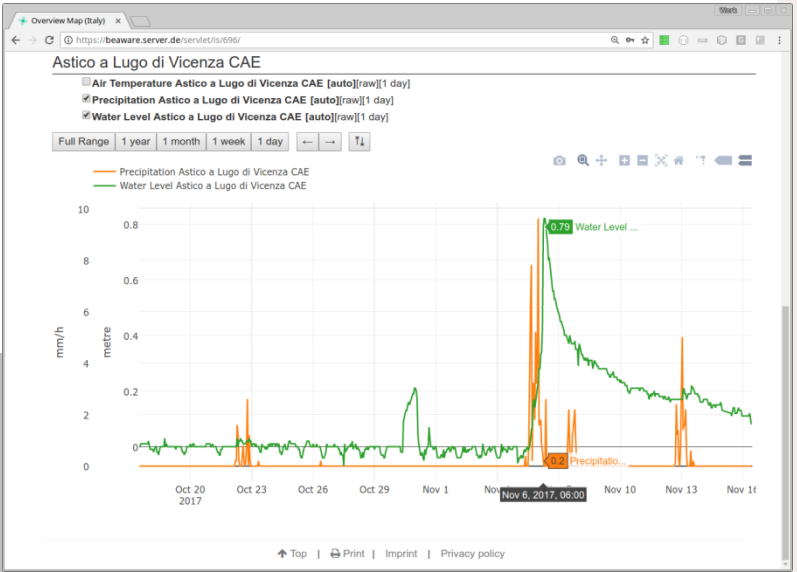
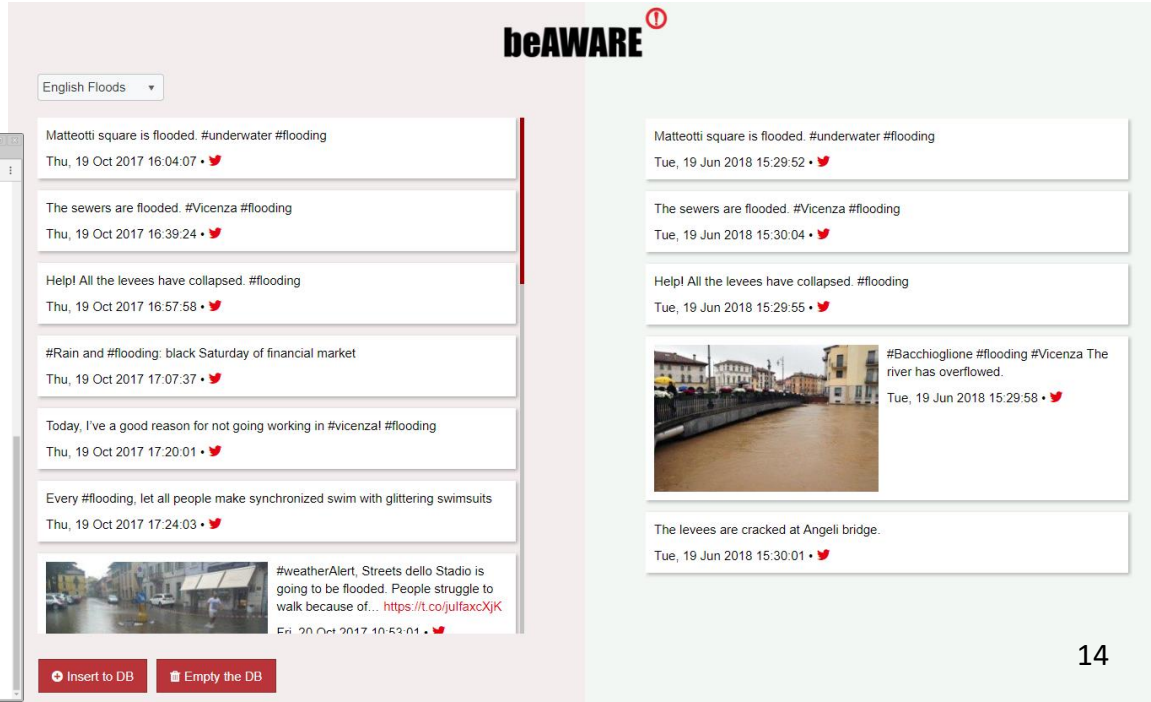
Aggregate Multimodal Information

- **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

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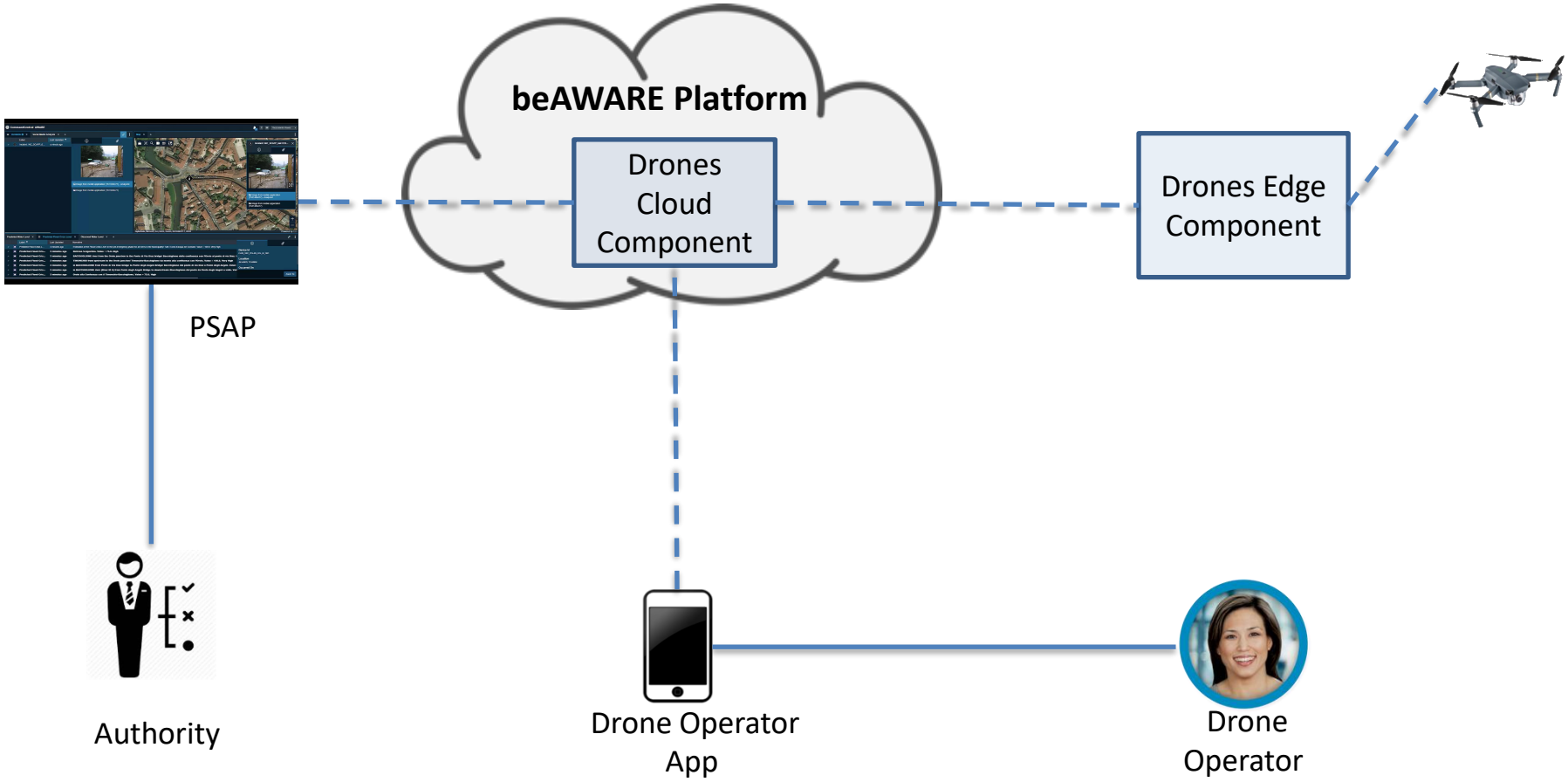
Visual Analysis – use of drones



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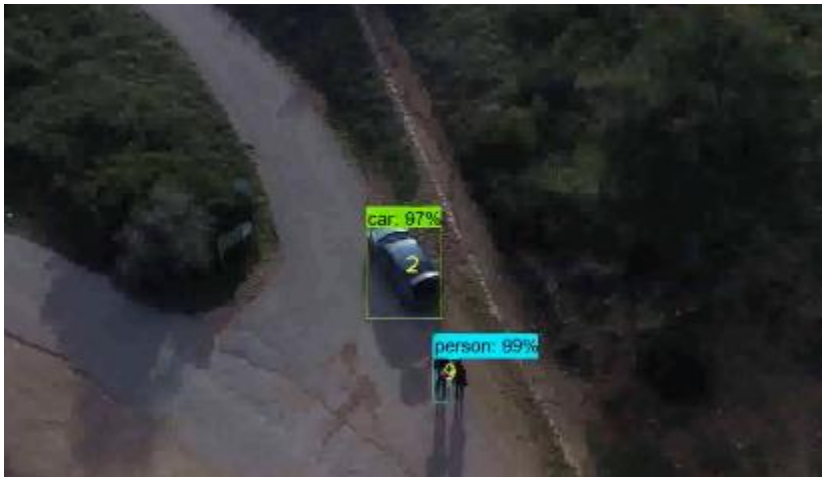
Visual Analysis – Use of drones

- 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**



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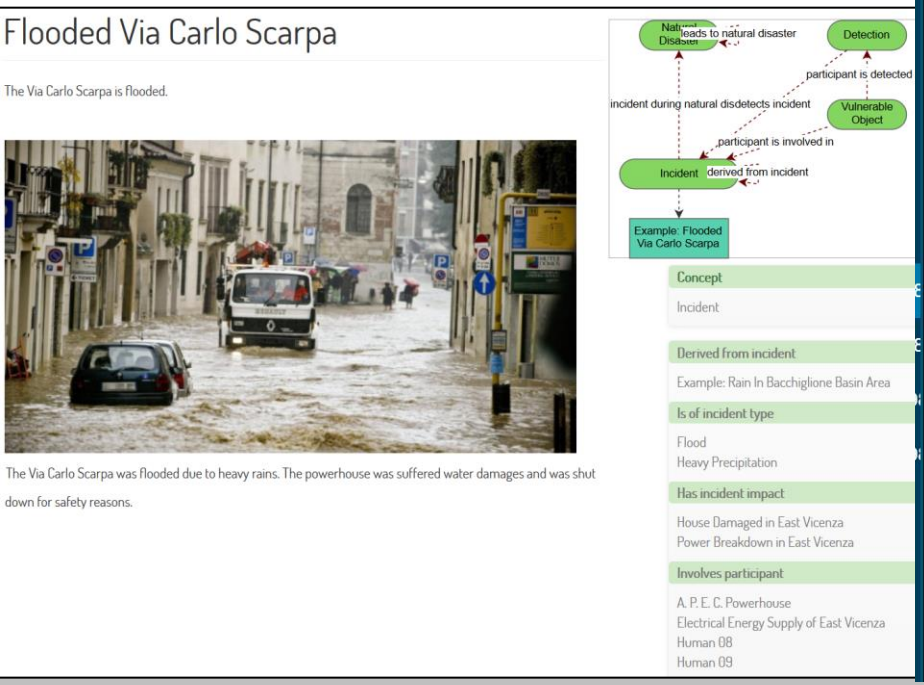
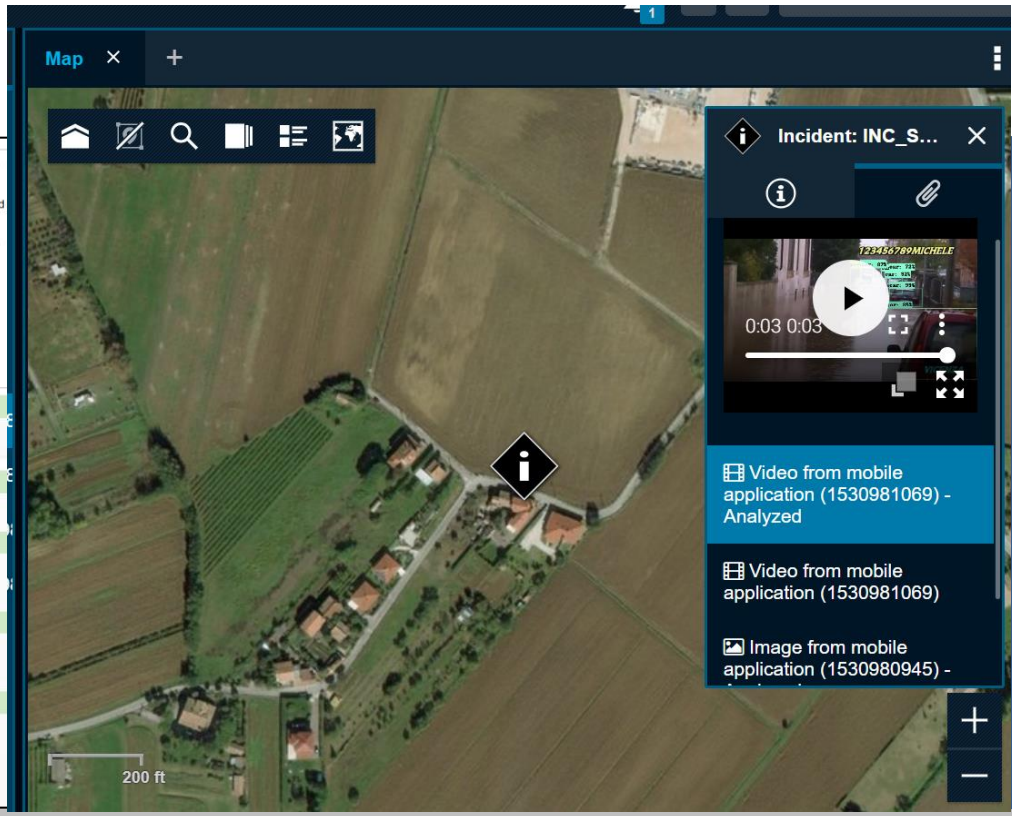
Semantic Integration

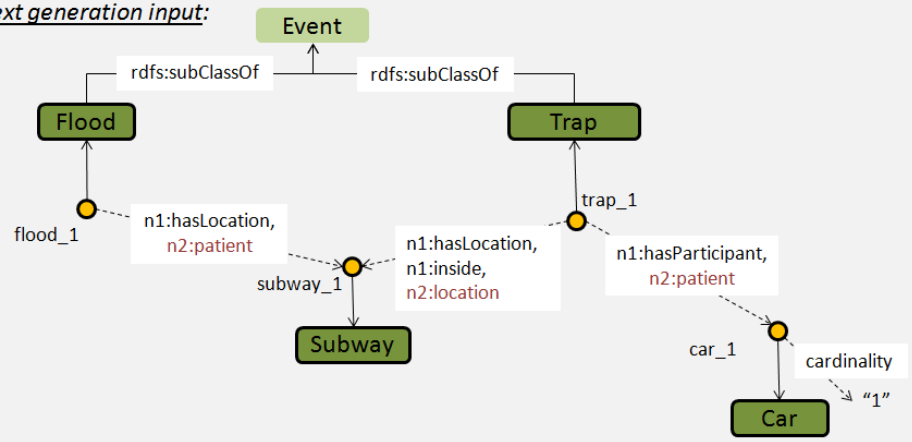
- **Reasoning** based on multimodal input
- **Incidents to PSAP**
- **Clustering of** incidents
- Calculation of incidents' **severity** levels
- Update of the **safe locations** status
- Identify the **crisis type**





Report Generation

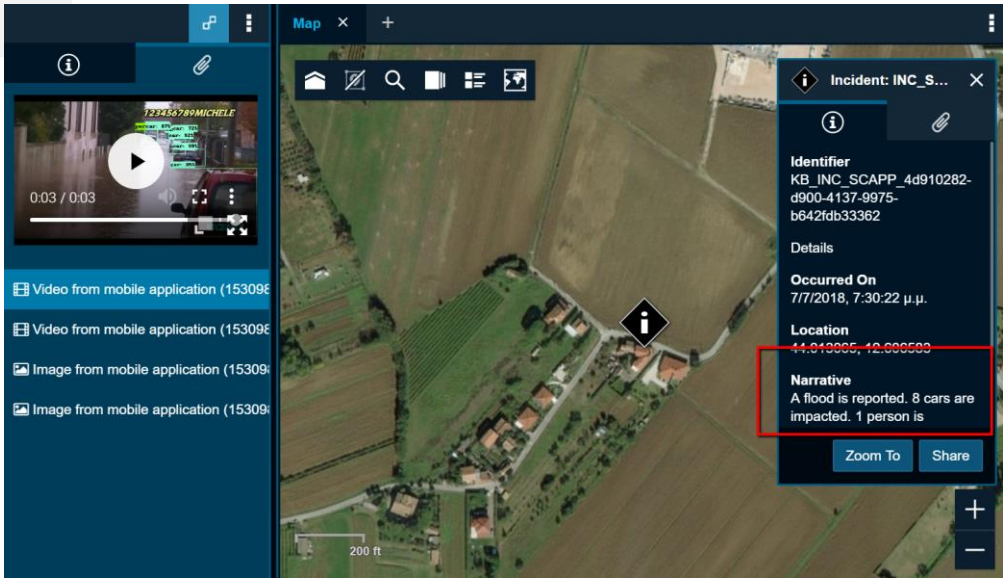
Text generation input:



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**



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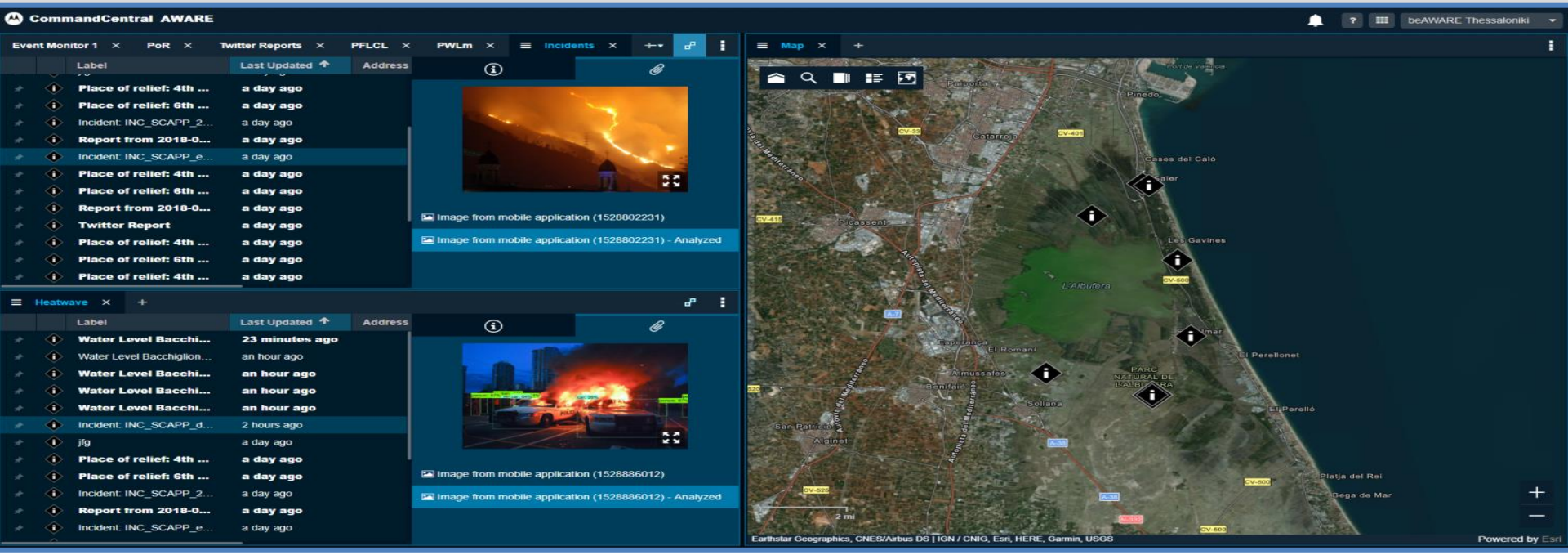
Main Public Safety Answering Point (PSAP)



- PSAP main environment
- PSAP dashboard

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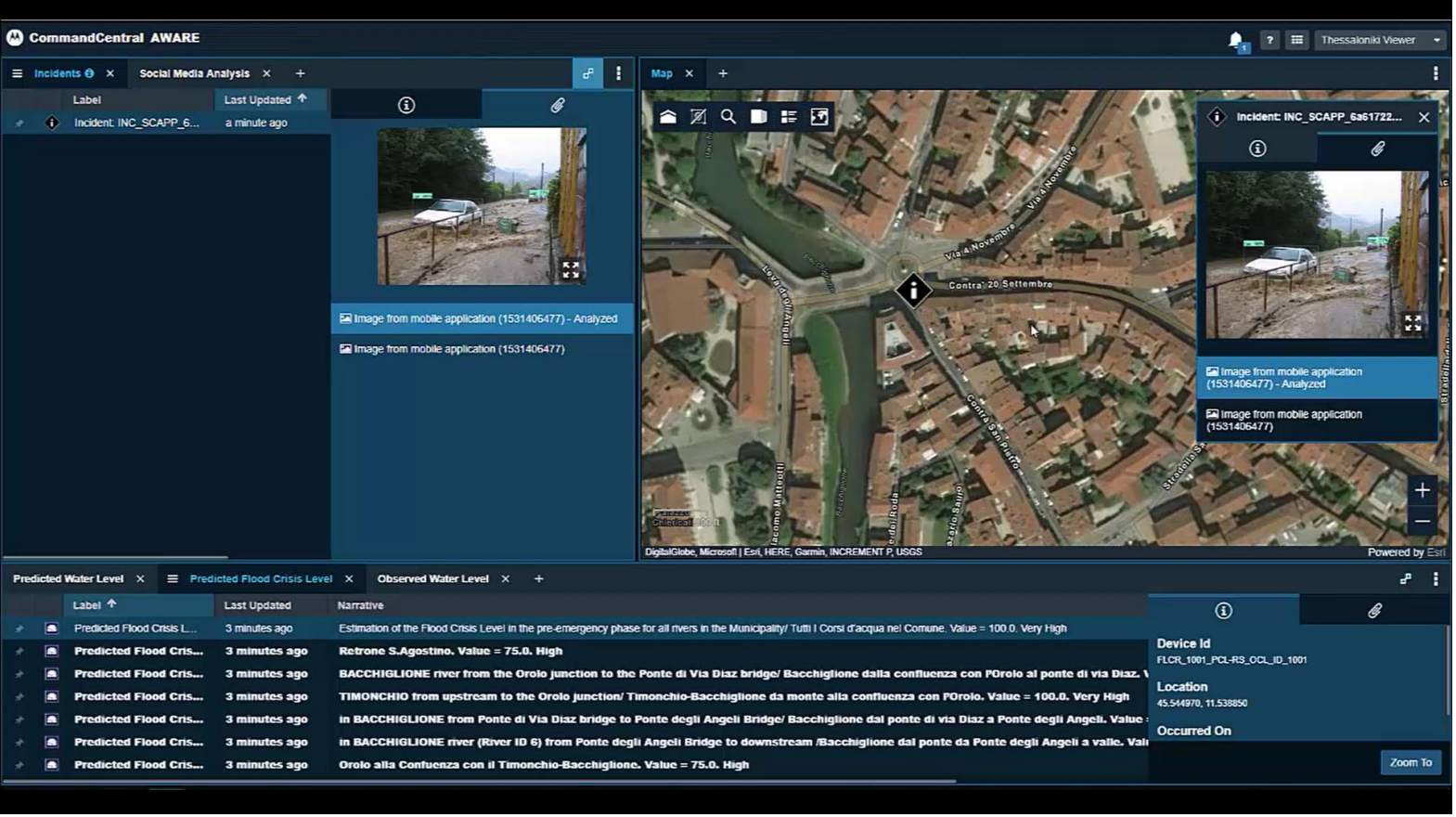
CommandCentral AWARE
Thessaloniki Viewer
Incidents
Social Media Analysis
Label
Last Updated
Incident: INC_SCAPP_6...
a minute ago
Image from mobile application (1531406477) - Analyzed
Image from mobile application (1531406477)
Map
Incident: INC_SCAPP_6a61722...
Image from mobile application (1531406477) - 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

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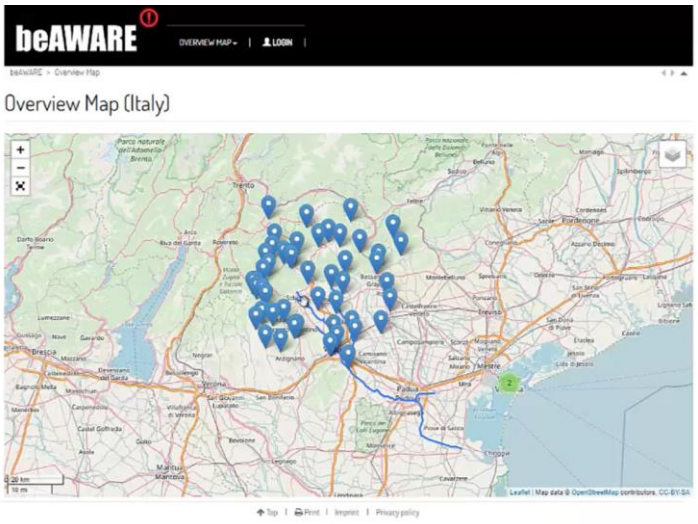
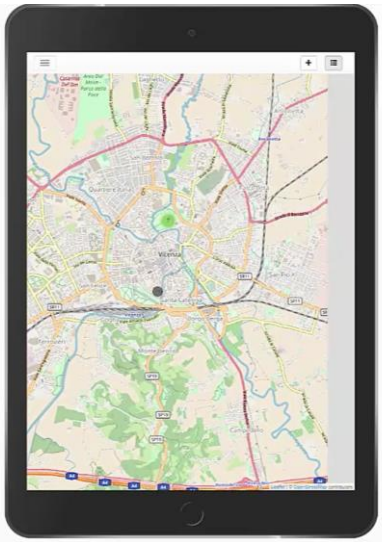

beAWARE
OVERVIEW MAP
LOGIN
Overview Map (Italy)



Fields of 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.

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Milestones

1. **more effective** and faster emergency **responses** to **extreme climate events**
2. **faster analysis of risks and anticipation**
3. publicly available online and **forecasting systems** for disasters;
4. improved **coordination** of emergency reactions in the field, including the use of adapted cyber **technologies**,
5. improved capacity to provide adequate emergency responses
6. **shorter reaction time** and higher **efficiency** of reactions
7. target the **needs and requirements** of emergency users
8. Possibility of **connection with other warning systems (CAP)**

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

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Thank you!

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