beAWARE

Enhancing decision support and management services in extreme weather climate events

Overall Project Presentation

The beAWARE team

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

General Information

- **Project Coordinator:** Centre for Research and Technology Hellas – Information Technologies Institute (CERTH-ITI), GR

- **Project Website**: https://beaware-project.eu/
- **Duration:** 1 January 2017 - 31 December 2019
- **Type of Action:** IA - Innovation action
- **Total Cost:** € 6 725 209
- **EU Contribution:** € 5 953 780

10 Partners

7 Countries

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

beAWARE

The Challenge

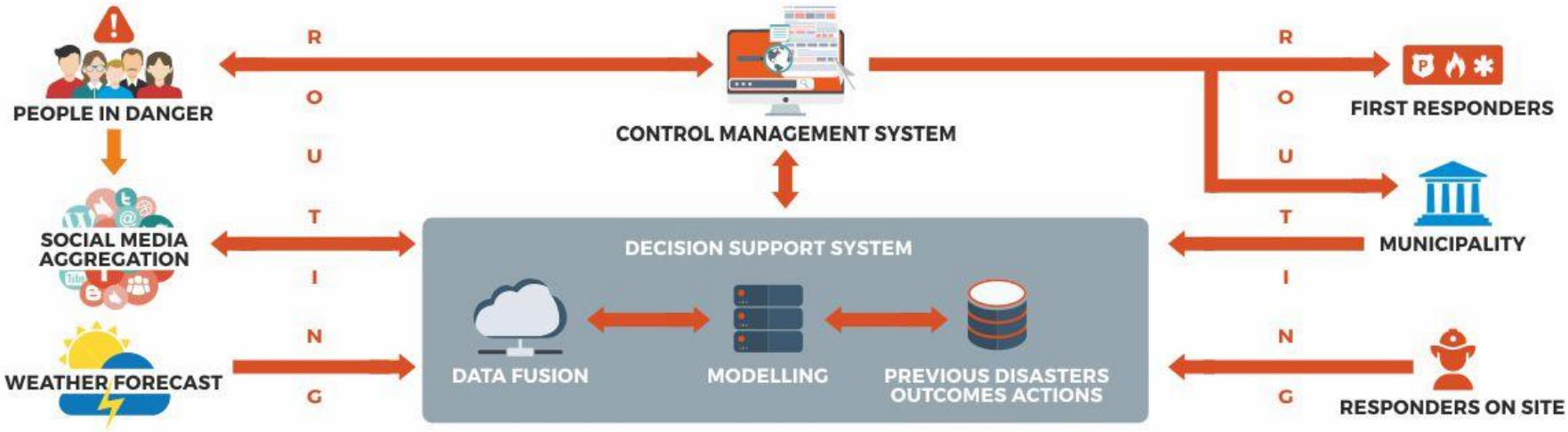
- **Extreme weather and climate events**, interacting with exposed and vulnerable human and natural systems, can lead to disasters
- Some types of extreme events (e.g. flash floods) have **increased**
- **Enhance the response capacity** to extreme weather and climate events affecting the security of people and assets
- **Current** solutions just **display** inputs to the authorities

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

WP1 MANAGEMENT

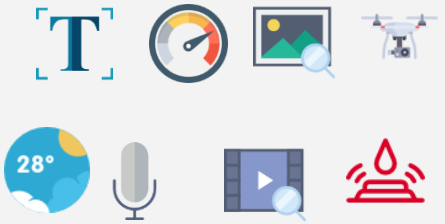
WP9 ETHICS

WP2 REQUIREMENTS

End Users Requirements

Use Cases Validation – Demonstration

WP3 EARLY WARNING

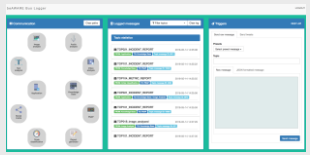


WP4 SEMANTIC INTEGRATION

WP5 REPORT GENERATION

WP6 PSAP

WP7 INTEGRATION



WP8 DISSEMINATION & EXPLOITATION

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 Pilots

- **Flood:** support **decision makers** in **Vicenza** during unplanned events (emergencies), in particular floods and flash floods.

- **Fire:** provide **early warnings** and support to the **Valencia** authorities **before** and **during a fire**. The fires can be influenced by the weather as periods of dry weather increases the risk of fires in the nature, and heavy winds can cause a wide spreading in a given direction.

- **Heatwave**: support the **authorities** during a strong heatwave (over 40oC) during summer in a region in **northern Greece**

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

Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

Obj.4 – **Visual context analysis**

Obj.5 – **Semantic integration of multimodal information**

Obj.6 - **Multilingual report generation**

Obj.7 –**Main Public Safety Answering Point** (PSAP)

Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

Obj.4 – **Visual context analysis**

Obj.5 – **Semantic integration of multimodal information**

Obj.6 - **Multilingual report generation**

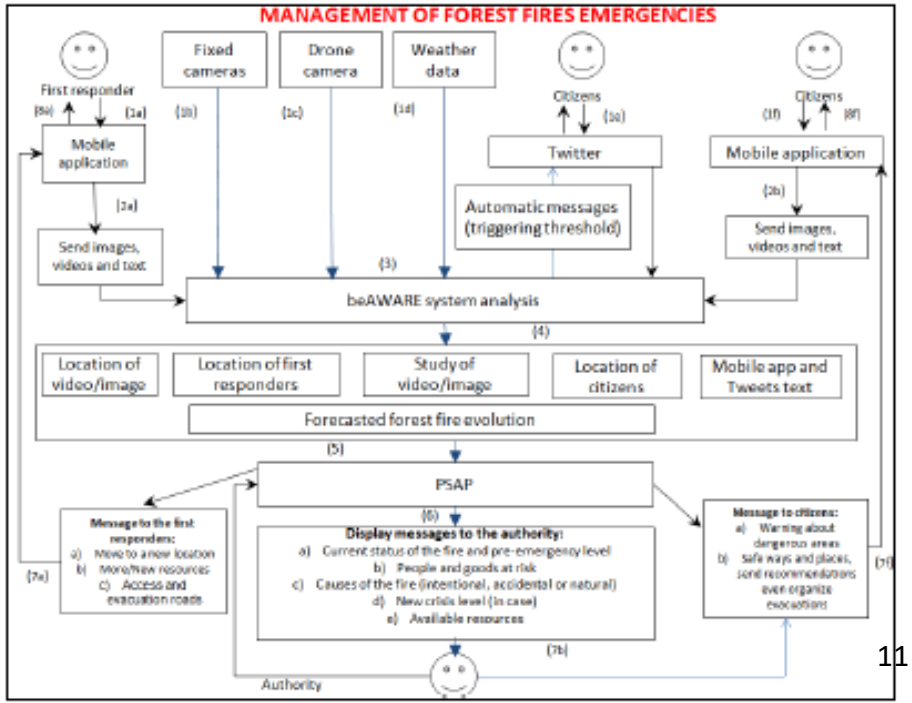
Obj.7 –**Main Public Safety Answering Point** (PSAP)

Requirements and Use Cases

- beAWARE end users (meetings, workshops)

- List of **User Requirements**
  - e.g. “Display information to authorities in a web-gis platform” - “Sending warnings of pre-emergency alerts to citizens by authorities”
- List of **Use Cases** for the beAWARE pilots
  - UC_101: Declaration of the attention status and continues monitoring of flood forecasting
- **Specific**, **Reusable**, **Transferable**

UR#	UC#	Requirement name	Requirement description
UR_101	All	Type of visualization	Display information to authorities in a web-gis platform (citizen and first responders reports by calls, apps, social media)
UR_102	101,102,103 104,105,106, 108	Map of the AMICO Flood EWS results	Display reliable and trustful flood forecasts, potential dangerous situations and the forecasted level of risk to the authorities, based on the results of the EarlyWarning System AMICO (improved with the assimilation of Satellite data (snow cover, soil moisture, etc.) and Meteorological forecasts data with a finer spatial resolution provided by FMI)
UR_103	101,102,103 104,105,106, 108	Flood warnings	Provide authorities/citizens with automatic warnings on river levels overtopping some



Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

Obj.4 – **Visual context analysis**

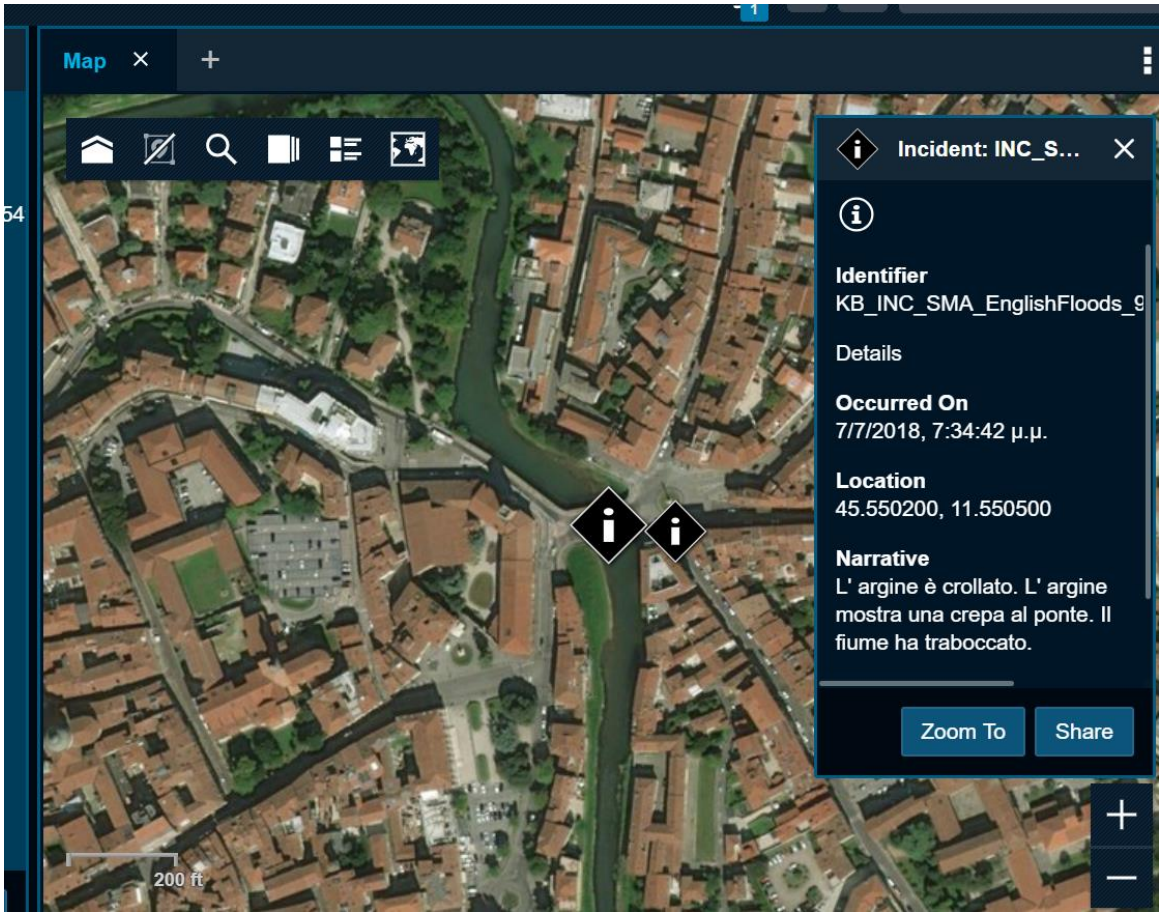
Obj.5 – **Semantic integration of multimodal information**

Obj.6 - **Multilingual report generation**

Obj.7 –**Main Public Safety Answering Point** (PSAP)

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

Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

Obj.4 – **Visual context analysis**

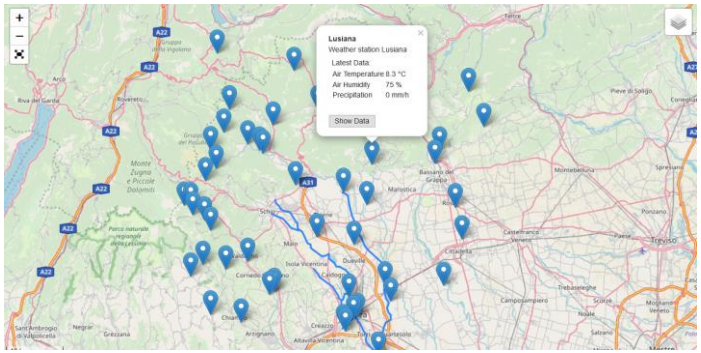
Obj.5 – **Semantic integration of multimodal information**

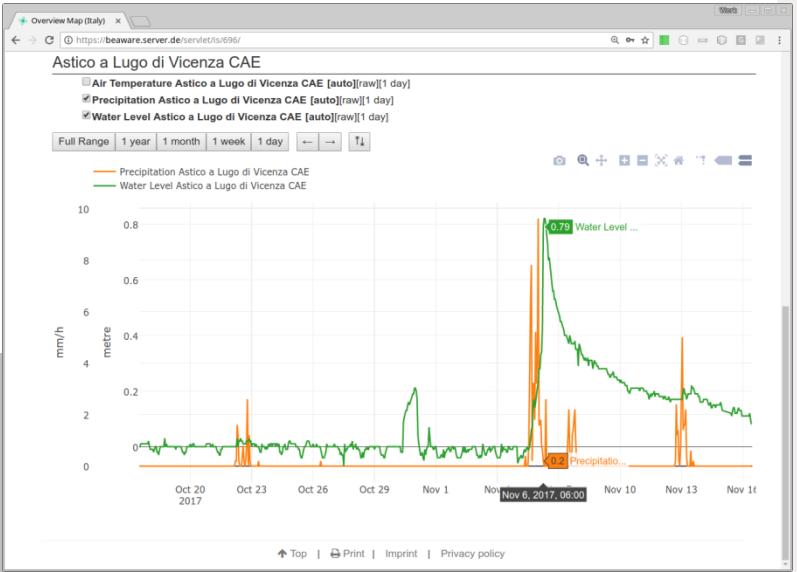
Obj.6 - **Multilingual report generation**

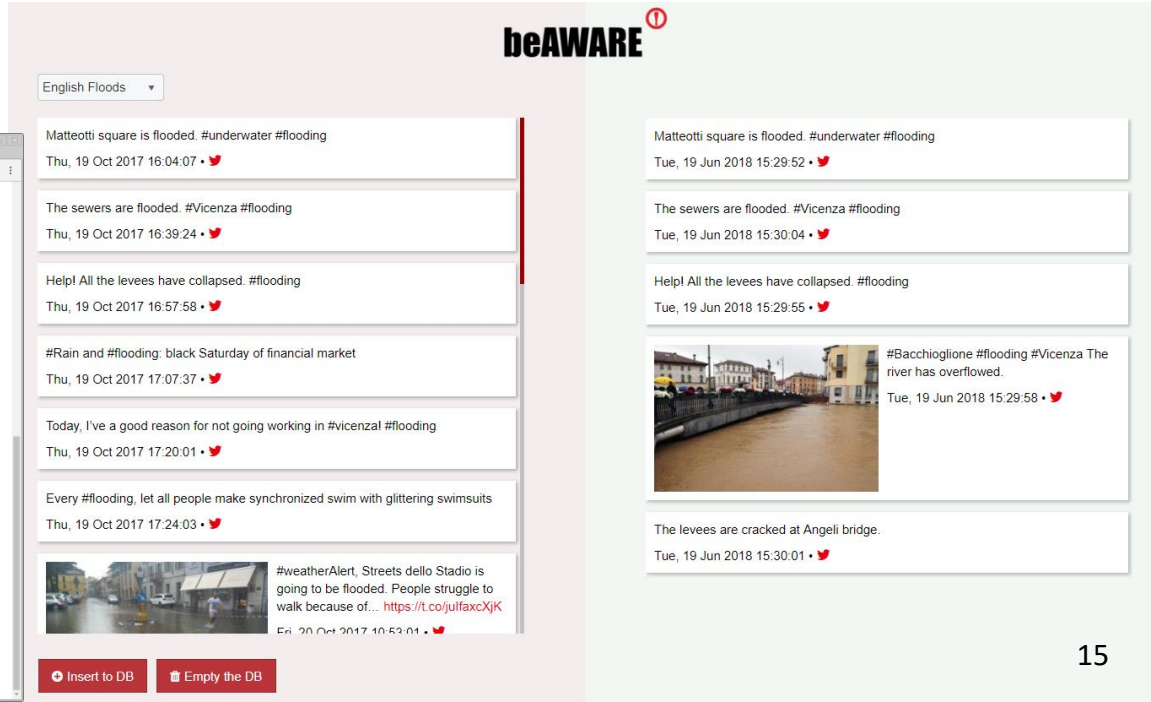
Obj.7 –**Main Public Safety Answering Point** (PSAP)

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**







Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

Obj.4 – **Visual context analysis**

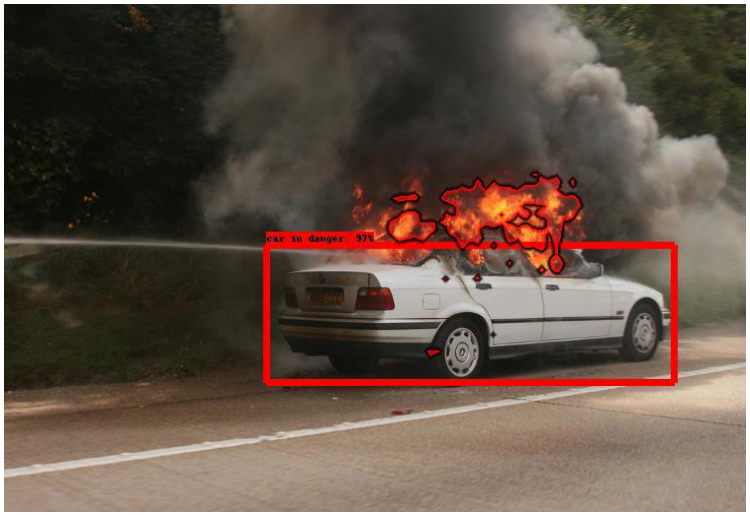
Obj.5 – **Semantic integration of multimodal information**

Obj.6 - **Multilingual report generation**

Obj.7 –**Main Public Safety Answering Point** (PSAP)

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

Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

Obj.4 – **Visual context analysis**

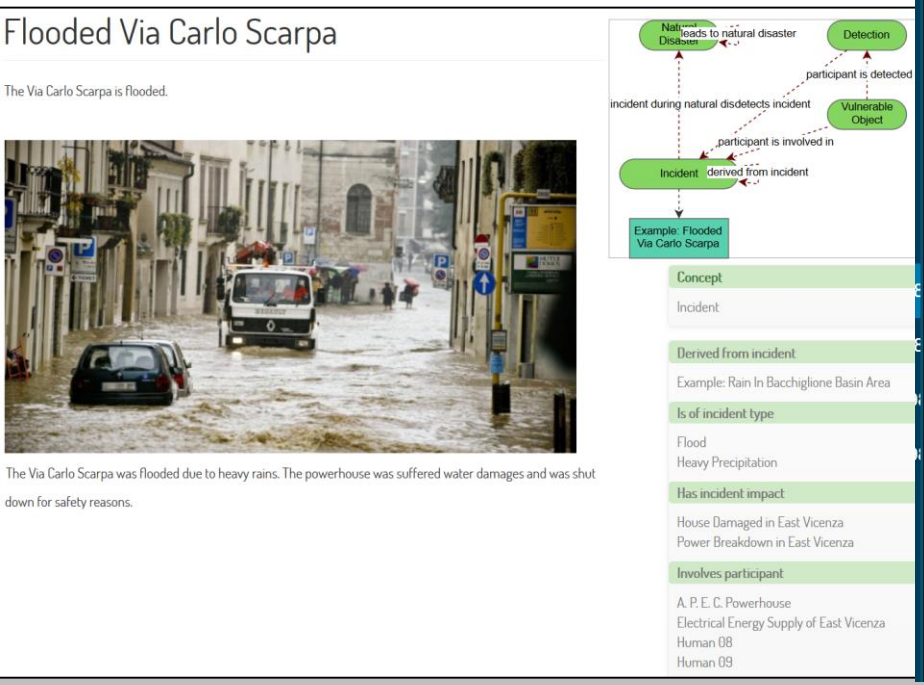
Obj.5 – **Semantic integration of multimodal information**

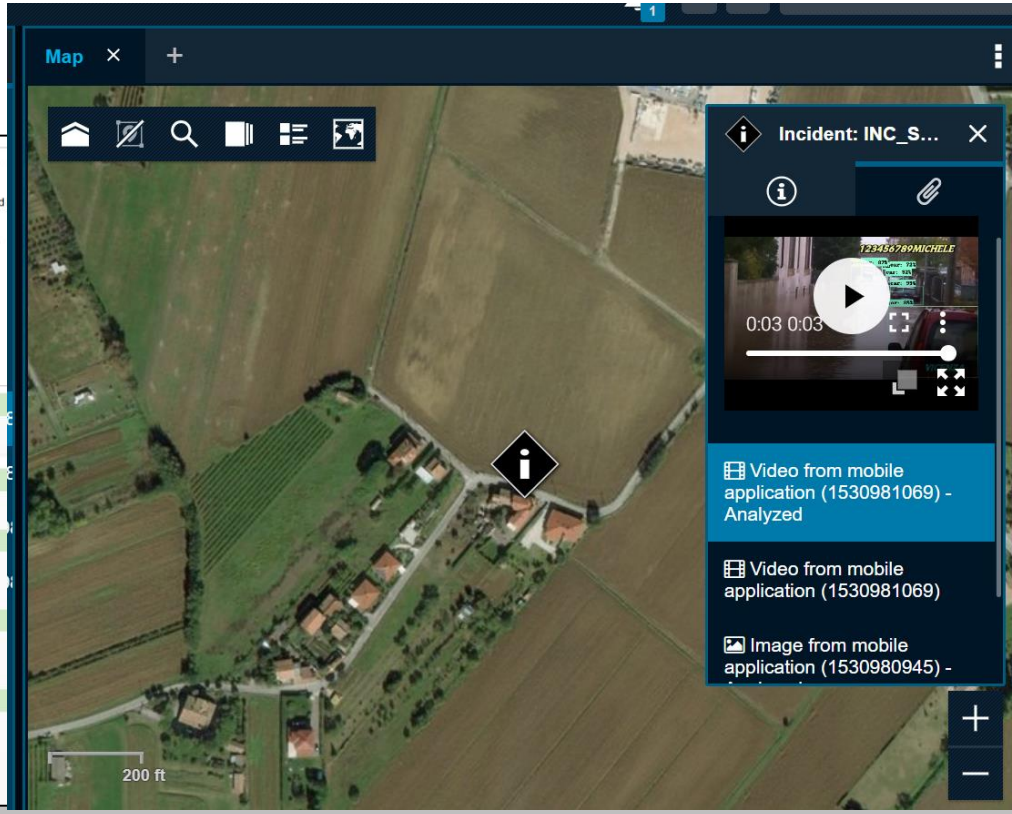
Obj.6 - **Multilingual report generation**

Obj.7 –**Main Public Safety Answering Point** (PSAP)

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**





Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

Obj.4 – **Visual context analysis**

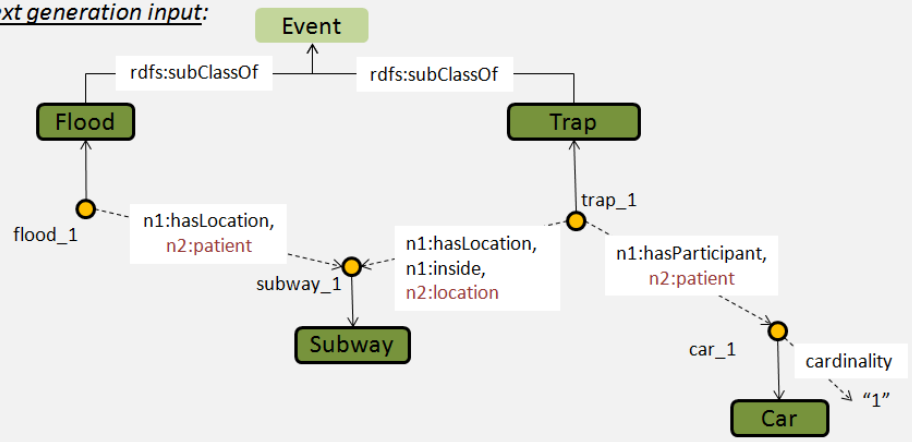
Obj.5 – **Semantic integration of multimodal information**

Obj.6 - **Multilingual report generation**

Obj.7 –**Main Public Safety Answering Point** (PSAP)

Report Generation

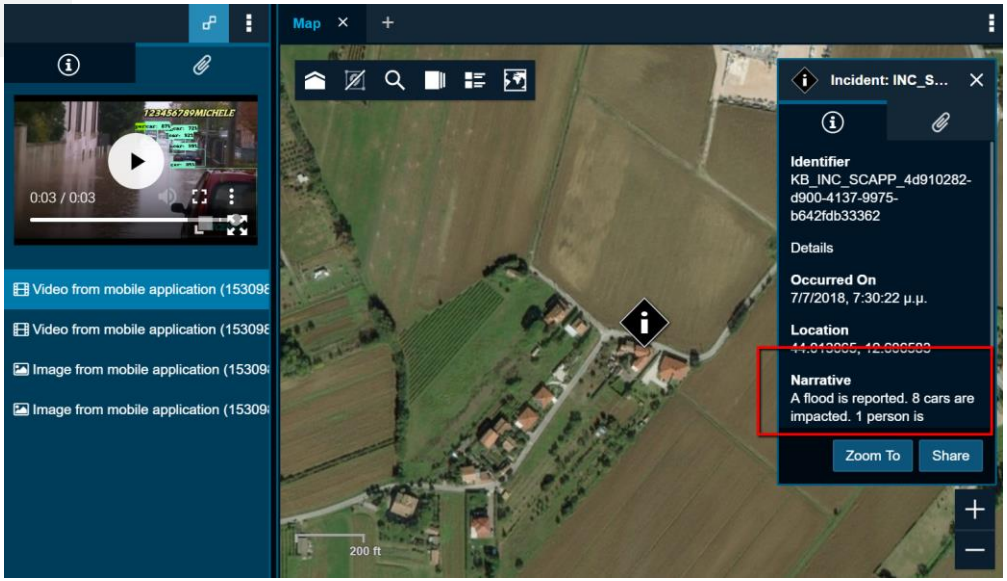
Text generation input:



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

Project Objectives

Obj.1 – Perform a research **study on the requirements for emergency services** given the current digital landscape

Obj.2 – **Multilingual speech & written communication analysis**

Obj.3 – **Aggregate multimodal information**

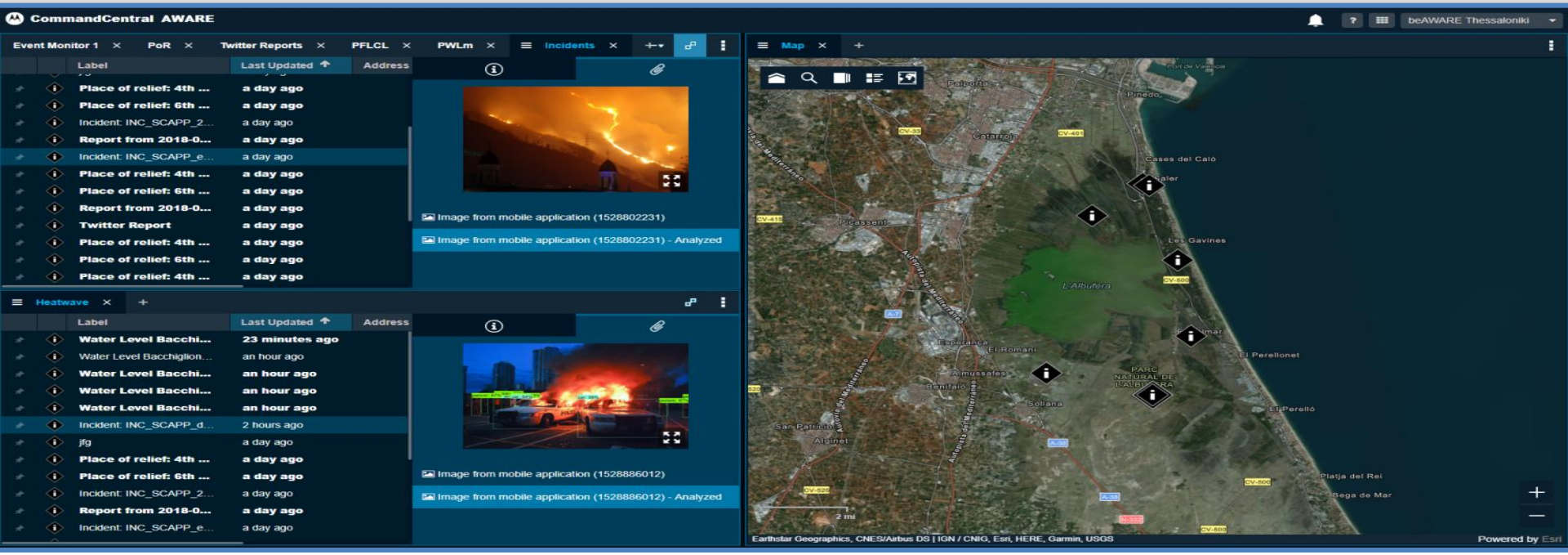
Obj.4 – **Visual context analysis**

Obj.5 – **Semantic integration of multimodal information**

Obj.6 - **Multilingual report generation**

Obj.7 –**Main Public Safety Answering Point** (PSAP)

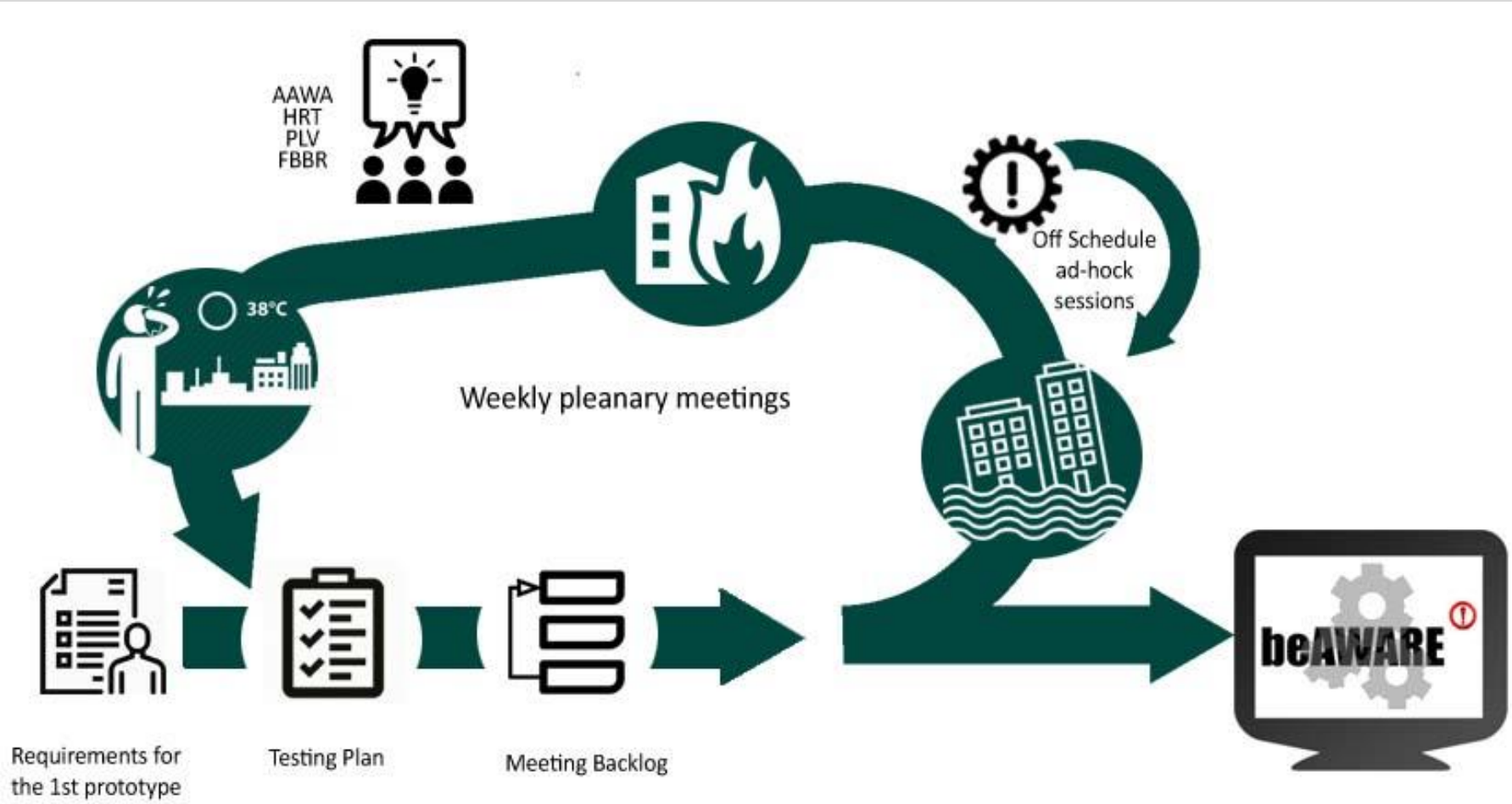
Main Public Safety Answering Point (PSAP)



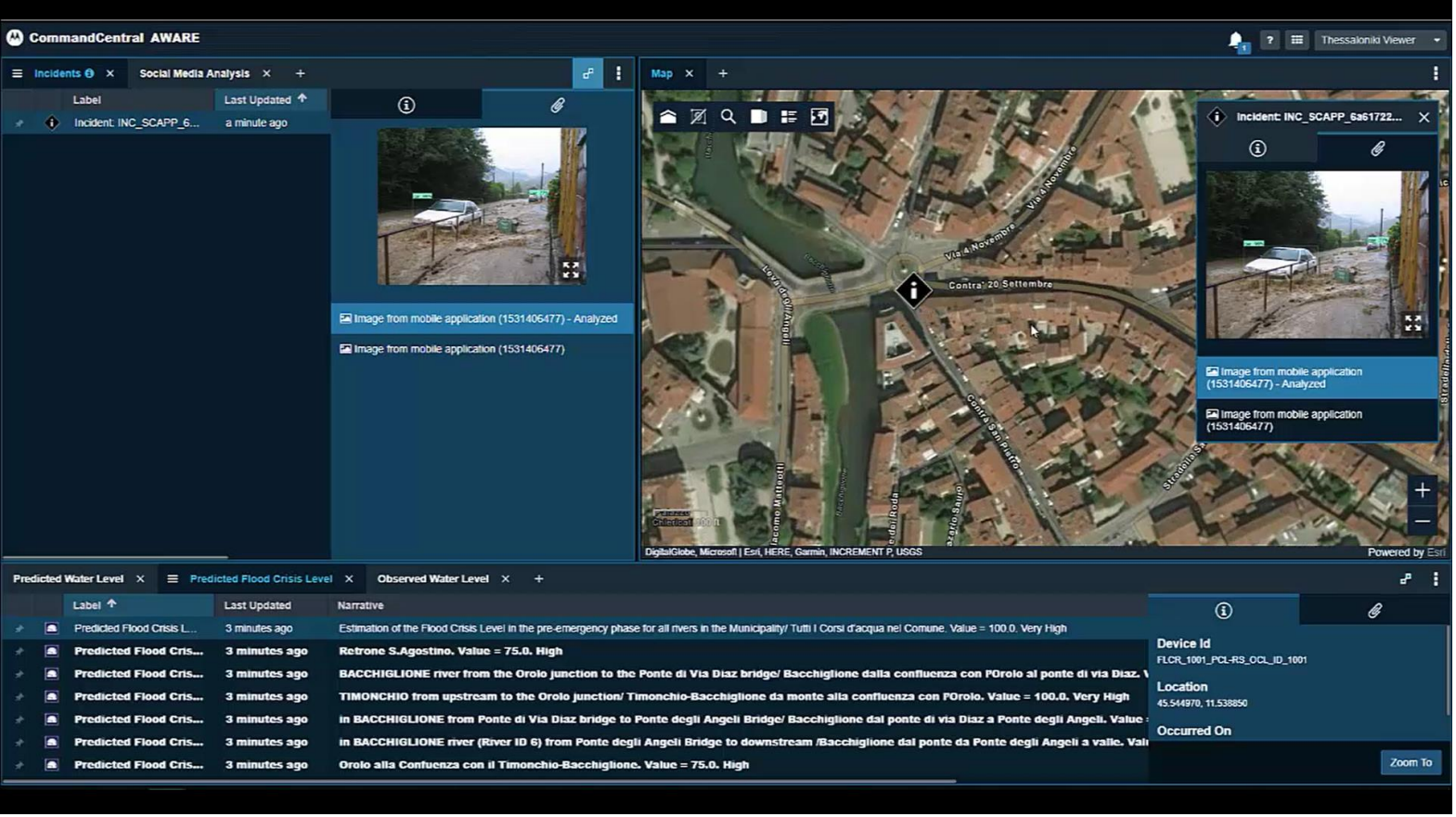
- PSAP main environment
- PSAP dashboard

beAWARE

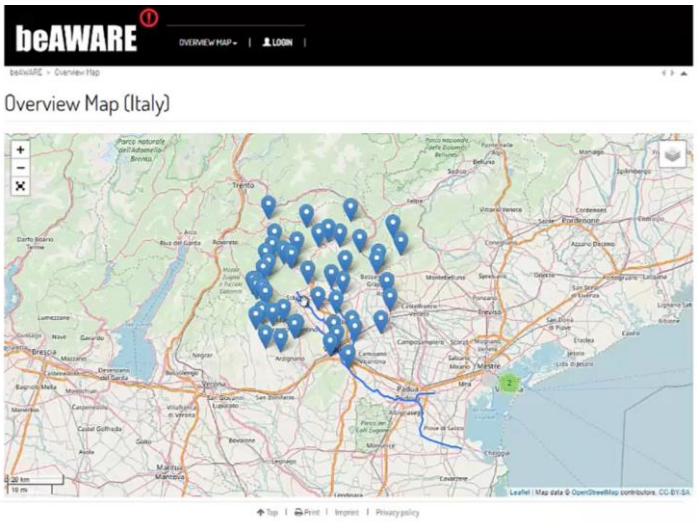
Technical Implementation Workflow

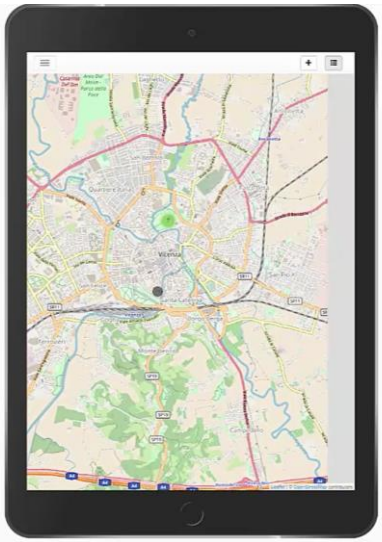


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 700475


CommandCentral AWARE
Thessaloniki Viewer
Incidents
Social Media Analysis
Map
Label
Last Updated
Incident: INC_SCAPP_6...
a minute ago
Image from mobile application (1531406477) - Analyzed
Image from mobile application (1531406477)
Incident: INC_SCAPP_6a61722...
Via 4 Novembre
Contra' 20 Settembre
Image from mobile application (1531406477) - Analyzed
Image from mobile application (1531406477)
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 l'Orolo al ponte di via Diaz.
TIMONCHIO from upstream to the Orolo junction/ Timonchio-Bacchiglione da monte alla confluenza con l'Orolo. 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.
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

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
Q2 2019

FIRE
Valencia, Spain
Q4 2019

HEATWAVE
Thessaloniki, Greece
by end of 2018

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

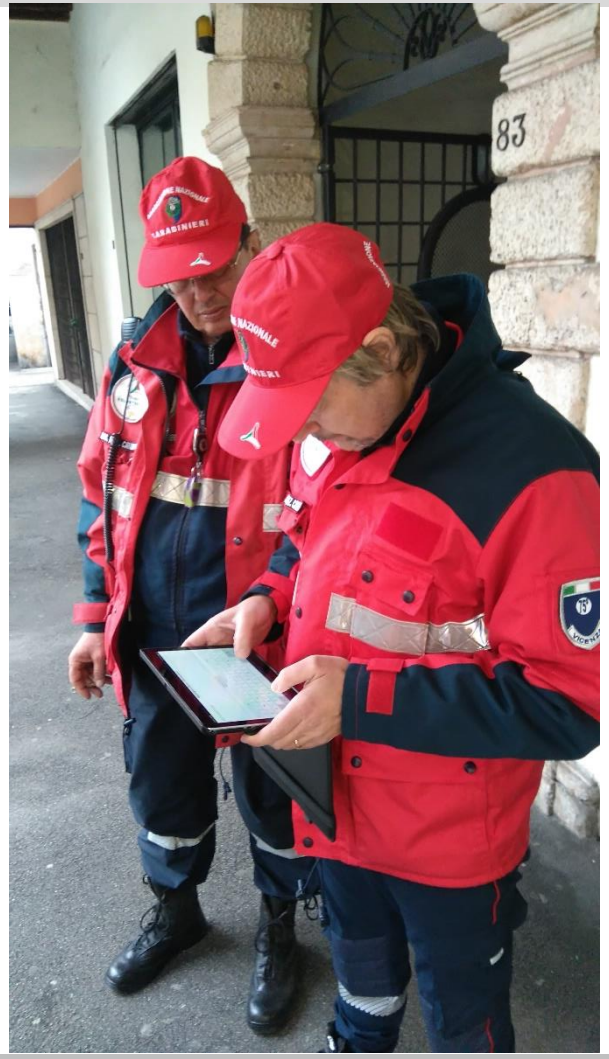
beAWARE

Participating Organizations

Organisation	Personel	Country	Type of organisation	Field of Expertise	Involvment in the project
Civil Protection-Municipality of Vicenza	15	Italy	Municipal	Civil Protection	PSAP Operator, Observer and Rescuer
National Assosiation of Alpini- Civil Protection Vicenza	6	Italy	Assosiation	Civil Protection	Citizen, Rescuer and Observer
National Assosiation of Carabinieri (ANC)	6	Italy	Assosiation	Civil Protection	Citizen, Rescuer and Observer
AAWA personel	20	Italy	Government	Public Authority	Citizen, PSAP operator, Decision Maker and
Municipality of Vicenza	8	Italy	Municipal	Public Authority	PSAP operator and Decision Maker
Land Reclamation Authority Veneta	3	Italy	Local Authority	Public Authority	Decision Maker and Rescuer
Local Water Authority-Vicenza	1	Italy	Provincial Authority	Public Authority	Decision Maker

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

Images from the Pilot



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

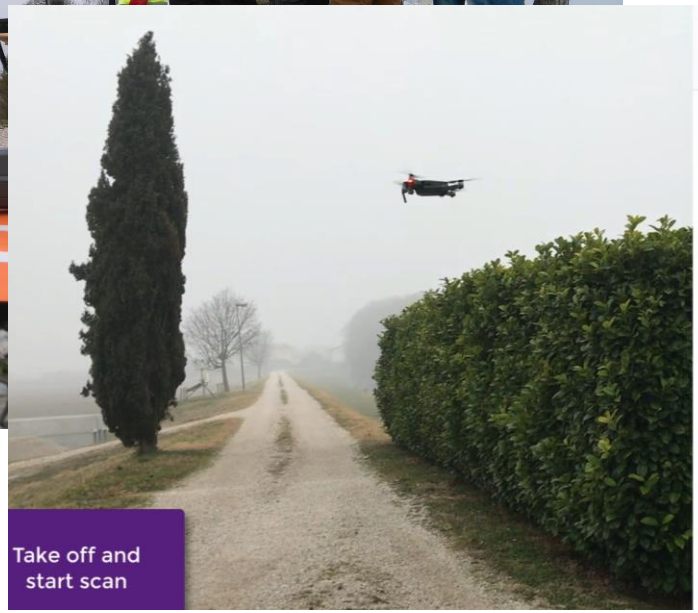
beAWARE

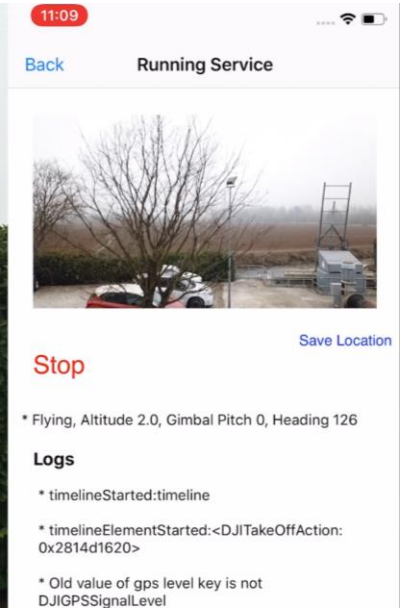
Images from the Pilot

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

beAWARE

Photo Pilot





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

the beAWARE consortium

Information Technologies Institute

MOTOROLA SOLUTIONS

Universitat Pompeu Fabra Barcelona

Fraunhofer IOSB

POLICIA LOCAL VALENCIA

ΕΛΛΗΝΙΚΗ ΟΜΑΔΑ ΔΙΑΣΩΣΗΣ

FINNISH METEOROLOGICAL INSTITUTE

IBM

Autorità di Bacino DEI FIUMI ISONZO, TAGLIAMENTO, LIVENZA, PIAVE, BRENTA-BACCHIGLIONE

FREDERIKSBORG BRAND & REDNING

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