beAWARE

Enhancing decision support and management services in extreme weather climate events

700475

D2.4

Evaluation report of the 1st prototype

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Abstract

This document contains a report of the1st beAWARE pilot, which took place in Thessaloniki (Greece) on 19th-20th of November 2018. The report includes also the evaluation of beAWARE 1st prototype based on the interaction of the users with the developed technology in occasion of the pilot. The goal of this activity is to evaluate if the 1st prototype of the platform meets end users' needs and to address in that direction the technical development and the implementation of the next prototypes.

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Executive Summary

The deliverable 2.4 presents the evaluation results of the 1st beAWARE prototype from the end user's perspective, based on the findings of 1st pilot (Thessaloniki, 19th - 20th of November 2018). During that occasion, the main stakeholders of the heatwave pilot tested the beAWARE platform in the context of their scenario.

The first section of this deliverable provides a short summary of the functionalities of each beAWARE tool developed for the 1st prototype and tested during the pilot.

Then, the deliverable starts to describe the pilot's structure, its context, its organization and its evaluation procedure.

A detailed report about the participants, the storyline and the timetable for the training day (19th of November) and the trial (20th of November) is presented afterwards.

The second part of the document focuses on the evaluation of the 1st prototype, from the perspective of the end users who participated in the pilot as active players or as observers. In fact, the beAWARE Consortium collected feedback from the stakeholders about their interaction with the platform, both during the pilot (through the 'observers forms') and after it, by sending questionnaires. These data had been analysed with the procedure described in the final part of this deliverable, which provides also the results emerged from the evaluation.

It is worth to be mentioned that these results regard the **entire** beAWARE 1ST prototype, starting from the end user tools of the platform, their features and the global user experience, but also the organization and structure of the pilot, and finally the evaluation procedure itself.

For this reason, the deliverable 2.4 is not only the reference point to address the future technical development of the platform towards the 2nd and the final prototypes but it is also the base to improve the next pilots' organisation and their evaluation procedure, as iterative process founded on the stakeholders' involvement.

Abbreviations and Acronyms

AAWA	Alto Adriatico Water Authority
AIM	Multi-utility of the Vicenza Municipality which provides services like energy, water supply
AMICO	AAWA's flood forecasting model
ASR	Automatic speech recognition
CMT	Hellenic Crisis Management Team
COC	Municipal Operational Centers
EWS	Early Warning System
HMOD	Hellenic Ministry of Defense
HRC	Hellenic Red Cross
HRT	Hellenic rescue team
KAPI	Open Centre for Elder Protection
KB	Knowledge base module of beAWARE
KBS	Knowledge base services
MTA	Multilingual Text Analyzer
PSAP	Public-safety answering point
SMA	Social Media Analysis
UC	Use Case
UR	User Requirements
VHF	Very High Frequency

Glossary

Term	Meaning in beAWARE
A	
Audio Item	Audio recording.
B	
Building	A structure with walls and a roof and usually windows and often more than one level, used for any of variety of activities, as living, entertaining, or manufacturing (e.g. a house or factory).
C	
Crisis	Situation with high level of uncertainty that disrupts the core activities and/or credibility of an organization and requires urgent action.
Crisis Management	Management process that identifies potential impacts that threaten an organization and provides a framework for building resilience, with the capability for an effective response that safeguards the interests of the organization's key interested parties, reputation, brand and value creating activities, as well as effectively restoring operational capabilities. Crisis management also involves the management of preparedness, mitigation response, and continuity or recovery in the event of an incident, as well as management of the overall programe through training, rehearsals and reviews to ensure the preparedness, response and continuity.
Crisis Classification Component	In the content of beAWARE project, it is a component which integrates and deploys the necessary technological solutions enabling stakeholders (authorities, first responders, citizens) to (a) timely aware them for an upcoming extreme natural event by acting as an Early Warning System; (b) provide real-time monitoring of the ongoing crisis, facilitating the risk assessment and decision support processes via the PSAP (Public Safety Answering Points) component.
Classification	The action or process of classifying something.
Communication	Any type of (tele) communication infrastructure.
D	
Damage	Combination of exposure and vulnerability
Data Analysis	A type of a task involving data analysis.
Disaster	The occurrence of physical event who causes negative impact, such as a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.
Drone	an unmanned aircraft or ship guided by remote control or onboard computers
E	

Term	Meaning in beAWARE
Early warning	The provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response.
Early warning system	The set of capacities needed to generate and disseminate timely early warnings.
Energy	Any type of energy-generating infrastructure.
Exposure	The presence of people, livelihoods, environmental service and resources, infrastructures, economic and social and cultural assets in areas or places that are subject to the occurrence of physical events and that thereby are subject to future potential negative impact
F	
Forecast	Definite statement or statistical estimate of the likely occurrence of a future event or conditions for a specific area.
Forecasting model	Numeric representation of a physical phenomenon, which - starting from input data (other forecasts, measures, etc.) - solves by numerical techniques its internal equations and provides forecasts as output data.
Flood	An overflow of a large amount of water beyond its normal boundaries, involving an area usually dry, triggered by various events (rainfall, snowmelt, exceeding of a drainage network, ...)
Flood forecasting model	a forecasting model which provide estimation of hydraulic variables (such as water level, velocity, depth…) in a specific domain from meteorological forecasts or measure as (intensity of rain, humidity, temperature…) provided as input
Flood map	Hazard outcome in case if flood, expressing the spatial distribution of the intensity of the flood in terms of depth, persistence or velocity
H	
Hazard	The occurrence of a physical event with a certain probability and intensity. Unlike the disaster, hazard may not cause any negative impact
Heatwave	A period of abnormally and uncomfortably hot and usually humid weather
Human	Human beings in danger.
I	
Image Analysis	The task of extracting useful information from still images.
Image Item	Captured image.
Impact	The impact of natural disasters and incidents.
Impact Type	The various types of impacts, like human, economic, and environmental impacts (e.g. injuries, damage to properties etc.)
Incident	The various incidents taking place during a natural disaster.
Incident Type	The various types of incidents, like e.g. floods, blocked streets etc.
L	

Term	Meaning in beAWARE
Living Being	Any living being that is in danger during a natural disaster.
Location	A location (point or area), indicated by latitude, longitude, and radius.
M	
Mission	A mission assigned to a rescue unit during a crisis.
Monument	A structure or building that is built to honour a special person or event.
N	
Natural Disaster	The actual manifestation of a natural disaster type. An instance of a natural disaster has specific climate conditions with specific values (e.g. temperature = 45) plus some other properties (e.g. start/end time).
Natural Disaster Type	The various types of disasters, like e.g. floods, forest fires, storms or earthquakes etc.
P	
Police	Law enforcement infrastructure and services.
Preparedness	The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or current disasters.
Prevention	The outright avoidance of adverse impacts of hazards and related disasters.
Priority	The condition of being regarded as more important than others are.
Property	Any type of private property.
Public awareness	The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.
Public information	Information, facts and knowledge provided or learned because of research or study, available to be disseminated to the public.
R	
Recovery	The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.
Relief Place	a position or the state of being covered and protected
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.
Responder	A first responder unit (e.g. a firefighter, police officer or emergency medical physician).
Risk	The combination of the probability of certain hazard to occur and of its potential negative consequences.

Term	Meaning in beAWARE
Risk assessment	A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.
Risk management	The systematic approach and practice of managing uncertainty to minimize potential harm and loss.
Risk map	Spatial distribution of risk in a certain area, obtained by evaluation and combination of hazard, exposure and vulnerability in each point of spatial grid od a certain size
River Section	graphic representation of a river obtained by the intersection a river reach with a vertical plane usually orthogonal to the main direction of the flow
S	
Scenario or operational scenario	environmental and ecological context of the natural disaster and its impact of the elements at risk and stakeholder assets
Sensor	A Sensor is an instrument that observes a property or phenomenon with the goal of producing an estimate of the value of a parameter.
Severity	Measure of the possible consequences of a hazard, for example given by the comparison between a measurement or forecast of a weather variable (e.g. temperature, water level, rain …) and one or more predefined alert thresholds.
Stakeholder	Every subject (person or groups) who holds interest or concern regarding a certain action, objective, project and can be affected by it or can affect it.
Street	The road network infrastructure.
Subway	Subway infrastructure.
T	
Task	A task that has to do with analysing or processing items.
Text Analysis	The task of analysing textual corpora.
Text Item	A piece of text.
Transportation	Transportation services and infrastructure.
Technical requirement	formalization, standardization and elaboration of the user requirement specification and allocation in the beAWARE subsystems
U	
Use Case	conceptual description of intended or expected utilization of the beAWARE system to prepare for, respond to, or act upon the occurrence of the scenario

Term	Meaning in beAWARE
User Requirement	expectation, request, guidelines for functionalities, capabilities, conditionalities and features that would facilitate the successful completion of an use case
V	
Video Analysis	The task of extracting useful information from video sequences.
Video Item	A video recording.
Vulnerability	Susceptibility or predisposition for loss and damage to human being and their livelihoods, as well as their physical, social and economic system when affected by hazardous physical event.
W	
Water depth	the height of the water (in a river section, channel section, section of a pipe, specific point of flooded area) measured from the bottom or the ground
Water Level	The height of the water (in a river section, channel section, section of pipe, specific point of a flooded area…) measured from well-defined zero (i.e. the mean sea level)
Weather station	Q place equipped for measure weather, meteorological, hydrological or hydraulic data

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1 Introduction

The beAWARE 1st Prototype represents the first functional version of the beAWARE system, which has all the main services integrated in the platform, meeting the requirements of Milestone 3 (first prototype: "*the successful completion of the first SW development cycle of the project. It includes the 1st version of beAWARE platform integrating: (ii) basic module of text analysis (iii) semantic representation and reasoning module; (iv) emergency report generation modules; (v) data source management framework prototype.*"); three different scenarios have been implemented: Flood in Vicenza (Italy), Fire in Valencia (Spain) and Heatwaves in Thessaloniki (Greece).
After developing the first prototype from a technological point of view, the goal is to monitor beAWARE platform's initial steps and to reveal any weaknesses and shortcomings in order to improve them into the next stages of the project.

In order to achieve this, the platform had to be tested against real life conditions, which had been demonstrated through the 1st beAWARE pilot and evaluated based on the interaction with the technology that the end users experienced during the pilot itself. This allowed the Consortium to gather precise feedbacks and indications from the end user's prospective, in order to incorporate them into further design modifications.
It was decided among the consortium that every beAWARE pilot should focus specifically on one of the three above mentioned scenarios; more in detail, the 19th and 20th of November 2018 took place in Thessaloniki the first beAWARE pilot, the heatwave one, carried out by HRT with the involvement of the other main stakeholders.
The report provided in this deliverable addresses the evaluation of the 1st prototype during the 1st beAWARE pilot, when a very crucial role was performed by the stakeholders of the heatwave scenario, who used the beAWARE technology and recorded their feedback about their user experience in suitable evaluation forms, according to the criteria explained in the D2.2.
As one of the general main criteria expressed in that previous deliverable for achieving a meaningful evaluation of the beAWARE platform, the pilot itself was organized simulating some emergency and pre-emergency situations both with beAWARE and with the current available equipment. In that way, the end users could make a direct comparison between the platform and the legacy tools, understanding precisely the benefits provided by beAWARE.
Based on the results of this evaluation, the technological development of beAWARE will be carried on until the 2nd Prototype, which will be tested during the second Pilot in Vicenza (March 2019), focusing on the flood scenario. After this pilot, another evaluation process will take place, to ensure that the beAWARE technology is still fully aligned with the end user's needs and to further address the development of the final prototype, which will be tested in

the 3rd Pilot in Valencia (November 2019, about the fire scenario); then, the final evaluation cycle will take place.

2 beAWARE 1st Prototype

In this chapter a brief overview of the beAWARE first prototype and its features that have been tested by end users during the 1st pilot (heatwave pilot) is presented. Since this document focuses on the first prototype from the end users' point of view, technical details are not discussed, which are instead the main objective of the work package 7 deliverables.

The table below (Table 1) contains a list of the main functionalities of the beAWARE system developed for the first prototype and that have been tested during the first pilot; a more detailed descriptions of each tool is provided in the subchapters below.

Table 1. Description of the status of the beAWARE component at the 1st prototype.

beAWARE components	First Prototype
KB	✓ KB fully implemented ✓ 1st version of the ontology available
SensorThing server (FROST)	✓ SensorThings-Server fully implemented and deployed. ✓ Basic visualization available in WebGenesis
Crisis Classification	✓ Connect with SensorThings-Server to receive meteorological, hydrological data and forecasting data from AMICO system ✓ Implement the Early Warning System. Develop forecasting methods to evaluate the level of severity in each user case (flood, fire and heatwave) ✓ Forward the outcome of the analysis to PSAP (Topic 104 Metric Report)
Image analysis	✓ Detection of flood event ✓ Detection of fire event ✓ Traffic level classification ✓ Object detection (People, Vehicles)
Video analysis	✓ Detection of flood event ✓ Detection of fire event ✓ Traffic level classification ✓ Object detection and tracking through sequence of frames (People, Vehicles)
ASR	✓ All four language models up and running
Social Media	✓ Crawling tweets for all predefined pilots and languages ✓ Visual and text classification (in order to estimate if a tweet is relevant or not) ✓ A dummy twitter report is sent to KB
Text analysis	✓ Extraction of key events/incidents, objects & locations for the four languages ✓ Manually curated lexicons & grammars; coverage tailored to first prototype UCs
Report generator	✓ First version of linguistic generation for the four languages ✓ Basic content selection ✓ Coverage tailored to first prototype UCs
Mobile application	✓ Send reports with attached media files
PSAP	✓ Displays metrics on the map. ✓ Displays teams on the map. ✓ Displays incidents on the map. ✓ Sends public alerts from a fixed list of texts.

2.1 Knowledge Base

The Knowledge Base (KB) constitutes the core means for semantically representing the pertinent knowledge and to supporting decision-making. As a basis, it uses the beAWARE ontology, which uses a well-defined formalism (OWL– Web Ontology Language). The beAWARE ontology encompasses, amongst others, information regarding domain knowledge (types of crises, risks and impacts), analysis results of multimodal input (image, video, text and speech) and contextual information, climate and environmental conditions, geolocations, as well as aspects relevant to events and time. The KB offers means to retrieve information and visualize information.

2.2 FROST

FROST (previously called SensorThings API Server) is the single-point for storing and retrieving time-series data (like most sensor data) within the beAWARE project. Sensor data offers big potential through long-term collection of objective data, enabling decision makers to assess emergencies and raise situational awareness. Data collected in beAWARE comprises for example temperature, humidity and rainfall, or the water level of a river section as well as weather forecasts. Depending on the use case, different sorts of sensors are available and their data can vary strongly concerning their type, frequency and format which makes the integration into the platform difficult. The FROST server helps to solve this problem since it offers a unified interface for the sensor data. FROST is an open-source implementation of the SensorThings API that defines communication mechanisms through which the exchange of data take place.

2.3 Mobile Application

The Mobile Application offers functionalities for First Responders and for Civilians: the functionalities for civilians focus on reporting incidents and giving status updates about a situation of interest. The user is able to provide information about the number of involved persons in an incident or, for example the water level during a flooding. Users can do so by reporting multimodal input, such as pictures, text messages, videos or speech recordings. The app reports both input and GPS position to the appropriate analysis tools within beAWARE. The app works with a well-defined data structure, to provide machine-readable input.

For First Responders, the app provides, additionally to the named functionalities, the following ones: it enables efficient communication with the Control Room and the First Responders. This shall help in managing tasks and orchestrating an efficient response to an emergency. In contradiction to the reporting functionalities of the version for civilians, First

Responders will have a more sophisticated report structure; we assume First Responders will be trained on using the mobile App and are therefore able to give more precise information to the receiving instances.

2.4 Social Media Monitoring Module

The Social Media Analysis (SMA) component serves a twofold purpose. On one hand, the module exploits Twitter's Streaming API[1] to collect social media content in four languages (i.e. English, Italian, Greek, and Spanish) that contain predefined keywords regarding flood, fire, and heatwave incidents. The crawled tweets are automatically classified as relevant or irrelevant, based on their textual or visual information. All posts are stored in a MongoDB database, but only the relevant ones continue in the flow of the beAWARE system. They are forwarded to the Knowledge Base Service (KBS) in order to populate corresponding incident reports and to the Multilingual Text Analyser (MTA) for further analysis. On the other hand, the module receives the analysed texts from MTA, performs a spatiotemporal clustering on the tweets and creates a summary per cluster, namely a Twitter report. The reports are sent to KBS and are handled as incidents. Although the clustering technique is completed, the communication with MTA is still pending, since the retrieval of location of tweets is under development.

2.5 Crisis Classification Module

The main objective of the Crisis Classification module is to process the available forecasts from prediction models (weather, hydrological etc.) and data obtained from sensors as well as other heterogeneous sources to estimate the crisis level of a forthcoming event or to monitor an ongoing event and to generate the appropriate warning alerts to notify the authorities timely.

The Crisis Classification module consists of two components. The Early Warning component that provide alerts during the pre-emergency phase and the real time monitoring and risk assessment component that is activated during the emergency phase and is responsible for monitoring the evolvement of the crisis.

For the heatwave pilot the Crisis Classification module acquires information from meteorological services and estimates a value named Discomfort Index. DI is a thermal stress indicator, which is based on air temperature and relative humidity and indicates the

[1] https://developer.twitter.com/en/docs/tweets/filter-realtime/overview

level of thermal sensation that a person experience. It is divided into a discomfort sensation scale of six (6) levels.

2.6 Visual Analysis Module

The visual analysis module is supported by two separate components, the image analysis and the video analysis components. The outcomes of the analysis tools are intended to contribute to the detection of emergency events and the enhancement of their contextual understanding, through the recognition of emergencies such as, traffic bottlenecks, flooded areas, forest fires, elements at possible risk (e.g. people, vehicles), etc. Specifically, for the heatwave pilot two modules are integrated, which are aligned to tasks relevant to heatwave management. The first is for finding and tracking impacted vehicles to provide information about the severity of traffic congestions and the second is for finding faces in indoor crowded places and estimate the occupancy rate in shelters and places of relief. The results of the analysis are sent to the PSAP for visualization including information about the type of emergency present in the media file as well as the location and class of the objects of interest that have been found.

2.7 Automatic speech recognition

The automatic speech recognition module provides a channel for the analysis of spoken language flowing into the system as audio recordings from citizens and first responders. The purpose of this module is to transcribe in four languages (English, Spanish, Italian and Greek). The module is based on open source available language and acoustic models and currently supports all the beAWARE languages. However, not all models are in a mature state and consequently, development is focused on adapting the acoustic models and the dictionaries to needs of the project. Specifically, for the purposes of the first pilot, Greek heatwave-related recordings were created in order to adapt the acoustic model to the heatwave task and the available Greek dictionary was tailored to the needs of the project, by removing erroneous or rare words and increasing this way its accuracy.

When an audio message flows into the system, ASR component selects the corresponding language model and creates the transcription. The transcribed text is sent afterwards to the text analysis (MTA) module for further analysis.

2.8 Multilingual Text Analyzer (MTA)

The beAWARE platform can process natural language text obtained either from social media and textual messages sent to the platform by user using the mobile application, or from the transcription of audio messages also sent using the app. Text in any of the project languages

–English, Greek, Italian and Spanish—is analysed using a set of natural language processing and information extraction tools, which produce language-indented representations of the information conveyed in each analysed message. These representations express relevant events, concepts, entities and relations identified in the text. The output of the analysis of each message is passed to semantic processing components for its integration with information obtained from other sources.

2.9 Multilingual report generation

Starting from contents in the knowledge base, the multilingual report generation modules produces multilingual texts providing to the users of the platform with relevant information about an emergency. Two types of report are supported, short reports to provide situation awareness related to one or multiple incidents, and wrap-up summaries. While situational reports are updated often to provide recent information available to the beAWARE system, wrap-up summaries are to be generated at the end of a crisis in order to provide authorities with a general overview of how incidents unfolded during the crisis. Reports are first planned by selecting and ordering contents made available to it by the KB services and obtained from the analysis of media collected by the system or as a result of reasoning and semantic enrichment tasks. A text is then produced that communicates the selected contents in any of the beAWARE languages (English, Greek, Italian and Spanish). The module implements various knowledge-related and linguistic strategies to ensure that the resulting summary is relevant, concise, non-redundant, coherent, grammatical and fluent.

2.10 PSAP

The Public Safety Answering Point (PSAP) is beAWARE's central command and control system, provided by Motorola Solution Israel (MSIL), which is intended to oversee the entire emergency preparedness and management processes. The PSAP in general is dedicated to be deployed in city councils, emergency authorities, or law enforcement agencies, and is meant to provide critical information to decision makers, emergency managers, and operators before and during the emergency.

PSAP receives information that was originated by first responders in the field and from the public regarding reported or sighted incidents associated with the evolving or ongoing emergency. The information is processed through automatic reasoning engines and analytics services that generate automatic incident reports or enrich field reports with additional information based on multimedia (video, audio, image, text), social media, and sensor analytics.

In addition, PSAP receives metrics related to early warning (based on weather forecasts and social reasoning), crisis classification, indicator status, and overall emergency statistics (e.g. number of incidents).

PSAP provides information about incident assignments to first responders (and expects them in-turn to provide updates regarding the progress of the incident handling and closure). In addition, PSAP provides alerts to the public and to more focused target populations (senior decision makers, first responders, volunteers, etc.)

For the heatwave pilot, three main modules had been used in PSAP.

Firstly, there is the **Dashboard,** a module which visualizes various metrics based on incoming streams of data from external sources (e.g. weather data, crisis classification data, statistics, etc.); for the first pilot it has been separated into 3 main phases:

- pre emergency: for the early warnings;
- emergency: for getting information in real time during the event;
- PoR (Places of Relief): for displaying places of relief (availability and capacity);

The Map visualization module provided the indication about the various events, together with further related information.

Finally, there is the **Public Alert module,** which allows sending alerts notifications to the mobile app by decision makers before and during the event.

3 General approaches

This chapter discusses the general approaches followed both for the pilot set-up and organization, both for its evaluation from the end user's prospective. These approaches had been shared and deeply discussed among the Consortium partners in the previous months.

3.1 Approach for the Pilot

The pilot for testing and evaluating the 1st beAWARE prototype had been organized in 3 phases, with the active involvement of the Stakeholders in each of them:

- Training of the end user to the beAWARE technologies;
- Test of technologies by the end user and stakeholders of the heatwave scenario;
- Evaluation of the pilot;

During each of these three phases of the pilot, the following assignment of roles had been established:

- Decision makers and control room operators: they used the PSAP to receive forecasts, real time monitoring of the outcome of the crisis, to send global alerts to the citizen and to establish a bidirectional communication to the first responders (equipped with the mobile app). During the pilot, the participants who played the roles of 'Decision makers and control room operators' remained in the control room.
- Rescue teams: they used the beAWARE mobile app to communicate with the control room, providing incident reports (text and/or video, photos and voice recordings) and receiving from the control room tasks to be performed; during the pilot there were two teams of first responders, placed in different locations according to storyline
- Citizen: they used the beAWARE mobile app to send incident reports (text and/or video, photos and voice recordings) and to receive public alerts from the Decision Makers. During the pilot, the participants who played the role of 'Citizen' were located in specific areas of the city, according to the storyline
- Observers, who had the role to watch the end user's interaction during the pilot and to take notes about: the performed tasks, their timing, if there had been difficulties of any kinds etc. During the pilot, the observers were located either in the control room (observers of the control room) or followed one of the various teams of first responders and citizen.

The first three roles were intended to participate actively to the training and to the pilot execution, intending with 'active participation' the direct usage of the beAWARE technologies; so they will be called generically '**actors**' or '**players**' of the pilot in the following.

The roles of 'players' had been performed by the stakeholders of the heatwave pilot: volunteers from HRT, HRC and CMT, with the involvement of one delegate of the Hellenic Ministry of Defence.

The 'observers' performed a passive role during the pilot, watching the 'actors' using beAWARE technologies and taking notes and observations about the execution of the pilot in the so called 'observations sheets', that are one of the main pillars for the evaluation process. This role has been performed both by consortium's members and stakeholders. During the pilot any interaction between the 'observers' and the 'actors' was forbidden.

Discussing now about the phases of the pilot, the training day took place at HRT headquarters the 19th of November 2018, with the aim to provide to the participants the ability to know and understand the platform (in particular the end user's tools: PSAP and the mobile app), how it works and what can be achieved with it. The participants were also trained by the consortium to use of the end user's tools, according to the established division of roles.

The beAWARE 1st pilot was executed at the 20th of November in Thessaloniki, with the aim to test the 1st prototype applied to the heatwave scenario.

The pilot followed the structure, organization and storyline discussed among the consortium members in order to cover the list of the final Use Cases and User Requirements of the heatwave scenario, expressed in the D2.10 and is an extract of the initial list provided in the D2.1 with the involvement of the stakeholders.

The storyline was divided in **three Sessions** of about 20-30 min, one related to the pre-emergency phase, the other two about different situations that can occur during a heatwave crisis.

Each of these sessions **had been executed twice**:

- the first time without the beAWARE platform, using only **legacy tools**
- the second time **with the beAWARE** platform.

Therefore, a total of **six different sessions** had been performed.

After the pilot, both the 'observers' and the 'actors' played a crucial role in the evaluation by compiling the questionnaires prepared by the Consortium, based on the criteria expressed in D2.2.

3.2 Approach for the Evaluation

The evaluation of the 1st prototype is based on the 1st pilot results, following the criteria and methodologies explained in the D2.2. More in detail, the two main pillars for this process are:

- **Observers sheets**: these sheets collected the feedback and notes taken by the 'observers' in each of the six sessions. Every observer was assigned to a specific type of 'actor' (i.e. there were some observers in the control room, others followed the first responder teams, etc.) with the aim to take note of every performed task, its timing and occurred problems. The observers were also advised to note any useful comment about the interaction of the 'players' with the beAWARE technology. Therefore, the observer goal is to record both qualitative and quantitate (the timing) information taken during the pilot, that can help to compare the sessions executed with the legacy tools with the respective performed with the beAWARE-platform.
- **Questionnaires:** created according to the criteria expressed in the D2.2 and sent by email to all the 'observers' and 'players' after the pilot. Each questionnaire contained a series of questions about how the 'observers' and 'players' evaluated the pilot organization and structure, the easiness to perform specific task with and without beAWARE; there were also questions about the rating of specific functionalities of the system and the clearness of the provided instructions.

4 General context of the pilot

The first prototype was tested by the end users and the stakeholders during the heatwave pilot in Thessaloniki, which had been the 1st beAWARE pilot. HRT, as the partner of the consortium responsible for the heatwave scenario, organized the training day and the pilot, provided the requested equipment, involved volunteers and coordinated the contact to the municipality of Thessaloniki, the KAPIs' authorities and the other stakeholders. In the following paragraphs is described the general context where the training day and the pilot took place, while more details about them are provided in the next chapters.

4.1 Description of the site

The demonstration site of the Heatwave pilot included some areas of the city of Thessaloniki, which are presented in the picture below. The main demonstration site, where the training took places and PSAP had been located simulating the control room during the pilot, was the HRT headquarter. Other places were part of the test, like the relief place (that is also called, in the next part of this document, **6th KAPI**), and four different points of the city where platform tests were executed. Those places were defined with the constant communication with the Municipality of Thessaloniki, which owns and manages the relief place and the open points were chosen after fruitful discussions between HRT and technical partners in order to have the maximum and best results from the implementation of the heatwave pilot.

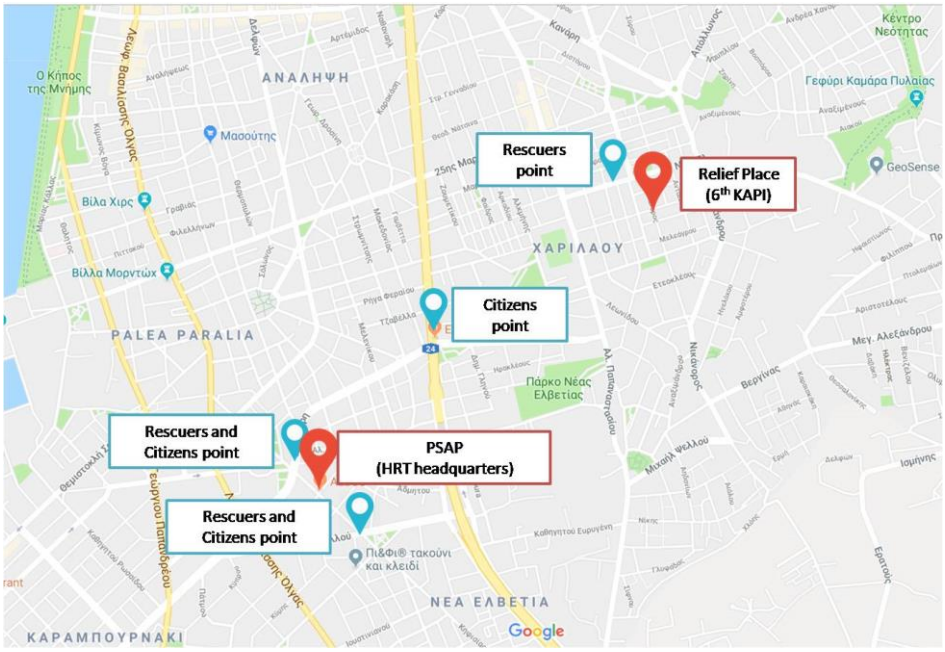


Figure 1: Heatwave pilot area.

It is important to mention that for the implementation of the pilot, discussions were made with the municipality of Thessaloniki and the KAPIs' authorities in order to take the

clearance to enter at the Relief Place. At HRT headquarters, the main room was transformed in order to set up the PSAP as also to give the ability to consortium members, Civil Protection authorities, rescuers and observers to view all the action that was taking place. The other four places (the blue ones on the map), were places in major crossroad in this part of Thessaloniki which helped to test different components of the beAWARE platform and app.

4.2 Available resources

The participants at the heatwave pilot were more than 50 people. In addition to the consortium members, volunteers from the Hellenic Rescue Team, volunteers from other rescue organizations (Mainly the Hellenic Red Cross HRC and the Hellenic Crisis Management Team CMT), and members of the Civil Protection of the Region of Central Macedonia participated at the implementation of the pilot. In addition, more than 30 citizens participated in the relief place Session, at the 6th KAPI.

In order to be clear and precise with everyone, the same procedure was applied, which is the following one:

1. Communicating with organizations, rescue teams and authorities.
2. Everyone informed for beAWARE platform and the heatwave pilot.
3. Everyone informed about GDPR and other personal data protection rules.
4. Signature and consent of participants based on point 3.
5. Participants were informed about their roles.
6. Heatwave pilot execution.

The following list contains the equipment, participants and places that were used for the implementation of the heatwave pilot:

1. HRT Headquarters
2. Relief place building (6th KAPI)
3. 5 VHFs
4. 10 laptops
5. 2 projectors
6. 40 mobile devices
7. 30 citizens only for the relief place
8. 25 rescuers, citizens and observers

4.3 Emergency protocol

The emergency protocols that are followed during a heatwave in Greece were described in D2.1. For the implementation of the pilot, it was agreed between the technical partners and HRT to test and the existing emergency protocol procedures and the beAWARE platform.

The emergency protocols, which are the legacy tools, are divided in two main fields.

1. Internal Communication
2. External Communication

The internal communication is between authorities, Civil Protection with the rescue teams, Police, Fire Brigade, Emergency Medical Services of Greece (EKAB) and other involved organizations and authorities for example municipalities from the pre-phase of the heatwave, during the heatwave up to the end of the phenomenon. This communication can be achieved with various tools such as:

1. Email
2. Telephone communication
3. VHF communication
4. Fax
5. Physical communication

The external communication is between authorities, such as Civil Protection with the public and media. This communication is constant before the phenomena, during its escalation up to the end of it. The communication can be achieved with various ways such as:

1. Email
2. Fax
3. Press Releases
4. Videos on TV stations
5. Voice Messages on Radios
6. Social Media such as Post, icons with notifications and small videos

4.4 Storyline of the pilot

For the execution of the heatwave pilot, during constant telecommunications and physical meeting between technical partners and HRT, a storyline based on the final Use Cases and User Requirements was created.

The storyline was divided in three sessions of about 20-30 min each:

1. Session 1: Pre – Emergency. This session represents the hours before the crisis itself, when then heatwave has not already happened, but the weather forecasts highlight a possible critical event in the next 54h (i.e. weather condition favourable to the heatwave phenomena). During this phase, a crucial role is taken by early warning systems and the goal of beAWARE is to help the Authorities to understand the possible future scenario, send the first alerts to the citizen and start the preventive measures
2. Places of Relief: this session of the emergency phase regards the management of the relief places during the crisis. In particular, beAWARE will support the real-time monitoring of the level of crowding of the shelters, which will be estimated also through images and videos sent by citizen and first responders.
3. Traffic Jam and Power Outage. This session, the latest to be performed during the crisis, regards the management of a situation where, due to heatwave, a power outage occurred, causing many problems such as traffic jams. The goal of this phase is to help the decision makers to understand the current situation, from incident reports send by citizen and first responders, and to improve the coordination with volunteers and authorities.

Each of these sessions had been executed twice during the pilot: the first time without the beAWARE platform, using only legacy tools (telephone, stable and mobile lines, and VHF); the second time the beAWARE platform had been tested.

4.5 Use Cases of the pilot

The deliverable D2.1 defined a list of Use Cases related to the heatwave scenario. However, after a decision of the consortium that the first pilot would be the Heatwave one and due to the maturity stage of the platform at that time and after discussions and agreements between the technical partners and HRT's needs, it was decided to test only some of them, shown in the following table.

Table 2. Tested Use Cases for the Heatwave pilot

USE CASES HEATWAVE
UC_301: Heatwave forecasting alert
UC_304: Management of traffic emergencies
UC_305: Management of Places for relief
UC_306: Response to Power Outage

4.6 User Requirements of the pilot

The following table contains a list of the initial User Requirements for the heatwave scenario that have been effectively implemented in the 1st prototype and so tested during the first pilot. The full list of initial User Requirements can be found in D2.1.

Table 3. Tested User Requirements for the Heatwave pilot

UR#	UC#	Requirement name	Requirement description
UR_301	301, 302, 305, 306	Real time weather forecast	Provide the authorities with real time weather forecast in relation to the progression of the heatwave phenomenon
UR_302	301	Automatic warning	beAWARE system to generate and provide the authorities with an automatic warning when an imminent heatwave phenomenon is forecasted
UR_304	303, 305	Heatwave intensity	Provide the authorities with a risk assessment regarding the intensity of the phenomenon in the city.
UR_305	303, 304, 305	Possible locations for incidents	Display to the authorities visual information about possible locations in the city (or outside the city) where a situation is more likely to develop that will require rescue team intervention (for example, based on past experience, traffic jam and/or accidents will be more likely to occur at a main street intersection/ public park/ entrance to hospitals or banks… etc.). In such cases a decision might be made to send rescue teams in advance to shorten response time if/when an incident occurs
UR_306	303, 305, 306	Number of people affected	Provide the authorities an estimation of the people that might be affected from the phenomenon and in which areas
UR_310	303, 304, 305	City-wide overview of the event	Provide the authorities to have a city-wide overview of the event – allow decision making authorities an overall view of all incidents handled at any point in time/ see where all rescue teams are located in real-time to allow them to make informed decisions regarding who to send where.

UR_311	301, 302, 303, 304, 305, 306	Information Storage	Provide the authorities with access to all historical information by providing storage for all information for future lessons-learned purposes, so that after the heat wave situation is over, decision making authorities can review the information gathered and handled during the event, and set-up better procedures to handle future events more efficiently
UR_312	301, 304, 305, 306	Warning citizens	Provide to citizens warnings through the beAWARE app, of an imminent heatwave and a list of proactive measures and how to reduce its effects
UR_314	303	Assign tasks to first responders	Allow authorities to assign additional tasks to those first responders who are available or even instruct those who are able to assist other responders
UR_315	303, 304	Traffic Status	Display to the authorities to monitor the current traffic situation so that they can decide where to direct the first responders or inform them which roots to avoid
UR_316	305	Capacity of relief places	Provide to the authorities the current state of the available capacity of all relief places provided to the public
UR_318	303, 306	Trapped citizens	Allow authorities to know if there are people trapped (e.g. in an elevator) and display where
UR_319	303, 306	Trapped elders at home	Allow authorities to know if there are elder people trapped in houses without an A/C and display where
UR_321	301, 306	Affected area	Provide to the authorities with a prediction of the affected area
UR_322	304, 305, 305	Information for incident status from Social Media	Provide to the authorities information regarding potential risks in case there is a situation inside the city (e.g. car accident) gathered from social media

UR_324	304	Information for existing situation in the from Social Media	Provide to the authorities information regarding existing traffic conditions all over the city grid gathered from social media
UR_325	305	Suggested places for relief	Provide citizens with information regarding the suggested places for relief through an app.
UR_326	301, 302, 303, 304, 305, 306	Type of visualization	Display to the authorities/citizens all the information in a web-GIS platform.
UR_327	304, 305, 306	Send emergency reports	Allow citizens to send text, images and video messages from their mobile phone (for the different operative systems) and from their social media account to the authority.
UR_328	303, 304	Send task reports	Allow First Responders to send reports about their assignments from their mobile phone to local authorities
UR_329	304, 305	Visualize video cameras	Display streamed video from video cameras to the authorities/citizens
UR_330	303, 304, 305, 306	Localize video and images	Provide authorities with the ability to localize videos and images sent by citizens from their mobile phones
UR_332	304, 305, 306	Localize tweets	Provide authorities with the ability to localize Twitter messages
UR_333	304, 305, 306	Localize calls	Provide authorities with the ability to localize Phone Calls to an emergency number concerning citizens who are trapped
UR_336	304	Traffic warnings	Provide authorities with the ability to send warnings to citizens in order to avoid a certain area that is jammed with traffic
UR_338	304, 305, 306	Warnings	Allow authorities to send warnings of pre-emergency alerts to citizens.

UR_340	303, 304, 305, 306	Internal sharing of information	Allow authorities and first responders to share data (images, videos, geolocation, reports)
UR_341	304, 305, 306	Twitter analysis and warning	Allow authorities/first responders to be warned by Twitter messages concerning traffic jam, availability of places of relief, potential hazards or people in danger
UR_342	303, 304, 305, 306	Coordination and communication between different resources	Provide communication between authorities and first responders, in order to improve their coordination.

5 Training day

The training day took place at HRT headquarters the first day of the pilot implementation, which was the 19th of November 2018.

The major goal of the training was, to give the ability to the participants to know and understand the platform and the mobile app components, how it works and what can be achieved with it.

5.1 Description of the training day

The training day started with an overview of the project and of the main functionalities of the 1st prototype given by the technical partners of the project.

Then the participants were informed in detail about the storylines of each of the three sessions. It should be noted that the consortium provided the participants information about the scope, the goal, the triggers, the storyline and the expectation of each session but no pre-defined text of communications, messages, alerts and tweets between the consortium and the stakeholders in that phase; neither a number of maximum reports was imposed nor the consortium provided in any way image or video to be send during the pilot. In other words, only the general context was explained to the participants, while was left a large degree of freedom about how to behave in specific.

Then division of the participants in the different roles was discussed. The first repartition was made between the 'observers' and the 'players'; while the second were chosen only between the stakeholders, the 'observers' were both volunteers and consortium's members.

Both the 'observers' and the 'players' were divided between the control room (HRT headquarters, where the PSAP was located) and the three teams spread among other different pilot areas (such as the relief places).

After this general explanation of the pilot organization, the training of the players started.

Firstly, the participants with the roles of 'citizen' and 'first responders' were trained to the use the mobile application. The consortium helped the stakeholders to download, install and configure the app on their own devices, providing technical assistance. Although different types of devices were, involved this phase went very smooth and no particular problems occurred.

After all the participants installed the app, the consortium members explained how to write reports, record video, photos and audio and send them to the beAWARE platform. All the participants were encouraged to test these features multiple times, so a large number of

incident reports was collected by the system and displayed in real time on the PSAP's map. The consortium members performed an analysis of the multi-media files sent during this phase (i.e. image analysis of the photo taken by the mobile) in order to show the capability of the system and train the players how to better acquire multimedia for the beAWARE purpose (i.e. it's better to take a photo of people from the front than from the behind).

Then the Features of the PSAP were shown to the identified control room operators; the consortium members explained the structure of the event map and of the dashboard, showing the meaning of the various metrics and how they are visualized (i.e. the different icons on the maps, graphs on the dashboards). Then various tests about the sending of public alerts from the PSAP to the mobile devices were successfully performed.

Finally, the training of the observers took place; the consortium members gave to each observer the six different observation sheets (two for each session, one for the legacy tool and one for beAWARE), providing these basic rules:

- write all the action performed and the specific time required to accomplish them, including the time needed to the control room operator to understand a new information provided by the system and to take a specific decision.
- Report only the action taken, not the action that are expected to be taken, but indicate eventual comments such "the user seems to have difficulties".
- Do no communicate or interact in any way with the 'players'; in particular it was forbidden to provide any type of help or suggestion to the end user of the technology.

The training was held in Greek, for the participant, with a translation to English for the consortium's members.

Figure 2: Heatwave's stakeholders and Consortium members during the training day.

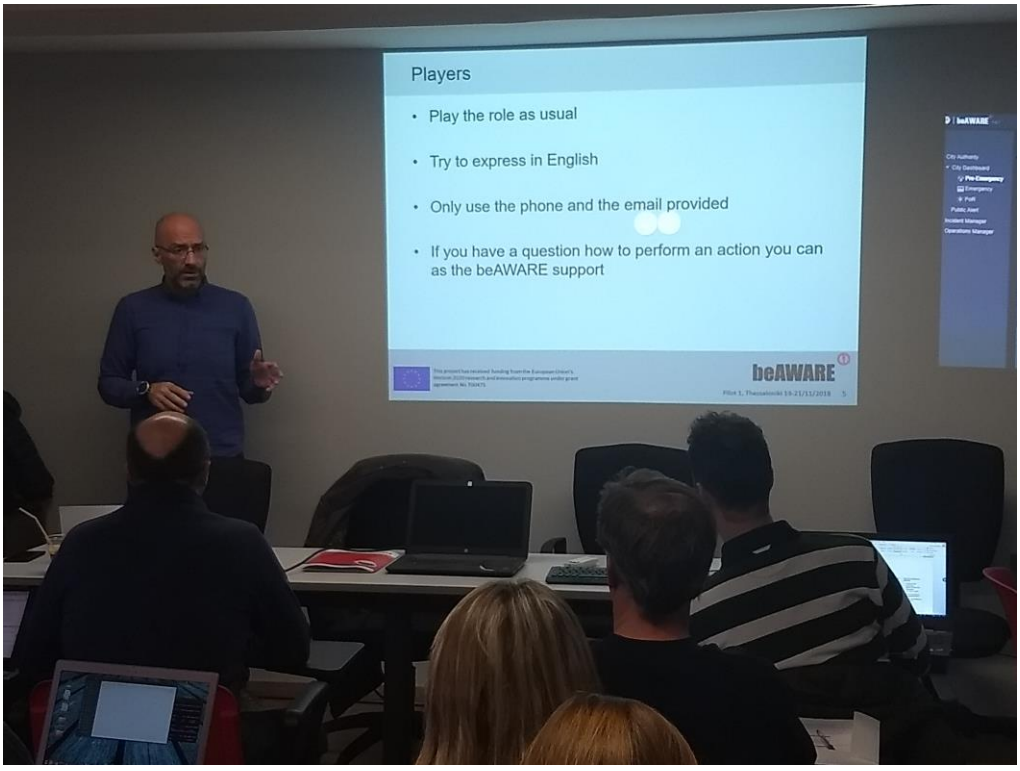


Figure 3: The training day for the heatwave pilot - Explanation of the roles.

Figure 4: The training day for the heatwave pilot.

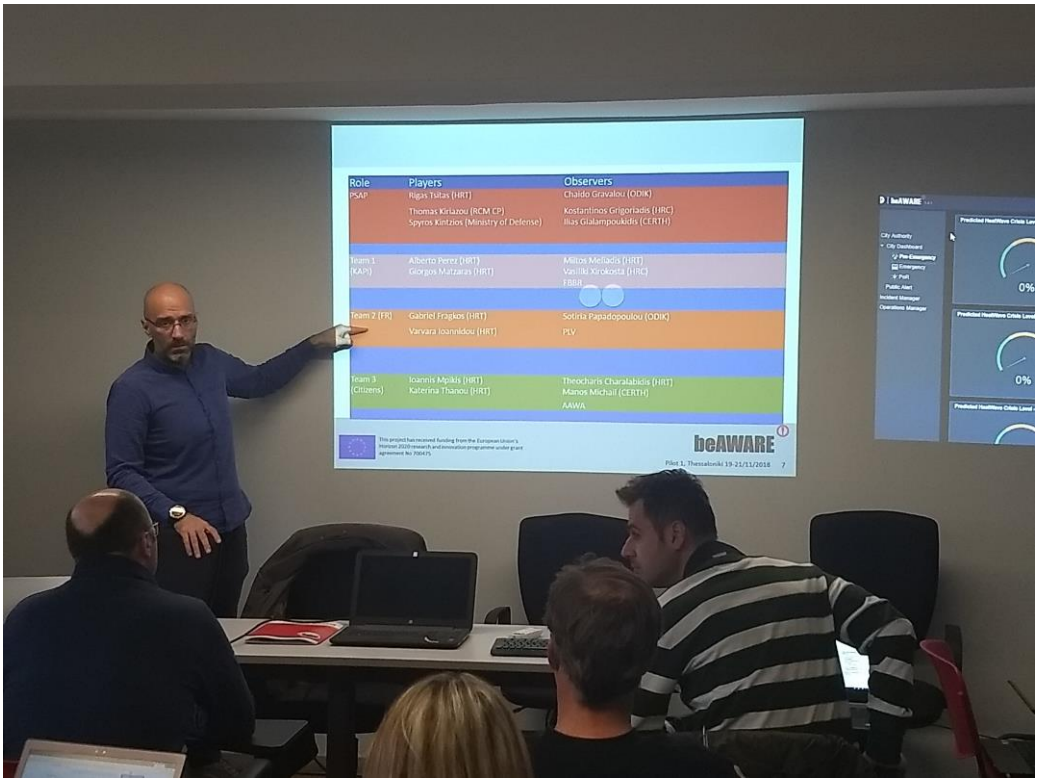


Figure 5: The training day for the heatwave pilot - Explanation of the sessions.

5.2 Timetable of the training day

In this paragraph is provided the timetable of the training day (19th of November 2018, HRT Headquarters)

Table 4. Timetable of the training day

Start	End	Subject	Presenter	Duration
9:30	9:40	Welcome – Introductions	All	0:10
9:40	10:10	Introduction to beAWARE	CERTH	0:30
10:10	10:40	Introduction to the Pilot objectives and scenario	CERTH	0:30
10:40	11:10	Explanation of the Pilot organization (roles)	CERTH	0:30
11:10	11:40	break		0:30
11:40	13:10	Components presentation	ALL	1:30
13:10	14:10	break		1:00
14:10	15:40	Training of the participants - part 1	ALL	1:30
15:40	16:10	break		0:30
16:10	17:10	Training of the participants - part 2	ALL	1:00
17:10	17:30	Wrap up of the day and presentation of following day	CERTH	0:20

5.3 List of participants

Table 5. List of participants to the training day.

	Name and Surname	Institution / Organization	Consortium member - CM/ Volunteer for the pilot -VP
1	Anastasios Karakostas	CERTH	CM
2	Stratos Kontopoulos	CERTH	CM
3	Kostas Avgerinakis	CERTH	CM
4	Panagiotis Giannakeris	CERTH	CM
5	Ilias Gialampoukidis	CERTH	CM
6	Ilias Koulalis	CERTH	CM
7	Panos Mitzias	CERTH	CM
8	Gerasimos Antzoulatos	CERTH	CM
9	Stefanos Vrochidis	CERTH	CM
10	Jürgen Moßgraber	IOSB	CM
11	Philipp Hertweck	IOSB	CM
12	Jan-Wilhelm Blume	IOSB	CM
13	Francesca Lombardo	AAWA	CM
14	Massimo Cappelletto	AAWA	CM
15	Boris Kantsepolsky	MSIL	CM
16	Itay Koren	MISL	CM
17	Benny Mandler	IBM	CM
18	Carmen Castro	PLV	CM
29	Jorge Hernández	PLV	CM
20	Tina Rasmussen	FBBR	CM
21	Kim Lintrup	FBBR	CM
22	Ari Karppinen	FMI	CM
23	Gerard Casamayor	UPF	CM

	Name and Surname	Institution / Organization	Consortium member - CM/ Volunteer for the pilot -VP
24	Ioannis Bikis	HRT	VP
25	Alberto Perez	HRT	VP
26	Theocharis Charalampidis	HRT	VP
27	Themis Syrvanidis	HRT	VP
28	Chaido Gravalou	CMT	VP
29	Sotiria Papadopoulou	CMT	VP
30	Xirocosta Vasiliki	HRC	VP
31	Grigoriadis Konstantinos	HRC	VP
32	Kiriazou Thoma	Civil Protection Region of Central Macedonia	VP
33	Spyridon Kintzions	HMOD	VP
34	Ioannidou Varvara	HRT	VP
35	Fragkos Gavriil	HRT	VP
36	Matzaras Georgios	HRT	VP
37	Rigas Tsitas	HRT	VP
38	Thanou Aikaterini	HRT	VP

6 beAWARE 1st Pilot

The beAWARE 1st Pilot was executed on the 20th of November in Thessaloniki, with the aim to test the 1st prototype within the heatwave scenario. The two main locations of interest were: HRT Headquarters, where the control room was established and the PSAP located, and one place of relief in Thessaloniki, the 6th KAPI. Additionally, some action where performed in the areas nearby these two main points.

The pilot followed the structure, organization and storyline discussed in the previous chapter; all the 'actors' involved were volunteer of HRT, external to the project, or stakeholders, who had been trained to the technology the day before.

Both the actors and observers where split into four groups:

- Control room operators (and relative observes):
- Team 1: group of volunteers who acted as first responders (and relative observers) assigned to the management of the shelter;
- Team 2: group of volunteers who acted as first responders (and relative observers) assigned to the management of the traffic and to control the situation in the area in the surrounding of the relief place;
- Team 3: group of volunteers who acted as 'citizen', who sent incident report and take pictures and video about the traffic level;

Team 1 was placed inside the relief place during the session 1 and 2, while in the session3 Team 1, 2 and 3 merged together in two mixed groups of both Citizens and first responders, who sent reports, voice messages, photos, and videos about the traffic

In general, the players of the pilot acted according to the story line defined by the consortium. However, all the contents sent through the beAWARE platform during the exercise were decided on the spot by the actor themselves, in order to have a pilot as more realistic as possible and to show that the analysis tools of beAWARE are able to analyse different types of random data in real-time.

The 'observers' of each of the four groups recorded the actions performed and their timing twice for each session (with legacy tools and with beAWARE), without interacting in any way with the 'players'.

While during the training day it was suggested to perform all the communications in English, the most of the interactions between the 'players' (i.e. communications between first responders and control room) were performed instead in Greek. In fact, it had been noticed that, in the middle of the pilot when the actors had to perform many actions, it was spontaneous for them to interact in their mother tongue instead of English. While this had

required a translation from the Greek observers to the non-Greek ones in order to better understand the development of the situation, let the end user interact freely in their mother tongue, instead to force them to speak in English, added a very high degree of likeliness and more fluidity to the pilot.

6.1 Execution of the pilot

As already described in subchapter 4.4, where the storyline has been presented in detail, the procedure that was followed is divided in the 3 main sessions, each of them performed first with the legacy tools used usually by HRT during emergency and then with the support of beAWARE platform.

The first session dealt with the pre-Emergency phase, which occurs before the crisis when the weather forecasts predict, in the next 54 h, conditions favourable to a heatwave.

In this session all the communications, performed both without and with beAWARE were made from the Control Room to Citizens and Rescuers, who were on the field. In the following picture the area where activities took place are shown.

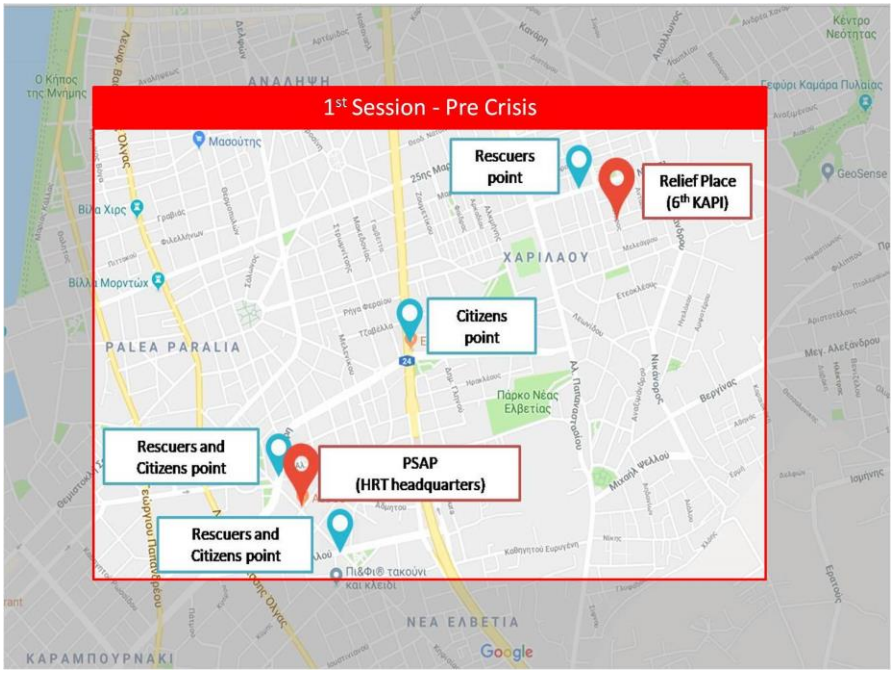


Figure 6. Session 1 area – Heatwave Pilot

The 2nd session regarded the management of the place of relief and the related communication between the control room and the rescue team, with and without the beAWARE platform; the picture below represents the active area.

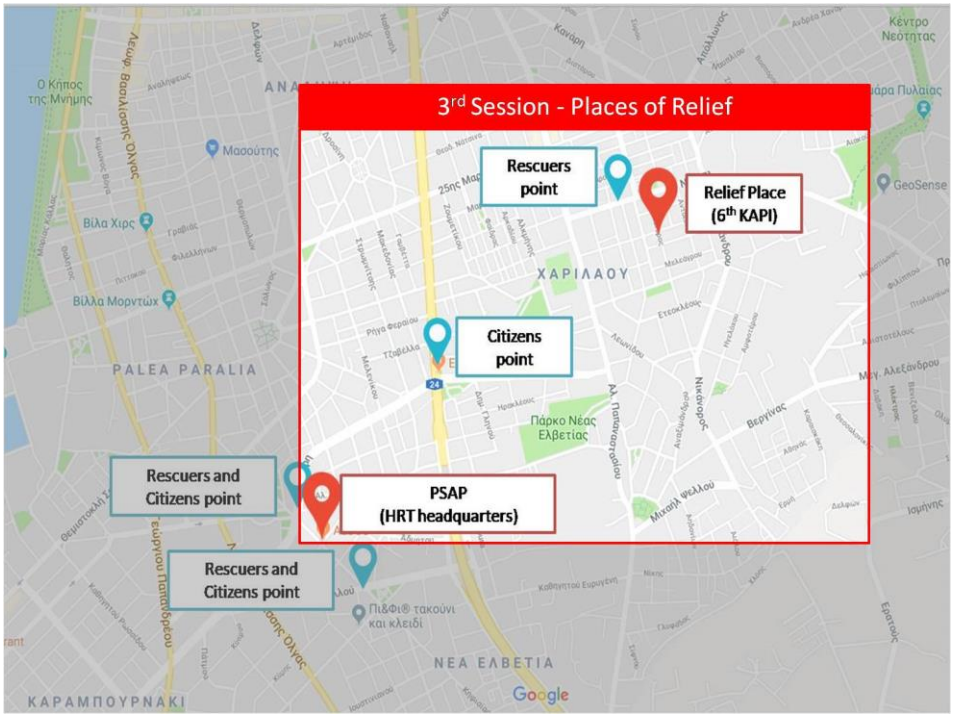


Figure 7. Session 3 area – Heatwave Pilot

In the 3rd session the occurrence of Traffic Jam and Power Outage due to heatwaves with and without beAWARE platform has been assumed. The picture below represents the active area for this session.

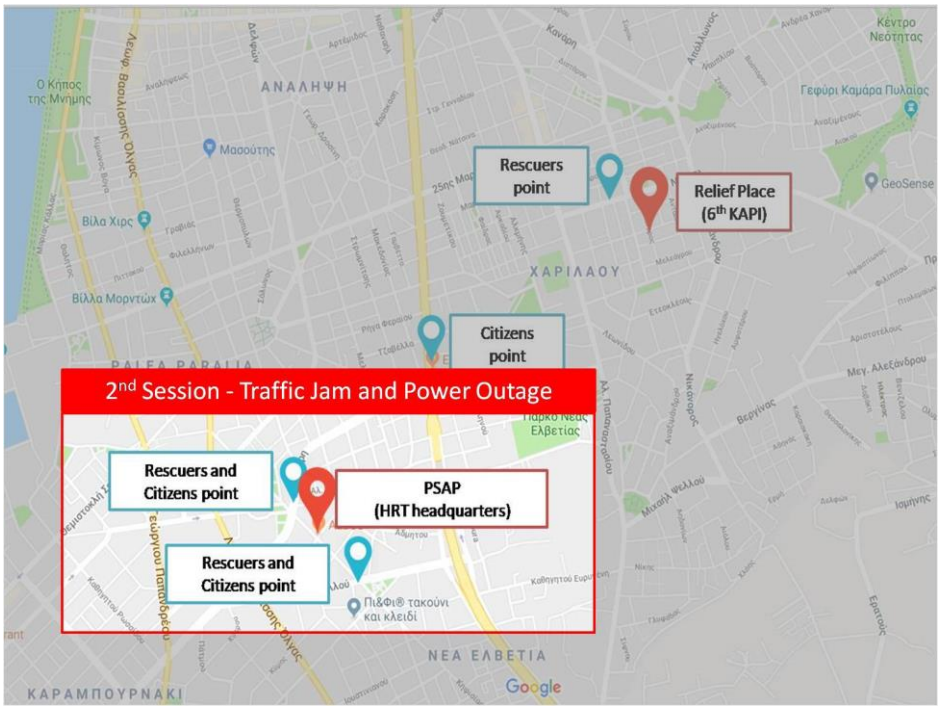


Figure 8. Session 2 area – Heatwave Pilot

As repeated many times, each one of the previous described sessions was first executed with traditional telecommunications systems / institutional, which were mainly:

- Telephone. Direct contact between Civil Protection and Rescue Teams: used for the communication between control room and first responders;
- VHF. Communication in pre-defined channels: used for the communication between control room and first responders;
- Fax: used for Civil Protection official requests to Rescue Teams;
- Email, Fax: used for Civil Protection's official requests to Rescue Teams and for receive forecasts;
- Media, social media and website: for spreading public alerts to the public and to see the forecasts.

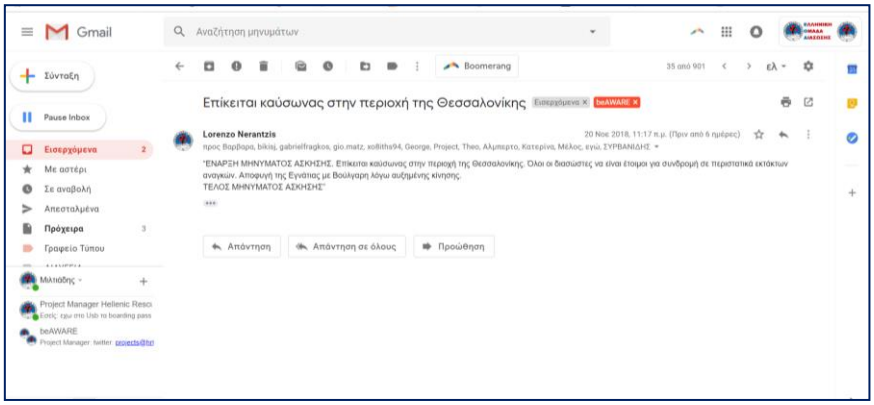


Figure 9. Email communication to rescuers – Legacy Tools

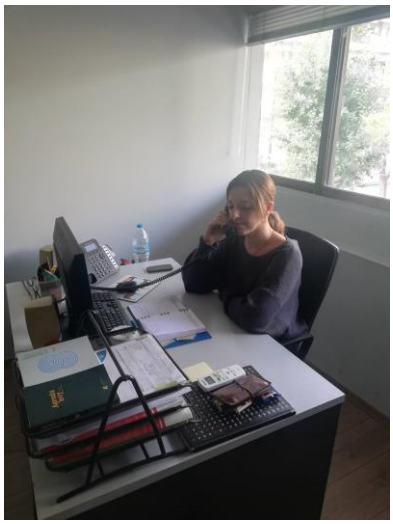


Figure 10. Telephone communication – Legacy Tools

Figure 11. VHF communication – Legacy Tools

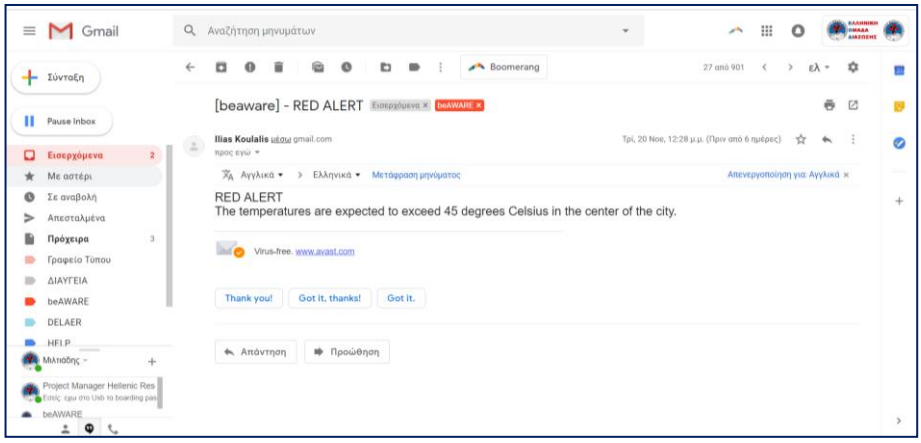


Figure 12. Email communication to citizens – Legacy Tools

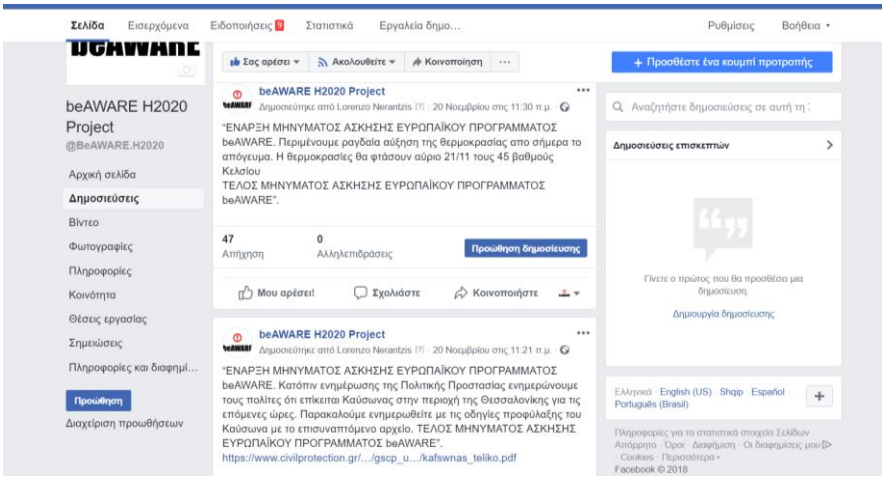


Figure 13. Social Media communication, Facebook – Legacy Tools

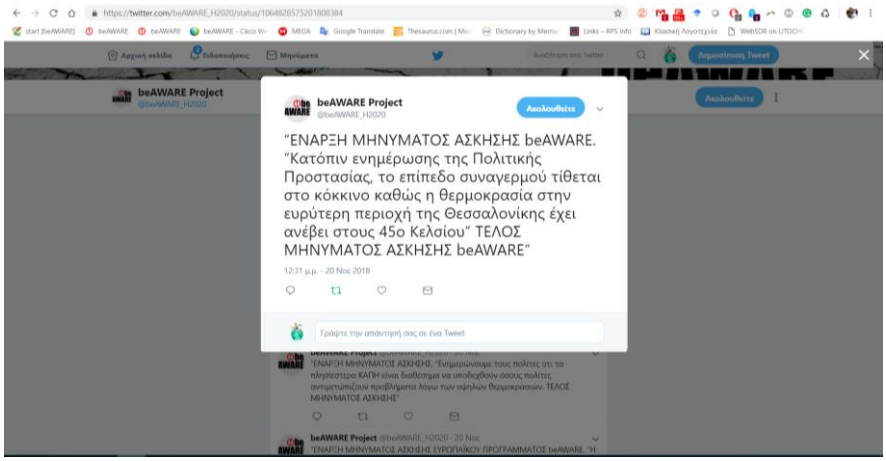


Figure 14. Social Media communication, Twitter – Legacy Tools

Figure 15. Civil Protection web-leaflet – Legacy Tools

Then each session was repeated with the support of the beAWARE platform and its end user tools: the PSAP (located in the control room) and the mobile app (installed on the devices of each actors as 'citizen' or 'first responders)'.

Figure 16. PSAP and observers

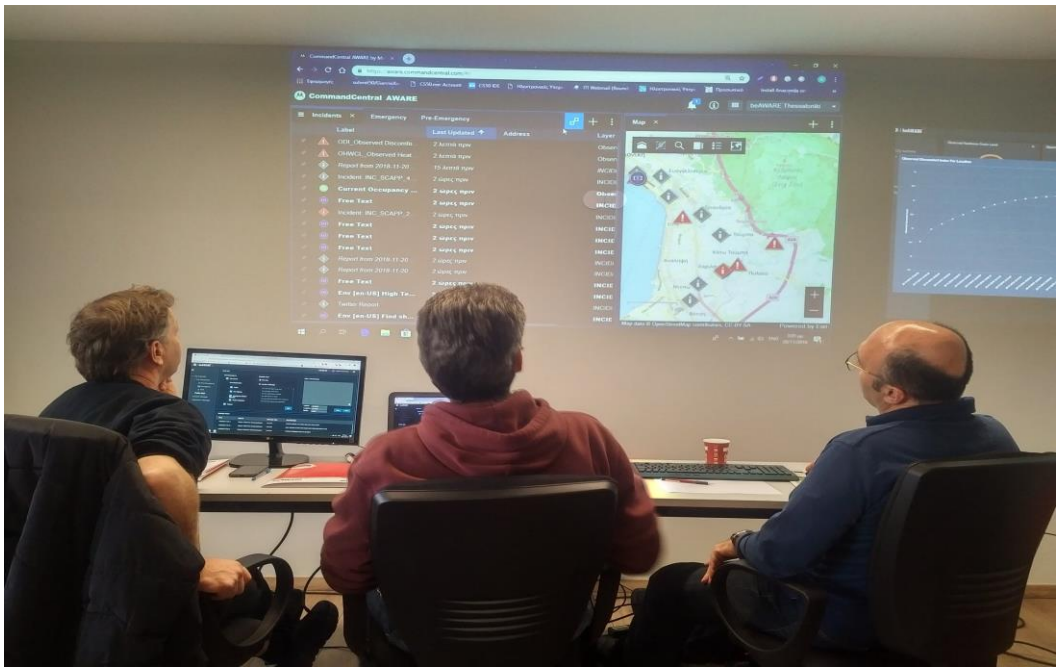


Figure 17. PSAP operation team

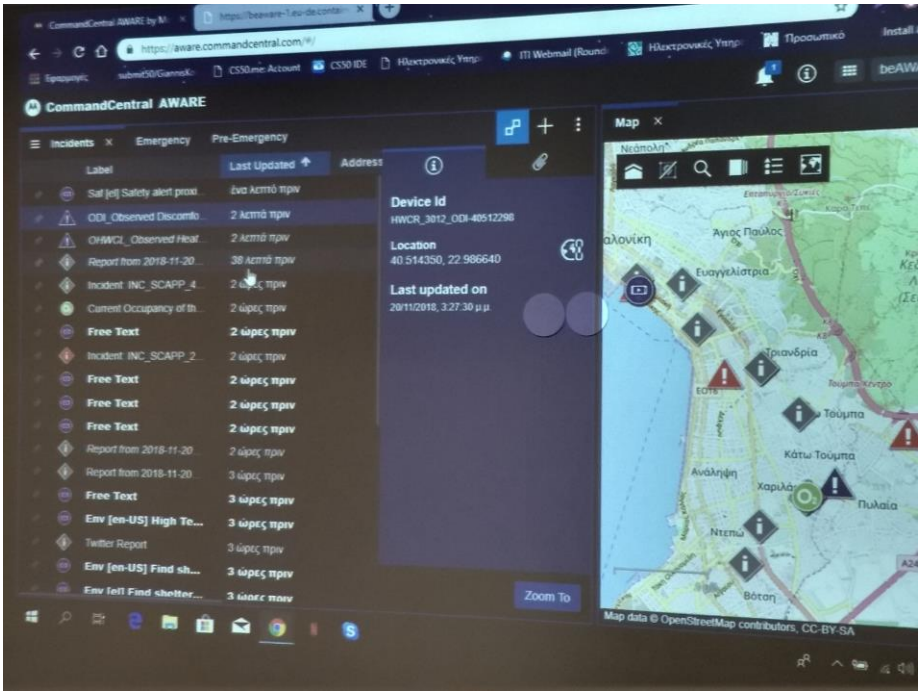


Figure 18. PSAP's emergency map during the pilot.

Figure 19. Rescuers, Citizens and Observers on the field (on the left: team2; on the right: team 3)

Figure 20. Citizens – Place of Relief

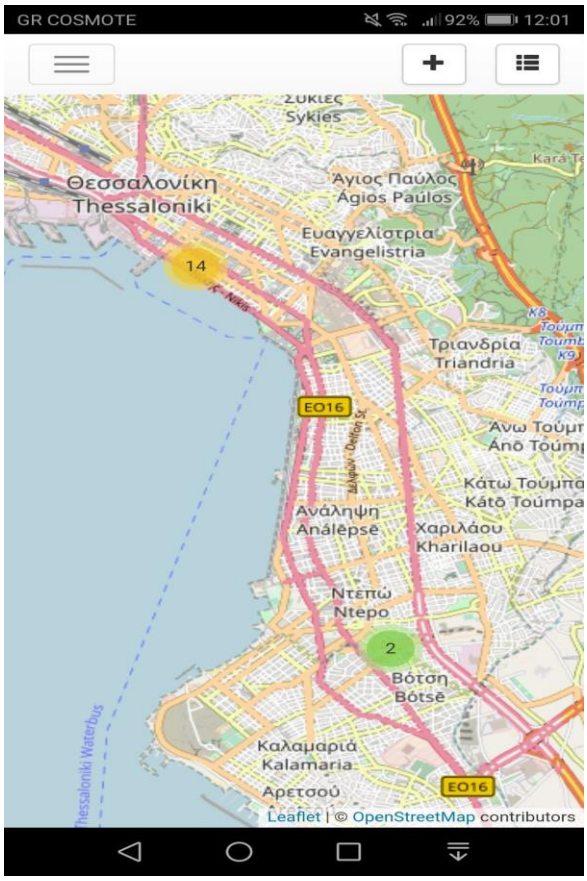


Figure 21. beAWARE mobile app main screen

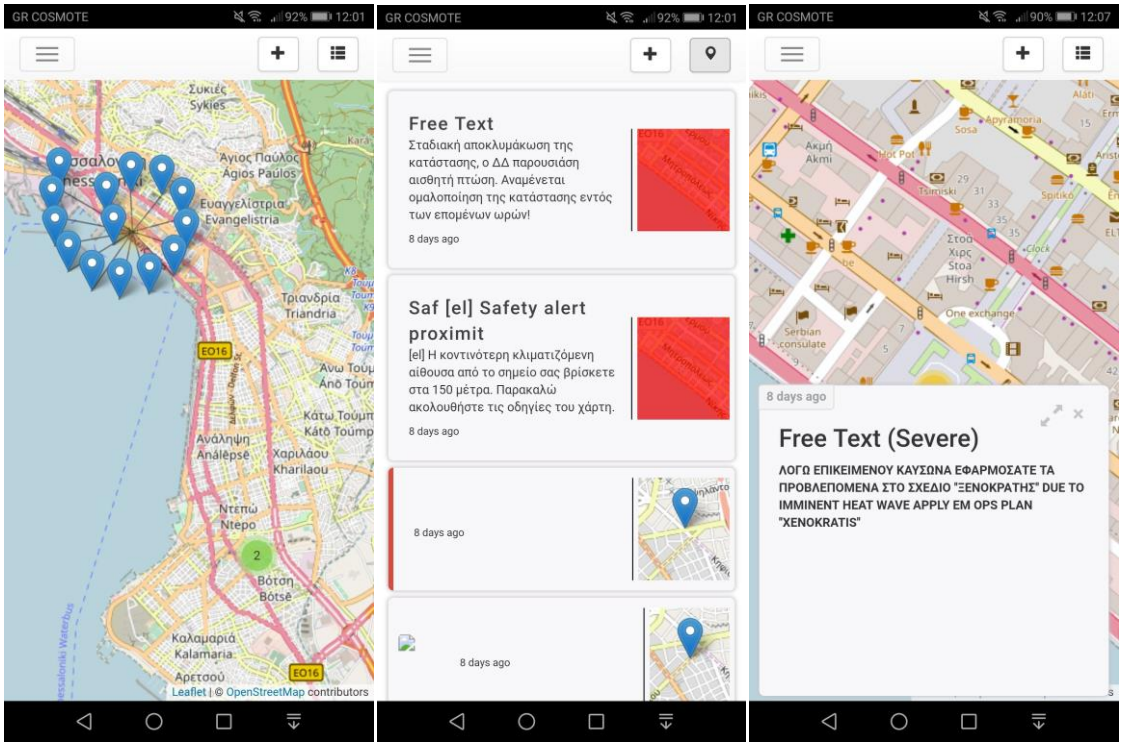


Figure 22. beAWARE mobile app information screens

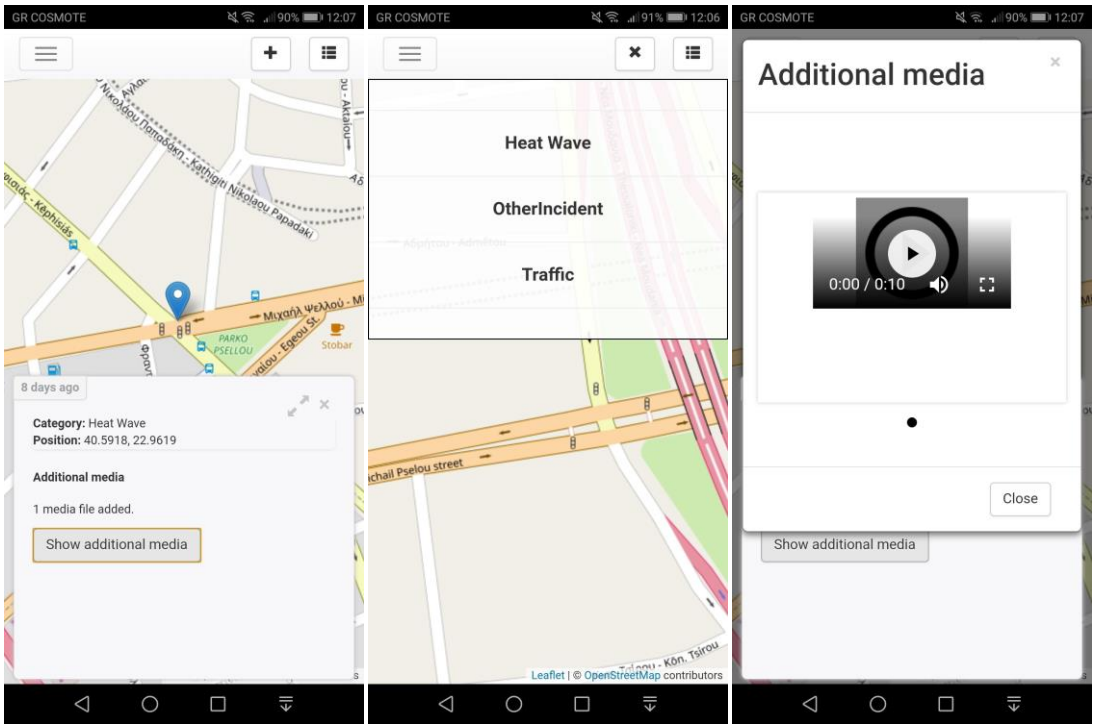


Figure 23. beAWARE mobile app report steps

After the end of the trial, a debriefing session took place, where the members of the consortium discussed with the participants all the steps that had taken place during the heatwave pilot, problems, ideas for improvements, and finally good practices of beAWARE platform and app versus the legacy tools.

6.2 Timetable of the pilot

The table below indicates the timetable of the pilot. Each trial session includes the time required to team 1, 2 and 3 to place themselves in their assigned location; the time to trigger the system and the time to execute the storyline firstly with the legacy tool and then, after a short pause, with beAWARE technology. Each repetition of the session (without and with beAWARE) required about 20-30min.

Table 6. Timetable of the pilot

Wednesday, November 20 **Room: HRT**				
Start	**End**	**Subject**	**Presenter**	**Dur.**
9:30	9:40	Pilot Briefing	All	0:10
9:40	11:25	Trial Session 1 - pre emergency		1:45
11:25	11:55	Coffee break		0:30
11:55	13:40	Trial Session 3 - during crisis		1:45
13:40	14:40	Lunch break		1:00
14:40	16:25	Trial Session 2 - during crisis		1:45
16:25	16:55	Coffee break		0:30
16:55	17:30	Debriefing		0:35

6.3 List of participants and the roles performed

The table below indicates the list of participants to the pilot directly involved as 'Players' or 'Observers'. The other members of the consortium where attending in control room.

It is important to mention that although PSAP team stayed at HRT Headquarters, teams 1, 2 and 3 were involved in all Session from different positions as presented in subchapter 6.1 maps.

Table 7. Tested User Requirements for the Heatwave pilot

Role	**Players**	**Observers**
Control room/PSAP	Rigas Tsitas (HRT)	Chaido Gravalou (CMT)
	Thomas Kiriazou (RCM CP)	Kostantinos Grigoriadis (HRC)
	Spyros Gitsios (Ministry of Defense)	Ilias Gialampoukidis (CERTH)
		Francesca Lombardo (AAWA)
		Tina Rasmussen (FBBR)
		Carmen Castro (PLV)
Team 1 (KAPI)	Alberto Perez (HRT)	Miltos Meliadis (HRT)
	Giorgos Matzaras (HRT)	Vasiliki Xirokosta (HRC)
		Kim Lintrup (FBBR)
Team 2 (FR)	Gabriel Fragkos (HRT)	Sotiria Papadopoulou (CMT)
	Katerina Thanou (HRT)	Giorgos Mavrokoleas (HRT)

		Jorge Hernández (PLV)
Team 3 (Citizens)	Varvara Ioannidou (HRT)	Theocharis Charalabidis (HRT)
	Ioannis Mpikis (HRT)	Manos Emmanouilidis (CERTH)
		Massimo Cappelletto (AAWA)

6.4 Outcomes of the system during the pilot

Finally, a report from of the pilot from a more technical point of view is provided, including the relevant outcomes of the system running, the triggers and screenshots taken in the different phases.

6.4.1 Session A : "Early Warnings":

Description

According to the weather report, a severe heatwave is expected in three days. The Met Office announces that an average temperature of 40°C by day will occur over the next 2 to 3 days. These temperatures can have a significant effect on people's health if they last for at least 2 days.

Trigger

During the pre-emergency phase, the Crisis Classification module acquires forecasting data to classify the crisis level and provides early warning to the system. The module collects data from six predefined locations (points) in the region of Thessaloniki. These forecasting data concern the air temperature and relative humidity and were obtained from the Open Data service of the Finnish Meteorological Institute (FMI) based on the HIRLAM weather prediction model. The forecasting period covers a time interval of 54 hours ahead. Relying on these forecasts, Crisis Classification module calculates the predicted Discomfort Index (DI) and generates the following:

- An overall heatwave estimation level per day for the coming three days.
- An estimation of the first Predicted Discomfort Index per point.
- The max Discomfort Index per point that will be encountered.
- The remaining hours for the first Predicted Discomfort Index per point.
- The remaining hours for the first max Predicted Discomfort Index per point.

For the Heatwave pilot, the pre-Emergency module was fed by simulated data that were acquired and stored by a real time Heatwave situation during the summer of 2017 in Thessaloniki. The module transforms the previous date/times to current ones to consider the data as new forecasts.

The following image (Figure 24) shows a screenshot of the PSAP's event map taking during the pre-emergency phase. The colours indicate the significance of the Predicted Discomfort Index over the population.

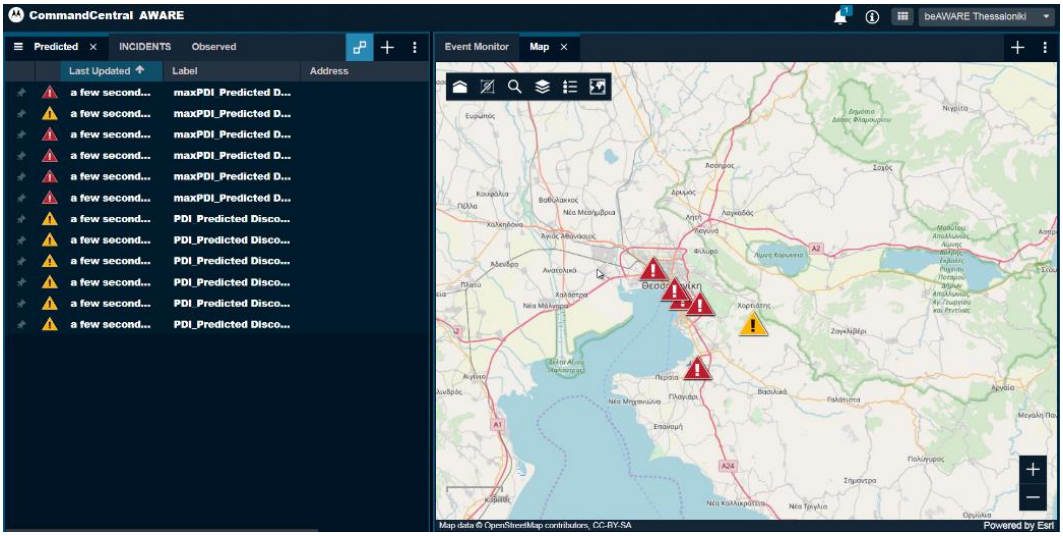


Figure 24: Screenshot of the PSAP's event map during

Figure 25 shows the dashboard of the PSAP in the pre-emergency phase; more in detail, the first column of charts illustrates the Predicted Heatwave Crisis Level over 3 days forecasting period (gauge charts). The level is presented as a percentage of the forthcoming crisis severity. The second column of charts illustrate the level of Predicted DI which corresponds to the first heatwave crisis event and how many hours are needed for its appearance in specific locations. Respectively, the third column illustrates the importance of the maximum value of Predicted DI and how many hours are needed until the heatwave crisis event receive its maximum value in specific locations.

Figure 25: Screenshot of the pre-emergency dashboard

Outcome

After receiving the indication of a forecasted crisis event, the decision maker issues a warning informing the general public, public authorities and first responders to prepare for high temperatures in the next days.

Specific instructions based on location and age group are given through the beAWARE mobile application.

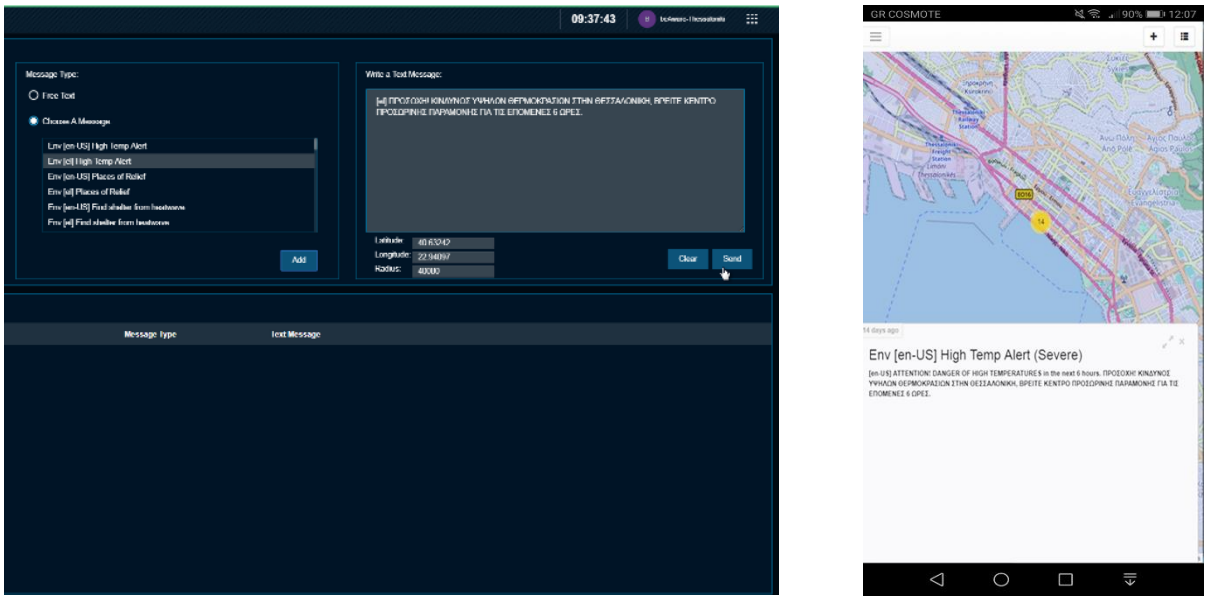


Figure 26: Screenshot of an alert issued by Authorities during the pilot, warning the general public, public authorities and first responders to be prepared for high temperatures for the next days.

During the 1st phase two alerts were sent.

High Temperature Alert - a severe heatwave may occur the next days. Be aware and wait for further instructions
ATTENTION! Danger of high temperatures in the next 6 hours.

6.4.2 Session B : “Monitor the Heatwave situation and guide people to safe locations”:

Description

STEP 1:

The day of the heatwave starts with 39°C at 11.00 AM. The alert system changes to yellow.

STEP 2:

While the temperature rises the alert system changes to orange. All, local authorities, social care, and other public agencies that can support during the emergency are in a state of alert.

Cooling shelter locations are announced ahead of the heatwave. Authorities monitor the heatwave phenomenon and guide people to safe locations.

STEP 3

The places of relief are beginning to accept people who are seeking shelter. Gradually shelters are filling up, as the temperature is getting higher.

Trigger

STEP 1:

During the emergency phase, the Crisis Classification module acquires real-time weather observations to classify the crisis level. Likewise, to the pre-crisis phase, the module collects data (air Temperature and Relative Humidity) for six predefined points in the region of Thessaloniki every 3 minutes. The module analyses the obtained data and produces every timestamp the following results:

- An overall heatwave crisis level for the current day.
- An estimation of the Predicted Discomfort Index per point

For the Heatwave pilot, in the Emergency phase the Crisis Classification module employs simulated data based on the real time observations in the previous Heatwave crisis during July of 2017 in Thessaloniki. For the pilot purposes, the module transforms every date/time from past values to current ones, in order to simulate the current heatwave conditions.

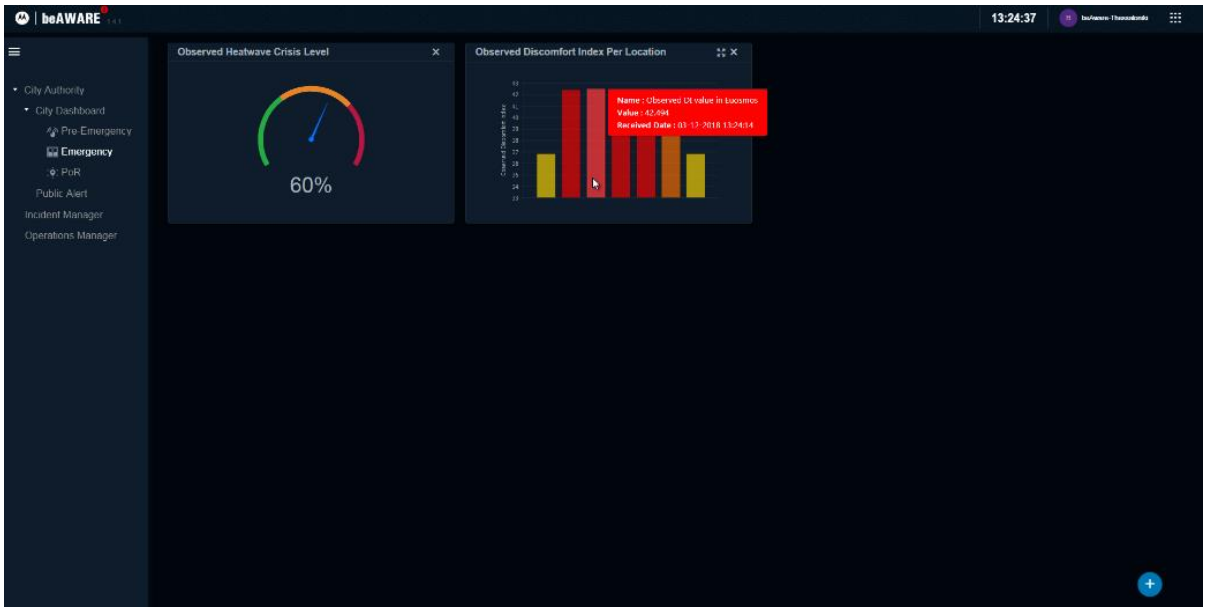


Figure 27: Screenshot of the PSAP's dashboard taken during the phase B of the pilot

The picture above (Figure 27) represents screenshot of the PSAP dashboard taken in this phase; more in detail the gauge bar in the first column represents the current observed

Heatwave Crisis Level during the day in percentage aggregated over all points. In the second column, the bar chart refers to the metric result of the observed Discomfort Index per point.

Figure 28: Line-graph, provided by the PSAP Dashboard that illustrate clearly the time evolution of the Discomfort index for specific location.

STEP 2:

As part of the heatwave pilot two reflective incidents are generated *respectively* for two *cooling shelter locations in the region of Thessaloniki.*

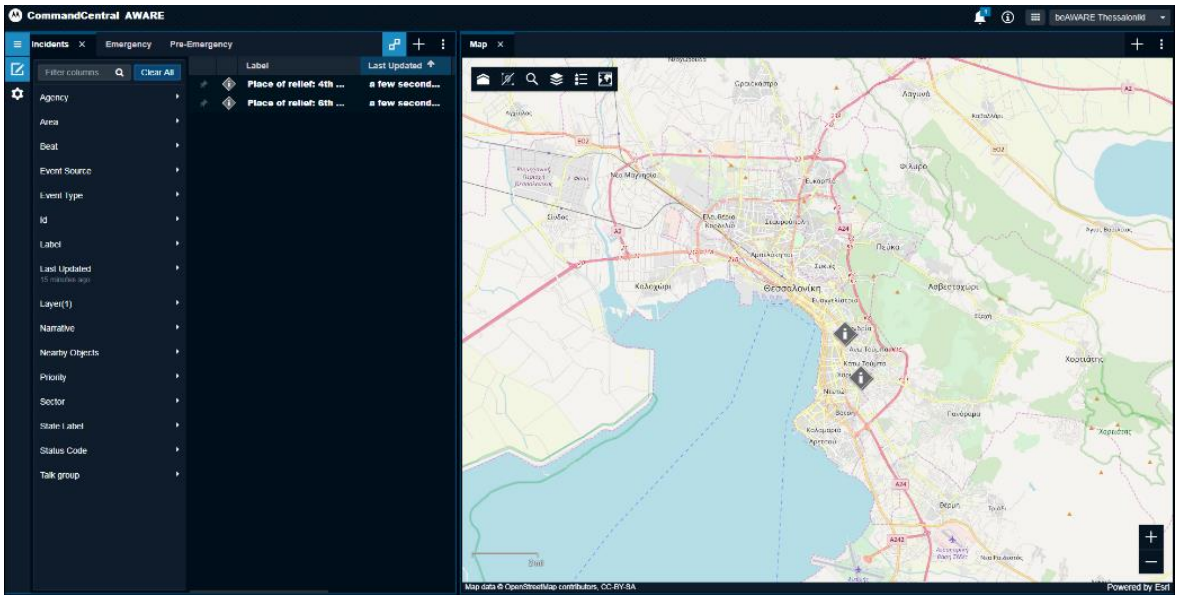


Figure 29:PSAP's event map illustrating the Two places of relief.

STEP 3:

beAWARE system starts collecting and combining heterogeneous data from several resources such as social media, visual and audio input from rescuers or people in danger.

Most interactions with the platform are triggered through the map-based mobile application. Each report sent by the application can contain photos, videos and audio recordings as well as a textual description.

Moreover, incoming data to the platform can originate from other sources such as social media pots grabbed by the system's social media live crawler.

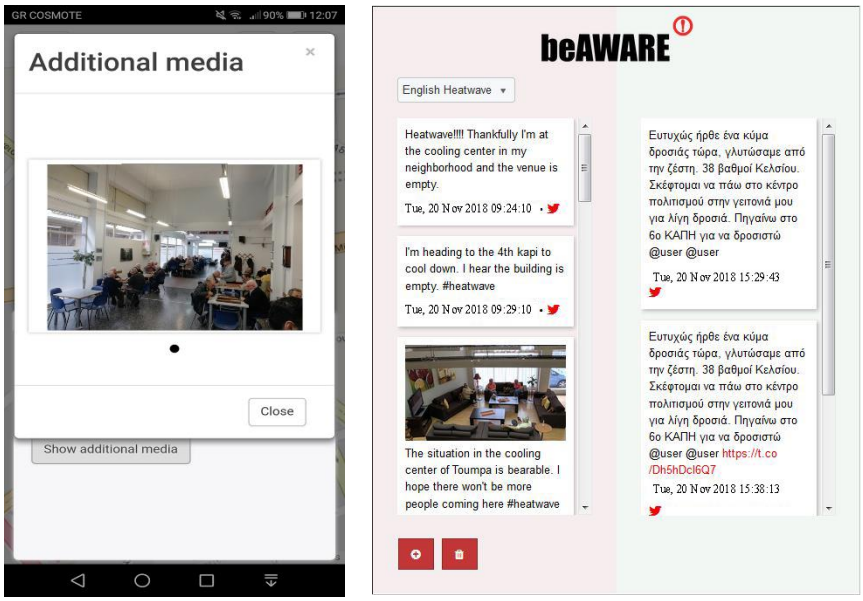


Figure 30:a) Interface for generating an incident report. b) Social media live crawler

In this second phase, the reported incidents are referred to the places of relief and the people that are looking for shelter to get protected from the heatwave. The participants were instructed to use their mobile devices to send reports that simulate the described scenario as if they were actually experiencing the story.

Outcome

STEP 1:

All public authorities, agencies related to the heatwave were instructed to be on alert through the mobile application. The following alert was issued to advise internal stakeholders on the implementation of specific unit actions:

Due to the imminent heatwave apply em ops plan "XENOKRATIS"

STEP 2:

The public is advised to stay at home, in cool areas or seek shelter to air-conditioned places. Specific instructions are sent through the mobile application to the public to inform which shelters are open and how to access them.

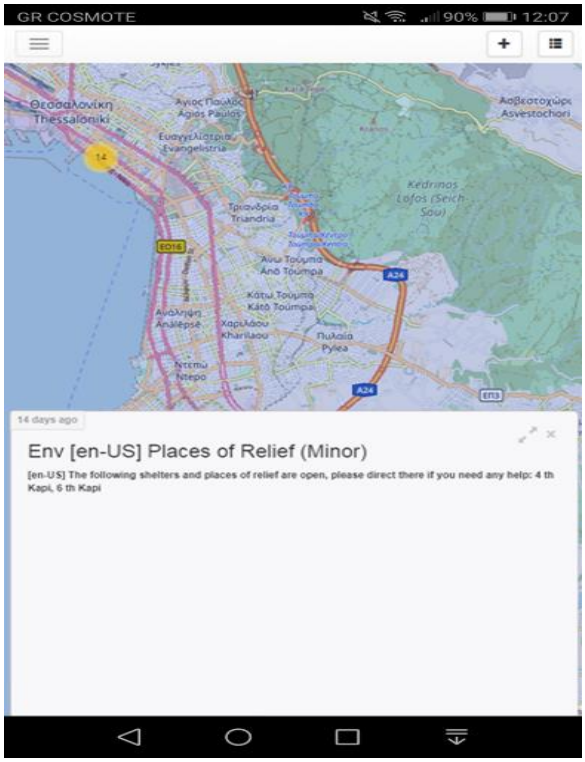


Figure 31: Example of a Public Alert received on mobile devices during the pilot.

The outcome in this step was the issuing of the following alerts from the Authorities:

The following shelters and places of Relief are open. Please head over there if you need any help: 4th Kapi, 6th Kapi.
Imminent Heatwave, please go to the nearest relief center.

STEP 3:

Information flows into the system from several resources such as users' reports and tweets grabbed from the beAWARE crawler and analysed by relevant components; Because beAWARE system gathers the incidents that are reported within a specific radius under a common spatial cluster, most of the reports sent in this phase from the place of relief have been clustered.

Outcome of the visual content

The Visual Analysis module analyses the visual content or reported incidents to extract conceptual information. The outcome of the analysis contributes to the detection of emergencies.

One of the modalities of the visual analysis tool is to find faces in indoor crowded places and to estimate the occupancy rate in shelters and places of relief.

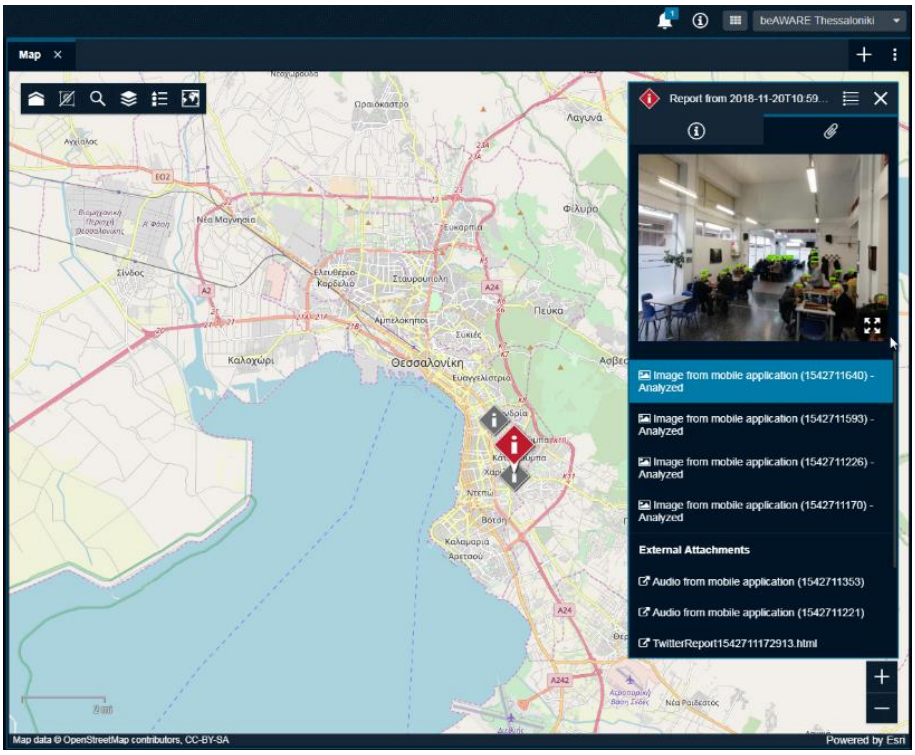


Figure 32: Cluster report from the place of relief, containing 4 image reports, 2 audios and a twitter report all referred to the 6th KAPI cooling shelter.

Once the analysis component discovers relevant information within the visual material, metrics are generated and are sent to the dashboard to update the "Current Occupancy Rate" of the place of relief (Figure 33).

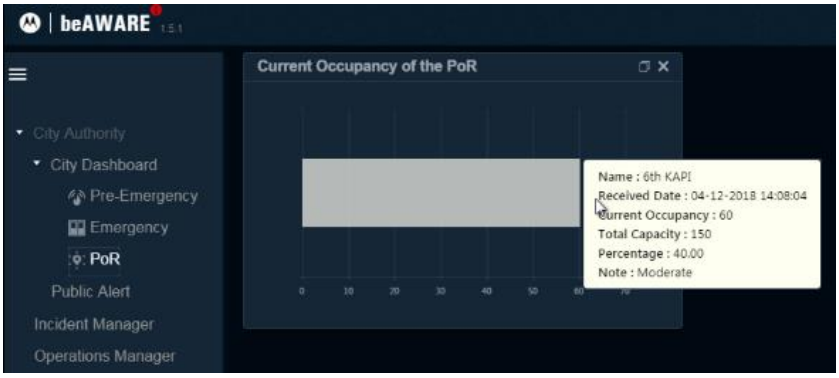


Figure 33: Current Occupancy Rate of the 6th KAPI. This information is generated automatically as result of the visual content analysis from the place of relief.

Outcome of the social media module

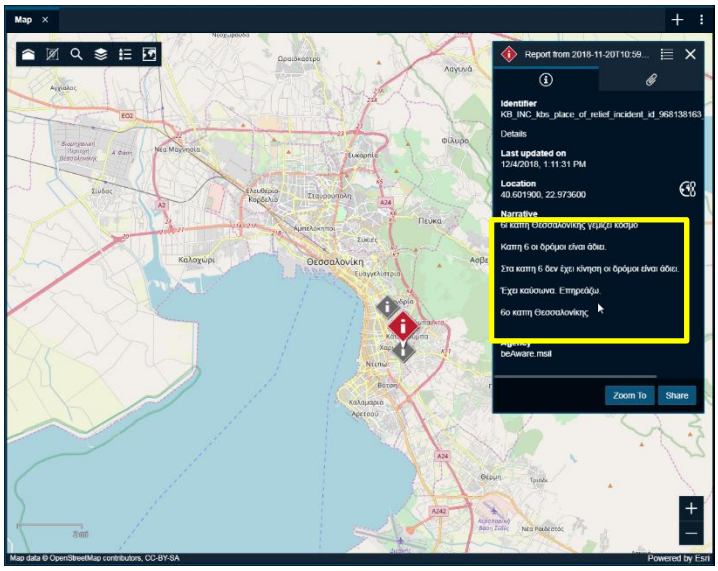
The live crawler collects relevant tweets that are published by citizens, civil protection organization or online news website.

Outcome of the automatic speech recognition module

The automatic speech recognition module selects the corresponding language model and creates the transcription of the audio message. The transcribed text is sent for further analysis to the Text Analysis Module.

General Outcome.

The beAWARE system gathers the incidents, which are reported within a specific radius under a common incident ID performing a proximity-based clustering. All the analysed information along with additional details, such as severity, timestamps, etc. are sent to the multilingual report generator to generate reports with a title and a description, as the summarization of the enumerated entitles. These values are integrated to the PSAP incident narratives, enriching the initial report with further information (Figure 34).



Narrative
1) A cooling shelter named "6th KAPI" is announced
2) Heatwave is reported
3) The streets around the 6th KAPI are empty and it is easy to access.
4) The 6th KAPI has started to filling-up with people

Figure 34: Cluster report from the place of relief.

In this step, the Authorities issued the following instructions:

Easy access to 6th KAPI. Road are open, availability at 80%
Status update 74 places available in 6th KAPI
Follow the pin point on the map to direct to the nearest cooling shelter.

6.4.3 Session C (1) : "Monitor the power outage situation and the traffic jam produced"

Description

Due to the extreme temperatures, the extensive Air Conditioning usage and the extreme electricity consumption the electrical supply system is overcharged and an electrical blackout occurs causing multiple traffic jams.

HRT call center receives numerous calls reporting traffic congestions on various streets from end users and citizens.

Trigger

In this phase, the participants were instructed to send reports that simulate a traffic congestion to specific locations in the city by distributing videos, images, tweets or text reports through their mobile phone about roads condition, problems with the traffic lights or traffic collisions.

Outcome

In this phase it is highlighted the monitoring that beAWARE platform provides regarding traffic congestions in urban road network that are produced due to a simulated electrical blackout.

The visual analysis module of the platform provides a mechanism to find and track impacted vehicles to deduce information about the severity of traffic congestions. The results of the analysis are verbalized through the multilingual report generation module.

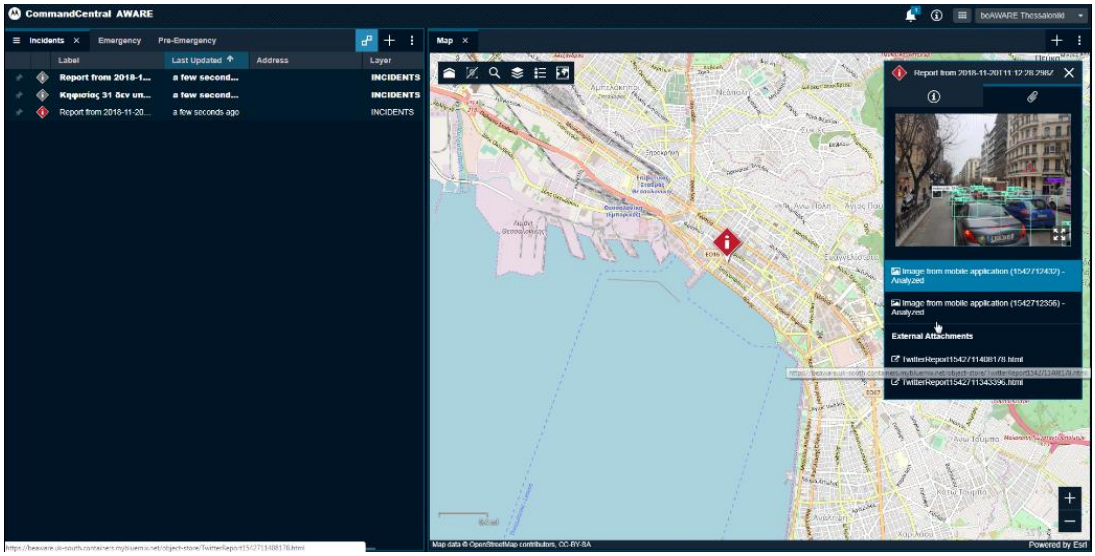


Figure 35: Incident report from Tsimiski street, containing 2 image reports and 2 twitter reports.

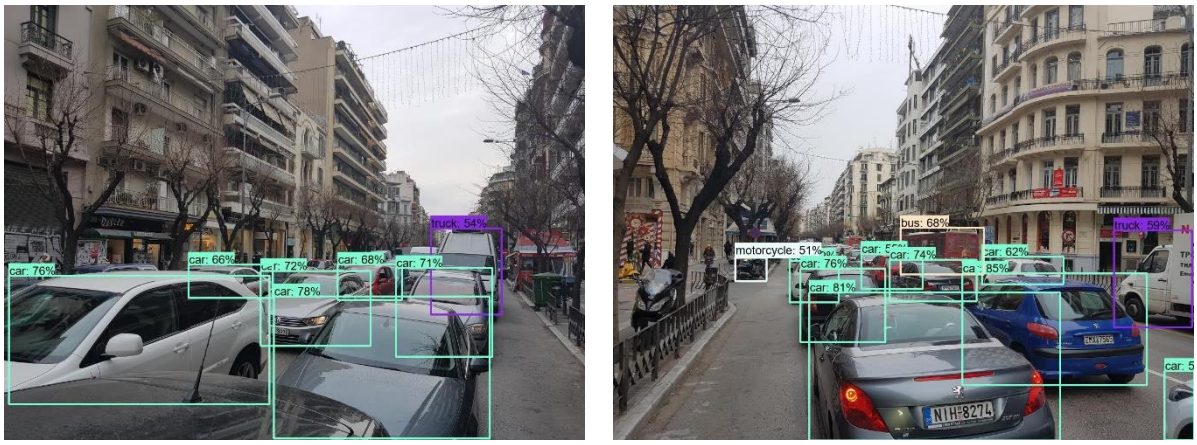


Figure 36: Analysed images illustrating traffic collision in Tsimiski Street.

Likewise, before beAWARE Social Media Analysis module crawls continuously social media content classifying the relative to the heatwave pilot Twitter posts. Relevant tweets are forwarded for further textual analysis. The beAWARE platform assembles information from tweets and other reports and notifies the PSAP.

An example of output provided by the Social Media Analysis module is the Tweeter report in the following picture. The translation of the illustrate tweets is the following: 1) Traffic congestion close to Aristotelous square. #heatwave 2) The traffic lights are off around Aristotelous square. #high_temperatures

Η κίνηση έχει κολλήσει μπροστά στην Πλατεία Αριστοτέλους #καύσωνας #καιγόμαστε

Posted at Tue Nov 20 10:54:37 +0000 2018

Show on Twitter

Κίνηση στην Πλατεία Αριστοτέλους, χωρίς φανάρια #θερμοκρασία_ρεκόρ

Posted at Tue Nov 20 10:55:05 +0000 2018

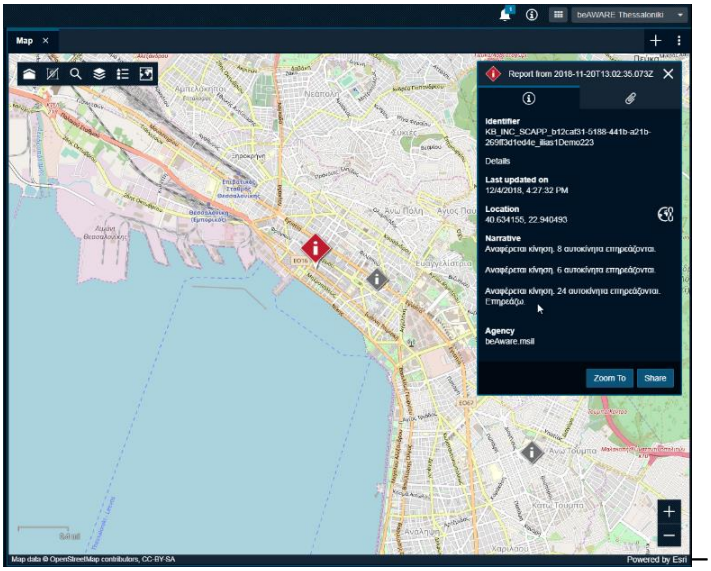
Show on Twitter

Nathan Valois
@nathan_valois
Follow

#THIS_IS_A_TEST #beawaretest Αν είστε με αμάξι, αποφύγετε την ΠΑΤ !! #καύσωνας

2:55 AM - 20 Nov 2018

Figure 37: Example of a twitter report contained in the cluster that is illustrated in Figure 35.



Narrative
1. Traffic is reported. 8 cars are impacted
2. Traffic is reported. 6 cars are impacted
3. Traffic is reported. 24 cars are impacted

Figure 38: The Narrative of the Incident report from Tsimiski street.

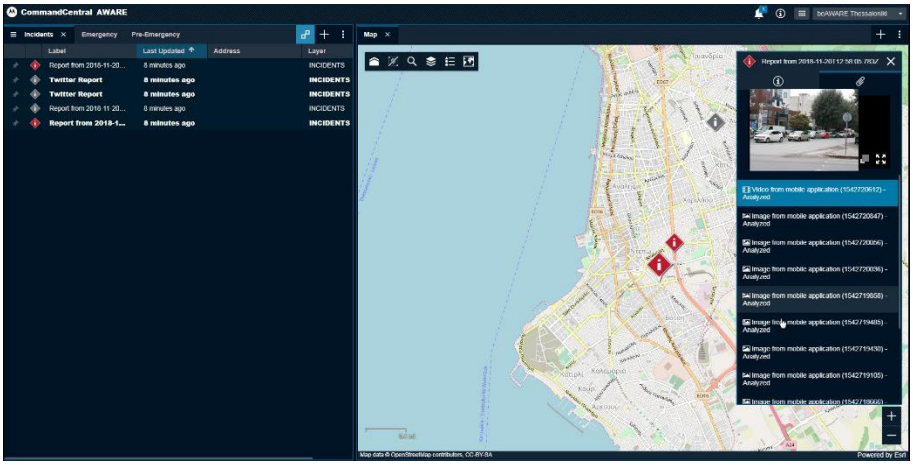


Figure 39: Incident report from Voulgari street.

In this step, the Authorities, after assessing the situation, issued the following alerts through the PSAP to the mobile applications of the stakeholders:

HIGH TEMP ALERT – Traffic Jam in Tsimiski street.
Increased traffic in Voulgari Street with direction to SW
Power outage in Touba region.

6.4.4 Session C (2) : “Fade Out”

Description

Gradually, the phenomenon is managed, the temperature drops below 36 °C and the power is restored.

Trigger

The Crisis Classification module acquires continuously weather observations to classify the crisis level. To simulate this phase a set of artificial weather data were fed into the module to generate a de-escalation process.

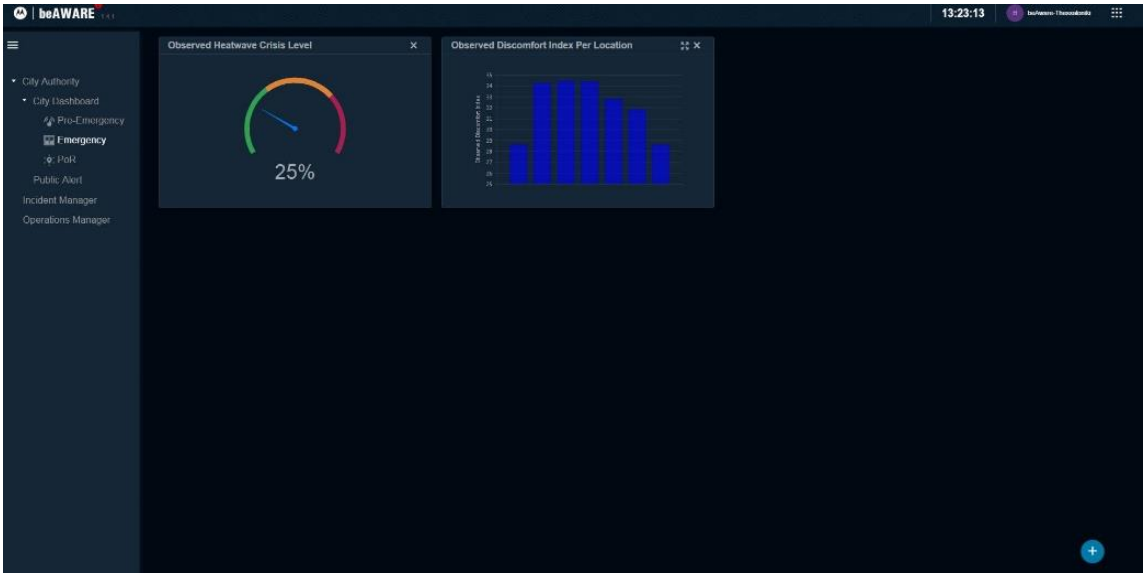


Figure 40:De-escalation of the heatwave

Outcome

In this phase, authorities removed the alert by sending a public message through the beAWARE platform:

Progressive de-escalation of the heatwave emergency. significant temperature decrease is expected in the next hours.

To summarize all the outcomes the following table presents the detailed storyline.

Description	Legacy tools	beAWARE	Trigger	Expected behaviour	Players	Observers - Evaluators	Evaluation
Session A - Pre crisis GOAL: early warning, understand the problem, send the first alerts							
According to the weather forecast there is an estimate that a severe heatwave is coming in 3 days.	Email, phone call, VHF	Crisis classification -> PSAP o forecast data o highest temperature value o Average value from 4 places	Crisis Classification run	See all the metrics and decide if there is a heatwave or not	3 PSAP operators (these roles will be there the whole time of the pilot in all sessions)	4 PSAP (these roles will be there the whole time of the pilot in all sessions)	
Authorities are issuing a warning informing the general public, public authorities and first responders to be prepared for high temperatures for the next days.	Email, phone call, VHF	Public alert -> mobile app		Send three alerts • Message for public • Message for authorities • Message for first responder	4 end users with app 4 citizens with the app	2 in each team (total 4) 2 in the citizens group	
General instructions are given to the general public through the press, social media and public releases.	Email, phone call, VHF	Public alert->mobile app		More specific instructions based on location and age group are given through the beAWARE mobile app base on age location	4 end users with app 4 citizens with the app	2 in each team (total 4) 2 in the citizens group	
Session B - Traffic Jam GOAL: understand the status of the heatwave, the problem of the electrical supply and the streets that are blocked							

Description	Legacy tools	beAWARE	Trigger	Expected behaviour	Players	Observers - Evaluators	Evaluation
The day of the heatwave starts with 39°Cat 11.00 AM. The alert system changes to yellow. All public authorities agencies related with the heatwave are in a state of alert.	no extra information	Crisis classification -> PSAP o forecast data o highest temperature value o Average value from 4 places	Crisis Classification run	See all the metrics and decide if there is a heatwave or not	3 PSAP operators (these roles will be there the whole time of the pilot in all sessions)	4 PSAP (these roles will be there the whole time of the pilot in all sessions)	
The day of the heatwave starts with 39°Cat 11.00 AM. The alert system changes to yellow. All public authorities agencies related with the heatwave are in a state of alert, and a dedicated warning is issued by the beAWARE platform to all its users.	Email, phone call, VHF	Public alert->mobile app		All public authorities agencies related with the heatwave are in a state of alert, and a dedicated warning is issued by the beAWARE platform to all its users.	4 end users with app 4 citizens with the app	2 in each team (total 4) 2 in the citizens group	
At 12.30 PM the temperature rises to 42°C. Due to the extreme temperatures and extensive AC use, the electrical supply system is overcharged and there is a power outage.	Call	Mob app, text report	inform them about the black out	End user send a report	2x(2 end users in the field)	2 observers with them	

Description	Legacy tools	beAWARE	Trigger	Expected behaviour	Players	Observers - Evaluators	Evaluation
	Email, phone call, VHF	Public alert->mobile app		The alert system changes to orange. The first responders are notified on the first cases that need to intervene through the platform and VHF	4 end users with app	2 in each team (total 4)	
Due to the power cut, the roads are blocked with heavy traffic. The places of relief are beginning to accept people who are seeking shelter there.	Email, phone call, VHF	Public alert->mobile app	Inform the authority that the places of relief are open	The public is advised with updated instructions through the beAWARE mobile app and guided to the nearest place of relief.	4 citizens with the app	2 in the citizens group	
• At 14.30 the temperatures rises further to 45°C. The alert system is upgraded to red. The authorities issue a warning through press releases, mass media and through posts on social media accounts.	Email, phone call, VHF						
	Email, phone call, VHF	mob app report 4 images 4 videos from the street	inform them when to send the reports (every 5 minutes)	report about the traffic	2 end users in the field	2 observers with them	

Description	Legacy tools	beAWARE	Trigger	Expected behaviour	Players	Observers - Evaluators	Evaluation
	Email, phone call, VHF	Public alert->mobile app	Inform the authority the places of relief are open.	Due to the power cut, the roads are blocked with heavy traffic. The places of relief are beginning to accept people who are seeking shelter there. The platform notifies the public of the nearest available location.	4 citizens with the app	2 in the citizens group	
Session C - Place of relief							
At 14.30 the temperatures rises further to 45°C. The alert system is upgraded to red.	Email, phone call, VHF	Public alert->mobile app		The public is advised through the beAWARE platform and mobile app to stay at home, in cool areas or seek shelter to air-conditioned places.			
			The call centers of public authorities are receiving numerous calls of elderly with health people who are stuck in their houses without AC and elevator, and require immediate attention.				

Description	Legacy tools	beAWARE	Trigger	Expected behaviour	Players	Observers - Evaluators	Evaluation
All the main roads are blocked due to the jam and lack of traffic lights.							
Some of shelters are beginning to arrive to the critical 80% of capacity and specific		social media	live tweets				
Some of shelters are beginning to arrive to the critical 80% of capacity and specific		social media	dataset				
Some of shelters are beginning to arrive to the critical 80% of capacity and specific	Email, phone call, VHF	Mob-app		Reports from shelters with images and videos			
specific instructions are sent through the beAWARE mobile app to the public to show which relief place is still open and easier to access	Email, phone call, VHF	Public alert->mobile app		specific instructions are sent through the beAWARE mobile app to the public to show which relief place is still open and easier to access			
Session C(2) - fade out							

Description	Legacy tools	beAWARE	Trigger	Expected behaviour	Players	Observers - Evaluators	Evaluation
Report from the team in the field	Email, phone call, VHF	Public alert->mobile app		Using the analysis with media from traffic of the platform and by notifying the public to avoid taking cars, the traffic is progressively decreasing in the road and by 16.00 the roads are clearer. The temperature for the first time drops to 43°C.			
Gradually, the phenomenon is managed, the temperature drops below 36 °C, power is restored and people return to their homes from the shelters. Nevertheless, to the weather forecast for the next days, authorities are on alert to manage any event that might rise during the duration of the phenomenon.	Email OR phone call OR VHF	Crisis classification -> PSAP o forecast data o highest temperature value o Average value from 4 places	Crisis Classification run				

7 Observation sheets

The observation sheets collected the feedback and notes taken by the 'observers' in each of the six session in which the pilot was divided. Every 'observer' was assigned to a specific type of 'actor' (i.e. there were some observers in the control room, some others who followed the first responders teams) with the aim to take note of every task performed, its timing and the problems occurred, **without any direct interaction with the 'players' or with the beAWARE technology**; the observers were also required to add any useful comment about the experience of the 'players' with the beAWARE technology.

The goal of the observer is to provide both qualitative and quantitate information taken during the pilot and that can help to compare the sessions executed with the legacy tools with the ones performed with the beAWARE-platform.

Before the pilot, each 'observer' was provided with 6 different observation sheets:

- Observation sheet for session 1 with the legacy tool
- Observation sheet for session 1 with beAWARE
- Observation sheet for session 2 with the legacy tool
- Observation sheet for session 2 with beAWARE
- Observation sheet for session 3 with the legacy tool
- Observation sheet for session 3 with beAWARE.

Each of these sheets was composed by two sections:

- Part 1, which contains a general expiation of what were the expected events for each session, the expected observation with and without beAWARE, an indication about the key indicators. These contents are the same for each of the six sheets. As explained in this section, as well as during the training, the observers had to be taken notes not only of tasks like 'send a report' or 'receive a forecast', but also about the time required to the 'actors' to understand what was happening or to take a decision based on the available information.
- Part 2: a blank table when the 'observer' had to indicate what are the tasks and actions he/she recognized during the pilot, the time required to the 'player' to accomplish them (starting local time, ending local time, total time), if there are any useful comments related to the execution of that task.

Each 'observer' had compiled the observation sheets according to his/her assigned position during the pilot; two different type of sheets have been provided: the ones about the control room, the others about the teams 'on the field'. An example-form of an observation sheets (valid for all sessions) is presented below:

Table 8. Observation sheet part 1

Main expected events and processes :	**Expected observations with legacy tools:**	**Expected observations with beAWARE solutions:**	**Related key Performance Indicators:**
• Alert reception • Location of the event • Understanding of the type of event • Decision to dispatch first means • Identification by Incident Commander of Ignition Point • Location by Incident Commander Field Command Post and Transit Point	• Time of alert reception • Time of creation of the event in legacy tool • Time of dispatch decision • Process of the information • Difficulties to understand information/additional clarifications requested	• Log Time of alert reception • Time of alert reception • Time of creation of the event in innovative solutions • Time of dispatch decision • Process of the information • Difficulties to understand information/additional clarifications requested compare info with the call description.	• Accuracy of the information (understanding of the information received/provided) • Time of receiving and sending information's • Number of clarifications requested

Table 9. Observation sheet part 2

Time	From	To	Action	Comment

8 Evaluation based on the results of the observations sheets

After the pilot, the observation sheets had been collected by HRT, who also translated them (in case of sheets written in Greek) and summarized the main relevant contents, which are going to be reported and discussed in this chapter.

It should be noticed that, although the observation sheets contained specific columns to indicate the timing of each performed action, usually the 'Observers' found very difficult to provide this information. As emerged from the discussions in the debriefing session, during the pilot a lot of actions happened in rapid succession or even in contemporary; so it was very difficult for the 'observers' to take note of all of them and of their timing, in particular for the non-Greek 'observers', who often required a translation to understand what was happening, as the most of the interactions were performed in the end users' mother tongue.

As consequence, the 'observers' provided useful 'qualitative' comments and observations about what was the current situation or the behaviour of the 'actors', but very few 'quantitative' information about the timing of the performed actions.

For that reason, a comparison of the sessions in terms of the timing was quite difficult; the evaluation had thus been based on 'qualitative' criteria, obtained from the comments reported by the 'observers' in their sheets.

8.1 Report of the observation regarding the tasks performed in the control room

8.1.1 Session A

With the legacy tools, there was a very good organization for the execution of the plan, each person knew what to do and completed the tasks. However, there were many difficulties with VHF communication with the teams inside the small streets and inside the relief place. The majority of the discussions between Control room operators were in Greek.

Repeating the session with beAWARE, initial problems occurred with the interface of the platform for all participants. After a few minutes, they familiarized with the system.

8.1.2 Session B

During the session with the legacy tools, the control room operators received too many phone calls and emails at the same time, having thus difficulties to manage them. Due to this rapid succession of actions, for some observers was very difficult to understand exactly the sequence of incidents occurred.

Moreover, the radio communications were affected by heavy interferences and small delays with the e-mail were noticed too.

8.1.3 Session C

During the session executed with the legacy tools, the observers noticed initial problems understanding each one their role and which equipment and platform they will use to communicate with rescue teams and citizens.

There were also problems in communicating with the first responders teams, such as bad telephone signal and interferences in the VHF.

With the support of beAWARE, the session went quite smooth, however some of the observers reported small problems with the platform's ontology. Some delays for the visual representation of the incidents were noticed too.

The session C, when repeated with beAWARE, was quite smooth, although some observers reported the same small technical problems reported in the session B.

8.2 Report of the observations regarding the tasks performed by the rescue teams

8.2.1 Session A

During the legacy-tools session, the use of VHF inside the city was sometimes problematic. There were also some internet connection issues, especially in small streets and inside the relief place (6th KAPI). Moreover, there were some telephone delays and misunderstandings with the received emails.

When the session was repeated with beAWARE, the same Internet difficulties and connectivity problems were observed in small streets and inside the relief place. Moreover, it had been noticed that some users had low reaction speed and some incidents had not be read.

8.2.1 Session B

During the session with the legacy tool, the use of VHF inside the city had been problematic in some areas. There were also some internet connection issues, especially in small streets and inside the relief place (6th KAPI). Moreover, there were some telephone delays and misunderstandings with the received emails. Some small problems were reported from inside the relief place as well as major difficulties in communication with the teams inside and outside the relief place. Many delays had been observed with the phone calls

The issues noticed during the session with beAWARE were similar to the ones reported for the session B. More in detail If there were two different active applications at the phone, this caused some delays uploading the images, video etc.

Some Difficulties were also noticed when the users sent images, videos etc at once, mainly due to the bad internet connection. When a pop-up message arrived at a social media app (messenger, viber, etc.), the active procedure that was occurring in beAWARE mobile app was freezing or stopping it.

It was finally observed, that some participants needed more time for training for the beAWARE app.

8.2.2 **Session C**

During the execution of the session without beAWARE, the observers reported bad telephone signals and many problems and interference with the VHF.

The observers assigned to one of the teams noticed that the control room operator delayed in answering to a phone call from one of the rescuers for up to 25 seconds.

When the beAWARE technology was used, the observers noticed that, when there were two different active applications at the phone, some delays occurred in uploading the images, video etc. Moreover, some users who had other social media app for instant messaging, like the application Messenger(https://www.messenger.com) or Viber (https://www.viber.com) already installed in their device, noticed that, when a pop-up message arrived to one of these applications, the active procedure that was occurring in beAWARE mobile app was freezing or stopping it.

It was finally observed, that some participants needed more time for training in the beAWARE app usage.

8.3 **Conclusions emerged from the observation sheet**

During the pilot, many problems had been observed concerning the communication with legacy tools, in particular inside the places of relief and in the narrow streets, due to interferences and bad signal; however, the weak internet network in the shelters sometimes affected also beAWARE mobile app, causing delays when the ‘first responders’ and ‘citizens’ tried to send incident reports and various multimedia.

Globally, it had been noticed that all the ‘actors’, both the control room operators and the rescue teams, had some initial issues with the platform, while they were obviously highly experienced in the use of the legacy tools. However, after these initial problems, most of the

end users got accustomed to the beAWARE tools quite quickly, although it was clear that some of the 'actors' on the field would have benefited from more in-depth training with the mobile app.

The two emergency sessions, in particular regarding the action performed in the control room, went smoother when executed with beAWARE, compared to the legacy tools. In fact, beAWARE supported the Control room operators in understanding and managing the numerous incidents, which arrived in rapid succession or at the same time, providing an ordinate and intuitive list of them and showing their location on the map. Instead, with the legacy tools - despite of the great familiarity of the operators with this kind of communication devices – sometimes it was very difficult for the Control room operator to manage so many mails and calls at the same time. Moreover, when using the legacy tools, the control room operator had to pay particular attention to understand correctly the location of the calls, while often communication problems occurred in the meanwhile and the many interferences required to ask to the speaker to repeat his/her position; instead, the location was one of the information automatically provided by beAWARE for each incoming incident report and multimedia sent with the mobile app.

Finally, some technical issues and small bugs emerged during the sessions executed with beAWARE. In detail: there had been noticed some interference between the beAWARE app and other users' social media app installed in their devices; some delays occurred when many users tried to upload images, video and recordings with their mobile app at once. Some lag times in updating the PSAP's event map were also noticed by the observers in the control room.

9 Questionnaires

After the pilot, a questionnaire was sent to all 'observers' and 'players' about various topics, starting from the organization of the pilot itself, to the functionalities of the 1st prototype that have been tested.

The creation of this questionnaire followed the criteria and guideline expressed in the D2.2, adapting the basic structure proposed here to the heatwave pilot.

For each of the questions, a rating scale is provided: the user has to indicate (with a cross in the respective box) how much he/her agrees with a certain statement or how much he/her rates a specific functionality of the system. Moreover, for the most of these questions, the user can insert a comment to explain his/her rating.

Here is briefly explained the structure of the questionnaire.

Part 1 - Explanation of the questionnaire. This part provided general information about how to answer the proposed questions, the goal of the questionnaire and how the Consortium will use these data:

"This questionnaire is used to collect data based on your participation and observations during the pilot.
All participants involved in the Trial are given the opportunity to complete this questionnaire. The results of the completed questionnaires will be collated and will be used to support evaluation of beAWARE.
Within the questionnaire, you will first be asked to fill in personal information, and to answer questions about the Trial.
There are no right or wrong answers.
Participating in this questionnaire is voluntary. You do not have to answer any questions you do not wish to answer, and you may cease to participate at any time.
Your responses to this questionnaire will be used for beAWARE research work which ultimate objective is to improve preparation and response to crisis events.
Your responses will remain confidential and data will always be presented in such a way that your identity cannot be connected with specific published data.
Shall you have any question, please ask the questionnaire administrator."

Part 2– Personal information. In this part are asked the following questions to the end users:

- *What is your professional background?*

☐ Crisis management ☐ Rescue service or Responder ☐ Research ☒ Technical/Technology

☒ Other, please indicate……

- *How many years of professional experience do you have:*

☐ 1-5 years ☐ 5-10 years ☐10-15 years ☐ More than 15 years

- *What is your Nationality?* _____
- *Gender*

☐ Male ☐Female

- *Age range*

☐< 30 ☐31 – 40 ☐ 42 – 50 ☐ 51+

- *How much would you agree with the statement that You have experience and knowledge regarding cross-border crisis management operations.*

☐ Strongly Agree ☐Agree ☐Neutral ☐ Disagree ☐ Strongly disagree

- *What was your role in the Trial.*

☐ Player ☐Observer ☐Other, please indicate……..

Part 3– Trial session: In this part is asked to the end user to indicate how much does he/here agree with some statement about the organization of the trial session. There are six possible ratings for every statement:

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Not applicable

The table below provided the full list of the statements that the users has to rate, for each of them he/her can insert a comment to explain his/her rating.

Table 10.List of Sentences to be rated in the part 3 of the questionnaires

The number of participants involved in the Trial sessions was adequate to the tasks, and to evaluate the solutions and their impact on the crisis management.
The background of participants involved in the Trial sessions was adequate to the tasks, and to evaluate the solutions and their impact on the crisis management.

The level of involvement of participants of the Trial sessions was adequate and enough to evaluate the solutions and their impact on the crisis management.
There were no organisational or logistics constrains (e. g. time management, infrastructure preparation) that influenced the quality and completeness of the Trial.
There were no external constrains (e.g. missing participants, emergency situation, technical breakdown, indisposition of key personnel) that influenced the quality and completeness of the Trial sessions.
The setup of the Trial was clear and every person involved in the Trial knew their role and responsibilities for all the activities organised.
The safety measures were adequately planned, explained and implemented during the Trial.
The Trial was conducted safely.
The scenario of the Trial was realistic (chosen hazard, its evolution and related cascading effects).
The injects from role players and the story telling were realistic.
Simulation helps in understanding the situation.
I am satisfied with the participation and conduction of the Trial.

Part 4– beAWARE: In this part is asked to the end user to indicate how much does he/she agree with some statement about the sessions of the pilot executed with beAWARE. There are six possible ratings for every statement:

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Not applicable

The table below provided the full list of the statements that the users has to rate, for each of them he/her can insert a comment to explain his/her rating.

Table 11.List of Sentences to be rated in the part 4 of the questionnaires

The Trial sessions scenario was adequate to evaluate the solution and its impact on the crisis management for **beAWARE.**
The technical setup of solution **beAWARE** was complete, professional and adequate to evaluate the solution and its impact on the crisis management.
How much do you agree with the following statements that an automated exchange of data between different IT solutions leads to: *- Less time needed for practitioners in their search for crisis relevant information.*
- Less time needed for practitioners to read data from one solution and entering data manually into another solution.
- Lower probability for wrong information caused by human errors while reading/entering data from/into a solution.
- More time for practitioners to define, communicate, execute and supervise crisis response actions.
- Higher quality of the crisis management outcome due to the time savings, better data quality and improvement of communication.

Part 5: in this section is asked to the end user answer the following questions regarding the functionalities performed via beAWARE platform or application during the pilot.

Table 12. Part 5 of the questionnaires

		Poor	Fair	Average	Good	Excellent
Project information on time	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Full overview of the platform / app	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Real time data on demand	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Clear Incidents and Reports on Screen	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Functionality of the components	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐

Real time Weather reports	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Instructions to the rescuers were clear	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Instructions to the citizens were clear	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
All icons and symbols are clear	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Navigation to main screen, browses menus etc	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Text, video, image and audio analysis is clear	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
Clear separation between legacy tools and beAWARE platform	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐
General picture of the beAWARE heatwave pilot	As observer	☐	☐	☐	☐	☐
	As participant	☐	☐	☐	☐	☐

Part 6: This section contains some questions regarding the functionalities performed via beAWARE platform or application during the pilot

Table 13. Part 6 of the questionnaires

Action	Q1 Did the user taken the correct action on?	Q2 [If Q1 = Yes] Did the user taken the right action in first attempt?	Q3 [If Q1 = Yes] Did the user ask for or receive assistance before identifying the right action in first attempt?	Q4 [If Q1 = No] Please describe the problem encountered by the user.
Log in to the platform / app	☐Yes ☐No	☐First Attempt ☐Tried other options first	☐Received verbal instructions ☐A beAWARE team member guided the user on computer	
Access main screen	☐Yes ☐No	☐First Attempt ☐Tried other options first	☐Received verbal instructions ☐A beAWARE team member guided the user on computer	
Access all menu with ease	☐Yes ☐No	☐First Attempt ☐Tried other options first	☐Received verbal instructions ☐A beAWARE team member guided the user on computer	
Send message to First Responders / Citizens	☐Yes ☐No	☐First Attempt ☐Tried other options first	☐Received verbal instructions ☐A beAWARE team member guided the user on computer	
Upload and send pictures, videos etc	☐Yes ☐No	☐First Attempt ☐Tried other options first	☐Received verbal instructions ☐A beAWARE team member guided the user on computer	
Check all components with ease	☐Yes ☐No	☐First Attempt ☐Tried other options first	☐Received verbal instructions ☐A beAWARE team member guided the user on computer	
General usability of the platform/app	☐Yes ☐No	☐First Attempt ☐Tried other options first	☐Received verbal instructions ☐A beAWARE team member guided the user on computer	

Part 7: This section contains some questions regarding the overall rating of the 1st prototype functionalities

Table 14. Part 7 of the questionnaires

	Poor	Fair	Average	Good	Excellent
Passing tasks assignments to participants	☐	☐	☐	☐	☐
Getting needed data and information from the system	☐	☐	☐	☐	☐
Informed on time about a potential or eminent change	☐	☐	☐	☐	☐

Part 8: Here are provided some blank sessions where is asked to the end user to indicate the list of the three major problems encountered using the platform and to provide any useful comment.

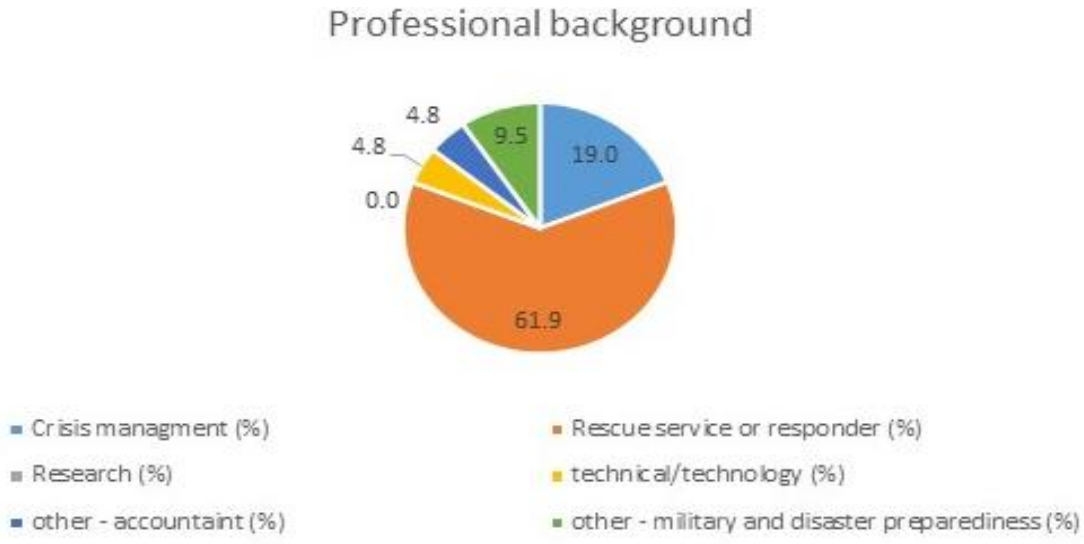
10 Evaluation based on the results of the Questionnaires

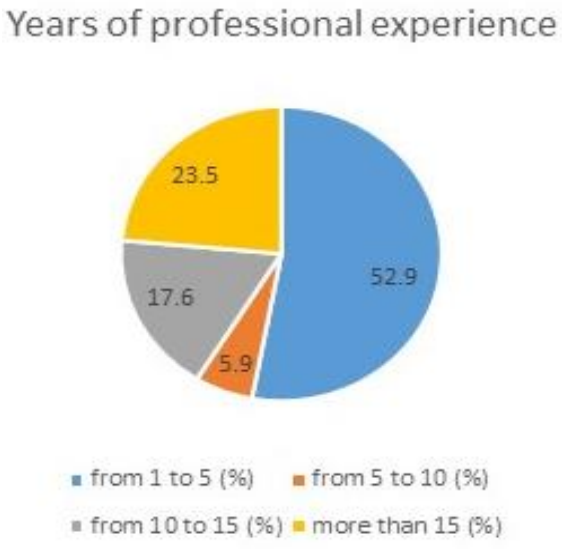
10.1 Results of the questionnaires

After the pilot, a total of 18 questionnaires was collected both from the 'observers' and 'actors'. The following part of this paragraph provides the percentage distribution of the answers provided by the end users for each question of the questionnaires.

Part 2– Personal information. In this part are asked the following questions to the end users:

Note: in some cases, multiple answers have been provided to the question about the professional background.





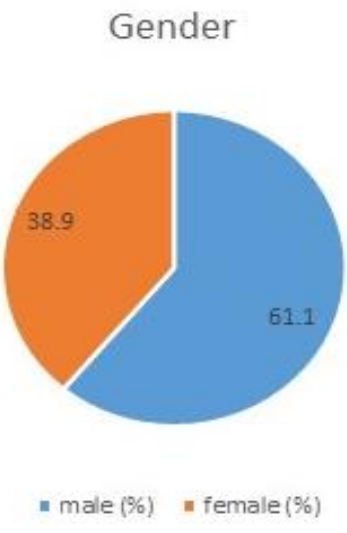


Figure 41:Result of the questionnaires – section 2 (first part)

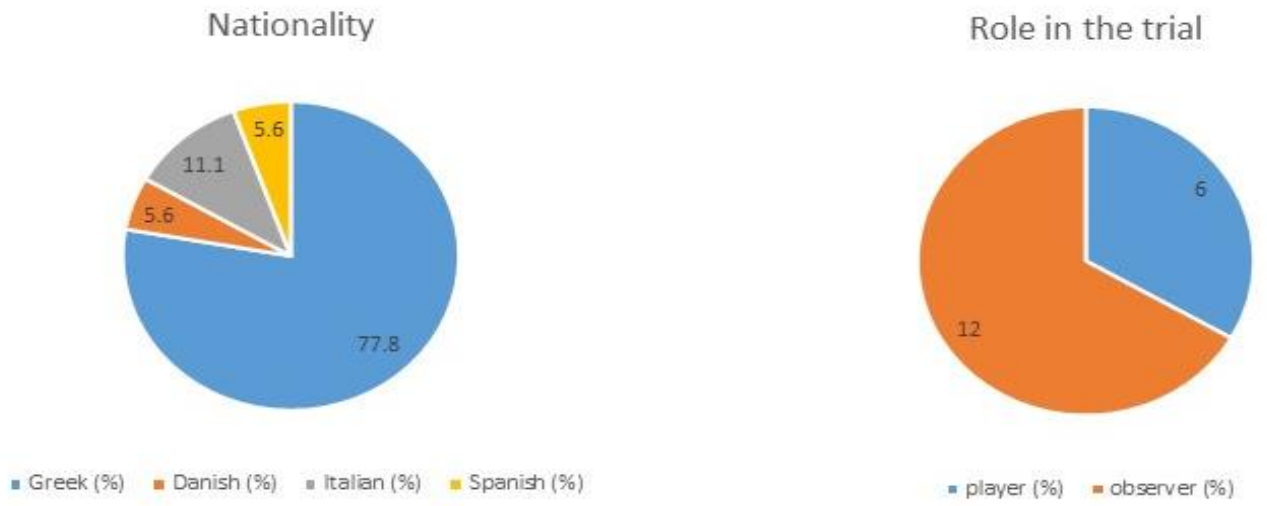


Figure 42:Result of the questionnaires – section 2 (second part)

Part 3– beAWARE In this part is asked to the end user to indicate how much does he/she agree with some statement about the sessions of the pilot executed with beAWARE

The following pictures show the result of the questionnaires in terms of cake diagrams, while the table below contains the list of all the comments added by the users to justify their answers; it should be notice that, even all the participants indicated their rating, only few of them provided written explanation to their answer.

Table 15. Justification and comment provided by the end Users to the question of the section 3 and 4 of the questionnaires.

Answer to which user provide justification	Justification/comment provided
The number of participants involved in the Trial sessions was adequate to the tasks, and to evaluate the solutions and their impact on the crisis management.	The number of participants were enough for accomplish the session, however involving more participant could have provide a more clear overview of the trial session
The background of participants involved in the Trial sessions was adequate to the tasks, and to evaluate the solutions and their impact on the crisis management.	It was clear that all the participant has a very strong knowledge about emergency management
The level of involvement of participants of	The number of participants were enough

the Trial sessions was adequate and enough to evaluate the solutions and their impact on the crisis management.	for the evaluation, however involving more participant could have provide a more clear overview of the trial session
The setup of the Trial was clear and every person involved in the Trial knew their role and responsibilities for all the activities organise	Maybe is needed some more training
The scenario of the Trial was realistic (chosen hazard, its evolution and related cascading effects).	The storyline for the trial was globally realistic, however the timing of some session was a little bit short
The injects from role players and the story telling were realistic.	It was globally realistic, more time to perform the sections and the storyline could have provide more reality
Simulation helps in understanding the situation.	It was a little difficult to understand because it was in Greek
The Trial sessions scenario was adequate to evaluate the solution and its impact on the crisis management for **beAWARE.**	It was globally realistic ,but more long sessions could have improved the evaluation

Figure 43: Result of the questionnaires – section 3 (first part)

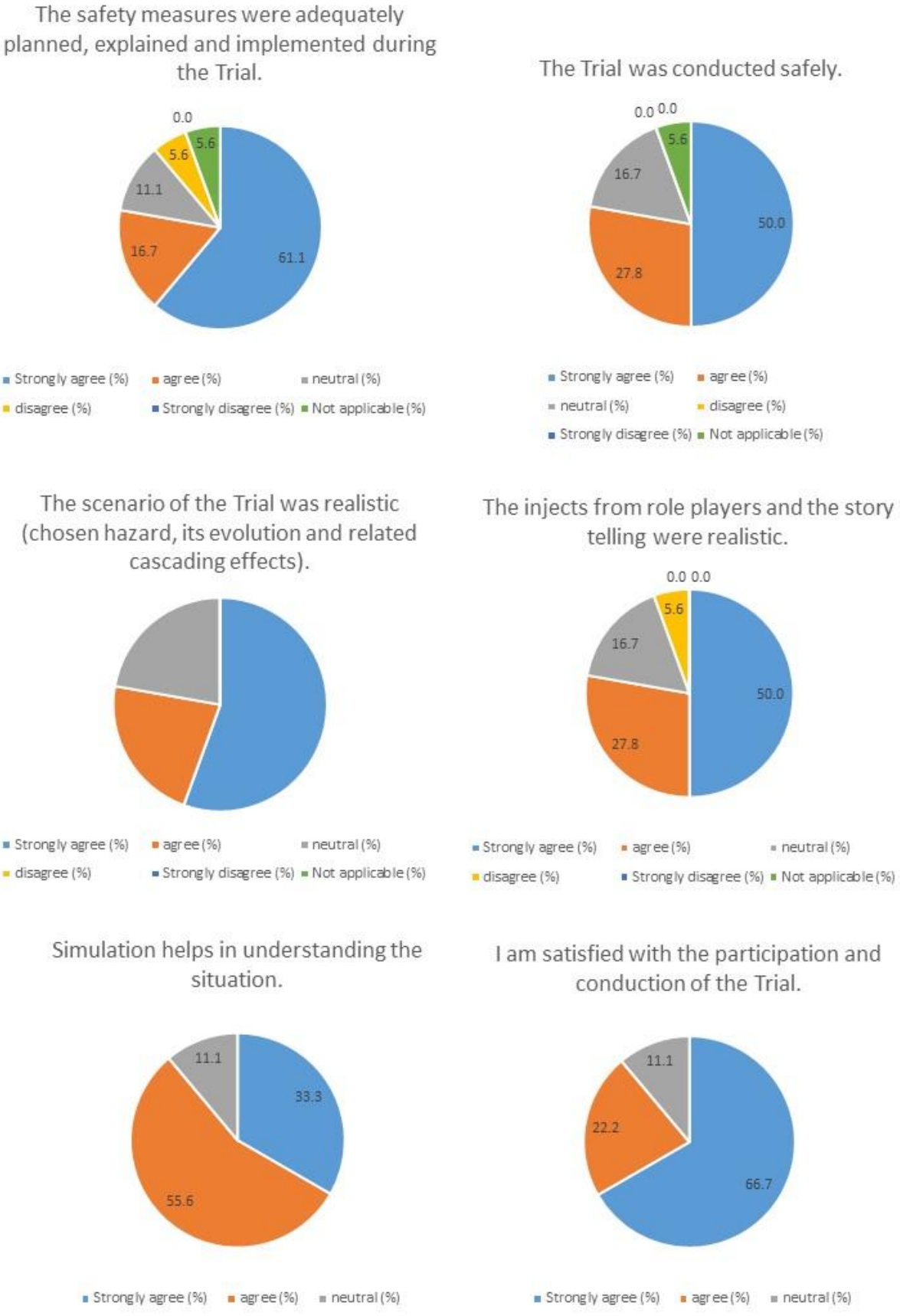


Figure 44: Result of the questionnaires – section 3 (second part)

Part 4– beAWARE In this part is asked to the end user to indicate how much does he/she agree with some statement about the sessions of the pilot executed with beAWARE.

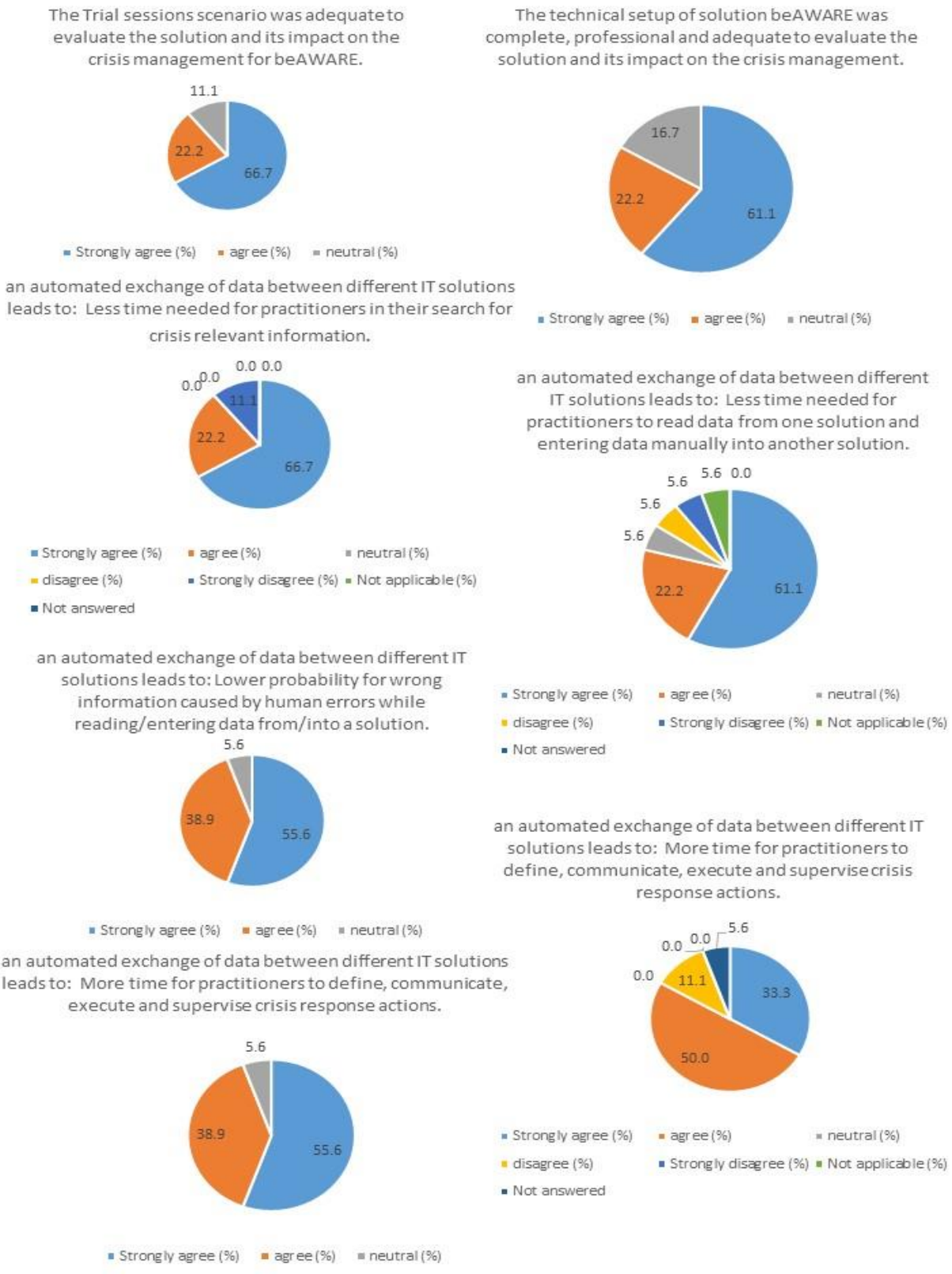


Figure 45: Result of the questionnaires – section 4

Part 5: in this section is asked to the end user answer the following questions regarding the functionalities performed via beAWARE platform or application during the pilot.

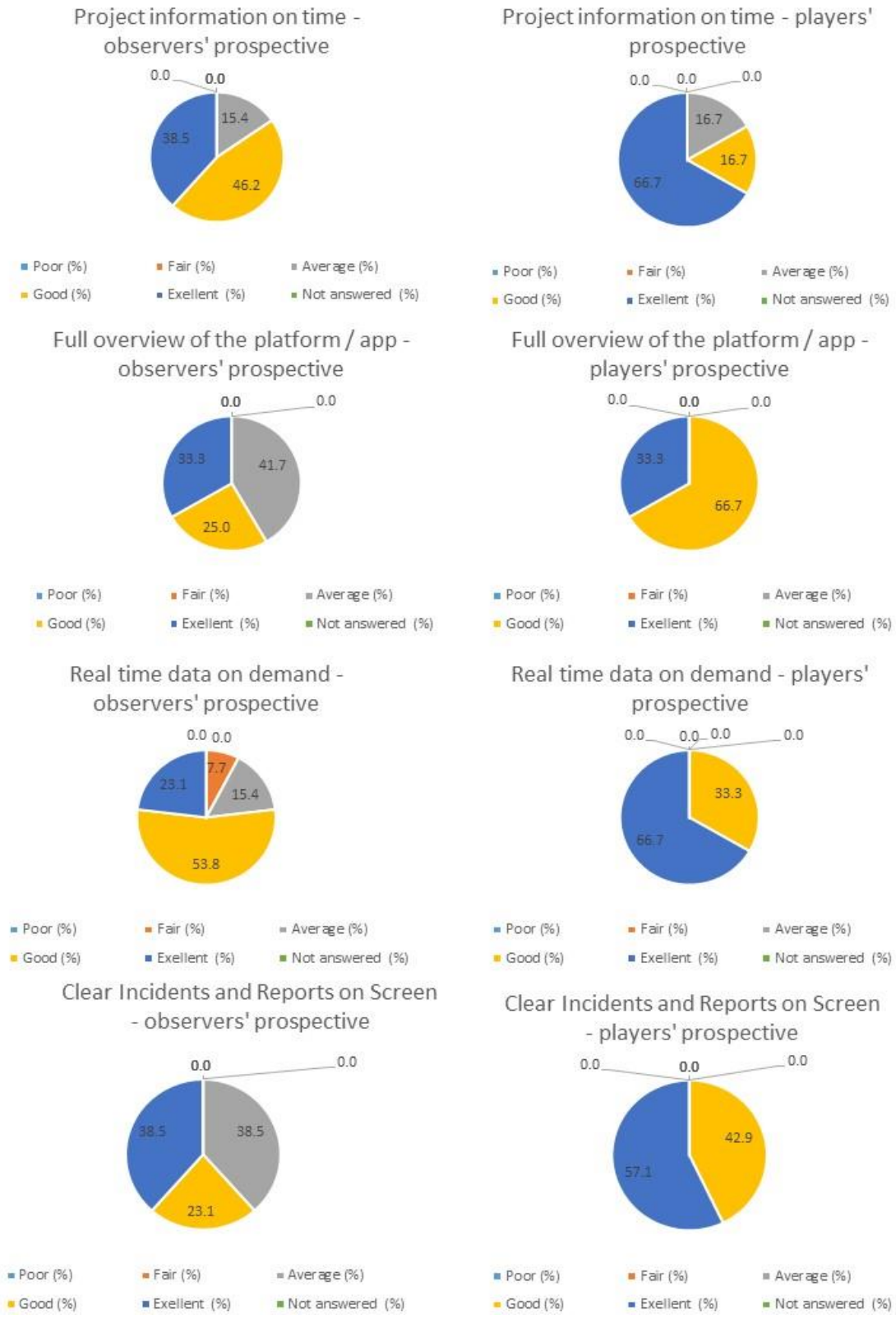


Figure 46: Result of the questionnaires – section 5 (first part)

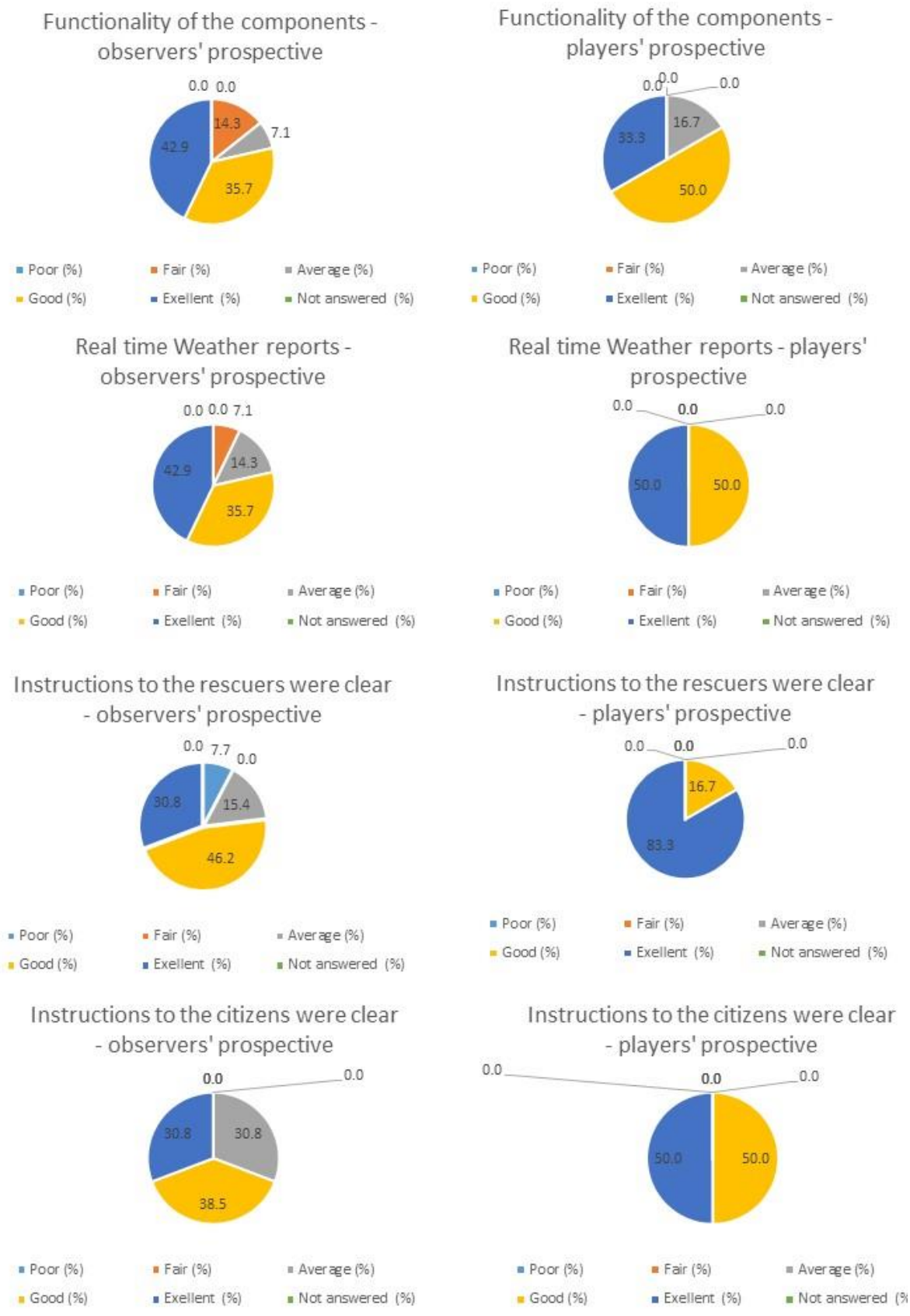


Figure 47: Result of the questionnaires – section 5 (second part)

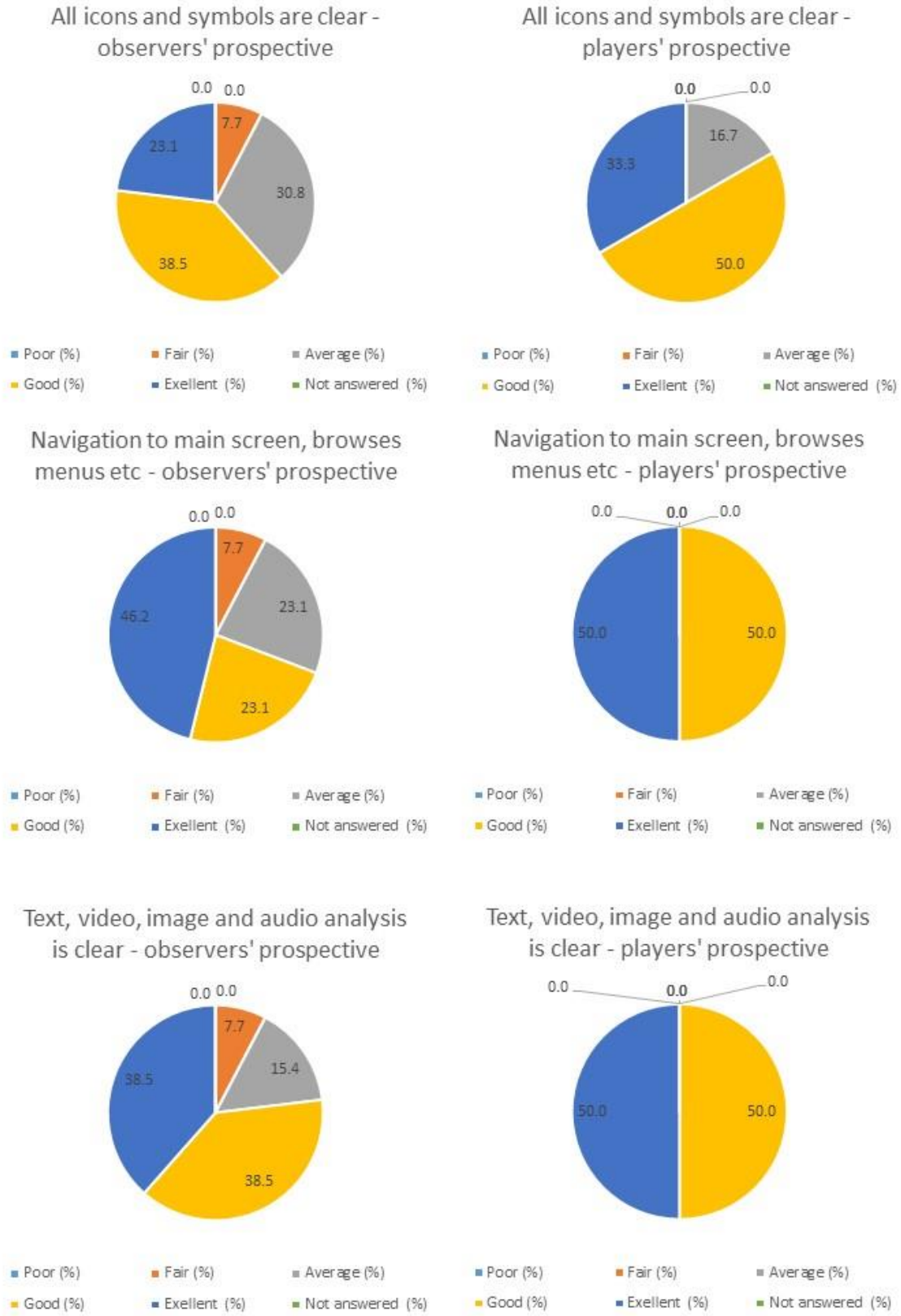


Figure 48: Result of the questionnaires – section 5 (third part)

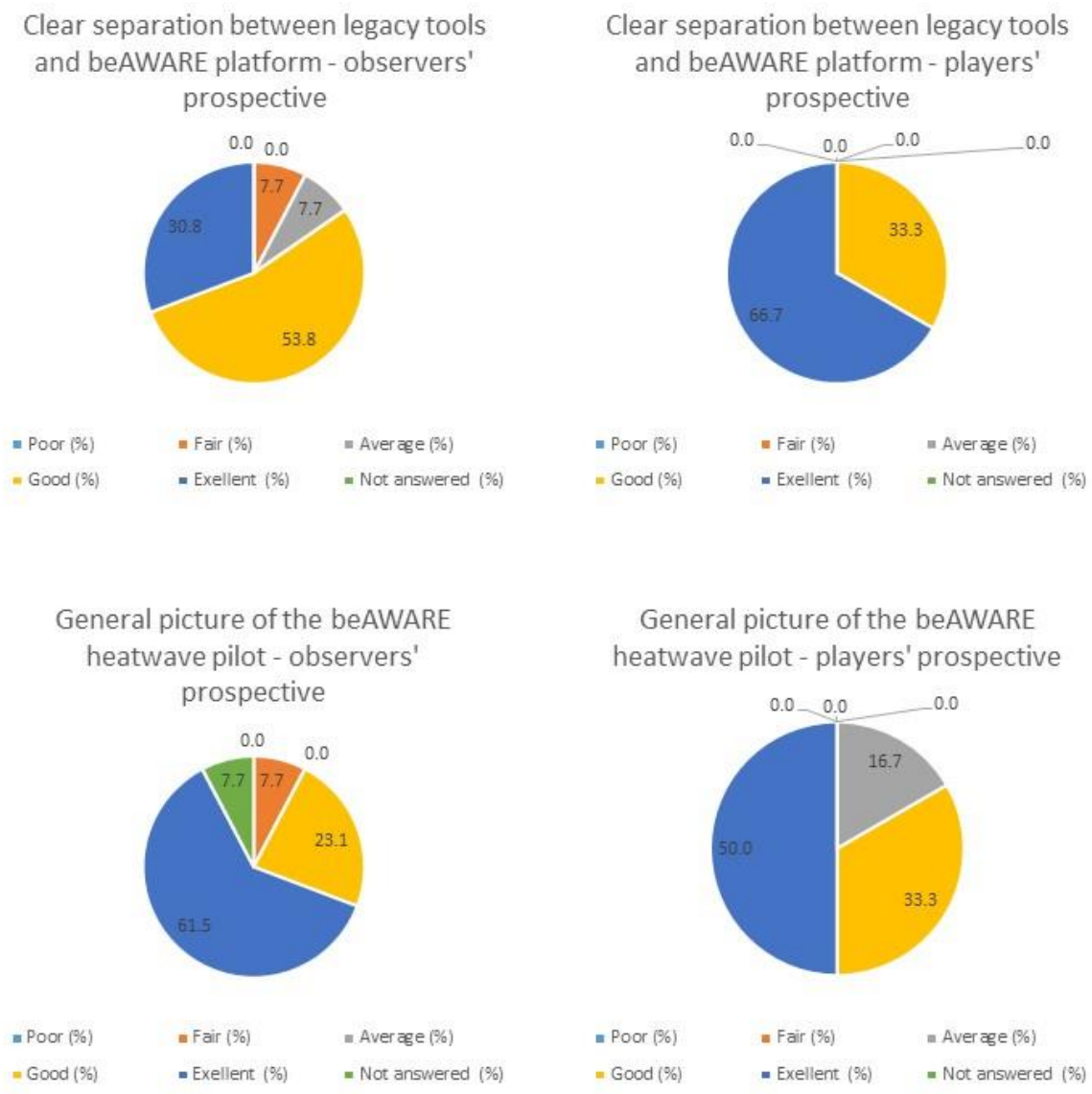


Figure 49: Result of the questionnaires – section 5 (fourth part)

Part 6: This section contains some questions regarding the functionalities performed via beAWARE platform or application during the pilot

Table 16. Distribution (in percentage) of the answers provided to the questions in section 6

	Question: Did the user take the correct action?			
	yes (%)	**no (%)**	**Not answered (%)**	**if no, describe the problem**
Log in to the platform / app	94.4	0.0	5.6	
Access main screen	88.9	5.6	5.6	Not answered
Access all menu with ease	88.9	5.6	5.6	Missing of previous training
Send message to First Responders / Citizens	94.4	0.0	5.6	
Upload and send pictures, videos etc	88.9	0.0	11.1	
Check all components with ease	88.9	5.6	5.6	Missing of previous training
General usability of the platform/app	94.4	0.0	5.6	
Question: Did the user taken the right action at the first attempt?				
	first attempt (%)	**tried other option first (%)**	**not answered (%)**	**Note**
Log in to the platform / app	83.3	11.1	5.6	
Access main screen	88.9	5.6	5.6	
Access all menu with ease	77.8	16.7	5.6	
Send message to First Responders / Citizens	77.8	11.1	11.1	
Upload and send pictures, videos etc	72.2	11.1	16.7	
Check all components with ease	72.2	22.2	5.6	

General usability of the platform/app	72.2	22.2	5.6	
Question: Did the user ask or receive assistance before identifying the right action at the first attempt?				
	received verbal instructions (%)	**a beAWARE team member guided the user (%)**	**not answered (%)**	**Note**
Log in to the platform / app	83.3	11.1	5.6	someone provide both answers
Access main screen	52.6	26.3	21.1	
Access all menu with ease	77.8	11.1	11.1	
Send message to First Responders / Citizens	66.7	16.7	16.7	
Upload and send pictures, videos etc	66.7	5.6	27.8	
Check all components with ease	66.7	11.1	22.2	
General usability of the platform/app	55.6	22.2	22.2	

Part 7: This section contains some questions regarding the overall rating of the 1st prototype functionalities

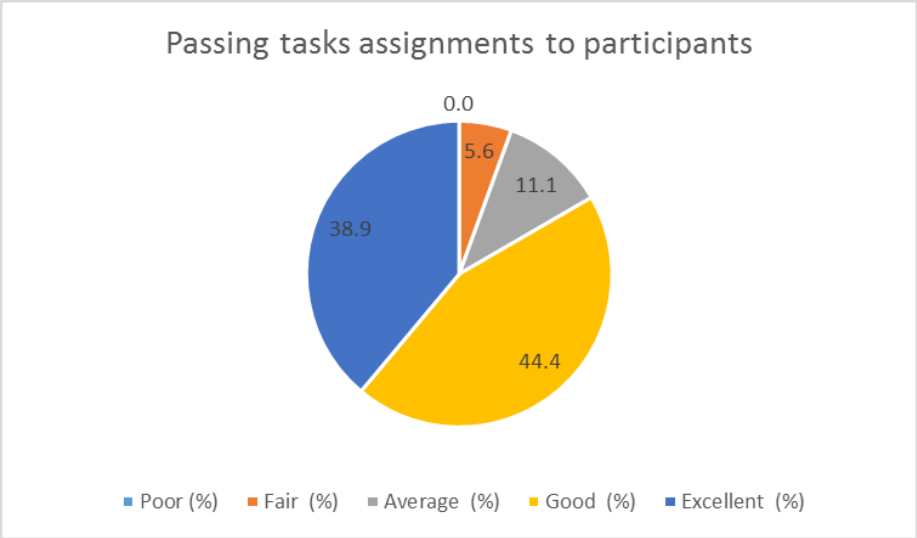


Figure 50: Result of the questionnaires – section 7 (part 1).

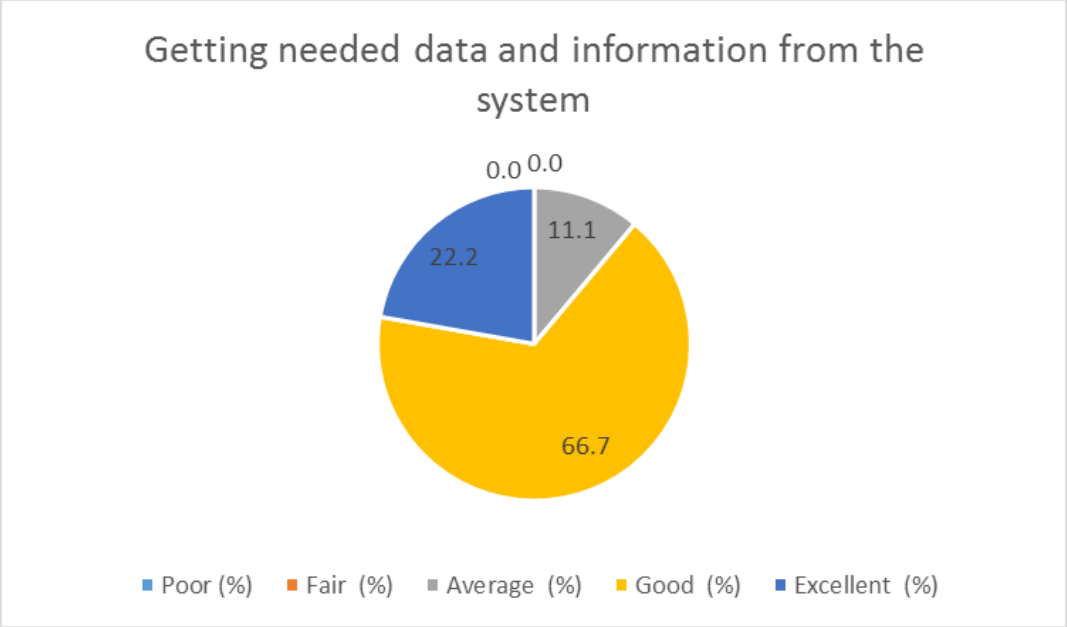


Figure 51: Result of the questionnaires – section 7 (part 2).

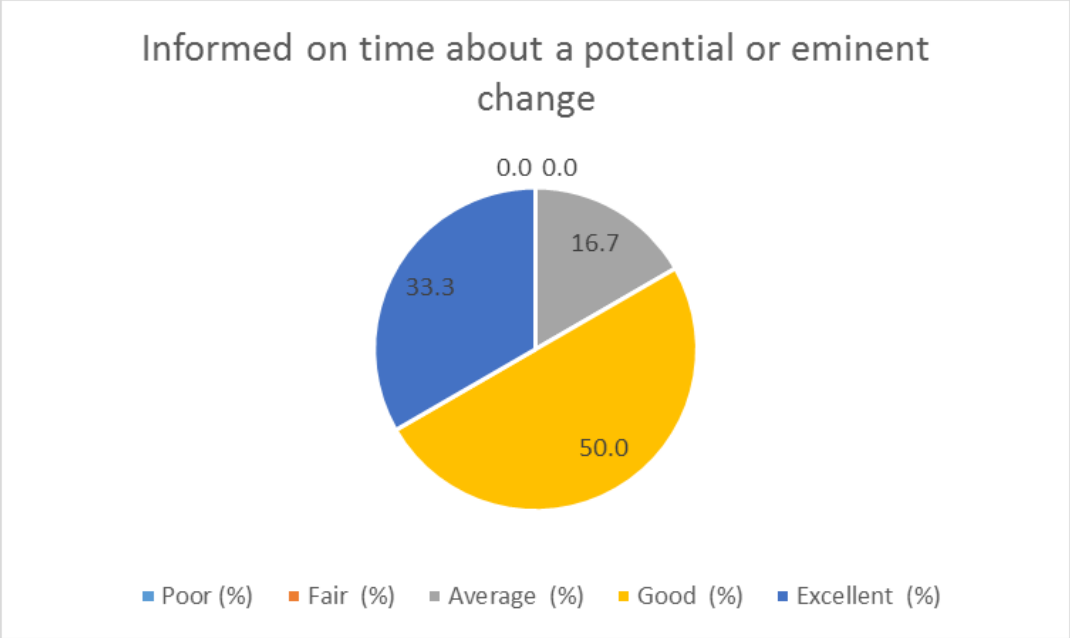


Figure 52: Result of the questionnaires – section 7 (part 3).

Part 8: Here are provided some blank sessions where is asked to the end user to indicate the list of the three major problems encountered using the platform and to provide any useful comment.

In this section there are some blank space when the user could insert his/her comments and listed the most problem encountered.

While the users mostly answered to all the precedent sections of the questionnaires, only four participants inserted some contributions here. All their contents are reported below.

Major problems encountered by the users (and indicated in the specific section of the questionnaire):

- Video sending;
- Missing training of the users in the beAWARE platform
- The users were not familiar with the crisis management at the operational level
- Play and pause of recording

Other comments provided in the specific section of the deliverable:

- It would be great to follow all the action of the Use Cases with English simultaneous translator, in order that non-native people (PO, reviewers, Consortium's partner) can follow the events and take actions
- Difficult for the non Greek observers to fully understand what is happening
- The sessions of the pilot were too short and the operation too fast to compile the observations forms

- The training can be improved

10.2 Analysis of the result of the questionnaires

The major of the users who answered to the questionnaires are Greek, they have a strong background in emergency management or as first responders (someone has both background) and they are globally quite young (i.e. more than half of the participants has less than 40 years).

The participants globally agree, or at least have are neutral reaction, with the statement about the trial session and the beAWARE's session; because of the nature of the questions, this result means that they mostly evaluate positively pilot organization and their experience with beAWARE.

In particular, there is a strong degree of agreement with the technical professionalism, adequateness and completeness of the beAWARE solution and about the improvement of the response, both in terms of time and quality, during the emergency.

Most of the answers indicate satisfaction with its general development of the pilot, however some of the participants expressed concerns about the short time of training and about some issues in understanding the situation for the non-Greek observers. Someone also expressed that more longer sessions could have improved the pilot, while one participant complained also strongly about the degree of realism of the chosen scenario.

About the single functionalities of beAWARE, the answer provided have been differentiated between the observers and player; while the ratings have been quite positive in both cases, it has been noticed that the observer were generally more critical than the players with the beAWARE functionalities. In particular, some observers complained that the instruction provided to the rescuers, the icons and the weather reports were not clear; some observers noticed also that there was not a clear separation between the legacy tools sessions and the beAWARE's ones.

It is very interesting to notice that the perception of these dynamics has been more positive for the players than the observers; in fact, the actors, who performed an active role during the pilot, found that the instructions provided and the various components of beAWARE were quite clear.

Finally, both the players and the observers evaluated positively the mobile app and the feature of beAWARE to provided real time information.

About the functionalities performed by beAWARE, the users agreed that generally the actors had taken the correct action during the pilot and mostly at the first attempt.

Only few users provided a list of encountered issues and suggestions for improvement; however, the collected information are totally aligned with the ones indicated in the observation forms and with the comments emerged from the debriefing sessions.

11 Evaluation for the Flood and the Fire Use Case based on simulation.

The 1st version of the platform was tested through the Flood and the Fire Use Cases that were not physically executed. For the evaluation, the prototype was demonstrated on an online session were the outcomes of the heatwave pilot were presented and correlated to the system's response in the Flood and Fire Use cases respectively. A user-centred evaluation was utilised based on standard questionnaires and a think-aloud-process. Evaluation itself has been conducted, under the coordination of CERTH, by the user partners PLV, AAWA, FBBR with a group of ten evaluators.

The objective of this session was to evaluate the functionality of the first prototype in case of a Flood or a Fire scenario, based on the user specified requirements and ultimately the assessment of the overall user satisfaction and the gathering of recommendations for improvement based on their needs.

The outcome of this evaluation session as it is summarized by the end users is the following:

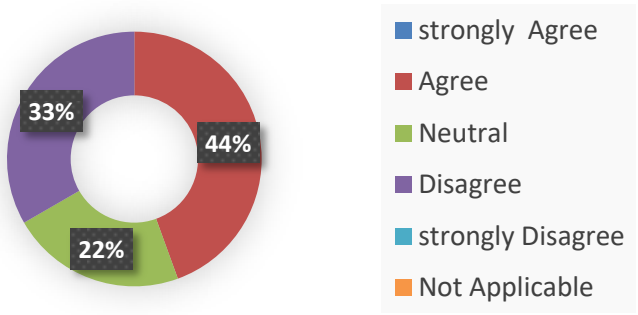
In the pre-emergency phase the interface illustrates precisely the situational picture. The weather forecast and the predicted indexes that appears on the incident map based on updated data from several measurements points covers a wide range of the inspected area, and provides accurate information. Up on User's request the platform allows to send public alerts to notify on the emergency event and as commented this feature covers the requirements for both Use Cases.

In the second phase the outcome was adequate. However, there were underlined some deficiencies, such as to send specific messages to recipients in specific zones. As it was noted, in case of evacuation this feature is very useful. Moreover, clustering of incidents was agreed that is practical for decision-making and noted that it should be followed by the ability to generate, up on request, wrap-up reports reflecting the variety of incidents included in a cluster. Finally, it was requested routes to places of interest (or evacuation routes) and first responders' location to be shown on the incident map.

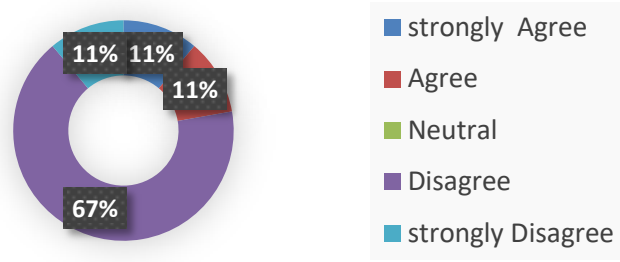
Overall, user feedback was found to be positive with most of the evaluators assessing the prototype's usefulness thanks to the wide variety of analysis types that can provide a real-time view of a complex situation.

Evaluation Summary from Questionnaires

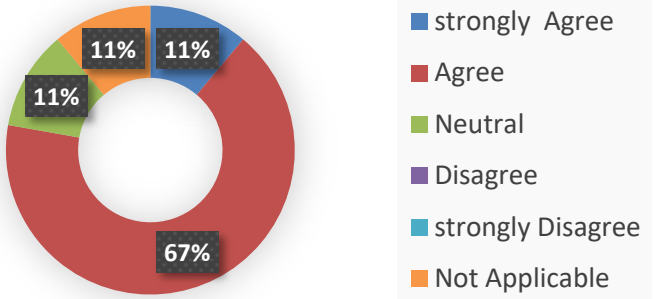
The Trial sessions scenario was adequate to evaluate the solution and its impact on the crisis management for beAWARE.



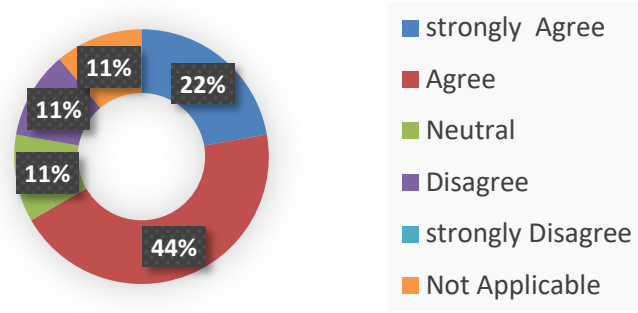
The technical setup of solution beAWARE was complete, professional and adequate to evaluate the solution and its impact on the crisis management.



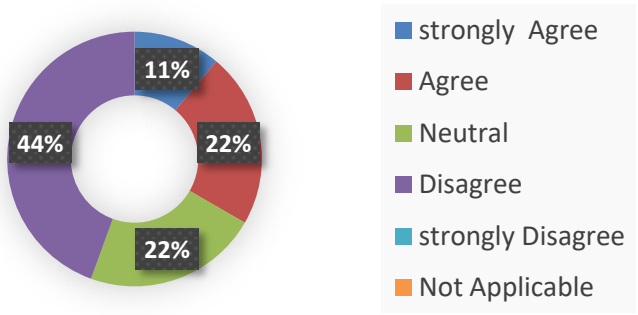
Less time needed for practitioners in their search for crisis relevant information.



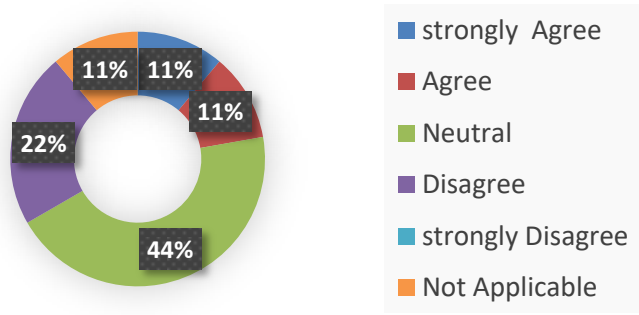
Less time needed for practitioners to read data from one solution and entering data manually into another solution.



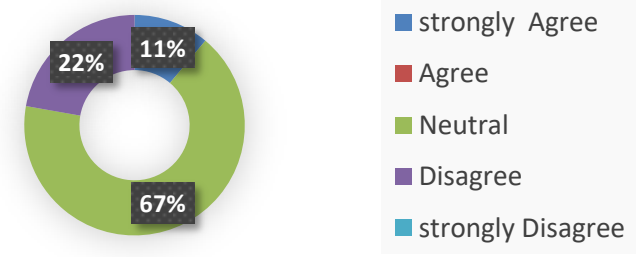
Lower probability for wrong information caused by human errors while reading/entering data from/into a solution.



More time for practitioners to define, communicate, execute and supervise crisis response actions.



Higher quality of the crisis management outcome due to the time savings, better data quality and improvement of communication.



12 Other feedback provided during and after the pilot

After the pilot, a debriefing session between the Consortium and the stakeholders took place in the HRT headquarters.

All the 'actors' and 'observers' agreed that the pilot was a successful experience, the organization was adequate and the benefit of beAWARE technologies were well highlighted by the trial.

However, some participants expressed that it should had been needed more time for training for the beAWARE app than the one provided the day before.

Another topic of discussion was the language: while on the training day, the Consortium suggested to perform all the communications in English, during the pilot the end users communicated the most time in Greek; in fact, the stakeholders pointed out that, in the middle of a real emergency, when they are required to perform many simultaneous actions, it is spontaneous for them interact in their mother tongue instead of English.

While this had required a translation from the Greek observers to the non-Greek ones in order to better understand the development of the situation, let the end user interact freely in their mother tongue, instead to force them to speak in English, added a very high degree of likeliness and more fluidity to the pilot.

During the debriefing, the stakeholders provided also useful feedback about some small technical issues and bugs stand out when they used the beAWARE app.

The most common problem reported was that, if there were two different active applications at the phone, this caused some delays uploading the images, video etc. Some Difficulties were also noticed when the users sent images, videos etc. at once, mainly due to the bad internet connection.

One volunteer reported that, when a pop-up message arrived at one of social media app (messenger, viber, etc.) installed in his device, the, the active procedure that was occurring in beAWARE mobile app was freezing or stopping it.

13 Conclusions

To summarize, this document provided firstly an overview of the beAWARE 1ST prototype, then a detailed report about the heatwave pilot and the training day; finally, the evaluation criteria and results have been discussed.

The main criteria used for the evaluation are:

- Results of the observation forms compiled by the observers during the pilot;
- Results of the questionnaires sent both to the actors and the players some days after the pilot;
- Results from the debriefing session;

All the details about these tree criteria have been detailed discussed in the previous chapters; now, as conclusion, a brief global summary of the evaluation is provided, merging the information coming from all the sources.

What is interesting to highlights is that the evaluation has provided useful feedbacks about the whole beAWARE, this mean not only about the users' experience with the technology, but also about the pilot organization and the evaluation methodology itself.

BeAWARE Technologies

From the interaction of the end users with the platform during the pilot, in particular comparing the new technologies with the legacy tools, it has been noted that beAWARE provides a very efficient support to the Control room operators in understanding and managing the many incidents which arrived in rapid succession or at the same time, providing an ordinate and intuitive list of them and showing their location on the map.

Instead, with the legacy tools - despite of the great familiarity of the operators with this kind of communication devices – sometimes it was very difficult for the Control room operator to manage many mails and calls at the same time; moreover using the legacy tools, the Control room operator had to pay particular attention understand correctly the location of the calls, while communication problems and interferences occurred that often required to ask to the speaker to repeat his/her position, whereas this information was automatically provided by beAWARE for each incoming incident report and multimedia.

BeAWARE also helped to overcome some various issues noticed with the legacy tools inside the city, such as bad radio signal, interference, and misunderstanding.

It was particularly appreciated the video ad image analysis in supporting the management of the traffic and of the relief places.

However, during the pilot some technical issues and bugs occurred also with beAWARE, in particular, the users reported interferences between the beAWARE app and other social media app installed in their devices; some delays occurred were users try to upload images, video and recordings with their mobile app at once; some lag times in updating the PSAP's event map were also noticed by the observers in the control room.

To take advantage to the different evaluation forms, the technical partners collected all these feedbacks and are working to improve the platform for the next prototype.

It was finally noticed; (in particular as result of the questionnaires) that some of the users would have benefit of more training time to get accustomed to the technologies.

Pilot organization

All the 'actors' and 'observers' agreed that the pilot was a successful experience, the organization was adequate and the benefit of beAWARE technologies well highlighted by the trial.

Based on the evaluation results, some aspect of the pilot set-up could be improved for the next prototype. In particular it was well highlighted the need of more training time, to provide more clear instructions in particular to the first responders and to make more clear all the dynamics for the non-native observers (as most of the interaction during the pilot were in the end users' mother tongue).

Evaluation methods

The various evaluation methods allow the Consortium to gather very useful feedbacks about the pilot; the different information collected (questionnaires, observation forms and feedbacks) were coherent and aligned, even if each of them highlighted different aspects of pilot.

In particular, the participation to the questionnaires was very positive, however it has been noticed that the users tend to answers to multiple-choice questions, while they generally avoid to provide comments, justifications or every other written comments in the 'blank' spaces of the questionnaire.

The observation form provided very useful qualitative result, however the observers found difficult to indicate the timing of the actions, as requested in the form, due to fact that many events happened in rapid succession or even in contemporary. For this reason, the forms did not provide sufficient information about the timing of the performed action to make a 'quantitative' comparison between beAWARE and the legacy tools session.

For that reason, the observation forms have to be slightly revised for the next pilots, taking account of these issues.