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Policy



B.03 – Knowledge Network and Evidence-Based Policy



# RESISTANT

## Crisis Training Platform

**Training and Knowledge Sharing Platform for First Responders and Educational Tools for students' and citizens' awareness and preparedness against Natural and Manmade Disasters and Risks**

### D2.1 First Report on *RESISTANT's* observatory

**Workpackage:** WP2 – Observatory of existing initiatives and training infrastructure

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## RESISTANT Project Profile

**Grant Agreement No.:** 101017819

<b>Acronym:</b>	RESISTANT
<b>Title:</b>	Training and Knowledge Sharing Platform for First Responders and Educational Tools for students' and citizens' awareness and preparedness against Natural and Manmade Disasters and Risks
<b>URL:</b>	<a href="http://www.resistantproject.eu/">http://www.resistantproject.eu/</a>
<b>Start Date:</b>	01/01/2021
<b>Duration:</b>	18 months

### Partners

 INTERNATIONAL HELLENIC UNIVERSITY	DIETHNES PANEPISTIMIO ELLADOS (IHU)	Greece
	ENOSI PTYCHIOYCHON AXIOMATIKON YPAXIOMATIKON PYROSVESTIKOY SOMATEIO (EPAYPS)	Greece
 konnektable TECHNOLOGIES	KONNEKT-ABLE TECHNOLOGIES LIMITED (KT)	Ireland
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## Document History

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## Abbreviations and acronyms

Augmented Reality	AR
Croatian Crisis Management Association	CCMA
Deliverable	D
Expected Outcomes	EO
Enosi Ptychioychon Axiomatikon Ypaxiomatikon Pyrosvestirkou Somatos (Association of officers and sub-officers with university degrees of Hellenic Fire Corps)	EPAYPS
International Hellenic University	IHU
Konnekt-able Technologies Ltd. – Greek Branch	KTGR
Military Academy General Mihailo Apostolski	MAGMA
Non-governmental organization	NGO
Operational Objectives	OO
Rescue Team DELTA	RTD
Evia Rescue Team	S.A.R. 312
Strategic Objective	SO
Union Civil Protection Mechanism Programme	UCPM
Virtual Control Room	VCR

## Executive Summary

RESISTANT is an 18-month duration project co-funded by the Union Civil Protection Mechanism Programme (UCPM-2020) under grant agreement no. 101017819.

The overarching objective of the RESISTANT project is to build the first European Crisis Training Platform to train first responders through threefold comprehensive training: educational training with the state-of-the-art knowledge in safety, including tools for the characterization of hazards and associated risks, operational training on mock-up real scale transport, and innovative virtual reality training reproducing the entire accident scenarios, intervention strategies and tactics, including the whole chain of command and communications between all members of the first responders team, facility managers, and public (e.g. volunteer firefighters, school children, citizens with disabilities). RESISTANT will also put in place a virtual 'agora' for first and second responders, academia, market practitioners, volunteers, and other civil protection stakeholders to share knowledge and exchange best practices, especially in cross-border crisis management. The 'agora' will facilitate discussion and contribute towards the development of a common prevention and protection culture.

The main purpose of this document is to analyze European and national research projects regarding their technical innovations, their tactical and operational recommendations, as well as, their potential to develop new guidelines and operational procedures within the field of emergency and crisis management. Additionally, this document presents existing technologies for emergency management (e.g. data mining and analysis tools in case of Natural Disaster Management) and training of first responders, as well as, a word cloud of interconnected key indicators, which are relevant for the operations in case of natural disasters.

## Table of Contents

<b>1</b>	<b>Introduction</b>	<b>9</b>
1.1	About the project .....	9
1.2	Purpose of the document.....	10
1.3	Work Package Objective .....	11
1.4	Relation to other deliverables .....	11
1.5	Intended audience .....	11
1.6	Structure of the document.....	12
<b>2</b>	<b>Research undertaken</b>	<b>13</b>
2.1	Methodology of the data collection process .....	13
2.2	Methodology for analysis the outcomes of research projects .....	13
<b>3</b>	<b>Inventory and analysis of results of research projects in the field of emergency and crisis management</b>	<b>15</b>
3.1	R&I projects and their results .....	15
3.1.1	GeoTwinn .....	15
3.1.2	DAREnet .....	17
3.1.3	I-REACT .....	19
3.1.4	Flood-SERV .....	21
3.1.5	COMRADES .....	24
3.1.6	FIRE-IN .....	27
3.1.7	STAIR4SECURITY.....	29
3.1.8	SAYSO .....	32
3.1.9	Climate-fit.city .....	33
3.1.10	DRIVER+ .....	36
3.1.11	IN-PREP .....	38
3.1.12	HEIMDALL .....	41
3.1.13	MEDEA .....	44
3.1.14	INACHUS .....	45
3.1.15	ResiStand .....	47
3.1.16	ANYWHERE.....	49
3.1.17	ZONeSEC .....	50
3.1.18	E2Mc.....	52
3.1.19	beAWARE .....	54
3.1.20	STORM.....	56
3.2	Top 10 key indicators in emergency and crisis management.....	58

<b>3.2.1 Top 10 key indicators.....</b>	<b>58</b>
<b>3.2.2 Other relevant indicators.....</b>	<b>59</b>
<b>4 Conclusions and recommendations</b>	<b>60</b>
<b>Annex I: Template for project presentation and analysis</b>	<b>62</b>
<b>References</b>	<b>63</b>

## List of Figures & Tables

Figure 1. DAREnet: Flood Management cycle following the four phases of the crisis management, including exemplified tasks during the four phases.....	18
Figure 2. Flood-SERV: The FLOOD-serv System. ....	22
Figure 3. COMRADES: The platform featuring sample data taken from Hurricane Harvey in 2017.....	25
Figure 4. COMRADES: Work Diagram. ....	26
Figure 5. COMRADES: Workflow of USHAHIDI and similar platforms. ....	26
Figure 6. FIRE-IN: Workflows. ....	27
Figure 7. DRIVER+: The test-bed.....	37
Figure 8. IN-PREP: Modules.....	40
Figure 9. HEIMDALL: Main screen of the platform. ....	43
Figure 10. beAWARE: System. ....	55



# 1 Introduction

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## 1.1 About the project

RESISTANT (Training and Knowledge Sharing Platform For First Responders and Educational Tools for students' and citizens' awareness and preparedness against Natural and Manmade Disasters and Risks) is an 18 months project that has been started on 01/01/2021 and it is implemented by a consortium led by the International Hellenic University – IHU (Greece) in cooperation with the Association of officers and sub-officers with university degrees of Hellenic Fire Corps -E.P.A.Y.P.S. (Greece), Konnektable Technologies Limited, Greek Branch – KTGR (Ireland), Military academy „General Mihailo Apostolski“, Skopje – MAGMA (North Macedonia), Croatian Crisis Management Association – CCMA (Croatia), Evia Rescue Team – S.A.R. 312 (Greece) and Rescue Team DELTA – RTD (Greece). The project is co-funded under the **Union Civil Protection Knowledge Network : Network Partnership (UCPM-2020-KN-AG) call of the Union Civil Protection Mechanism.**

RESISTANT's aim is to build the first **European Crisis Training Platform** to train first responders through threefold comprehensive training:

- **educational training** with the state-of-the-art knowledge in safety, including tools for characterisation of hazards and associated risks,
- **operational training** on mock-up real scale transport, and
- **innovative virtual reality training** reproducing the entire accident scenarios, intervention strategies and tactics, including the whole chain of command and communications between all members of the first responders' team, facility managers, and public (e.g. volunteer fire fighters, school children, citizens with disabilities).

### RESISTANT Operational Objectives (OO)

**OO.1:** Support civil protection and disaster risk management actors that promote and facilitate the development, dissemination and exchange of knowledge, good practices and expertise.

**OO.2:** Update and expand a **training programme** through further development of emergency scenarios to reflect the latest state of the art

**OO.3:** Implement an **educational platform**, where educational and training programs for primary, secondary schools, residents of endangered areas, citizens with disabilities of the aforementioned areas and tourists, as well as, for municipalities' employees, could be demonstrated with the help of **Augmented Reality (AR)** Techniques.

**OO4: Mapping and status of current initiatives, procedures and resources for coordination, education and training for natural disasters and technological risk mitigation.**

### RESISTANT Strategic Objectives (SO)

**SO.1: Support new and consolidate existing partnerships** in civil protection and disaster risk management that **enhance cooperation and synergies** in prevention, preparedness and response.

**SO.2:** Establish a **European network of trainers for first and second responders**, supported by stakeholders from EU and beyond, to share best practices and facilitate dissemination of knowledge and experience generated within the RESISTANT project and relevant follow-up projects from EU to national level.

**SO.3: Educate and train tomorrow's responder trainers** through established and regularly updated comprehensive educational, operational and virtual reality training.

**SO.4: Establish strong links between first responders' activities from different countries and constituencies and research and educational projects;** Valuing the responders' experience and their feedback to **enrich and harmonise harm criteria, models for hazards and risk assessment**, expand communications to other stakeholders, including but not limited to legislators, technology experts, insurance companies, citizens and students to raise awareness and increase preparedness.

### **RESISTANT Expected Outcomes (EO)**

**EO.1:** The implementation of **a Trans-European Network of trainers for first and second responders.**

**EO.2:** Design and implementation of **innovative training programs for natural disaster and technological risks prevention and mitigation especially focusing on cross-border events** that will be implemented in Virtual Control Room (VCR) with an integrated state of the art emergency management system.

**EO.3:** Implementation and deployment of a **dual-purpose platform** which will incorporate **the training programs for natural disaster and technological risks prevention and mitigation** along with **a series of educational and awareness programs enhanced with AR techniques for students', citizens' and tourists' preparedness.**

**EO.4: Mapping of current activities in Croatia, Greece and North Macedonia in the areas of disaster management and of disasters' education and training.** A comprehensive report with data derived from the mapping training exercises will allow decision and policy makers to evaluate the current state, challenges and opportunities for collaborative disaster management across Europe. Results and the mapping itself will serve as a basis for collaboration, knowledge sharing/exchanging and training among the network member countries.

## **1.2 Purpose of the document**

The purpose of this document (**D2.1 First Report on RESISTANT's Observatory**) is to present the findings resulted from the research activities implemented during the first 6 months of the RESISTANT project. **Deliverable D2.1** provides a thorough insight in the outcomes of national research projects of the RESISTANT participating countries (Croatia, Greece and North Macedonia) and the European research projects by making an inventory and investigation of the projects that impact operations in case of natural disasters. The focus is on nearly finished projects or on projects that are finished within the last two years. Additionally, this document presents existing technologies for emergency management (e.g. data mining and analysis tools in case of Natural Disaster Management) and for training of first responders as well as a word cloud of interconnected key indicators, which are relevant for the operations in case of natural disasters. This document is the output of two tasks: **Task 2.1: Inventory and investigation of national research projects of participating countries and European research projects** and **Task 2.2: Developing of a word cloud of interconnected key indicators, which are relevant for the operation**

## 1.3 Work Package Objective

**D2.1 First Report on RESISTANT's Observatory** is a deliverable of **Work Package (WP) 2: Observatory of existing initiatives and training infrastructure**. The objective of WP2 is to analyse European and national research projects regarding their technical innovations, their tactical and operational recommendations and their potential to develop new guidelines and operational procedures within the field of emergency and crisis management.

## 1.4 Relation to other deliverables

**The current deliverable - D2.1 First Report on RESISTANT's observatory** - is one of the 3 reports (D2.1, D2.2 and D2.3) of WP2 that will be released by the *RESISTANT* Consortium every 6 months in order to develop recommendations related to innovative approaches and new technologies, share lessons learned and common good practices in prevention, preparedness and response.

**Deliverable D2.2 Second Report on RESISTANT's observatory** will present a comparison of national experiences and lessons learned in Croatia, Greece and North Macedonia during various incidents. Investigating reports on various incidents in the partnering countries will give an insight on lessons learned and lessons not learned. Comparing these national experiences with the experiences of the international partners will help to develop a vision on what the differences and overlap in experiences are. National experiences in case of natural incidents will be examined and compared including interconnected key indicators like evacuation plans, dealing with volunteers and improving the resilience of the citizens. Finally, this deliverable will update the information provided in D2.1 regarding the software tools that are currently available for the training of the first responders and for emergency management (e.g. data mining and analysis tools for Natural Disaster Management). This deliverable will be released by Month 12 of the project (December 2021).

**Deliverable D2.3 Third Report on RESISTANT's observatory** will present the current activities in Croatia, Greece and North Macedonia in the area of disaster management, and disaster education and training and to make an inventory of strategic innovation agendas in these countries. The aim is at understanding the current activities – initiatives, procedures, and resources – that are being held, or planned, in the *RESISTANT* network's participating countries in the area of disaster management. A special focus will be to investigate how first responder organizations could better work together with society in general and specific on how they could improve the cooperation with volunteers. Finally, this deliverable will update the information provided in D2.1 and D2.2 regarding the software tools that are currently available for the training of the first responders and for emergency management (e.g. data mining and analysis tools for Natural Disaster Management). This deliverable will be released by Month 18 of the project (June 2022).

## 1.5 Intended audience

The intended audience of this deliverable consists of the following target groups:

- Representatives from civil protection and risk disaster management community - First responders (fire fighters, law enforcement, emergency services, etc.), civil protection units and civil society organisations / NGOs and their networks with interest in the Crisis Management domain;
- International and national networks of civil protection and disaster management actors

- Members of the projects funded under the same call as RESISTANT project (Union Civil Protection Knowledge Network: Network Partnership (UCPM-2020-KN-AG))
- Information Communication Technology entities (industry organisations and SMEs)
- Universities and research centres
- Civil protection authorities of European countries
- Policymakers at local, national, EU and the wider Neighbourhood level
- RESISTANT project partners and the Project Officer at the Knowledge Network and Evidence-Based Policy (ECHO.B.3) Unit in the Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG ECHO) of the European Commission

## **1.6 Structure of the document**

In chapter 2, this report describes the data collection process, the different sources of information that were used to collect data, the methodology for presenting and analysis of outcomes of the research projects.

In chapter 3, this report presents an inventory of national research projects of the participating countries in RESISTANT project, namely Croatia, Greece and North Macedonia as well as the European research projects and an analysis their technical innovations, their tactical and operational recommendations and their potential to develop new guidelines and operational procedures within the field of emergency and crisis management. Based on this investigation there were selected and presented the top 10 key indicators which are relevant for the operations in case of natural disasters. Moreover, this report shows what software tools are currently available for the training of the first responders and for crisis management (e.g data mining and analysis) in case of Natural Disaster Management.

The Conclusions and Recommendations outline the conclusion of the research.

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## 2 Research undertaken

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The findings presented in this report are based on two main lines of research.

### 2.1 Methodology of the data collection process

A first desk research was implemented by the RESISTANT partners in order to undertake an inventory of national research projects of participating countries and European research projects that have impact on operations in case of **natural disasters**.

The focus was on nearly finished projects or on projects that were finished within the last two years.

The sources of information regarding the research projects were:

- The Community Research and Development Information Service (CORDIS) <https://cordis.europa.eu/>
- Interreg Europe: <https://www.interregeurope.eu/projectresults/>
- Erasmus+ Project Results Platform: [https://ec.europa.eu/programmes/erasmus-plus/projects\\_en](https://ec.europa.eu/programmes/erasmus-plus/projects_en)
- the Projects Explorer, a common repository of relevant research and operational projects along with their results that is accessible through both, the DRMKC - Disaster Risk Management Knowledge Centre and the CoU - Community of Users on Secure, Safe and Resilient Societies of DG HOME web-platforms: <https://drmkc.jrc.ec.europa.eu/knowledge/PROJECT-EXPLORER>
- A Community of Users on Secure, Safe and Resilient Societies (CoU) Mapping Horizon H2020 and EU-Funded Capacity-Building Projects under 2016-2018 Programmes - October 2019 - Publications Office of the EU (europa.eu): <https://op.europa.eu/en/publication-detail/-/publication/e626e2c2-f388-11e8-9982-01aa75ed71a1/language-en/format-PDF/source-82621453>
- The Knowledge DB is part of the website stores results of the DRIVER+ project systematic literature research: <https://pos.driver-project.eu/en/gt/knowledge>

The RESISTANT Consortium partners searched these aforementioned sources for research and innovation projects from the last 5 years (started in January 2016) and selected a number of 20 projects. At the same time a research was implemented by the RESISTANT partners in order to identify current tools for emergency management (e.g Data Mining and Analysis tools for Natural Disaster Management) and training infrastructures for first responders. The sources of information were:

- <https://www.preventionweb.net>
- The Disaster Risk Management Knowledge Centre
- <https://pos.driver-project.eu/en/PoS/solutions>

### 2.2 Methodology for analysis the outcomes of research projects

A template (see **Annex 1**) to be used as a guideline by the partners to present the research projects and their outcomes in terms of technical innovations, their tactical and operational recommendations was developed by IHU. The projects identified were classified and structured according to the following criteria: goal, impact, tools, results, media etc.

After the selection of the relevant research projects, the RESISTANT Consortium has used a template to present and analyse the outcomes of selected research projects.

Finally, all partners assessed the potential of selected projects to develop new guidelines and operational procedures within the field of emergency and crisis management, with a view to recommend the uptake or the industrialisation of their results and, at the same time, based on this investigation, to select the top 10 key indicators which are relevant for the operations in case of natural disasters.

### 3 Inventory and analysis of results of research projects in the field of emergency and crisis management

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#### 3.1 R&I projects and their results

##### 3.1.1 GeoTwinning

Start date 1 October 2018 - End date 30 September 2021

###### PROJECT NAME

Strengthening research in the Croatian Geological Survey: *Geoscience-Twinning* to develop state-of-the-art subsurface modelling capability and scientific impact.

###### DESCRIPTION

The major aim of the project is to significantly strengthen the Croatian Geological Survey's (HGI-CGS) research potential and capability. HGI-CGS will benefit from a range of research tools, technologies, software and methods at the disposal of the Geological Survey of Denmark and Greenland (GEUS) and the British Geological Survey of the United Kingdom Research and Innovation (BGS-UKRI). The project will also develop active collaboration and partnership between people; involving talented scientists within HGI-CGS and highly productive scientists within GEUS and BGS-UKRI, who in a number of cases are world-leading experts in their field. Two-way scientific exchanges and training programmes, will support HGI-CGS to strengthen research in four important geoscience subject areas, which are at the core of most world-leading geological surveys and geological research institutes:

###### (1) 3D geological surveying and modelling;

- **BGS·SIGMA** is an integrated toolkit for digital geological mapping, which enables the assembly, capture, interrogation and visualisation of geological information as well as the delivery of digital products and services.
- **BGS·Groundhog Desktop** is a simple, effective way of visualizing and interpreting site data as well as developing conceptual and 3D digital geological models.
- **GeoVisionary** is a specialist software for high-resolution visualization of spatial data.
- **Augmented Reality Sandbox** <https://arsandbox.ucdavis.edu/>
- **SKUA-GOCAD**
- **MiraGeoscience Viewer** is built be used for viewing models built in SKUA-GOCAD, and ArcGIS and AutoCAD for viewing surfaces (grids, .dxfs...)
- **MOVE software package**

###### (2) advanced groundwater flow and contaminant transport modelling;

- **PEST** software

###### (3) geological hazards;

- **Remote Sensing**
  - Establishment of a landslides inventory using remote sensing methods on DEMs and 3D models of exemplar sites
  - Remote geological mapping on DEMs and 3D models of exemplar sites, development of badlands inventory
  - Available satellite imagery interpretation and review of available stereo photos
  - Agilix Photoscan, ERDAS Imagine remote sensing software and ENVI remote Sensing software, GeoVisionary software (3D) which is linked with ArcGIS.
- **Geostatistics**
  - Learning how to use the R programming environment to perform statistical analyses
  - Performing geostatistical analyses using the R package gstat
  - Modelling the factors that lead to landslide susceptibility and using ArcGIS for spatial data analysis and display

#### **(4) geothermal energy.**

Comparison of different software packages used for numerical modelling of fluid and heat

- **FEFLOW**
- **ECLIPSE**

Deterministic and stochastic modelling

- **Stanford Geostatistical Modelling Software (SGeMS)**
- **methodology of kriging**
- **Sequential Gaussian Simulation**
- **Modelling of categorised variables**

## **RESULTS**

**WP1:** Embedding state-of-the-art geological surveying techniques: from maps to models to 3D parameterization of the subsurface.

- D1.1: Initial structural-stratigraphic 3D model of greater Zagreb pilot area (month 9), and
- D1.2: Initial integrated 3D model of Rijeka-Istra pilot area (month 24)
- The results of the D1.1 will be used as input data for hydrogeological modelling by WP2

**WP2:** Implementing advance methods for characterizing and modelling groundwater flow and contaminant transport.

- groundwater flow and solute transport modelling in porous aquifer systems, and
- characterizing flow and contaminant transport in karst aquifer systems

More specific:

- to develop new groundwater flow and solute transport modelling skills and capabilities within the fields of automated groundwater model calibration and uncertainty assessments groundwater flow models,



- to develop new skills and expertise at HGI-CGS in the areas of time series analysis and emerging contaminants, and
- to improve scientific productivity and raise the international research profile of HGI-CGS hydrogeologists

**WP3:** Implementing state-of-the-art techniques for the identification and analysis of geohazards.

- The three partners will exchange knowledge and experience of the latest remote sensing methods for landslide research including field workshops on the use of unmanned aerial vehicles for data capture, training on the interpretation and visualization of stereo imagery, as well as the processing of satellite imagery, INSAR interferometry and satellite detection of small-scale movements.
- Will deliver specialist training through formal courses and placements on heuristic, statistical and geostatistical techniques to enable production of landslide susceptibility mapping at scales that are suitable for spatial planning or land-use management.

**WP4:** Strengthening expertise in geothermal energy – the carbon free, sustainable energy source.

- More specifically, the objective of WP4 is to upgrade skills and competencies in modelling fluid and heat flow using finite element solution techniques to characterize geothermal systems.

**WP5:** Dissemination, communication and exploitation.

**WP6:** Project management and coordination.

## **PARTNERS**

- Croatian Geological Survey (HGI-CGS) – COORDINATOR
- Geological Survey of Denmark and Greenland (GEUS) – BENEFICIARY
- British Geological Survey of the United Kingdom Research and Innovation (BGS – UKRI) – BENEFICIARY

## **LINKS**

<https://cordis.europa.eu/project/id/809943>

<http://geotwinn.eu/home/>

### **3.1.2 DAREnet**

Start date 1 September 2017 - End date 31 August 2022

#### **PROJECT NAME**

DAREnet is a network of practitioners dealing with flood resilience in the **Danube River Region**, supported by a continuously evolving multi-disciplinary community of stakeholders consisting of policy makers, academics, industry and many more.

- **Defining the challenges**
- **Enabling collaboration**
- **Facilitating innovations**

#### **DESCRIPTION**

##### **Connecting National Practitioner Networks**

DAREnet is organized as a network of national practitioner networks, led by dedicated DAREnet National Contacts (DNC). The DNCs are building in their countries multi-disciplinary practitioner communities to collect information about innovation needs and opportunities in an ongoing dialogue. The DAREnet

project will unite these national communities in an open\_ecosystem to foster synergies, innovation and its uptake across the Danube Region. The network is supported by a broad range of stakeholders from policy, industry and research.

### **DAREnet Annual Practitioner Forum**

For professionals in flood response or flood management who are convinced that the training of first responders or volunteers could be better. This event is a unique opportunity for practitioners to meet, exchange and network with academia, industry, policy makers and funding authorities.

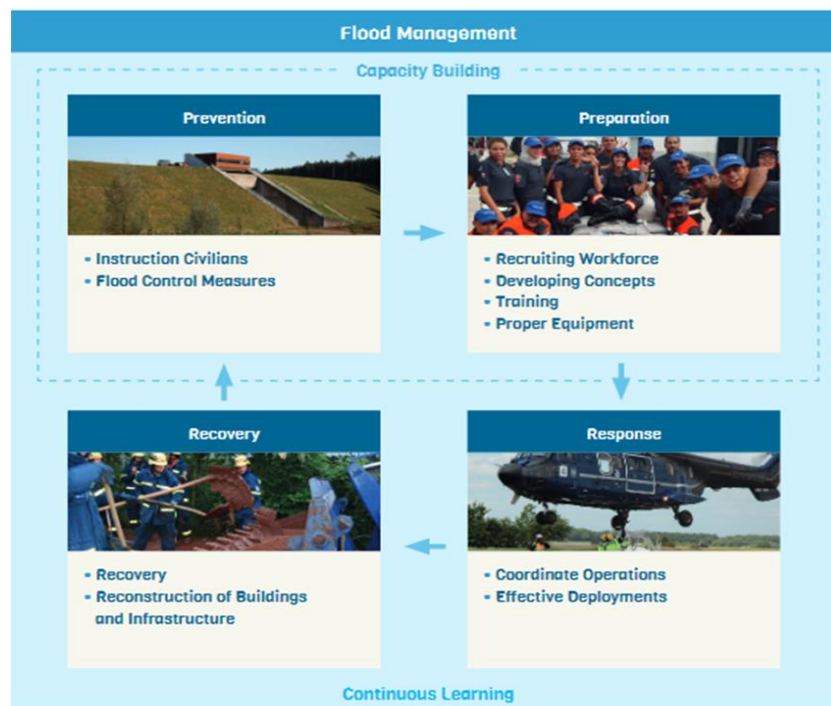
The DAREnet Community is a truly collaborative environment bringing together practitioners, researchers, industry representatives and decision makers, to identify and analyze the most relevant innovation gaps, and to translate the gaps into a joint innovation strategy to improve flood resilience in the future.

**Until 2022**, DAREnet will deliver an annual Innovation Roadmap highlighting promising innovation opportunities to cope with the main environmental and societal challenges of the region.

## **RESULTS**

The DAREnet project will enable Flood Management Practitioners in the Danube River Region to:

- identify and analyze by and for themselves relevant innovation gaps.
- translate the gaps into a joint innovation strategy to improve flood resilience in the future.



**Figure 1. DAREnet:** Flood Management cycle following the four phases of the crisis management, including exemplified tasks during the four phases.

### **Deliverables**

[RDI Roadmap \(V1\)](#)

[RDI Roadmap \(V2\)](#)

[Report of Topic Working Groups: Knowledge Base for assessment and roadmapping cycle 1 \(cut-off 1\)](#)

## PARTNERS

- Federal Agency for Technical Relief Germany,
- ICPDR, Red Cross Austria,
- International Security and Emergency Management Institute Slovakia,
- Hungarian Civil Protection Society Hungary,
- National Protection and rescue Directorate Croatia,
- Sector for emergency Management,
- MoI Serbia,
- APELL National Center for Disaster Management Romania,
- Directorate General Fire Safety and Civil Protection,
- MoI Bulgaria,
- ITTI Poland, University of Belgrade Serbia,
- German Aerospace Center Germany,
- Stad Geel Belgium,
- ARTTIC France

## LINKS

<https://cordis.europa.eu/project/id/740750>

<http://darenetproject.eu/>

### 3.1.3 I-REACT

Start date 1 June 2016 - End date 31 May 2019

#### PROJECT NAME

Improving Resilience to Emergencies through Advanced Cyber Technologies(I-REACT)

#### DESCRIPTION

**I-REACT** is the result of a three-year European Project that developed the first **European-wide platform** to integrate emergency management data coming from **multiple sources**, including that provided by citizens through **social media** and **crowdsourcing**. This way, we are able to produce information faster and allow citizens, civil protection services and policymakers to effectively **prevent and/or react against disasters**.

#### RESULTS

The I-REACT system was developed thanks to the support of the European Commission through the funding of the Horizon 2020 program. Anyone can access the academic results of the project on [OpenAire](#), and see a detailed list of the publications in the [dissemination](#) section.

#### IMPLEMENT I-REACT

I-REACT has been **constituted as an enterprise**. The system has been released as an OpenAccess system, [available on BitBucket](#). If you are interested in implementing the I-REACT system, [take a look at our brochure](#) to know the services we provide or [contact us](#) and we will provide you with a quote.

## I-REACT

1. CITIZENS
  - a. An app is available
  - b. Whenever citizens identify a hazard they can use the app to take a picture
  - c. The app will geolocalise it
  - d. selection of the type of hazard
  - e. Adding more information of damages, people at risk
  - f. Real-time risk map will be created from the previous report
  - g. Social media analysis tool will use geolocalised tweets to extract real-time disaster information so everyone can be more prepared against floods and fires
  - h. Tips and quizzes to improve knowledge about how to respond to different hazards
2. RESPONDERS
  - a. It is important for responders to have at hand all available information to respond as quickly as possible
  - b. Cyber technologies used (mobile app, augment reality, wearables)
    - i. The mobile app will allow both citizens and professionals to report emergencies
    - ii. Responders will be able to validate citizen's reports
    - iii. Augment reality glasses (designed) that will easily fit in helmets.
      1. Responders will be able to visualize real time maps, reports or even pictures taken from drones
      2. Reports and communication with the control room without using hands
    - iv. Wearables for responders safety
      1. EGNOS/EDAS positioning system connected to Galileo satellite
      2. Oxygen sensor to warn responders
    - v. Also information gathered from satellites, drones, weather forecast, historical data
3. DECISION MAKERS
  - a. Gathered information for control room. (satellites, mobile app, social media, drones, weather forecast, historical data)
  - b. Making choices is always hard. I-REACT designed a decision support system software that will suggest tailored lines of actions.
4. BUSINESS
  - a. I-REACT modules integrate all the relevant data in one place, crossing over inputs from different sources. All the services are modular, and can be deployed independently or as a global system.
    - i. I-REACT Social
    - ii. I-REACT Reporting
    - iii. I-REACT EMS
    - iv. Season and climate prediction service
    - v. Wearable
    - vi. Smart glasses
    - vii. Hazard and risk map service
    - viii. UAV data service
    - ix. Nowcast, forecast, flood delineation, burned area
    - x. Weather forecast and extreme weather detection
    - xi. LEMS (local emergency management systems)

## PARTNERS

- Istituto Superiore Mario Boella (ISMB)
- GeoVille
- EoXplore UG

- TerraneaUG
- ALPHA Consultants (UK)
- UNESCO
- Politecnico di Torino
- CELI
- JoinPad
- Finnish Meteorological Institute
- Meteosim
- Bitgear
- AnsuR
- Fondazione Bruno Kessler
- Technical University of Wien
- Scienseed
- CSI Piemonte
- Aquobex
- Answare
- Joint Research Centre

## LINKS

<https://www.i-react.eu/>

<https://cordis.europa.eu/project/id/700256>

### 3.1.4 Flood-SERV

Start date 1 August 2016 - End date 31 July 2019

#### PROJECT NAME

**To provide a pro-active and personalized citizen-centric public service application** that will encourage citizens' involvement and will the involvement of the citizen and will harness the collaborative power of ICT networks (networks of people, knowledge and sensors) to raise awareness on flood risks and enable collective risk mitigation solutions and response actions.

#### DESCRIPTION

**The general objectives of FLOOD-serv are:**

1. To empower local communities to directly participate in the design of emergency services dealing with mitigation actions for floods
2. To harness the power of new technologies, such as social media and mobile technologies, to increase the efficiency of public administrations in raising public awareness and education regarding floods risks, effects and impact
3. To encourage the development and implementation of long-term, cost-effective and environmentally sound mitigation actions related to floods through an ICT-enabled cooperation and collaboration of all stakeholders: government, private sector, NGOs and other civil society organizations as well as citizens

**The specific objectives of FLOOD-serv are:**

1. To make use of the best available data in order to identify the location and potential impacts that natural hazards as floods can have on people, property and natural environment
2. To improve the systems of warning and emergency communications
3. To provide support for the public authorities and government institutions' hazard mitigation efforts, including planning and action coordination

4. To inform the public on the risk exposure to natural hazards and how they can get prepared, respond, recover and mitigate the impacts of such events

So given the above-mentioned objectives, the project will offer an opportunity for collective problem solving, knowledge sharing, social exchange and community-wide participation at local and global scale. This will lead to an insight into the information and preparedness requirements of local communities and the development of solutions adapted to the social realities.

Secondly, it will lead to a closer cooperation and coordination for flood forecasting and warning services of public institutions based on user needs.

Thirdly, based on the flood event studies, and including consultations with affected communities and other recipients of flood warnings, improved technical means of detecting the areas at imminent risk and warning more effectively, will be developed.

Technically the project will focus on developing a collaborative platform that will link citizen, public authorities and other stakeholders and on enabling the public to be warned en masse so that actions can be taken to reduce the adverse effects of the flood.

## RESULTS



**Figure 2. Flood-SERV:** The FLOOD-serv System.

The FLOOD-serv System is an integrated multi-component, Multilanguage system designed to serve public authorities, citizens and stakeholders in various aspects of flood risk management: management, coordination of alerts and missions, communication with and involvement of citizens, flood risk awareness raising, etc. The FLOOD-serv System is the technical output of the FLOOD-serv Project. The system is accessible via the FLOOD-serv Portal [here](#).

The FLOOD-serv System is made of several Components, each with their distinct functional role:

1. **The FLOOD-serv Portal** (developed by Siveco) acts as the overall entry point to the FLOOD-serv System and is a portal for presenting information and engaging in dialogue with citizens related to floods.
2. **Emergency Management Console (EMC)** (developed by Answare) can be used as a data visualization or decision support system dedicated to employees of public authorities involved in flood emergency management. It receives and monitors relevant data from a variety of sources, internal to the FLOOD-serv project (from other components e.g. data submitted by

citizens, or based on analysis of satellite pictures, etc) and from external sources (e.g. meteorological and sensor data). EMC generates various visualizations of data based on maps and charts, proposes response measures and tracks their evolution.

3. **The Social Media Component** (SMC, developed by Ano Software) aims to monitor and provide awareness citizen's concerns about flood related issues. It collects, monitors and analyses articles, opinions, posts about floods from various social media and Web sources, visualizes and structures them for further analysis. This provides an additional tool for flood management authorities to be aware of public concerns and sentiment. This assist in developing long-term strategies and communicate with the citizens efficiently through multichannel messaging in case of an emergency.
4. **FLOOD-serv Semantic Wiki** (SW, implemented by Siveco) is a semantic wiki containing general information and knowledge about floods and flood management but also specific and contextualized knowledge related to the FLOOD-serv Project. The SW is dedicated for use by both specialists on the one hand, and regular citizens on the other.
5. **Citizen Direct Feedback** (CDF) module provides a direct communication channel from the citizens to the respective local authorities, enabling them to more effectively inform and engage in dialogue with those local authorities of any flood related information, in terms of risks or prevention. CDF enables public authorities to more easily process and make use of information from citizens.
6. **Territory Management System (TMS)** is an instrument for producing situational awareness and risk analysis within a geographical area by means of analysis pictures (vertical, by airplane or satellite, or horizontal from ground).. By analyzing images, its intelligent processing engine is able to generate reports about relevant change events, localize them, and determine water level where sensors are not present.

## PARTNERS

- SIVCO ROMANIA SA (SIVCO), Romania – Project Coordinator
- CELLENT AG (CELLENT), Austria
- ANSWARETECH SL (ANSWARE), Spain
- Government To You (GOV2U), Belgium
- COMUNE DI GENOVA (GENOVA), Italy
- INSTITUTUL NATIONAL DE CERCETARE-DEZVOLTARE DELTA DUNARII (DDNI), Romania
- AYUNTAMIENTO DE BILBAO (BILBAO), Spain
- A.N.O. SISTEMAS DE INFORMATICA E SERVICOS LDA (ANO), Portugal
- EXDWARF CONSULTING SRO (Exdwarf), Slovakia
- INSTITUTIA PREFECTULUI JUDETUL TULCEA (IP TULCEA), Romania
- BRATISLAVSKY SAMOSPRAVNY KRAJ (BSK), Slovakia
- MUNICIPIO DE VILA NOVA DE FAMALICAO (CMVNF), Portugal

## LINKS

<https://cordis.europa.eu/project/id/693599>

<http://www.floodserv-project.eu/>

### 3.1.5 COMRADES

Start date 1 January 2016 - End date 31 December 2018

#### PROJECT NAME

Collective Platform for Community Resilience and Social Innovation during Crises aims to empower communities with intelligent socio-technical solutions to help them reconnect, respond to, and recover from crisis situations.

#### DESCRIPTION

**The aim of COMRADES is to build a next generation platform to:**

- Quickly filter the citizen reports as they arrive from social media and mobile texts
- Remove uninformative and irrelevant ones
- Point out unreliable sources
- Pick up, and alert to several lone messages requesting urgent help during a crisis
- Extract, group, and monitor unfolding emergency micro-events.

#### Goals of COMRADES

##### 1. Community Resilience

Providing intelligent Information and Communication technologies to boost community resilience, by increasing the ability of a community to take collective actions, and to utilise available resources to self-organise and respond to crises.

##### 2. Community Engagement

Platform will be designed and created bottom-up by communities. Project will run several co-design and engagement events with communities, along with theoretical research.

##### 3. Informativeness of Citizen Reports

During crises, a very large number of messages are often posted on various social media platforms by using the hashtags dedicated to the crises at hand. COMRADES will produce a set of automatic filters, to efficiently and intelligently identify the messages of sufficient relevance and value.

##### 4. Content and Source Validity Assessment

Falsified crises and emergency reports are amongst the biggest concerns of humanitarians and communities towards using social media content during crisis. COMRADES will develop methods to help responders with assessing the validity of content and its source and also provide responders with means for alerting the community through the COMRADES platform and social media of unreliable content and information sources currently circulating.

##### 5. Crisis Event Modelling Detection

COMRADES will develop tools and algorithms for automatically and accurately detecting, modelling, and matchmaking emergency events.

##### 6. Participatory Community Innovation during crises

The services and platform will be open source using open and linked data, thus facilitating the extension of the platform to other application areas. The COMRADES platform will be accessible over the Web and mobile devices.

#### COMRADES will involve citizens at two levels:

1. By engaging multiple communities in the requirements, design, and evaluation tasks and



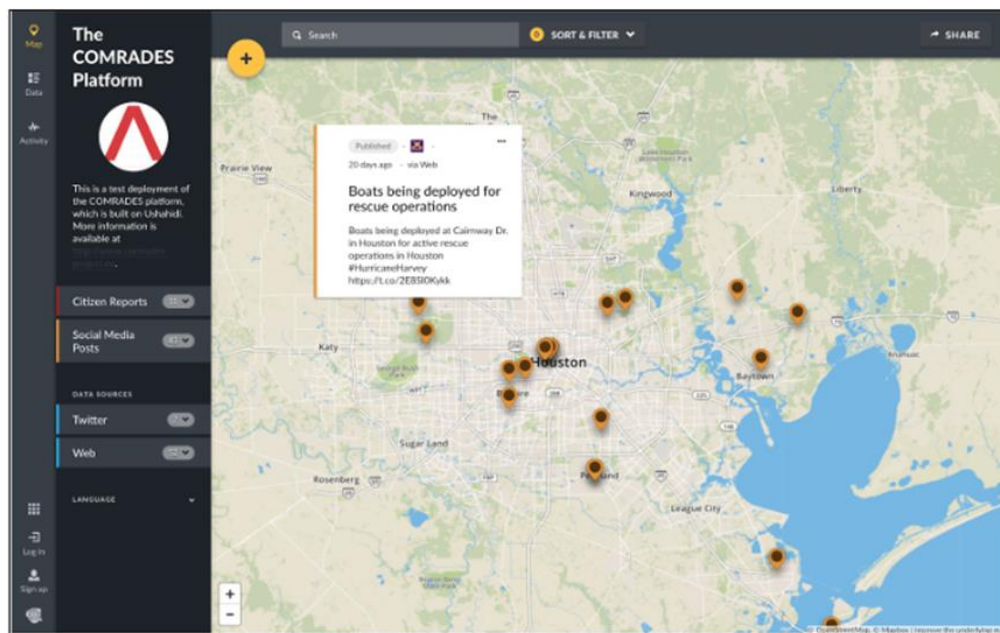
2. By producing a platform to be primarily used by the citizens, to help their communities and fellow citizens. The platform will be based on Ushahidi; a common platform for crises mapping, developed in collaboration with iHub.

### COMRADES will engage with three communities that are core to effective resilience efforts

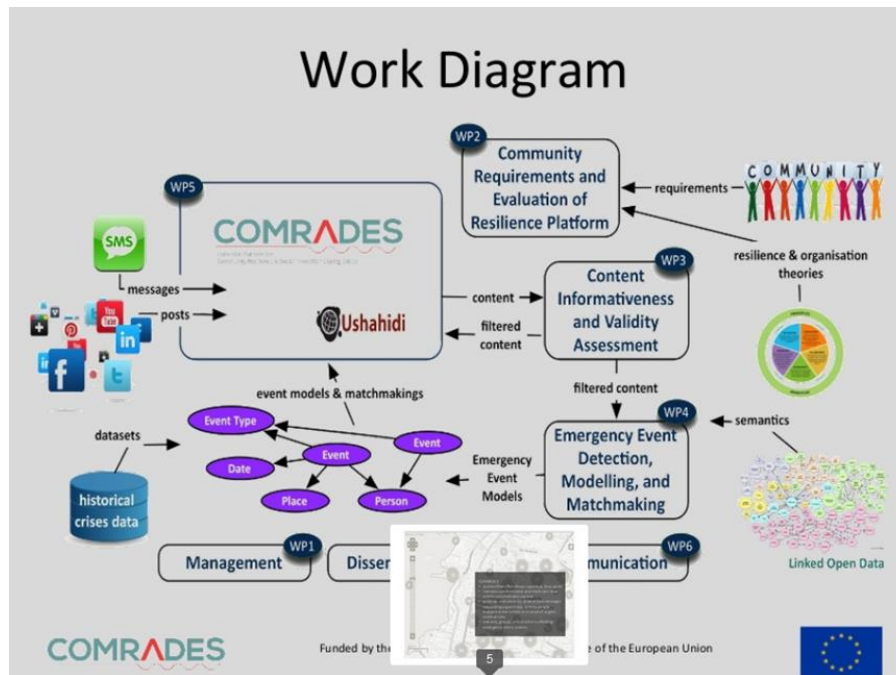
- **Activists (platform deployers):** individuals and groups of people who set up instances of the community platform.
- **Responders:** communities that organise and coordinate resources and provide expertise when the platform is deployed.
- **Reporters:** communities who report on crisis.

## RESULTS

- **Crisis Event Extraction Service (CREES)**  
CREES provides a Web API and accessible tools for automatically filtering and classifying social media documents during emergency crises.
- **Rumour veracity classifier**  
This service attempts to classify whether a text is discussing a rumour that is true, false or unverified.

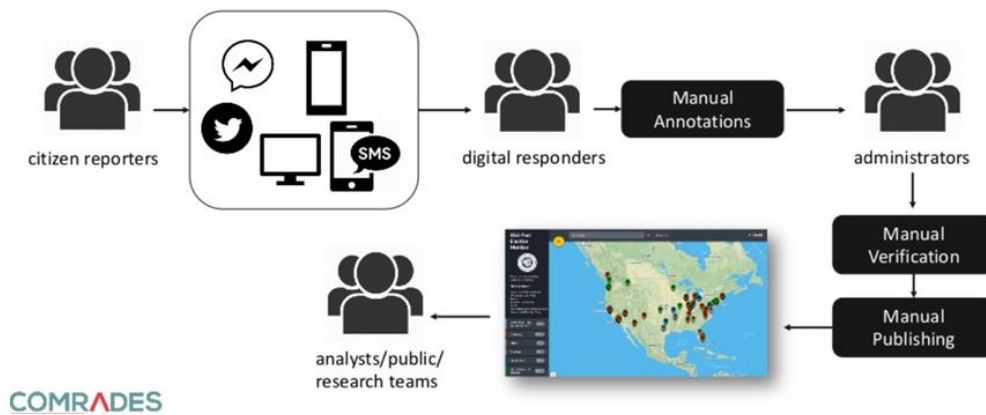


**Figure 3. COMRADES:** The platform featuring sample data taken from Hurricane Harvey in 2017.



**Figure 4. COMRADES: Work Diagram.**

## WORKFLOW OF USHAHIDI & SIMILAR PLATFORMS



**Figure 5. COMRADES: Workflow of USHAHIDI and similar platforms.**

### PARTNERS

- Knowledge Media institute, The Open University, UK
- Ushahidi
- University of Sheffield, UK
- TU Delft
- Government to You, Belgium

### LINKS

<https://cordis.europa.eu/project/id/687847>

<https://www.comrades-project.eu/>

### 3.1.6 FIRE-IN

Start date 1 May 2017 - End date 30 April 2022

#### PROJECT NAME

**e-FIRE-IN:** EU-wide one-stop shop for Fire-& Rescue Faster and cheaper access to the state-of-the-art Fire & Rescue technology for the whole of Europe.

#### DESCRIPTION

**The FIRE-IN Common Capability Challenges are based on the knowledge and experiences of more than 80 experts on emergency management.**

Indeed, the topics related to fire and rescue have been split into 5 thematic fields (Search & Rescue Emergency Response, Structure Fires, Landscape Fires, Natural Hazards, CBRNe) and experts have been invited to create Thematic Working Groups.

During a process organized with several workshops involving practitioners from each TWG, needs for new technologies, methods and standards have been expressed. These needs have been gathered and consolidated, and finally reformulated into capability challenges that are common for the 5 TWGs.



**Figure 6. FIRE-IN: Workflows.**

#### RESULTS

**The Common Capability Challenges (CCC) are presented in the matrix below in a short version. By clicking on a cell of the matrix you will find a detailed description of the CCC and examples of solutions that are available or being developed.**

The process is on-going, and at this stage, the FIRE-IN Team is engaging with the Associated Experts to further identify solutions that address already identified challenges or to further identify new challenges.

**As Associated Expert, provider or researcher you can choose to click the 2 buttons:**

- Submit a solution: for identified challenges you are invited to introduce a new solution (not yet in the list already available) to a challenge and provide some details such as the principles of the solutions, who is the supplier, what are the performances...

- Submit a challenge: you might also think about new challenges that you would like to propose for consideration by the FIREIN consortium, you are invited to click on this button.

<b>The FIRE-IN Common Capability Challenges</b>	<b>High flow of effort in hostile environment</b>	<b>Low frequency, high impact</b>	<b>Multiagency / multileadership environment</b>	<b>High level of uncertainty</b>
<b>Incident Command Organization</b>	Focus on sustainability of safe operations (TOP CHALLENGES)	Anticipate vulnerability, and communicate to the public (TOP CHALLENGE)	Distribute decision-making (TOP CHALLENGE)	Strategies choosing safe, resilient scenarios, and maintaining credibility
<b>Pre-planning</b>	Pre-plan a time-efficient, safe response, minimizing responder's engagement	Negotiate solutions with stakeholders for anticipated scenarios (TOP CHALLENGE)	Pre-plan interoperability and enhance synergies	Focus on governance and capacity building towards more resilient societies
<b>Standardization</b>	Establish specific procedures and guides facilitating operativity	Standardize capabilities in front of pre-established scenarios (TOP CHALLENGE)	Establish an interagency framework	Build doctrine for resilience in emergency services and societies
<b>Knowledge cycle</b>	Train specific roles and risks	Organizational learning focusing efforts in key risks and opportunities (TOP CHALLENGE)	Build a shared understanding of emergency and train interagency scenarios (TOP CHALLENGE)	Focus on capacity building towards more resilient societies
<b>Information management</b>	Information cycle	Manage key information focused on decision-making	Define common information management processes between agencies	Provide an efficient, flexible flow of information for a shared understanding
<b>Community involvement</b>	Develop public self-protection to minimize responders exposures	Involve communities in preparing population for the worst	Not identified at this stage	Cultural changes in risk tolerance and resilience

	(TOP CHALLENGE)	scenario before it happens (TOP CHALLENGE)		
<b>Technology</b>	Use technology to assess risks and minimize responder's engagement (TOP CHALLENGE)	Forecast and simulate complex scenarios	Technological tools to support data sharing	Get a clear picture of the risk evolution

## PARTNERS

- KEMEA, Greece (KEMEA)
- Italian Ministry of Interior, Department of Fire Corps, Public Rescue and Civil Defence), Italy (CNVVF)
- INNO TSD (inno)
- Ecole Nationale Supérieure des Officiers de Sapeurs-Pompiers, ENSOSP
- Catalonia Fire Service Rescue Agency, Spain (CFS)
- Fire Ecology and Management Foundation Pau Costa, Alcubierre, Spain (PCF)
- Global Fire Monitoring Centre, Germany (GFMC)
- Bundesanstalt Technisches Hilfswerk, Germany (THW)
- Czech Association of Fire Officer, (CAFO)
- Scientific and Research Centre for Fire Protection, Poland (SRC)
- The Main School of Fire Services, Poland (MSFS)
- Council of Baltic Sea States (CBSS)
- Civil Contingency Agency, Sweden (MSB)

## LINKS

<https://cordis.europa.eu/project/id/740575>

<https://fire-in.eu/>

### 3.1.7 STAIR4SECURITY

Start date 1 January 2019 - End date 30 June 2021

#### PROJECT NAME

STANDARDS, INNOVATION AND RESEARCH FOR SECURITY

## DESCRIPTION

Project's goal is to create an expert platform setting a mechanism of coordination of research-related standardization activities in the security sector.

### What is STAIR4SECURITY - Introduction

A wide range of security threats including man-made and natural risks can result in disruptive events having serious consequences for societal and citizen security. Both, public and private stakeholders require adequate solutions in organization, procedures and technological capabilities to be able to respond timely and effectively. Thus, there is a need to develop specific standards that enable various public and private organizations within Europe, being local, national, European or international to be effectively coordinated ensuring as much as possible a smoothly cooperation before, during and after a disruptive event.

The main objective of STAIR4SECURITY is to create a collaborative platform as single entry point for information on the security sector stemming primarily from research activities in order to allow better governance of standardization needs in the Disaster Resilience and Chemical Biological Radiological Nuclear and Explosive (CBRNe) sectors to be realised. The platform will be practitioner / policy making driven. It aims to permit a better overview of current and new projects being at, national, European and international level; ensuring more coordination between all stakeholders and responding more efficiently and timely to the critical needs following an agreed strategic vision and identified priorities.

Besides ensuring the necessary partnering network, STAIR4SECURITY will review process efficiency and effectiveness, including the necessary tools and mechanisms, which encapsulates the CEN and CENELEC Workshop Agreement (CWA) process and a fast-track procedure. The adoption and suitability of a CWA as well as any other standard type deliverable or reference document, such as a TS and TR, will also form part of the review under the guise for the need for more relevant consensus standard (EN).

### Overall concept

The underlining concept is to support the facilitation and transfer of research results at European and national level into the market involving standardization activities.

STAIR4SECURITY aims to deliver a policy making / practitioner driven platform, which enables a more effective networking within experts from research, industry including SMEs, practitioners, policy makers and standardizer to be realised.

The platform will not only ensure the awareness of relevant activities from the demand and supplier sides but also digest the input received, align the gaps with the policy priorities to provide recommendations on standardization needs and the relevant standardization body to address the needs identified. The platform should also support the initial steps to launch the standardization activities in, for example, helping in the drafting of the standardization mandate or proposed work item.

The platform aims to ensure that all current and planned actions are made known to the community and that an assessment of the maturity and the market relevance of the pre-standardization activities to be upgraded in a consensus standard will be facilitated.

## RESULTS

**The first objective** of the project is to establish an expert platform setting a mechanism of coordination of research-related standardisation activities in the security sector, building up on a legacy of identified projects, and providing a "single entry point" for any query related to standards in the

Disaster Resilience and CBRNe sectors. It is to be noted that the platform will not cover cybersecurity activities.

The project aims to ensure that the upstream work i.e. pre- or co-normative research is conveyed quickly and adequately into the standardisation process. This means it is accessible, signalled to relevant CEN-CENELEC technical committees, discussed with relevant stakeholders, aligned with policy priorities and allocated to the relevant standardization body. The process will by no means substitute the role of National Standardization Bodies in research projects. The platform shall involve Member States' representatives, policy-makers, scientists (research, academic), standardizers and practitioners including through existing network of practitioners as well as security industry/SMEs. Industry might be involved only once the process of expression of means is matured enough. This will allow relevant research outputs being more efficiently and faster directed to proper activity streams e.g. mandates to issue EN, CWA, or non-standardised guidelines and best practices.

**The second objective** of the project is the revision of the necessary standardization tools and mechanisms to fit the needs of research and innovation when market need has been outlined by the proposer. This will be translated in the review of the CEN and CENELEC Workshop Agreement (CWA) process assessing its fit for purpose for the security sector and comprising the possibility to develop CWAs with classified information.

**Using the STAIR4SECURITY platform** for early information exchange between research projects having a standardization dimension and standardizers, the assessment of maturity by the relevant standardization bodies of non-consensus standardization deliverables like CWA but also Technical Specifications (TS) and Technical Report (TR) to be adopted as consensus standard (EN) will be facilitated. Therefore, it is proposed to analyse the options designing a new mechanism including selection criteria and necessary steps to be followed during the development of CWA, TS or TR to be eligible for a fast-track adoption as CEN or CENELEC consensus standard.

The CWA and the fast track adoption procedure being CEN and CENELEC internal procedures, the project will propose clear and detailed improvement options to fit the needs of the security sector to be finally adopted by the relevant CEN and CENELEC governing bodies.

## **PARTNERS**

- CEN-CENELEC
- DIN
- Swedish Institute for Standards
- AFNOR
- TFC
- FAC
- Insight – NUI Galway
- Austrian Standards International

## **LINKS**

<https://cordis.europa.eu/project/id/853853>

<http://cen-stair4security.eu/>

### 3.1.8 SAYSO

Start date 1 May 2017 - End date 30 April 2019

#### PROJECT NAME

Standardisation of situational Awareness sYstems to Strengthen Operations in civil protection

#### DESCRIPTION

The project's main objective is to put in place the preparatory work for the development of innovative **Situational Awareness Systems** that will improve the coordination of **civil protection operations** where multiple organizations are involved, especially in the case of international cooperation.

#### RESULTS

SAYSO includes three main work phases:

Phase 1 <b>Requirements</b>	<ul style="list-style-type: none"> <li>• Survey of <b>requirements of practitioners and emergency responders</b> across Europe.</li> <li>• Analysis of the <b>shortcomings of systems currently used</b>.</li> <li>• Investigation of <b>existing and new tools and features</b>.</li> </ul>
Phase 2 <b>Specifications</b>	<ul style="list-style-type: none"> <li>• Integration of requirements into <b>system specifications</b> and a <b>reference architecture</b>.</li> <li>• <b>Validation of SAYSO specifications</b> against reference scenarios, also considering <b>standardisation</b>.</li> <li>• <b>Technical feasibility assessment</b> of specifications supported by the project's <b>network of suppliers</b>.</li> </ul>
Phase 3 <b>Procurement</b>	<ul style="list-style-type: none"> <li>• Provision to Public Procurement Authorities of a <b>toolkit for Pre-Commercial Procurement (PCP)*</b>.</li> <li>• Creation of an <b>open call platform</b> for future PCP activity.</li> <li>• Creation of an <b>online registry of suppliers and procurers</b> of SAYSO-compliant systems.</li> </ul>

Handling the crises faced by modern societies often requires the coordination of multiple types of stakeholders from different countries. One of the key requirements to manage crisis is to have access to Situational Awareness (SA). However, current Situational Awareness Solutions (SAS) are not adapted to operate in **cross-border contexts and present several shortcomings related to interoperability, data management and processing, decision making, standardisation, and procurement**. This hinders reliable sharing of situational awareness information.

SAYSO will address these shortcomings and pave the way for **the development of innovative European cost-effective Multi-Stakeholders Situational Awareness Systems (MSSAS)**, which



will provide civil protection practitioners with user-friendly systems through all phases of emergency response, analysing hazards and uncertainties associated with the disaster site, providing a clear picture of the situation at hand with relevant advices.

Addressing both the technical and human aspects of technology implementation, SAYSO will define the specifications of future MSSAS on the basis of practitioners' requirements and specify the corresponding Reference Architecture to support the integration of various data into a common operational picture. This architecture will support interoperability and allow the integration of legacy and future SAS. It will also be customisable to practitioners' needs and safeguard adequate privacy protection and data security levels. SAYSO will pursue the agreement and sustainable involvement of a community of practitioners, relevant suppliers and potential procurers, institutions and policy makers to obtain widely accepted results and prepare future procurement actions at EU level.

SAYSO will develop a toolkit for MSSAS procurers, which will include tender documentation for SAYSO-compliant MSSAS and a SAYSO Procurers Handbook (with tools to evaluate MSSAS tenders and assess their compliance with the SAYSO specifications and existing standards). A registry of potential suppliers and procurers of MSSAS will be set up. Finally, SAYSO will deliver roadmaps for future MSSAS and standardisation.

## **PARTNERS**

- Bundesministerium des Inneren (Germany – Project coordinator)
- ISCC GmbH (Austria)
- CNet Svenska AB (Sweden)
- Luxembourg Institute of Science and Technology (Luxembourg)
- European Organisation for Security SCRL (Belgium)
- Stockholms Universitet (Sweden)
- ARTTIC (France)
- Kentro Meleton Asfaleias (Greece)
- Ministerium für Inneres und Kommunales Nordrhein-Westfalen (Germany)
- Universität Paderborn (Germany)
- Department of Health (United Kingdom)

## **LINKS**

<https://www.din.de/en/innovation-and-research/research-projects/security/sayso-243646>

<https://cordis.europa.eu/project/id/740872>

<https://cmt.sym.place/groups/profile/20479/sa-in-eu>

### **3.1.9 Climate-fit.city**

Start date 1 June 2017 - End date 29 February 2020

## PROJECT NAME

Climate-fit.City

## DESCRIPTION

Urban areas are very vulnerable to the impacts of climate change, because of the high concentration of people, infrastructure, and economic activity, but also because cities tend to exacerbate climate extremes such as heat waves and flash floods. Climate-fit.city will translate the best available scientific urban climate data into relevant information for public and private end-users operating in cities across a range of different sectors.

This will be achieved by demonstrating the benefits of urban climate information to end-users, considering the sectors of energy, cultural heritage, mobility, energy, health, and urban planning. During the first half of the 30-month project, end-users (included as partners) and climate service providers will be involved in the co-design/-development of six concrete sectoral cases, to be implemented in Antwerp, Barcelona, Bern, Prague, Rome, and Vienna. Each of these cases will be subject to a detailed socio-economic impact analysis, quantifying the benefits of using urban climate information. The second half of the project will focus on upscaling and market replication, initially aiming at the extension with six new cases, involving new (non-financed) end-users. Through a business development strategy, supported by dissemination and marketing activities, we ultimately aim at acquiring six more cases by the end of the project, involving new business intermediaries without PUCS project financing, and demonstrating the long-term market viability of the service.

PUCS aims at a genuine market uptake of (urban) climate services, based on a distributed network of local business intermediaries throughout Europe, enhancing the awareness for urban climate-related issues in the end-user community, and converting (mature) research results into tailored added-value information, thus removing important barriers for the deployment of urban climate services.

## RESULTS

### Climate-fit.city services

- Active mobility and cycling

Bike Citizens is an app that supports cyclists in 450 cities, by keeping them informed about weather conditions, the best bike routes, delays and estimated cycle speed.

- Building Energy

Climate resilience strategies can prepare buildings to face climate change emergencies, helping communities and businesses to bounce back. Areas likely to flood, for example, can be built to withstand these events without damage being caused to equipment, and to continue operations when the power goes out. Measures like this can prepare cities to face climate change, but only if the data they are built on is accurate and precise.

- Cultural Heritage

Using scientifically established methodologies, our World Heritage Service processes a city's existing data to produce sound and detailed insights into the current levels of heat stress and energy

consumption of its heritage sites. The service team then guides our client towards the most effective ways to adapt visiting patterns, safeguard buildings, and make informed long-term investment plans.

- Emergency Planning

The rapid spread of urban fires is part of the collective memories of city communities everywhere, while the effect of heavy rainfall can be much more severe in built-up areas. The lack of open soil, for instance, often results in city sewage systems becoming overwhelmed. This 'urban flooding' is still a frequent occurrence throughout Europe, and one that urgently needs to be addressed.

- Heat and health

One significant urban health problem is heat. The urban heat island effect causes temperatures to rise in cities, exacerbating the negative impacts this has on health. With climate change already creating more frequent heat waves, social inequality and illness will only increase unless targeted heat-mitigation measures are taken.

- Urban Planning

While many environmental urban planning tools already exist, most are still too inflexible and difficult for planners to use. According to recent studies, for urban planning to be effective, climate services must develop a more collaborative approach to working with planners.

- Stakeholder engagement and communication

Climate change impacts so many different aspects of lives in cities. Over the coming years, cities will need to rethink their public transport systems and cycling infrastructure, community organizing and emergency responses in the face of extreme weather, green spaces, urban planning guidelines that can tackle more severe floods ...

- Socio-economic impact assessment

T6's modular methodology can be customised for different scenarios, independently from the specific field of application (health, urban planning, mobility, risk management, etc). Our approach can help you evaluate whether specific climate initiatives:

- improve public service effectiveness;
- lower health-related costs in several scenarios;
- reduce social inequalities;
- foster more sustainable and healthy habits in citizens;
- raise awareness among professionals and the general public of climate change-related issues;
- stimulate collaboration and knowledge-sharing among different stakeholders.

## **PARTNERS**

- VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V.
- Agencia de Salut Publica de Barcelona
- ARCTIK SRL
- BIKECITYGUIDE APPS GMBH
- FUNDACION PRIVADA INSTITUTO DE SALUD GLOBAL BARCELONA

- GISAT S.R.O.
- IMMO 14 GENOSSENSCHAFT
- INES ENERGIEPLANUNG GMBH
- IURS - INSTITUT PRO UDRZITELNY ROZVOJ SIDEL ZS
- JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH
- METEOTEST AG
- PRONOO AG
- SOPRINTENDENZA SPECIALE PER IL COLOSSEO IL MUSEO NAZIONALE ROMANO E L'AREA ARCHEOLOGICA DI ROMA
- STAD ANTWERPEN
- T6 ECOSYSTEMS SRL

## LINKS

<https://cordis.europa.eu/project/id/730004>

<http://climate-fit.city/>

### 3.1.10 DRIVER+

Start date 1 May 2014 - End date 30 April 2020

#### PROJECT NAME

Driving Innovation in Crisis Management for European Resilience

#### DESCRIPTION

Launched in May 2014, DRIVER+ is a project funded under the 7th Framework Programme of the European Commission, whose main aim is to cope with current and future challenges due to increasingly severe consequences of natural disasters and terrorist threats, by the development and uptake of innovative solutions that are addressing the operational needs of practitioners dealing with Crisis Management.

#### RESULTS

To achieve its overarching objective, DRIVER+ is committed to deliver and make sustainable by April 2020 (end date of the project):

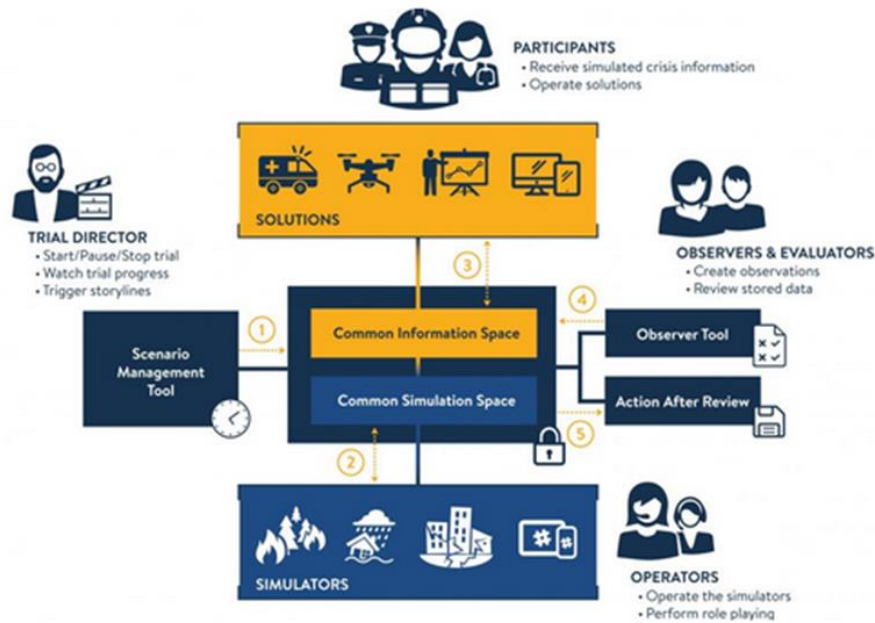
- A pan-European Test-bed for Crisis Management capability development enabling practitioners to create a space in which stakeholders can collaborate in testing and evaluating new products, tools, processes or organisational solutions.
- A Portfolio of Solutions (PoS) in the form of a database-driven website that aims at documenting all DRIVER+ solutions. These will be tested via trials during the project lifetime. Ultimately, the

PoS will be opened up to any external organisations willing to share data and experiences of solutions

- A shared understanding in Crisis Management across Europe, through the enhancement of the cooperation framework.

## DO YOU KNOW WHAT IS THE DRIVER+ TEST-BED?

Sep 13, 2018



The DRIVER+ Test-bed is a pan-European arena of virtually connected facilities and crisis labs, aiming at providing the following:

- A pragmatic step-by-step guidance to conduct Trials
- A reference implementation for all DRIVER+ Trials
- General guidance and technical infrastructure of the Test-bed to support the Trials
- A demonstration infrastructure where stakeholders can collaborate in trialling and evaluating new tools, processes or organisational solutions.

**Figure 7. DRIVER+:** The test-bed.

## PARTNERS

- ATOS, SPAIN
- TNO, The Netherlands
- GERMAN AEROSPACE CENTER
- [Arttic SAS](#), France
- The JOINT RESEARCH CENTER
- AUSTRIAN INSTITUTE OF TECHNOLOGY
- Space Research Centre Polish Academy of Sciences, Poland
- AUSTRIAN RED CROSS RESEARCH
- DANISH RED CROSS
- MAGEN DAVID ADOM, Israel
- European organisation for security

- ThaleS, France
- ECORYS, The Netherlands
- EDISOFT, Portugal
- The MAIN SCHOOL OF FIRE SERVICES, Poland
- FREQUENTIS, Austria
- HKV, The Netherlands
- ITTI, Poland
- XVR SIMULATION, The Netherlands
- PUBLIC SAFETY COMMUNICATION EUROPE FORUM, Belgium
- DIN, Germany
- Westfälische Wilhelms-Universität, Germany
- Centre for Security and Defence Management, Bulgaria
- THE HAGUE CITY, The Netherlands
- ARMINES, France
- GMV, Spain
- Valabre, France
- ESTONIAN ACADEMY OF SECURITY SCIENCES, Estonia
- DISASTER WASTE RECOVERY, United Kingdom
- CITET, Spain
- THE PEACE RESEARCH INSITUTE, Norway

## LINKS

<https://cordis.europa.eu/project/id/607798>

<https://www.driver-project.eu/>

### 3.1.11 IN-PREP

Start date 1 September 2017 - End date 28 February 2021

#### PROJECT NAME

An INtegrated next generation PREParedness programme for improving effective inter-organisational response capacity in complex environments of disasters and causes of crises.

#### DESCRIPTION

Effective disaster response and preparedness rely on making sense of the situation in a rapidly changing scenario and responding with accuracy and speed. Research has shown us there is a lack of sufficient links between agencies during crises. They want to respond immediately and receiving clear information

on available resources impacts their response. There are barriers between organisations in terms of interoperability, organisation cultures and shared tools.

Interoperability of technologies – when technologies are different in and between organisations it affects the exchange and flow of information between emergency agencies. Communication can slow down wasting precious seconds in rescue operations. IN-PREP will create a tool called the Mixed Reality Preparedness Platform to facilitate interoperability, merge decision support mechanisms with 'at-a-glance' visualisation and integrate situational awareness with real time information.

Organisational cultures – organisation and management of emergency agencies can vary from one country to another or between two different agencies in the same country. One agency may have a hierarchical structure while another may be more horizontal. IN-PREP will provide training to standardise operations in transboundary situations and build capacity within organisations.

## RESULTS

### What's novel about IN-PREP

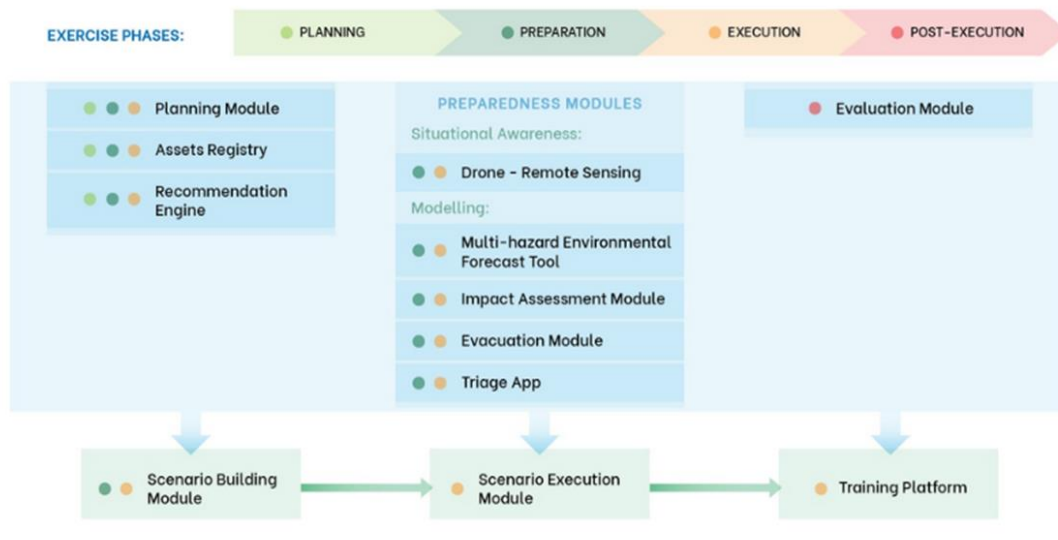
- The Mixed Reality Preparedness Platform is a tool that combines many types of technologies to integrate how responders perceive information on the ground and how they direct their resources

The MRPP provides an interactive visualisation of the crisis environment combining both simulated and real data. Features include:

- Decision support capabilities with built-in situational awareness
- Resource allocation in real-time
- Rapid remote sensing for quicker response actions
- Large scale evacuation simulation
- Coordinated C2/C3 systems
- Vulnerability and Risk assessment
- INTERDISCIPLINARY RESEARCH: The INPREP research team is interdisciplinary and brings together fields of Social Sciences & Humanities, Responsible Research and Innovation, Engineering and Information technology
- IN-PREP OPEN SOURCE HANDBOOK: A handbook of transboundary preparedness will be produced. It will have check lists, case studies and lessons learnt and be a resource for civil protection agencies to refer to when customising their crisis plans.
- IN-PREP TRAINING: Training sessions will be provided to ensure that tools and procedures are demonstrated and understood in different organisational cultures and countries

### How to use

The diagram shows the different IN-PREP modules and the relations between the modules. You can find out more information about each module by clicking on a module box. The tabs in the header show the different phases during an exercise. The modules are colour-coded to show which modules should be used during each phase.



**Figure 8. IN-PREP: Modules.**

More details about MRPP in the following link.

<https://www.in-prep.eu/handbook-mrpp/#1615483811119-dd20b4b2-98087729-f411>

## PARTNERS

- Institute of Communication and Computer Systems (ICCS), Greece
- Crisisplan BV, The Netherlands
- AIRBUS Defence and Space (ADS), France
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
- DIGINEXT SARL (DXT), France
- Italian Ministry of Interior Department of Fire Corps, Public Rescue and Civil Defence (CNVVF)
- EXUS Ltd, Greece
- SATWAYS Ltd – Proionta kai Ypiresis Tilematikis Diktyakon kai Tilepikinoniakon Efarmogon Etaireia Periorismenis Efthinis EPE (STWS), Greece
- Fraunhofer-Gesellschaft Zur Foerderung der Angewandten Forschung EV (FhG), Germany
- Assistance Publique – Hôpitaux de Paris (AP-HP), France
- University of Greenwich (UoG) Fire Safety Engineering Group (FSEG), United Kingdom
- Trilateral Research Ltd (TRI), United Kingdom
- Carr Communications International Communications Consultants C.C.I.C.C. Limited (CARR), United Kingdom
- Police Service of Northern Ireland (PSNI), Ireland
- Intelligence for Environment & Security- IES Consulting SRL (IESC), Italy
- Deutsche Hochschule der Polizei (DHPol) The German Police University



- Veiligheidsregio IJsselland – Safety Region IJsselland (SRIJ), The Netherlands
- Dimos Rodou – Municipality of Rhodes (RHO), Greece
- AIR Worldwide, United Kingdom
- Health Service Executive (HSE), Ireland

## LINKS

<https://www.in-prep.eu/>

<https://cordis.europa.eu/project/id/740627>

### 3.1.12 HEIMDALL

Start date 1 May 2017 - End date 31 January 2021

#### PROJECT NAME

Multi-Hazard Cooperative Management Tool for Data Exchange, Response Planning and Scenario Building

#### DESCRIPTION

HEIMDALL aims at improving preparedness of societies to cope with complex crisis situations by providing a flexible platform for multi-hazard emergency planning and management, which makes use of innovative technologies for the definition of multi-disciplinary scenarios and response plans, providing integrated assets to support emergency management, such as monitoring, modelling, situation and risk assessment, decision support and communication tools. HEIMDALL fosters data and information sharing among the relevant stakeholders, maximises the accuracy of valuable information and improves population awareness.

With the aim of successfully achieving this overall purpose, HEIMDALL will address the following key aspects: (i) improved data and information access and sharing among the involved stakeholders, including the population and first responders on the field; (ii) better understanding of the situation by using advanced multi-hazard methods to develop realistic multi-disciplinary scenarios, risk and vulnerability assessment, information sharing and emergency response; (iii) recognising the value of information by advanced data fusion, situation assessment and decision support tools. The combination of these aspects will be integrated in a modular and highly flexible platform which will make use of a federated architecture to provide user-tailored interfaces and foster information sharing among the involved stakeholders. Additionally, the platform will provide citizens at risk and first responders on the field with valuable incident-related information, increasing population awareness.

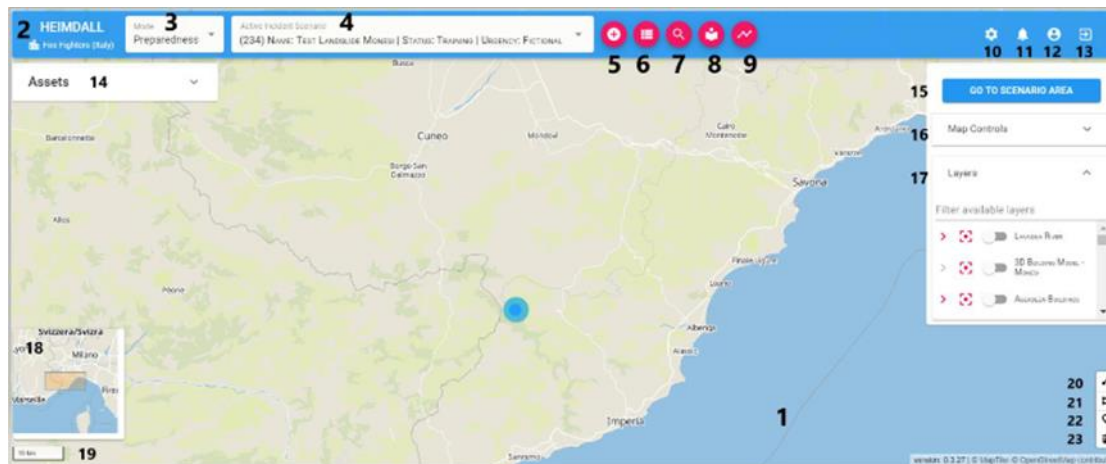
#### RESULTS

HEIMDALL will develop and demonstrate a modular, flexible and scalable architecture that provides key stakeholders with relevant tools to process the available data and improve preparedness of societies in relation to emergency management, thus enhancing response capacity of society as a whole.

The HEIMDALL services can be divided according to the phase of the emergency management cycle in which they are mainly used. According to this, the platform will offer services to be used either in (i) the preparedness and mitigation phases or in (ii) the response and recovery phases. Regarding the former group, the system will allow end users to define, store and share a catalogue of realistic scenarios based on their experiences and according to the requirements of the different user profiles (firefighting units, civil protection, police departments, medical emergency services and command and control centres). The system will allow end users to associate each scenario to the corresponding response plans to be applied according to their experiences and best practices, thus fostering their sharing. Additionally, risk detection and monitoring services will be provided by HEIMDALL thanks to the integration of a wide range of advanced satellite and ground-based sensors, adapted to the hazards under consideration: forest fire, floods and terrain movements.

With regard to the response and recovery phases, once a risk or emergency has been detected, the platform provides a series of modelling algorithms for each addressed hazard, which combined with data fusion techniques and decision support tools provide users with an improved assessment of the situation and its associated risk and vulnerability. Making use of these inputs, the decision support tools will compare the data corresponding to the actual situation with the information available in the catalogue of scenarios and determine the most relevant scenario to be considered, together with the associated response plan and the corresponding best practices. Finally, the information generated or available in the system, such as relevant response plans or map-based situation assessment information can be accessed by the relevant stakeholders or shared with them once it is available. In order to allow this feature, which is especially relevant for first responders deployed on the field, HEIMDALL will make use of rapidly-deployable communication infrastructure in order to allow the re-establishment of communications on the field in case the existing infrastructure has been damaged or never existed. Making use of this portable, satellite-based communication system, first responders on the field will be able to access the information available in the platform, to receive any relevant message generated by the platform and to provide data, such as their own location or pictures from the field, to be stored at the platform.

HEIMDALL will foster data and information sharing among stakeholders by means of developing a federated architecture, based on content oriented concepts, where different local units of the system can publish services, data and information by means of a global catalogue. This approach provides flexibility at different levels: on one hand, different services can be available in each local unit and made accessible to users accessing other local units by means of publishing them in the catalogue. On the other hand, additional external services can be easily added to the overall architecture by publishing the corresponding services or information in the catalogue and establishing the corresponding connection, without additional integration efforts.



**Figure 9. HEIMDALL:** Main screen of the platform.

## PARTNERS

- Deutsches Zentrum für Luft- und Raumfahrt e. V. (Germany)
- SPACE HELLAS S.A. (SPH)
- Pau Costa Foundation
- Tecnosylva
- Avanti Communications Ltd
- International Centre for Ethics in the Sciences and Humanities (IZEW)
- UNISTRA – SERTIT
- Centre Tecnològic de Telecomunicacions de Catalunya CTTC
- Institut Cartogràfic i Geològic de Catalunya (ICGC)
- CIMA Research Foundation (Centro Internazionale di Ricerca in Monitoraggio Ambientale)
- Catalan Fire and Rescue Service, Catalan Department of Interior
- General of Security Administration, Catalan Department of Interior
- Frederiksborg Fire & Rescue Service (FBBR)
- Scottish Fire and Rescue Service
- Italian Red Cross

## LINKS

<https://heimdall-h2020.eu/>

<https://cordis.europa.eu/project/id/740689>

*case studies*

[https://heimdall-h2020.eu/wp-content/uploads/2019/03/HEIMDALL\\_D3.2.PCF\\_v1.0.F.pdf](https://heimdall-h2020.eu/wp-content/uploads/2019/03/HEIMDALL_D3.2.PCF_v1.0.F.pdf)

[https://heimdall-h2020.eu/wp-content/uploads/2021/01/HEIMDALL\\_D3.3.PCF\\_v1.0.F.pdf](https://heimdall-h2020.eu/wp-content/uploads/2021/01/HEIMDALL_D3.3.PCF_v1.0.F.pdf)

### 3.1.13 MEDEA

Start date 1 June 2018 - End date 31 May 2023

#### PROJECT NAME

The Mediterranean & Black Sea Security Practitioners' Network

#### DESCRIPTION

The Mediterranean and Black Sea region is characterised by a very volatile and dynamically changing security environment that pose severe threats and challenges on the societies and prosperity. The MEDEA project, during its 60 months of implementation provides funding for four interrelated actions:

- (i)** Establish and Operate the MEDEA network, a multi-disciplinary network of security practitioners, with active links to policy makers and users/providers of security innovations across the M&BS countries focusing in Border Protection and other Security- and Disaster-Related tasks. During the project duration, MEDEA members will engage in activities towards maintaining its sustainability and longevity after the financing of this project ends,
- (ii)** Engage participants in anticipatory governance on emerging security challenges that the Mediterranean and Black Sea regions would face in the coming years (present until +10 years), which concretely operationalizes the backbone of the project in a triple structure: a) understanding unsatisfactory state of play, b) design the desirable future and c) define a resilient pathway on how to achieve this,
- (iii)** Push for the "co-creation" of security technology and capabilities innovations between practitioners and innovation suppliers, which is based upon their evaluation and prioritization on multi-criteria analysis (technology, operational and cost-benefit, etc.) and also linked to Human Development, Policy Making and Organizational Improvements in-terms of facilitating its use by the practitioners
- (iv)** Establish and annually update the Mediterranean Security Research and Innovation Agenda (MSRIA), that identifies areas where security & defence research is needed and the establishment of recommendations for European Security & Defence technology investments.

#### RESULTS

- **Improve collaboration among institutions and actors from different disciplines** using research and innovation as a catalyst for a) enhancing capabilities of practitioners through the use of technological innovations in their operations and b) enable the coordinated use of interconnected information systems.
- **Define Mediterranean and Black Sea regional security priorities**, amalgamated in an annually updated **Mediterranean Security Research and Innovation Agenda**, using a scenario based visioning method for considering alternative future threats and high impact scenarios, comparing them, analysing how they might occur in the mid to the long-term and how effective and efficient responses may be devised.
- **Build a scenario driven technology roadmap** that a) identifies common needs of relevant actors across the region b) explores the use of innovative tools such as PCP, PPI, etc. taking advantage of economies of scale and reducing time to market and c) capitalize on previous

research and innovation activities (national, FP7, H2020, ISF etc.), policy documents, relevant reports.

## **PARTNERS**

- Center for Security Studies – KEMEA
- Guardia Civil
- Ministero dell' Interno - Department of Public Security (Policia di Stato)
- Romanian Police
- Entente pour la Forêt Méditerranéenne - VALABRE CEREN
- Ministério de Defesa Nacional
- Defence Institute "Professor Tsvetan Lazarov"
- Bundesministerium des Innern
- General Maritime Directorate
- Hellenic Ministry of National Defence
- Croce Rossa Italiana Comitato di Vicenza
- Ingenieria de Sistemas para la Defensa de España
- European University of Cyprus / Centre for Risk and Decision Sciences (CERIDES)
- HALPIN - Centre for Research & Innovation at NMCI
- ZAKA - Search and Rescue
- Deutsche Gesellschaft für Auswärtige Politik e.V. – DGAP
- European Organisation for Security – EOS
- European Union Satellite Center – SATCEN
- Fundación Euroárabe
- Hellenic Police - HPO - ΕΛ.ΑΣ.
- 

## **LINKS**

<https://www.medeia-project.eu/>

<https://cordis.europa.eu/project/id/787111>

### **3.1.14 INACHUS**

Start date 1 January 2015 - End date 31 December 2018

#### **PROJECT NAME**

Technological and Methodological Solutions for Integrated Wide Area Situation Awareness and Survivor Localisation to Support Search and Rescue Teams

## DESCRIPTION

Crisis incidents may result in difficult working conditions for Urban Search-and-Rescue (USaR) crews. INACHUS aims to achieve a significant time reduction related to Urban Search and Rescue (USaR) phase by providing:

- 1) Wide-area situational awareness solutions for improved **detection** and **localisation** of trapped victim.
- 2) Simulation tools for **predicting structural failures**.
- 3) Holistic decision support mechanism aiding in **prioritization and mission coordination**.

## RESULTS

### INACHUS tools and technologies

**Collapse simulation:** Simulation tools for estimating the locations of survival spaces (after a structural collapse) and identify the location of survivors for different construction types and building materials.

**Decision & Planning:** Decision and planning tools for advanced casualty and damage estimation that will be based on input coming from airborne and ground-based laser-scanning and imaging data.

**Victim localization:** Integration of i) existing and novel sensors (electromagnetic, vision, chemical) for detecting and high-accurate localisation and ii) mobile phones signals for estimating the number of the trapped humans.

**Inachus snake robot:** A robot with integrated sensors, radar, cameras and a two-way communication system penetrates the rubble to pinpoint the location of trapped victims.

**Communication platform:** A robust, resilient and interoperable communication platform to ensure that the sensors data can reach the command centre.

**Decision support:** Enhanced data analysis techniques and 3-D visualization tool of the mission place to be operated by the crisis managers and the decision makers. A suitable decision support system will be used for planning & managing complex USaR operations.

**Wide area surveillance:** A robust, resilient and interoperable communication platform to ensure that the sensors data can reach the command centre.

**System integration:** System Integration of all the aforementioned software and hardware subcomponents (INACHUS platform).

**Contribution to standards:** Interaction with international organizations and public authorities in the fields of USaR, through an early defined and developed User Group, to ensure strong links with the user communities and standardisation bodies.

**Social & legal impacts:** Consideration of societal impacts and legal/ethical issues of the proposed solution at the onset of the project feeding into the technical solutions.

**VALIDATION:** Numerous field and simulated validation tests properly designed and executed for presenting the capabilities of the INACHUS integrated platform.

**Training:** Appropriate training package and extensive training courses to the First Responders.

## PARTNERS

- Institute of Communication and Computer Systems, Greece

- EXODUS Anonymos Etaireia Pliroforikis
- Totalforsvarets Forskningsinstitut
- Crisisplan B.V.
- ONERA, The French Aerospace Lab
- Fundacion Tekniker
- Laurea-Ammattikorkeakoulou OY
- Diginext SARL
- Applied Science International Europe SRL
- Cinside AB
- Fraunhofer-Gesellschaft Zur Foerderung Der Angewandten Forschung E.V.
- Entente pour la Foret Mediterraneenne
- Urban Search and Rescue Team from The Netherlands
- Stiftelsen SINTEF
- BYTE Computer Anonymi Viomichaninkiemporiki Etaireia
- TELINT RTD Consultancy Services LTD
- Universiteit Twente, The Faculty of Geo-information Science and Earth Observation (ITC)
- Sodertons Branforsvarsforbund
- Mikrosystemata Mikrorois Gia Genetikous Elegkous Kai Moriaki Diagnostiki EPE
- Schüßler-Plan Ingenieurgesellschaft MBH

## LINKS

<https://www.inachus.eu/>

<https://cordis.europa.eu/project/id/607522>

### 3.1.15 **ResiStand**

Start date 1 May 2016 - End date 30 April 2018

#### **PROJECT NAME**

Increasing disaster Resilience by establishing a sustainable process to support Standardisation of technologies and services

#### **DESCRIPTION**

ResiStand is a two-year project (May 2016 - April 2018) that aims to identify new ways to improve the crisis management and disaster resilience capabilities of the European Union and individual Member States through standardisation. Whilst standardisation is a powerful tool with the potential to maximise technical, procedural, operational and semantic interoperability, there is a need to overcome apathy

and limited participation from stakeholders. ResiStand will contribute to an improved disaster resilience by identifying and analysing the drivers, constraints and expectations of three main stakeholder communities: Standardisation Organisations, End-Users, and Suppliers, consisting of researchers, industry and SMEs. ResiStand's partners will work with these communities to identify standardisation gaps and to create a prioritised roadmap for new initiatives. The roadmap will be complemented by a critical evaluation of standards as a tool to improve disaster resilience. Additionally, ResiStand will implement a pre-standardisation process that supports the development of standards. To test the feasibility of this process and encourage the continued use of the "ResiStand Process", ResiStand will develop a new work item.

## RESULTS

The overall objective of ResiStand is to identify new ways to improve the crisis management and disaster resilience capabilities of the European Union and of individual Member States through standards. This objective will be achieved by:

- Proposing new standardisation activities that can advance and improve disaster resilience.
- Providing a better understanding of the potential of standardisation as a tool for improving disaster resilience.
- Presenting a new, sustainable process for better and faster capitalizing on the potential of standardisation.

## PARTNERS

- Geowise Oy, Finland
- EU-VRi
- The Netherlands Organisation for applied scientific research, TNO
- German Institute for Standardization (DIN)
- Finnish Standards Association
- The Netherlands Standardization Institute
- Fraunhofer-Institute for Technological Trend Analysis
- VTT TECHNICAL RESEARCH CENTRE OF FINLAND LTD
- FORSVARETS FORSKNINGINSTITUTT
- Atos, Spain
- D'APPOLONIA SPA
- Steinbeis Advanced Risk Technologies GmbH
- TRILATERAL RESEARCH LTD
- TREELOGIC TELEMATICA Y LOGICA RACIONAL PARA LA EMPRESA EUROPEA SL

## LINKS

<http://resistand.eu/>

<https://cordis.europa.eu/project/id/700389>



### 3.1.16 ANYWHERE

Start date 1 June 2016 - End date 31 December 2019

#### PROJECT NAME

EnhANCing emergency management and response to extreme WeatHER and climate Events

#### DESCRIPTION

**The principal objective of ANYWHERE** is to enable society as a whole and the main civil protection agencies to respond more rapidly than today to extreme climate and weather events, and to better cope with the high social, environmental and economic impacts related to these extremes.

The Project will establish a pan-European platform on extreme climate risks that will enable to identify, in a number of geographic regions, critical situations that could lead to loss of life and economic damages. Such early-warning should enable to improve protection measures and, in case of catastrophic situations, ameliorate the coordination of rescue operations.

The platform will therefore serve as decision-making tool for various authorities when faced with a situation of crisis, and will provide state-of-the-art early warning systems to help exposed populations avert disaster.

#### RESULTS

##### **Enhancement high-impact weather emergency management**

ANYWHERE provides cutting-edge technology solutions to enable society as a whole and the main civil protection agencies to respond more rapidly and effectively than today to high-impact weather events, and to better cope with social, environmental and economic impacts related to them. Achieving this requires focusing on impacts, transforming emergency response from reactive to proactive.

##### **For operational authorities**

Multi-hazard early warning system platforms to support decision-making by management operational authorities in situations of risk.

##### **For citizens and enterprises**

Developments and tools oriented to raise self-preparedness and self-protection of population and activities.

#### PARTNERS

Coordinated by: UNIVERSITAT POLITECNICA DE CATALUNYA

The Consortium is composed by 34 organisations belonging to 12 European countries including all the relevant fields in the value chain linked to the weather-induced emergency management: 12 operational emergency management authorities covering different scopes (national, regional and local), 13 research, development and innovation organizations (former project coordinators) developing impact forecasting products and 9 Small and Medium Enterprises and Industries.

## LINKS

<http://anywhere-h2020.eu/>

<https://cordis.europa.eu/project/id/700099>

### 3.1.17 ZONeSEC

Start date 1 December 2014 - End date 30 November 2018

#### PROJECT NAME

Towards a EU framework for the security of Widezones

#### DESCRIPTION

**ZONeSEC aims** to address the needs of Widezones surveillance by defining a new European-wide framework, which will extend beyond a sole technical proposition. Driven by the need to yield a holistic and uniform approach, ZONeSEC redefines the issue of security of widezones by taking into consideration issues pertaining to costs, complexity, vulnerability, societal acceptance and ethics.

A potential failure of critical infrastructures such as, pipelines, energy lines, transportation routes, etc., can occur at any point and at any unexpected moment across their extended grid spread over wide geographic areas. These Widezones aim primarily to the strengthening of the infrastructure's robustness by extending in a transboundary fashion for the transport of materials necessary on a daily basis. Failures at critical points (functions, equipment, and controls) can compromise the integrity of the involved installations and the security of energy and resources supply, with adverse socio-economic effects to citizens, customers and the environment (major accidents). Shortcomings in the control of hazards inherent to the safe performance of the infrastructures are strongly linked with the effective implementation and functioning of a Safety Management System (SMS) including appropriate safety and security provisions, emergency planning and other proactive measures such as surveillance, from detection to alert.

#### RESULTS

ZONeSEC aims to address the needs of Widezones surveillance by defining a new European-wide framework, which will extend beyond a sole technical proposition. Driven by the need to yield a holistic and uniform approach, ZONeSEC redefines the issue of security of Widezones by taking into consideration issues pertaining to costs, complexity, vulnerability, societal acceptance and ethics.

ZONeSEC will perform all needed research, development, integration and awareness raising work to yield a holistic system:

- By adopting a Total Security Approach, merging and balancing all relevant aspects in the design of an innovative Widezone surveillance system.
- To put in place a scalable framework and congruent prototype that will guarantee the seamless and cost-efficient surveillance of Widezones – irrespective of their type – enhancing to that effect the security of these broad areas beyond the mere surveillance of critical infrastructures.

- To support with its valuable functions a total Early Detection and Situational Awareness mechanism that will assist authorities and operators in the prevention of illicit activities even in the most complex, remote or demanding localized spaces.
- To dynamically assess how an activity might evolve into a threat for the well-being of the protected Widezone, fusing different information data which establishes an active and dynamic surveillance framework instead of the current passive and static one.
- To improve the sensor base and sensor intelligence for high quality input for the systems information fusion and processing framework, to detect various kinds of illicit pattern of activity, reducing the rate of false alarms.
- To provide a new EU trendsetting benchmark for Widezones surveillance systems, by delivering a highly usable and on-line toolkit that will provide references, consultation and guidance services for the protection of infrastructure spreading across Widezones (EU-WSRT).
- To set a cornerstone for the standardization of equipment, network architecture, processes and methodologies for Widezones surveillance purposes on an EU level addressing the cross-cultural issues emerging from the diversity of normative frameworks, contexts of implementation etc. ZONeSEC aims at providing pre-normative standards through modern dual path standardization process: Standardization Organizations committees and workshop agreement/industrial specifications group.
- To provide recommendations on policies development aiming at harmonizing the European, National and Regional regulatory packages applicable to the protection of critical infrastructures in Widezones.
- To safeguard the societal acceptance of the proposed framework by adhering to the recommendations and expectations of the Societal Impact Expert Working Group.
- To set-up visible demonstrations of an innovative and a Unique Reference Surveillance System for the protection of Widezones in realistic situations.
- To support civil protection authorities in the formation and validation of proper safety procedures for the mitigation of the effects of illicit activities towards a Widezone. (esp. parts of the protected infrastructure that are close to metropolitan or urban, semi-urban areas)

## **PARTNERS**

- EXODUS Anonymos Etaireia Pliroforikis
- DIGINEXT SARL
- FUNDACION TEKNIKER
- ATOS Spain SA
- Technische Universität Dresden
- ISIG-Istituto di Sociologia Internazionale di Gorizia
- AIRBUS Defence and Space GmbH
- University of Southampton-IT Innovation Centre
- Institute of Communication and Computer Systems, Greece
- CRISISPLAN B.V.
- ADITESS-Advanced Integrated Technology Solutions & Services Ltd
- GAP Analysis S.A., Greece

- SILIXA Ltd
- THALES S.A.
- TELESTO Technologies, Greece
- Attikes Diadromes S.A., Greece
- Compania Aquaserv S.A.
- ACCIONA Infraestructuras S.A.
- Hellenic Gas Transmission System Operator S.A, Greece

## LINKS

<https://www.zonesec.eu/>

<https://cordis.europa.eu/project/id/607292>

### 3.1.18 E2Mc

Start date 1 November 2016 - End date 30 April 2019

#### PROJECT NAME

Evolution of Emergency Copernicus services

#### DESCRIPTION

E2mC (Evolution of Emergency Copernicus services) project aims at demonstrating the technical and operational feasibility of the integration of social media analysis and crowd-sourced information within both the Mapping and Early Warning Components of Copernicus Emergency Management Service (EMS).

The Project will develop a prototype of a new EMS Service Component (Copernicus Witness), designed to exploit social media analysis and crowdsourcing capabilities to generate a new Product of the EMS Portfolio. The purpose of the new Copernicus Witness Service Component is to improve the timeliness and accuracy of geo-spatial information provided to Civil Protection authorities, on a 24/7 basis, during the overall crisis management cycle and, particularly, in the first hours immediately after the event. This will result in an early confirmation of alerts from running Early Warning Systems as well as first rapid impact assessment from the field. The technological enabler of the Copernicus Witness is the innovative and scalable Social&Crowd (S&C) Platform, developed by E2mC. Heterogeneous social media data streams (Twitter, Facebook, Instagram, and different data: text, image, video, ) will be analysed and sparse crowdsourcing communities will be federated (crisis specific as Tomnod, HOT, SBTF and generic as Crowdcrafting, EpiCollect.).

#### RESULTS

Social media, crowdsourcing, and AI join forces to achieve near real-time event mapping

Users of social media mobile apps already provide live updates of events as they unfold. Now EU-funded researchers have developed a platform to filter and organise all that information to enhance value in varied applications.

Global social media usage continues to increase. There are now approximately [3.2 billion users worldwide](#), meaning about 42 % of the population is using social media. Enhanced accessibility on mobile devices is a key driver. The EU-funded [E2mC](#) project has developed a platform to exploit user-generated data, improving accuracy and resolution of near real-time event maps for numerous applications. Its platform currently enhances the [emergency management service \(EMS\)](#) of the EU's [Copernicus Earth Observation Programme](#).

### **Putting crisis maps in focus**

Near real-time and accurate information during the first hours of an unfolding disaster is critical to effective disaster management but current methods often lack the spatial and temporal resolution required. The E2mC project focused on developing [a new EMS service component](#), the [Copernicus Witness - Social&Crowd S&C platform](#), and an associated EMS product, a social crisis map. As project Technical Leader Domenico Grandoni explains, "The Copernicus Witness platform automates the collection, [georeferencing](#), analysis, filtering, and visualisation of social media data. Social media crawlers collect data in 40 different languages from Twitter, YouTube, Flickr, and GDELT based on a set of keywords related to an event of interest. AI techniques tackle the main challenges related to social media data – filtering of irrelevant data and data quality improvement." In addition, a [group of volunteers](#), the 'crowd' component, is mobilised when the Copernicus EMS activation begins. These volunteers tag the content of images collected to enhance automated geolocation. The enhanced data is then used to create crisis maps that can be filtered using the tags.

### **From the test crowd to the Copernicus cloud and beyond**

E2mC faced unique challenges posed by assimilating and meaningfully categorising a tremendously heterogeneous data set of relatively low quality, and in real-time. The team surpassed goals in many ways to do it with automatic filtering algorithms, an automated geolocation algorithm and AI helping to make order out of chaos. The platform has been activated during some 50 real events, 23 Copernicus-related. During those events, the system analysed relevant posts of varying density, from a few dozen in small forest fire events in Italy in July 2019 to more than 3 000 during the floods in Iran in March 2019. Other uses include monitoring of refugees and the humanitarian crisis, worldwide flood monitoring, boat accident tracking, and disaster monitoring that did not require Copernicus activation. Thanks to the close working relationship between the AI and crowdsourcing communities fostered by E2mC, new opportunities for collaborative research and development continue to arise. The platform has been eagerly welcomed by potential end-users in numerous fields, many of whom have noted the maturity of the system and its many functionalities. As Grandoni explains, "The most exciting part of the project is that now the platform, borne as a research project, is becoming operational. The outcome represents a real enhancement of the Copernicus EMS products." Expect the S&C platform to continue to evolve. Pre-operational use is free and helps to validate use scenarios – so get onboard and support your community today.

## **PARTNERS**

- E-GEOS SPA
- PARIS-LODRON-UNIVERSITAT SALZBURG
- TERRANEA UG (HAFTUNGSBESCHRANKT) GMBH
- UNIVERSITE DE STRASBOURG
- POLITECNICO DI MILANO
- PUBLIC SAFETY COMMUNICATION EUROPE
- FORUM AISBL
- SYSTEMES D'INFORMATION A REFERENCE SPATIALE -SIRS
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
- KAJO SRO
- AUTONOOM PROVINCIEBEDRIJF CAMPUS
- VESTA
- GAF AG
- UNIVERSITY OF GENEVA

## **LINKS**

<https://cordis.europa.eu/project/id/730082>

### **3.1.19 beAWARE**

Start date 1 January 2017 - End date 31 December 2019

#### **PROJECT NAME**

Enhancing decision support and management services in extreme weather climate events

#### **DESCRIPTION**

**beAWARE** proposes an integrated solution to support forecasting, early warnings, transmission and routing of the emergency data, aggregated analysis of multimodal data and management the coordination between the first responders and the authorities. Our intention is to rely on platforms, theories and methodologies that are already used for disaster forecasting and management and add the elements that are necessary to make them working efficiently and in harm under the same objective.



**Figure 10. beAWARE: System.**

## RESULTS

The main expected results of beAWARE are:

- New enhanced decision support and early warning services based on aggregated analysis of multimodal data and previous crisis management records
- Shorter reaction time and
- Higher efficiency of reactions
- Improved coordination of emergency reactions in the field
- Contribution to the European Policy regarding disaster risks and crises management

## PARTNERS

- Centre for Research and Technology Hellas (CERTH)
- Motorola Solutions Israel Ltd (MSIL)
- Universitat Pompeu Fabra (UPF)
- Fraunhofer Institute of Optronics, System, Technologies and Image Exploitation (IOSB)
- Valencia Local Police (PLV)
- HELLENIC RESCUE TEAM
- FINNISH METEOROLOGICAL INSTITUTE
- IBM ISRAEL - SCIENCE AND TECHNOLOGY LTD
- ALTO ADRIATICO WATER AUTHORITY (AAWA)
- Frederikssund-Halsnæs Fire & Rescue Service (FH)

## LINKS

<https://cordis.europa.eu/project/id/700475>

<https://beaware-project.eu/>

### 3.1.20 STORM

Start date 1 June 2016 - End date 31 May 2019

#### PROJECT NAME

Safeguarding Cultural Heritage through Technical and Organisational Resources Management

#### DESCRIPTION

Starting from previous research experiences and tangible outcomes, STORM proposes a set of novel predictive models and improved non-invasive and non-destructive methods of survey and diagnosis, for effective prediction of environmental changes and for revealing threats and conditions that could damage cultural heritage sites. Moreover, STORM will determine how different vulnerable materials, structures and buildings are affected by different extreme weather events together with risks associated to climatic conditions or natural hazards, offering improved, effective adaptation and mitigation strategies, systems and technologies. An integrated system featuring novel sensors (intra fluorescent and wireless acoustic sensors), legacy systems, state of the art platforms (including LiDAR and UAVs), as well as crowdsourcing techniques will be implemented, offering applications and services over an open cloud infrastructure.

#### RESULTS

Ensuring that Europe's cultural heritage can weather climate change and natural hazards. Researchers with the EU-funded STORM project are building new technologies and processes to better protect and preserve Europe's cultural heritage against the threats of climate change and natural hazards.

**STORM** provides critical decision making tools to all European Cultural Heritage stakeholders charged to face climate change and natural hazards. The project improves existing processes related to three identified areas: Prevention, Intervention and Policies, planning and processes.

##### Prevention

**Objective 1.** Select, evolve and integrate innovative environment assessment methodologies to effectively and accurately process, analyse and map environmental changes and/or natural hazards.

**Objective 2.** Define and implement an innovative supporting service for the mitigation of natural hazards and climate change, and the assessment/management of corresponding threats while minimizing their impact.

##### Intervention

**Objective 3.** Provide innovative, cost effective, non-invasive and non-destructive methods and processes, as well as applications for survey and diagnosis based on the study of materials properties, particular environmental conditions, and profile of the cultural assets to be assessed.

**Objective 4.** Define and implement models and services for generating and managing a situational picture based on the data/information collected from the field by physical and human sensors and evaluators, the so called "crowdsensing".



**Objective 5.** Provide innovative practices, software and tools for more reliable maintenance, quick restoration and long-term conservation of the Cultural Heritage assets, preserving their historic and cultural integrity.

**Objective 6.** Define a collaboration and knowledge-sharing framework for the community of stakeholders to co-create, share and maintain improved practices, knowledge and experience on cost-effective and eco-innovative solutions for sustainable management and conservation of Cultural Heritage in Europe.

### **Policies, planning and processes**

**Objective 7.** Propose adaptations, changes in existing policies and validation of new knowledge in government processes.

**Objective 8.** Cost analysis for the sites protection against natural hazards managed by the **STORM** data analytics tools.

### **PARTNERS**

- Engineering Ingegneria Informatica (ENG)
- Instituto de Novas Tecnologias (INOV)
- Foundation for Research and Technology (FORTH)
- Piraeus University of Applied Sciences (Technological Educational Institute of Piraeus – TEIP)
- Università degli Studi della Tuscia (TUSCIA)
- University of Stuttgart (USTUTT)
- University of Salford (USAL)
- ResilTech (RESIL)
- KPeople (KP)
- Sparta Digital (SPA)
- Nova Conservação (NCR)
- Soprintendenza Speciale per il Colosseo
- il Museo Nazionale Romano e l'Area archeologica di Roma (SSCOL)
- Mellor Archaeological Trust (MAT)
- Troia Resort (TRO)
- Ephorate of Antiquities of Rethymno (EFARETH)
- Bogazici University (BU)
- Direção-Geral do Património Cultural (DGPC)
- Zentralanstalt für Meteorologie und Geodynamik (ZAMG)
- Corpo Nazionale dei Vigili del Fuoco (CNVV)
- Municipio de Grândola (SMPC)

### **LINKS**

<https://cordis.europa.eu/project/id/700191>

<http://www.storm-project.eu/>

## 3.2 Top 10 key indicators in emergency and crisis management

The preliminary selection of existing projects that are most relevant to RESISTANT project are listed in **section 3.1**. This list will be further examined and assessed in the following months of the project.

We identify, based on the projects we have studied, an effort orientation in three directions:

- crisis management in natural disasters
- predictability and preparedness
- early warning

In order to achieve the above, it is proposed, almost by all, to collect information by any means; social media, UAVs, satellites, etc. This information is evaluated and fed back to anyone involved in an emergency, such as policy makers, first responders, volunteers, citizens. From the analysis of the aforementioned, relevant to RESISTANT, projects and tools we can extract some key indicators as they are presented below:

### 3.2.1 Top 10 key indicators

- Crisis Management
- Policy Makers
- Resilience
- Interoperability
- Collaboration
- Coordination
- First Responders
- Cross Border
- Social Media
- Training Programs



### 3.2.2 Other relevant indicators

- Critical Infrastructure
- Evacuation Rules
- UAV
- Volunteers
- Awareness System
- Preparedness
- Black Out
- Educational Programs
- Innovations



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## 4 Conclusions and recommendations

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Natural disasters have accompanied man and his activity on earth since the beginning of history. The evolution and expansion of the human factor on earth has brought to our doorstep new risks, as natural phenomena can now hit overpopulated areas. In the battle to meet new challenges, scientific research focuses on the use of new technologies. Technologies that will allow the collection and processing of information for a valid and early prediction of a natural phenomenon, in order to warn and inform citizens and stakeholders (first responders, policy makers etc.) who will be called to deal with the phenomenon. Hence, the dealing with natural disasters will be done only through the prism of cooperation between the countries, the competent services and the citizens themselves. In conclusion, most of the aforementioned research programs and tools propose the use of collected information to a collaborative crisis management.

More specifically, the projects that were studied are among the most up-to-date in the field as they have either been implemented in the last two - three years or they are still running. As presented in section 3.2, all efforts made or proposed in these projects are targeted at four (4) main actions. Furthermore, all highlighted key indicators characterize or result from these 4 main actions.

The first action (in projects such as GeoTwin, FIRE-IN, In-prep, DAREnet, STAIR4SECURITY, MEDEA, beAWARE etc.) refers to the **cooperation-training**. At this direction, methods and techniques for the exchange of knowledge, experiences, technologies, innovations, etc. between universities, organizations, and services are analyzed and developed. Based on these projects, it becomes clear that the effort to deal with natural hazards is no longer a matter of just one service or one country. Cooperation among countries and their regional services is needed. To this end, the development of a communication network is proposed, in order to make cooperation possible and effective. The issue of cooperation-education, however, extends beyond the boundaries of professionals in the field and concerns both volunteers and ordinary citizens. Citizens should be able to recognize the signs of impending natural hazards and understand how to act in the first critical moments even to participate as much as possible in dealing with them.

The second action (in projects such as I-REACT, Flood-SERV, COMRADES, In-prep, E2MC etc.) refers to the **collection of information**. A key point, as emphasized in the projects, is the utilization of every possible means for gathering information about natural hazards. A new tool in this endeavor is social applications. Through this, every citizen who has a basic knowledge, as mentioned in the previous action, will be able to inform both the competent authorities, for example with photos, live image or GPS coordinates about a natural phenomenon that is evolving. Other media that are proposed for data collection are satellites, UAVs, and ground-based sensors. Timely data collection and dispatch to crisis management centers are crucial to the outcome of a natural disaster.

The third action (in projects such as SAYSO, CLIMATE-FIT.CITY, INPREP INACHUS, E2MC, beAWARE) is the development of an **alert system** (awareness). This will be achieved by utilizing the two previous actions. For example, social platforms used by citizens to collect and send information, in real time, will inform with notifications or live maps for places / areas at risk. The warning system can also be used during the action / mobilization of the first responders in order to have a clear picture of the evolution of the phenomenon around them.

Finally, the 4th action (in projects such as DRIVER +, HEIMDALL, ANYWHEEL, beAWARE) refers to the development of a crisis management model that will utilize all the above. Handling the crises faced by

modern societies often requires the coordination of multiple types of stakeholders from different countries. One of the key requirements to manage crisis is to have access to Situational Awareness. A wide range of security threats including man-made and natural risks can result in disruptive events having serious consequences for societal and citizen security. Both public and private stakeholders require adequate solutions in organization, procedures and technological capabilities to be able to respond timely and effectively. Thus, there is a need to develop specific standards that enable various public and private organizations within Europe, being local, national, European or international to be effectively coordinated ensuring as much as possible a smoothly cooperation before, during and after a disruptive event. For example, information sent by citizens should be evaluated and combined with other data. During several workshops involving practitioners from a variety of stakeholders, needs for new technologies, methods and standards have been expressed. A new proposed technology, for example, is the use of augmented reality where AR glasses are used to guide the first responders from the control centre.

From the above, it is clear that the 10 top indicators presented in the previous section are related to one or more of the aforementioned four (4) actions. For example, the following key indicators, Collaboration, Coordination, Cross Border, Policy Makers, apply to both the first and fourth action. Social Media find application in all actions. Crisis Management, which is characterized as both a key indicator and an action, includes, essentially, everything else. The rest key indicators, Awareness System, Preparedness, Resilience, etc., are reported and complement all the aforementioned actions proposed by the projects studied.

All-in-all, contingency planning is a process of developing strategies, arrangements and procedures to address the humanitarian needs of those adversely affected by potential crises. An active planning process enables individuals, teams, organizations and communities to establish working relationships that can make a critical difference when facing a crisis. By working together in such a process, the actors develop a common understanding of problems, of each other's capacities and of objectives and organizational requirements. Hence, contingency planning involves actions in which individuals and institutions are alertly responsive and entirely responsible for all eventualities.

## **Annex I: Template for project presentation and analysis**

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To keep the time-consuming data collection work to a minimum level, we only added information of projects relevant to the RESISTANT project as listed and explained below.

<b>Field Name</b>	<b>Description</b>
Acronym	Abbreviation of the project, if any
Duration	Start and end date of project
Project Name	Complete name of the project. Brief explanation, if applicable
Description	Main objectives and key topics of the project
Results	Results of the project
Partners	Lead partner (first in of the list)
Links	Link to website of project, if available

## References

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- [1] GeoTwin: Available at <http://geotwin.eu/home/>
- [2] DAREnet: Available at <http://darenetproject.eu/>
- [3] DAREnet: Report of Topic Working Groups: Knowledge Base for assessment and roadmapping cycle 1 (cut-off 1). Available at <https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5bec5a01a&appId=PPGMS>
- [4] I-REACT: Available at <https://www.i-react.eu/>
- [5] Flood-SERV: Available at <http://www.floodserv-project.eu/>
- [6] COMRADES: Available at <https://www.comrades-project.eu/>
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