Improving Resilience to Emergencies through Advanced Cyber Technologies
Communicating and receiving information during weather-related emergencies can make the difference between simply facing their consequences or being under control, thus saving both lives and economic resources. Nowadays, technologies like Big Data, Social Media or Artificial Intelligence allow the collection and processing of data with unprecedented efficiency. However, the challenge resides in delving into these large amounts of data and transforming them into rapidly actionable information.

The I-REACT tools harness the power of cyber technologies, providing each actor with quick and updated information at every step of the emergency cycle: Insurance companies may receive accurate and detailed reports about their client’s future risks; emergency planners can keep updated about the on-going crisis; first responders are able to send and receive real-time reports to and from the control centre for better coordination; and citizens can receive clear and concise instructions, whilst also providing crucial information.

I-REACT has developed a set of modules that integrate all the relevant data in one place, crossing over inputs from different sources: satellites, social media, incoming reports from responders using the I-REACT app, weather forecasts and much more. Altogether, the I-REACT solutions offer an improved assessment, planning and response to a disaster.

All the services are modular, and they can either be deployed independently or as a global system. For a faster adaptation, they can be easily integrated into existing systems. For this reason, the I-REACT solutions are offered in 3 different core services:

- **I-REACT Social** extracts valuable information from social media in crisis situations.
- **I-REACT reporting** connects emergency managers, responders and citizens through a common communication platform: the I-REACT app.
- **I-REACT EMS** gathers input from satellites, weather forecasts, crowdsourcing, amongst others, showing it in one place, to take better and faster decisions.

In addition, I-REACT places at the clients’ disposal 8 Added Value Services. Depending on the needs, they can be combined or contracted as stand-alone products.
MODULE #1: I-REACT SOCIAL
Crowdsourced information for faster updates

MODULE #2: I-REACT REPORTING
Bi-directional communication for safer communities

MODULE #3: I-REACT EMS
All the information in one place: take better decisions, faster

I-REACT ADDED VALUE SERVICES
Off-the-shelf solutions for your specific needs: from UAV integration to risk forecasting.
Whether there is a fire, a flood or a hurricane, emergency coordinators need fast, reliable and updated data. This need is nowadays easily met, since social media has turned each citizen into a source of real-time information. Yet the number of messages posted each second makes it almost impossible to filter out the relevant information.

I-REACT Social is a unique service that scans Twitter for publications in 6 different languages, covering 8 different types of natural hazards. The tool is based on cutting-edge natural language processing and machine learning techniques to detect and pin down the publications that provide the most accurate updates. A highly customizable service that can be tailored to the language and type of emergency needed.

**MODULE #1: I-REACT SOCIAL**
Crowdsourced updates for a more accurate assessment

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**Kenty Taxy Company**
@KentyTaxi

We have been advised there’s #fire in Sutton, and Dalesway is therefore closed.
12:06 PM - 5 Nov

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**Laura Martín**
@reactora

Wildfire forced us to turn away!
12:06 PM - 5 Nov
If communication fails during an emergency, it can have unpredictable and terrible consequences. There is a need to have a robust and reliable way to ensure a coordinated action. Through its app, I-REACT Reporting acts as a **common communication platform** for the three main actors in disaster management:

- **Emergency responders**: ensures bidirectional communication with emergency managers, enabling the reception and sending of crucial updates, including geolocated photos and standardised information on real-time.
- **Citizens**: enables direct communication with authorities through the reception of alerts and the possibility to send reports.
- **Emergency managers**: enhances the capability for the collection of emergency-related information generated by both first-responders and citizens, as well as instructing personnel on the ground.

The I-REACT app is available for both Android and iOS devices.
Emergency managers balance many factors simultaneously: real-time reports pouring in, protocols to follow, comparison with past disasters, coordination with different agencies…

The I-REACT Emergency Management System (EMS) integrates all the resources in a single Big Data platform. Its comprehensive front-end web application provides a quick visualization through real-time map layers. These include Copernicus EMS information (rapid and on-demand mapping), updated situational maps of the safety operators on field, and many plug-and-play options from the I-REACT Added Value Services.

A key additional component of the service is the Decision Support System (DSS) that generates suggestions for the user based on real-time information and customised to the specific protocols of action of the organisation.

Also, when joined with the I-REACT Reporting Service the I-EMS becomes a powerful tool for communicating with in-field agents and citizens.
Extreme weather events are inherently uncertain but can be forecasted. The I-REACT Season and Climate Prediction Service improves preparation protocols with one of the most reliable downscaling approaches for Europe. This is the first commercial service to offer seasonal forecasts paired with probability of extreme climate events in Europe. In addition, the service incorporates global climate models to take into account the near and long-term impact on floods and wildfires due to climate change.

Meteorological conditions are the main drivers behind destructive events such as floods and landslides. The I-REACT weather forecast and extreme weather detection service provides better probabilistic quality for early warning, thanks to its calibrated ensemble forecasts. The service integrates modifiable thresholds, so it can be tuned to different regions and needs.

I-REACT Added Value Services

WEATHER FORECAST AND EXTREME WEATHER DETECTION

SEASON AND CLIMATE PREDICTION SERVICE

Knowing the level of risk can be crucial for disaster response, hazard mitigation, and crisis planning. The I-REACT Hazard and Risk Map Service integrates exposure and vulnerability data, classifying potential consequences of natural hazards such as floods, wildfires and heatwaves. This service provides a set of colour-coded classes that can trigger operational procedures. Thanks to its scalability, the service works at transnational, country and municipality levels.

HAZARD AND RISK MAP SERVICE

The safety of personnel on the ground is a key priority in emergency response. The I-REACT wearable ensures a safer and more effective coordination of rescue teams. It allows emergency managers to know the location of the personnel deployed with unprecedented accuracy. This is thanks to advanced GNSS and Ultra-wide band radio technology. Also, its motion and oxygen sensors allow the detection of falls and stumbles of the wearer, and help in the prevention of poisoning of first responders, amongst other functionalities.

WEARABLE
Augmented Reality adds an extra layer of information that can be vital during emergencies. It allows personnel on the ground to know their exact location, and visualise incoming data from nearby zones or direct instructions from managers. Also, I-REACT Smart Glasses are easily integrated into the user’s equipment, enabling the dispatch and reception of information in a fast and reliable manner, thanks to voice commands, on-eyes display and a simplified interaction.

I-REACT Smart Glasses

UAVs revolutionized emergency management, making it possible to have eyes on affected zones. The I-REACT UAV Data Services stretch UAVs further. They integrate communication and management of UAVs into the Control Room, providing actionable information while the UAV is still in the air. Robust and agile, this service cuts bandwidth demands up to 99%, enabling UAVs to work even with a damaged or saturated network.

UAV Data Services

Efficient planning relies on accuracy of the data. The I-REACT nowcast & forecast service allows on-going tracking of floods and fire to estimate their evolution and impact. This service is automated, so once the initial parameters are set, the mapping is regularly updated. It has a quick time-rate, generating flood extension maps in less than 15 minutes.

Nowcast, Forecast, Flood Delineation, Burned Area

The standardisation of alerts enhances efficiency and multiagency collaboration in the response phase. I-REACT LEMS provides the connection and integration of local systems for the broadcasting of alerts. Its use of XML Cap format, a world standard for emergency alert communication, ensures a fast and reliable communication.

LEMS (Local Emergency Management Systems)
I-REACT is a refined commercial product resulting from more than 3 years of research and development. It started with an initial investment of over 6 million € from the European Commission, and brought together some of the best European companies, research institutes and universities in the domain of emergency management and technology.

As a result, I-REACT integrated and tested cutting-edge advances in Artificial Intelligence and Big Data into disaster management. These tools are now available for both public and private sectors, helping them create more resilient and secure societies.

While each of the services that I-REACT offers has value on their own, the I-REACT Modules and Added Value Services offer the advantage of crossing data, taking into account many different inputs. Overall, this offers a unique point of view for crisis situations.

For more information on the services, pricing or any other queries, please contact us at:

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