

## **A generic intensity and damage scales framework for multi-hazard crowd mapping based on a smartphone application**

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Signalert app is a crowdmapping application for smartphone allowing any citizen to report the effects of natural or manmade disasters, the impact of climate change extremes. The app is working worldwide in various languages (English, French, Spanish) and for multiple types of phenomenon's.

Beside usual geolocation and time information about what the user is witnessing currently used in classical social networks, the app contains simple questions to describe the phenomenon allowing its characterization in terms of intensity and impact. Defining these questions and an appropriate and harmonious intensity scales has been a real challenge.

Requirements for the questionnaire in the app were the following:

- Based on visual observation of markers on the field in any environment (urban, countryside, anywhere);
- Markers recognizable by anybody with a universal values (no cultural, national, regional influence);
- Markers or indicators with state, shape, level evolving according to intensity of the source phenomenon;
- Scales and markers extend from weakest level to extreme level of intensity and damages in order to detect onset and serve for early warning and monitoring;
- Intensity and damages levels split in 4 to 5 growing degrees.

A generic scale framework has been defined to fulfil these requirements.

The scales are derived from a first intensity scale defined in the early 2000's for French Ministry of the Environment to establish a yearly inventory of disasters impact on French Territory.

The scales are split in two parts: a first part to describe the physical intensity range of the source phenomenon, (water, wind, fire, etc. . . ) and a second to describe the impacts on stakes.

Three to four questions are concerning the physical intensity of the phenomenon as perceived by the witness. Another set of 3 to 5 questions concerns the impacts and effects on people and life, infrastructures and networks, buildings, environment. Thus as for earthquake, the physical intensity of the natural event is defined independently of the effects on stakes in order to take in consideration local vulnerability since the purpose is not only to have an absolute physical value of the phenomenon but also an assessment of local impacts of the phenomenon.

When an intensity or magnitude scale already exists for a natural phenomenon, the various levels of our scale are bound to one or more levels of the existing scale.

A colour code based on the European Meteorological warning, is extended to other non hydromet phenomenon's. Seven natural phenomenon's have been covered using the same principles: Floods, flash floods, snow falls, avalanches, wild fires, rock falls, cyclones/hurricanes. New natural and manmade phenomenon's are periodically added after conception of the intensity scale with national or international scientists of the phenomenon and specialist of monitoring or rescue interventions used to cope with the phenomenon.

New types of events are going to be added, including earthquakes, tsunamis, and other manmade phenomenon's such as air or water pollution.

When sending an alert with the free app, the individual user who contributes to a better monitoring of a danger, receives information's about what's occurring in his neighbourhood through the visibility on a map of alerts sent by other users or by consultations of website of environmental monitoring institutions. Institutions, local, regional, international organizations can subscribe to a service of alerts monitoring and detection of events reported by the app users, anywhere in the world.