



Lower the impact of aggravating factors in crisis situations
thanks to adaptive foresight and decision-support tools

D6.7 : Post Crisis Report

For the attention of the Research Executive Agency

Organization	INEO
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Due date	31/10/2016
Issue date	31/10/2016



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 606742



Document information

Document title	D6.7 : Post crisis report
Document file name	D6.7 : Post crisis report
Revision number	1.1
Issued by	Louis JALLET
Issue date	31/10/2016
Status	Updated version after internal revision

Nature of the deliverable

R	Report	X
P	Prototype	
D	Demonstrator	
O	Other	

Dissemination Level

PU	Public	X
PP	Restricted to other program participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Document Approval

Name	Role in the project
Jean-Pierre BIDAU	Project coordinator

Document Review

Date	Version	Reviewers
26/10/2016	1.0	Pierre Ponsar
03/11/2016	1.1	Pierre Ponsar
06/11/2016	1.1	Jean-Pierre BIDAU



Acknowledgement

This report forms part of the deliverables from a project called "Snowball" which has received funding from the European Union's Seventh Framework Program FP7/2007-2013 under grant agreement n° 606742. The Community is not responsible for any use that might be made of the content of this publication.

Snowball aims at lowering the impact of aggravating factors in crisis situations thanks to adaptive foresight and decision-support tools.

The project runs from March 2014 to February 2017, it involves 11 partners and is coordinated by Gedicom.

More information on the project will soon be found at <http://www.snowball-project.eu>.

Abstract

Snowball aims to develop a software solution for the decision makers in order to improve crisis preparedness. In this perspective, the post crisis report allows the decision makers to take into account the feedback of the population from Twitter. It provides synthetic indicators about preliminary trends, impacts and cascading effects. Having a look back on the past, decision makers can improve preparedness plans and optimize crisis management.



Executive summary

The post crisis report is a web component that displays crisis impact assessment based on Twitter analysis. Twitter data stream is captured and stored on the Events Log Database, ref. D4.6 Events Log Database (version 2). Key indicators are computed in near real time on the top of a Hadoop cluster that provides a high level of velocity.

The computed results are visualized on a rich graphical user interface in the form of a web portal. The web portal has been designed in a way that it facilitates easy navigation through different computed results designed with the focus on user-friendliness, understandability, and easy interpretation.

Results can be displayed during the different phases of the crisis: before, during and after. Having a look back on the evolution of the crisis from the population perspective could be useful in order to increase the preparedness to a next similar crisis with potentially the same cascading effects. Several methodologies are compared to evaluate impact assessment.

A dictionary based method using twelve different set of lexicons semantically related to the natural hazards and crisis management. A machine learning method trained on the sample of classified Tweets.

The computed results are represented via heatmaps, time line charts and lists. The graphical visualizations are user-interactive. Many parameters are made available to the user in order to facilitate using different combinations and check the results. For example, it is possible to get the results for one theme or combination of different themes by selecting the following parameters: "caution and advice", "displaced and evacuated people", "human casualties", "infrastructure damages", "needs, supply and aid".

The post crisis report is embedded within the secured web portal in order to provide a complete suite of tools dedicated to crisis management in a preparedness phase. Going ahead, past crises will be demonstrated during the experimentation in order to show its potential and to validate main use cases.



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ABBREVIATIONS

API	Application Programming Interface
DSS	Decision Support System
EDXL	Emergency Data Exchange Language
ELDB	Event Log Database
ESB	Enterprise Service Bus
ETL	Extract, Transform and Load
FTP	File Transfer Protocol
GML	Geography Mark-up Language
HDFS	Hadoop Distributed File System
JSON	JavaScript Object Notation
REST	Representational State Transfer
URL	Uniform Resource Locator
WKT	Well-Known Text
API	Application Programming Interface

DEFINITIONS

Twitter	Twitter is a microblogging website which allows users to post short messages, known as tweets. Tweets may also contain images, url, emoticons, hashtags which adds the value to the information posted on twitter.
Dictionary Method	In the context of this report a dictionary is a set of words identified as per a theme or a specific subject topic.
Machine Learning Algorithms (Data Science)	Machine learning is a science of devising algorithms to get computers to learn from data automatically without being explicitly programmed. Such algorithms (learning algorithms) build a model after learning from the data and the model can be used to make predictions or decisions.



INTRODUCTION

Social media analysis in case of natural hazard requires data collection from various sources and in particular from popular social media like Twitter in order to catch people reactions and sentiments during the crisis situation. Given the unpredictable occurrence of natural disasters like earthquakes, storms and floods over the world, it is necessary to monitor the data stream in real time in order to detect crises.

For this reason, the so called “post crisis report” is made of three parts that allow the decision makers to categorize information along the time.

The first module, called crises detection, allows the decision makers to focus on current events on the whole site area before the crisis occurs. It includes a dedicated graph in order to identify crisis patterns.

The second module, called current crises, allows the decision makers to focus on current crises in the whole site area. It refines the scope of the analysis on current crises, taking into account the crisis area and the start time.

The third module, called past crises, is the core of the “post crisis report”. It allows the decision makers to have a synthetic feedback about past crises on the site area. Having a look back on past crises should give the opportunity to better understand impacts from the population perspective.

Finally, this tool should be mainly used to improve the crisis preparedness plans taking into account the social aspect of the crisis. It could also be used in a more operational way during the crisis even if it is not the main purpose within Snowball.