

## JRC SCIENCE FOR POLICY REPORT

# Social Media in Crisis Management

*Outcomes of the 7th  
JRC ECML Crisis  
Management Technology  
Workshop*

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#### **Title** *Social Media in Crisis Management*

##### Abstract

*The Social Media in Crisis Management Workshop was held in the European Crisis Management Laboratory (ECML) of the Joint Research Centre in Ispra, Italy, from 11 to 12 October 2016. The aim of the workshop was to investigate the potentiality of Social Media services in Crisis Management with major experts like system providers and end users. We wanted to examine together the state-of-the-art of this kind of tools, to investigate their technological background, and to find common ways to fill the existing gaps. People affected by natural disasters seek and share information through Social Networking websites (SNs). In the same way, governments and response agencies could rely on Social Media to get firsthand information and thanks to this, for example, coordinate relief efforts, as shown in 2010 during the Haiti earthquake or in the case of the Haiyan Tropical Cyclone in Philippines of 2013. Are first responders ready to deal with big crisis data? How can the surge of information during disasters turn into an information crisis? In this context, understanding the needs of different stakeholders (from tool providers to end users) is vital to explore two interrelated dimensions, at least: the technical domain and the social perspective*



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## **Executive summary**

The "7th JRC ECML Crisis Management Technology Workshop on Social Media for Crisis Management" was held at the Joint Research Centre in Ispra, Italy, from 11 to 12 October 2016. Thirty-three participants attended the event. At the meeting there was a good mix of JRC and External system providers and end-users, along with European and non-European systems providers and users. Participants were actively involved in the workshop through presentations, discussions and demonstrations (see list below):

### System Providers:

- Danish Emergency Management Agency - Denmark
- Qatar Computing Research Institute Qatar
- AIT - Austrian Institute of Technology GmbH
- ITTI Sp.z o.o.
- Deutsches Zentrum für Luft- und Raumfahrt (DLR)
- JRC – EC

### End-Users:

- Italian National Fire-Fighters Corp (CNVVF)
- Ministère de l'Intérieur France/ DGSCGC / COGIC
- ACAPS - Assessment Capacities Project
- Swedish Contingency Agency

The aim of the workshop was to investigate the potentiality of Social Media services in Crisis Management with major experts like system providers and end users. We wanted to examine together the state-of-the-art of this kind of tools, to investigate their technological background, and to find common ways to fill the existing gaps.

This intention also responds to policy makers' need for a more clear overview on the benefits and on the risks of using Social Media in emergency contexts.

Social Media assemble information from traditional media, and convey huge amounts of information shared through PCs, mobile phones and other kinds of devices. For this reason, Social Media can become a valuable resource for decision makers. To guarantee reliable Social Media services and the compliance with regulations and the standards of ordinary communication services usually deployed by authorities and response agencies, scientific evidences must be given.

## INTRODUCTION

In the last decade, Social Media tools like social networks have changed both the landscape of personal interactions and - to some extent - the relation between citizens and Institutions. Information is a basic need, but today anyone can generate information.

Recently, some organizations have attempted to use Social Media also for Crisis Management, i.e. from preparedness to disaster response. Crisis Management requires quick reaction to allow proper and timely responses.

People affected by natural disasters seek and share information through Social Networking websites (SNS). In the same way, governments and response agencies could rely on Social Media to get first-hand information and thanks to this, for example, coordinate relief efforts, as shown in 2010 during the Haiti earthquake or in the case of the Haiyan Tropical Cyclone in Philippines of 2013<sup>1</sup>.

Are first responders ready to deal with big crisis data? How can the surge of information during disasters turn into an information crisis?

In this context, understanding the needs of different stakeholders (from tool providers to end users) is vital to explore two interrelated dimensions, at least: the technical domain and the social perspective. There are different contexts with different needs, e.g. emergency response organizations, users and digital humanitarians.

As far as the technological domain is concerned, data mining and text analytics are key to extract information and identify patterns in Social Media. However, given that the reliability of Social Media content is often questioned, filtering and verification tools are also important to make sense of the sheer amount of information. With regards to the social perspective, information from citizens and groups proved to be useful to provide situational awareness when information from media sources is scarce or not available. Digital volunteers and social networking communities can play an important role during response and recovery phases.

How can we validate the information generated by volunteers on the web? Can real-time big data analysis enhance disaster response? How can organizations transform Social Media data into useful information? Are organizations ready to work with new data sources? Can Social Media data aid in disaster response and damage assessment? As some open questions is looking for answers, the aim of this workshop was to have tool providers and end users (e.g. Civil Protection, First Responders, Coordinating Institutions, Early Warning Authorities) explore the present and the future in this field. In particular, the workshop explored the following emerging topics of interest:

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<sup>2</sup> Europe Media Monitoring

## The role of Social Media as effective and reliable crisis management support tool

- Social Media and disaster response
- SOCMINT (Social Media INTelligence): sources and analysis
- Social Media and situational awareness for emergency responders
- Opportunities and challenges of big data
- Social Media, crisis communication and emergency response
- Case studies and lessons learned
- Social Media and crisis mapping
- Text and data mining
- Policy implications

# 1. PRESENTATIONS

In one day and a half, providers presented their experiences in Social Media in Crisis Management. Presentations were always followed by questions and/or comments, which made the workshop interactive.

This section gives the most important aspects of all the presentations given by system providers and by end users.

## 1.1 System providers

### 1.1.1 Preparing for future large scale manmade disasters: Crowd OSInfo

#### Austrian Institute of Technology (AIT) - J. Klerx

The Austrian Institute of Technology (AIT) is a national? private? research institute with five independent and performance-driven departments: Energy, Mobility, Health & Environment, Digital Safety & Security and Innovation Systems. The institute works in close collaboration with industry and customers from public institutions, aiming at increasing their added value through innovation and new technologies.



Figure 1 Joachim Klerx from AIT

Main topics covered during the presentation:

- Description of the Aim of Cyber Documentation and Research Center (CDRC)
- Identification of long term trends
- Management of different languages
- Identification of relevant sources
- The human side
- Dark web
- Traditional media gateway player is lost
- Shodan social network for hackers group
- Network-centric issue management. Identify of relevant communication channel
- How to identify influence group and opinion leaders



### **1.1.2 Real-Time Analysis of Social Media Data for Disaster Response.**

#### **Qatar Computing Research Institute (QCRI) – M.Imram**

Social Media platforms like Twitter are invaluable sources of time-critical information during mass emergency events. For rapid crisis response, real-time insights are important for humanitarian response organizations. Although, many response organizations would like to use this information, they have to face some major issues, like information overload, information vagueness and credibility, misinformation.

Artificial Intelligence for Digital Response tool (AIDR) is an engine capable to process high-velocity data in real-time during crisis events. AIDR follows the crowdsourced stream processing paradigm and combines human intelligence and machine computation, which accurately classifies messages in real-time.

#### **Main topics covered during the presentation:**

- Widespread use of Social Media during mass emergencies such as natural or man-made disasters
- Use of Twitter during Nepal earthquake, Sandy hurricane, Joplin tornado etc.
- Usefulness of Twitter for actionable information gathering e.g. strategic and technical info for first responders
- Artificial intelligence, roles of machine learning and human computation for automatic processing of Social Media data
- Machine training techniques, approaches and read-to-use tools built at QCRI

#### **QCRI activities in the field of SMCM**

Qatar Computing Research Institute (QCRI) studies and investigates Social Media roles during mass convergence events. QCRI builds computational models to solve real-world problems in the field of humanitarian computing and offers free and open tools to communities to fulfill their information needs during time-critical situations.

#### **Challenges**

Traditional ways to use machine learning techniques do not work.

- Tactical information is available in the first 24h. Key is to target the first few hours of a crisis
- How do we effectively classify? Require fresh labels to train machines
- Data collection human annotations machine training and classification all have challenges
- Online training mechanism is a solution

- Combine Human and Machine Intelligence is required to keep an eye on machine's performance
- Active learning is required to boost system's performance
- Artificial intelligence for digital response is the system that addresses the above challenges

### **AIDR system description**

Artificial Intelligence for Digital Response (AIDR) combines human and machine intelligence to process large volume of Social Media data arriving at high-velocity. AIDR uses human intelligence to learn about information needs for a given emergency situation and classifies each Social Media posting to separate items of interest from noise.

### **Future work**

- Information summarization in real-time
- To built more robust classifiers based on past disasters data.
- To acquire actionable information in time-critical situations



Figure 1 -M.Imram from QCRI.

### **1.1.3 Coupling Flood Forecasting System with Social Media Analysis and Crowdsourcing to improve Situational Awareness and Emergency Response JRC – M.Kalas, V.Lorini, F.Dottori, P.Salamon, D.Muraro, A.Wania, J.Kucera**

Social and mainstream media monitoring is a valuable source of information in disaster management and response. The information on ongoing disasters could be detected in very short time, and Social Media can bring additional information to traditional data feeds like ground and remote observation schemes.

Probably the biggest attempt to use the Social Media in the crisis management was the activation of the Digital Humanitarian Network by the United Nations Office for the Coordination of Humanitarian Affairs in response to Typhoon Yolanda (2013). There, a network of volunteers performed rapid needs and damage assessment by tagging reports posted on Social Media, which were then used by machine learning classifiers as a training set to automatically identify tweets referring to both urgent needs and offers of help.

Most of the applications reported in literature use anomalies detection and breakpoints in normalized time series from flood signal derived from the Social Media in order to identify events. The JRC proposes a novel approach, where prior knowledge of potential threat derived



## Description of **EFAS in SMCM system**

- EFAS provides warnings based on flood forecasts to its members and Copernicus Services
- EFAS provides Rapid Risk Assessment based on flood forecasts (up to 10 days in advance)
- EFAS forecasts combined with RRA trigger the Social Media Monitoring component
- EFAS requests satellite based flood mapping (Rapid Mapping) for areas potentially at risk of medium and high impact

### **1.1.4 The FP7 SOTERIA project - Online and Mobile Communications for emergencies ITTI - Marcin Przybyszewski, Anna Stachowicz**

The SOTERIA Project's aim is to research and develop recommendations and an associated toolbox for leveraging the potential of social and mobile media in emergencies. SOTERIA is studying the dynamics between PSOs (Public Safety Organizations) and citizens in emergencies leading to:

- greater understanding of the impact of Social Media in emergency management systems;
- the use of all communication channels in emergency situations to benefit PSOs and citizens;
- the exploitation of mobile platforms' ubiquity to locate and effectively communicate with citizens;
- the leveraging of PSOs levels of shared awareness benefiting from citizens' Social Media information.

#### **Main topics covered during the presentation:**

- (1) Soteria project overview
- (2) Divided into four sub-subjects
  - SOTERIA Tool-box PSO space and Citizen Space
  - Description of the application Pomoc (which means Help in English)
  - Mobile app for citizens
  - Desktop application for PSOs
  - Campaign of experimentations in different scenarios – as validation through end-user's feedback
  - Goals of validation and experimentations:
    - Users' acceptance of application
    - Trust towards application
    - Users' expectations for this kind of applications
    - Suggested improvements.



Figure 3 – Marcin Przybyszewski

### **ITTI description**

ITTI sp. z o.o. is an SME working in IT and telecommunications sectors, located in Poznan, Poland. The company has a team of about 80 persons. The activities of ITTI can be grouped into three categories:

- technical consulting in the telecommunications and IT areas: ITTI assists end-users (i.e. public administration, utilities, banks, companies) in purchasing, implementing and optimising IT and telecom systems; a number of professional methodologies are used in this area, e.g. PRINCE2, MSP, CISA, PMI, TOGAF, ITIL, ISO 27001, BS 25999, UML OCUP2;
- applied R&D in the area of IT and telecommunications: ITTI contributes to the R&D projects providing the expertise in the areas of user requirements, system design, data processing (ontologies, data mining), lessons learnt systems, graphical user interfaces, mobile applications, quality of service and quality of experience, cybersecurity, simulation of telecommunication networks, simulation of procedures in crisis situations;
- development of innovative applications and software solutions : ITTI designs and develops innovative solutions which are adjusted to customer needs (e.g. in crisis management, health and space sectors).

Moreover, ITTI is an institutional member of the Public Safety Communication Europe Forum and Integrated Mission Group for Security (IMG-S). ITTI is also one of the Polish Space Industry Association co-founders and participates to Wielkopolska-region ICT Cluster, Poland.

### **ITTI activities in SMCM**

ITTI is involved in Research and Development projects in using Social Media for crisis management, e.g.

- ISAR+ – Online and Mobile Communications for Crisis Response and Search and Rescue (EU FP7 Project, Grant Agreement no 312850, completed);
- SOTERIA - Online and Mobile Communications for Emergencies (EU FP7 Project, Grant Agreement no 606796).

ITTI participated in both projects, both for the technical aspects such as software development, technological recommendations, and for user requirements gathering, validation and experimentations of project solutions.

The project SOTERIA's team has also studied the use of Social Media for the purpose of crisis and emergency management by citizens and public safety organizations. Preliminary results of this research are presented in the figure below, and summarizes the most important findings regarding the most popular Social Media (Facebook, Twitter, You Tube), the use of SMS and mobile apps.

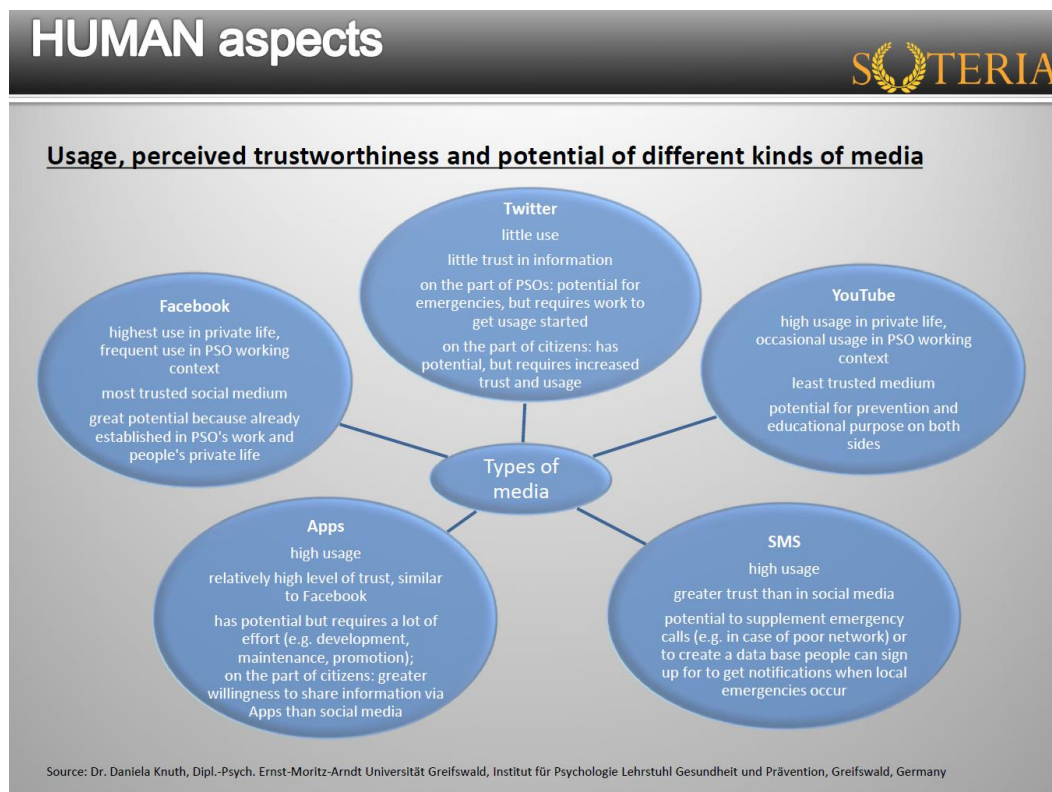


Figure 4 – Usage, perceived trustworthiness and potential of different kinds of media.

### 1.1.6. Social Media Role in Earling and Early Warning Systems

#### Circular World Foundation - Farzad Azima

Earthquake Early Warning (EEW) systems involve very high Capex and have been installed in a very limited number of regions. Applying crowdsourcing on humanitarian projects led to use accelerometers in smartphones distributed all over the globe to detect earthquake shakes.

Circular World Foundation has implemented Earling, an innovative method of EEW system, utilizing personal smartphone sensors, to detect earthquakes by gathering shake reports. To minimize false alarms, they have devised some special algorithms, i.e. Trust Algorithms (TA).

Data sent from smartphones are analysed by TA in real time. In communicating with a service, the system can receive shake data from smartphones, analyse and distinguish earthquakes from everyday shakes. Then central unit applies complementary analysis on the results and sends an alert to users in the vicinity of the earthquake in seconds.

Circular World Foundation has successfully tested some of the recent earthquakes using simulation data around Europe by Earling, at a first stage to detect the earthquakes, and then to issue an alert in simulated environment.

Using algorithms embedded in Earling, reserachers can detect epicentre and magnitude of earthquakes, as well as microcosms. Therefore, detecting a massive earthquake in the coastal region means a tsunami may be on its way. Earling can act as a complementary system for traditional early warning networks and following local public-safety policies, issue a tsunami early warning alert, to areas at risk.

#### **Main topics:**

- The use of Social Media to promote an application to use in case of earthquakes
- Without Social Media, Earling could not be distributed
- Promotion through Social Media
- More focus on Facebook
- Reactions on retargeting
- Costs on safety campaigns

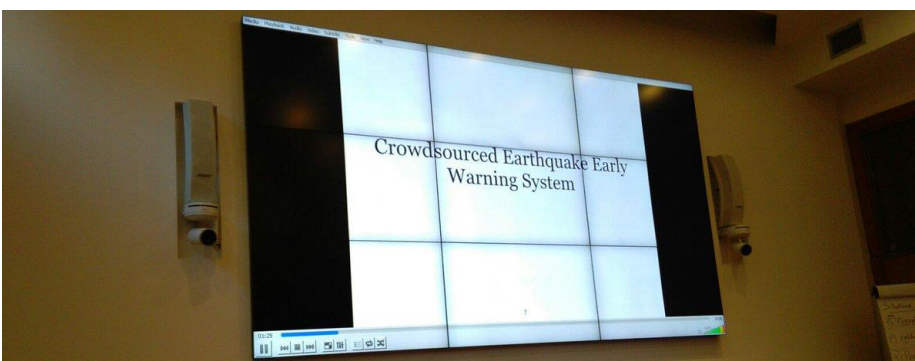


Figure 5 - Presentation of SM activities of circular world foundation. Remote session from (IRAN).





Figure 6 – Earling mapping the Chile’s Earthquake of 25 July 2016.

### **1.1.7. Mining Twitter during Natural Disasters - A Case Study for the Central Italian Earthquake | JRC – A. Podavini, V. Zavarella, H.Tanev**

A Twitter monitoring system for analysis of Social Media content and some experiments for extraction of relevant tweets were detected during the Central Italian Earthquake in August 2016 with in-house text mining technology.

Twitter data can be integrated into our existing media monitoring tools (EMM). The JRC experimented with in-house tools to visualize the reaction of Twitter to the earthquake event. In a separate experiment JRC researchers have translated a set of domain-specific terms from a disaster ontology from English into Italian and have searched for relevant tweets using combinations of these keywords and time restriction using the Twitter search interface. The usefulness of Facebook via their search tool was also tested. Experiments show that Social Media contain potentially useful information mostly for the people in the disaster-hit areas. To a lower extent, the information can also be used by first responders, especially the first Social Media posts which come right after the disaster.



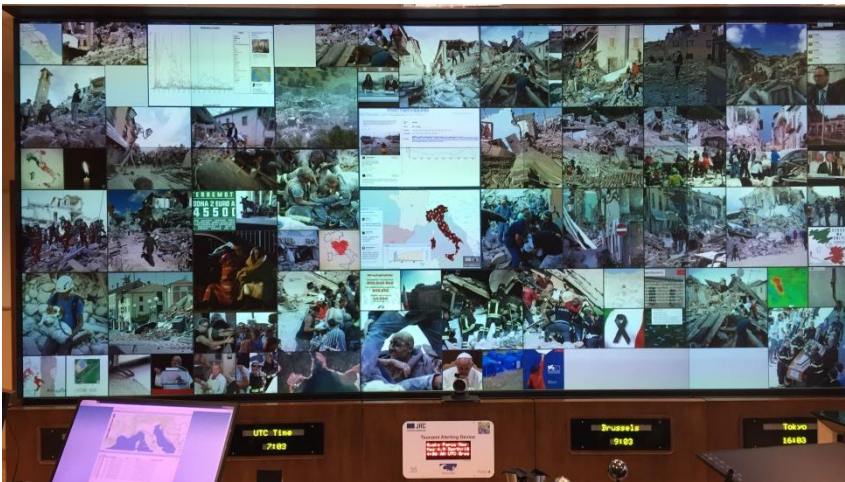


Figure 7 - NewsDesk Application

### Main topics

- EMM description
  - Platform for multilingual news real-time monitoring (6,000 news sites, 70 languages )
  - Extraction of meta-data for long term analysis
  - EMM users: EU Commission, Member States, EU agencies, Non-EU organizations, general public
  - Pipeline of text processing modules
  - Detection of policy support topics (categories)
  - Extraction of named entities and quotes
  - Geo-tagging
  - Event extraction
  - Sentiment detection
- MEDISYS: news monitoring platform for the public health domain
- NewsDesk application for registered users
- EMM apps for iOS and Android
- Social Media monitoring in EMM

### Topic classification of Twitter streams

- Extraction of metadata from tweets
- Integration of Twitter meta data into the visualisation tool
- Chart with the distribution by languages
- Link to GDACS
- And distribution by countries (tweets published in the area)
- A case study from Central Italian earthquake
- Detection of disaster secondary effects
- Qualitative analysis



Figure 8 - Vanni Zavarella presenting EMM features.

### **EMM short description**

The Europe Media Monitor ([EMM](#)) provides advanced analysis systems for traditional and Social Media monitoring. NewsBrief presents the latest news and classifies it according to the subject. It is updated every 10 minutes, 24 hours per day. It gathers reports from news portals world-wide in 43 languages, classifies the articles, analyses the news texts, aggregates the information and issues alerts.

### **EMM activities in SMCM**

Within EMM, metadata are extracted from the Twitter Decahose stream categorized by disaster related or public health topics, such as URLs, hashtags and user profiles.

## **1.2 End Users**

### **1.2.1 Social Media and Disasters: Legal concerns | Italian National Fire-Fighters Corp (CNVVF) – S.Marsella**

Since their birth, Social Networks (SN) have gained the interest of emergency managers for their potential of reaching people in immediate and cheaper ways in comparison to other media. Initially, Social Networks were applied in emergency situations only in the Authority to Citizen's (A2C) communication flow. Consequently, all over the world, national and local Authorities have activated corporate accounts on the main SN, in order to reach more citizens with timely and authoritative information.

More recently, the attention moved to the Citizen to Authority (C2A) communication flow, both in the daily emergency services and during large scale events, which raises bigger technical problems, addressed by extensive research efforts.

The new generation of emergency control rooms might be reached and exchange information directly with citizens, e.g. when they need assistance or need to be rescued.

EU Commission has funded several research projects (e.g. Emergent) focussed on the technical challenges raised by such scenarios. Nevertheless, such efforts have not succeeded yet in stimulating a debate on the legal issues. In the future, legal issues could be raised for the use of IT systems that filter incoming information from Social Media. As such, this could result into a mandate to prioritize rescue activities.

There is a clear need for a well-defined legal framework, which allows rescue services to benefit from the use of Social Media in carrying out their task, and which limits their legal responsibility in case of potential tragic consequences triggered by system faults.

### **1.2.2. Social Media in Emergency Management in France**

#### **Ministère de l'intérieur France/ DGSCGC / COGIC – X.Tyelman**

Since 2013, France's emergency management departments were organized to commit on Social Medias.

Three level of involvement were defined and applied:

- Social Media monitoring
- Information diffusion and population alerting
- Interaction with the population and use of online tools

From the very beginning, online volunteer communities were involved in the emergency response since their workload capability and online visibility outmatched the official online capabilities. The French-speaking volunteers are now coordinated in the VISOV association and

their collaborative work has been concluding in data gathering, fact-checking and rumour-control, communication and support to the victims. They are now able to provide online collaborative maps where emergency departments and impacted communities.

The use of real-time monitoring and alerting systems through online software will be our next achievements. According to our testing, it could allow us to detect some events with a 15-minutes advance on usual feedbacks procedures.

### **Main topics:**

- The importance of digital volunteers
- VOST virtual support team
- Example of the google doc
- The issue of time both with traditional and Social Media: 2-3 weeks to erase the noise of a specific topic; everything that comes from the media is erased



Figure 9 - Xavier Tytelman

### **1.2.3. Lessons Learned of the Nepal Social Media Monitoring Project | ACAPS - Assessment Capacities Project - Daniel Schübel**

Carried out in English and Nepali, and operating from 1 June to 27 August, Social Media monitoring was part of ACAPS support to the Nepal Earthquake Assessment Unit. Insights gained through Social Media (mainly Twitter, Facebook, YouTube, Flickr and blogs) and national media monitoring were intended to feed into the "Communication with Communities" (CwC) project. This Pilot Social Media monitoring project was later evaluated and key lessons learned and recommendations were drawn up. The process was informed by a lessons learned workshop in Nepal as well as interviews and email exchanges with members of the project and external recipients of project's reports.

This presentation gives a quick outline of what Social Media monitoring is and what it can be used for. Followed by a description of the project different methods and software used throughout the project will be introduced. The presentation finishes with a brief evaluation of the project and which lessons can be learned for the future as well as conclusions. Afterwards there will be time to discuss the project and the use of different tools in Social Media Monitoring.

## Main topics

Verified information from responsible actors

- Social Media for monitoring and dialogue between authorities and the public
- use of twitter and Facebook
- They do not handle crises
- Proactive use of Social Media

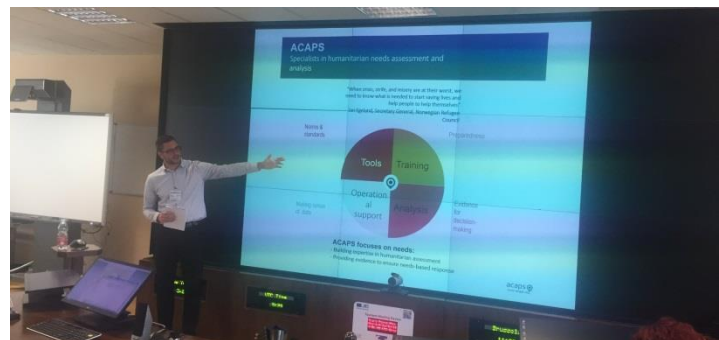


Figure 10 – Presentation of the Nepal Earthquake case study.

### 1.2.2 Krisis Information | Swedish Contingency Agency – K.Palm



Figure 11 – Slide reporting the mission of SMB in SMCM.

**Main topics:**

Verified information from responsible actors

- (1) Social Media for monitoring and dialogue between authorities and the public
- (2) use of twitter and Facebook
- (3) Proactive use of Social Media

## First day wrap-up

One of the crucial aspects of SM for CM is the autonomous analysis. Using this method, the number of staff can be reduced and the speed of the analyses can be enhanced. However, the human interpretation of data and a defined decision making procedure are crucial to get a high quality result.

The Social Media framework is quite large; most of the market is covered by Twitter, Facebook, YouTube, Instagram and other famous services, but many other Social Media, or Dark Web, have to be taken into account.

Some policy implications have been analysed and discussed, but since they have been re-elaborated during the final discussion of the second day, the main debated themes are reported in the Discussion section below.

Some further activities were proposed to improve SM for CM effectiveness:

- Analysing past disaster/Crises, gaps, advantages and challenges of the SM analytical tools, lesson learnt, both from the technical perspective but also from social cultural aspects can be identified and examined in depth.
- Social Media should be used to advertise apps that can be useful in case of natural disaster

A central theme that emerged during the discussion was focalized on the expected results and the purpose of SM deployment:

- To provide information?
- To gather data/information?
- To organize and harmonize collective work during an emergency?

Following the reported experiences, it seems hard to achieve the organization of collective work, as it entails a mutual exchange of information amongst different levels: field operators, analytical teams, modellers, decision makers.

Hereafter, a rough comparison among the most common SM services has been carried out. Twitter results quite interesting, especially for an automatic analysis approach. It can manage videos and images; the API is open and is more suitable for filtering purposes. Twitter does not need a group of friends, and is "crowd oriented".

Facebook cannot connect and search all messages in the last hours, however it is easier to make outreach, even if it is more complicated with privacy policies.

Despite some substantial differences between them, the communication strategy established is the most important factor, e.g. if you need to reach the crowd or you need to reach a restrict group of people etc.

It is also important to follow encrypted links to reach additional content and text. Multiple links in the same twitt are important and need to be followed.

One more indication from the discussion is the amount of messages that can be mined analysing videos, e.g. logo recognition. U-tube, Instagram and Flicker give a lot of information but few people post messages with videos.

Another important aspect to take into account to evaluate a suitability of a SM service, is the response time, i.e. the time frame between an event and the availability of information concerning the event in the SM service.

## **Discussion**

At the end of the workshop, a round table discussion was organized and moderated by the JRC. The discussion revolved around a set of questions (themes) which are reported below:

- Policy Implications
- Situation Assessment & Awareness
- Technical Issues
- Learned from the WS
- Cultural issues
- Additional topics
- What's up as Social Media ?

### **1.3 Policy Implications**

As in other fields, there are often significant gaps between research knowledge and current policy and practice, especially when the research field lays in a technological boundary as the Social Media.

The impressions and different approaches given by the several member states in relation to policy constrains are summarized in the table below. There are three main communication modes: Authorities to Citizens (A2C), Citizens to Authorities (C2A) and Citizens to Citizens (C2C).

Concerning the **A2C** communication activities, each country has its own institutional channels (i.e. sirens, radio, TV) to dispatch notification to the citizens, and the regulations are quite clear. However, the regulation of Social Media use differs among different countries. Some of them - Poland, Qatar and Bulgaria - do not have yet a precise regulation on the matter. In some others - Denmark, Sweden, The Netherlands, Greece - Social Media are used by



authorities as a usual means of communication; others - Austria and Italy – do not use Social Media as a tool to dispatch official communications but as a parallel mean of communication. In some cases, Social Media are sporadically used in case of catastrophic event: for instance in the case of Balkan floods in 2014, Serbia established a Twitter account on the fly to inform people.

Concerning **C2A** communications, Qatar only uses SM as indirect communications. Sweden and Denmark do not consider SM as official channel, but in some cases the notifications can be taken into account following verifications, e.g. Lonely person lost in an unknown place or in large accidents. In Austria, volunteers regularly use SM to communicate. The legal question is rather important for many authorities: should a police or fire brigade intervene if help is requested via Facebook or Twitter ? What is the consequence in case the authority does not intervene or intervening in a false alert removes resources to other real emergency ?

Even if the **C2C** is an unrestrained activity, which is not generally regulated, some authorities rely on it to engage the citizens to warn each other. In some cases, C2C is exploited using official accounts where official information are given. A common concern is about involving the citizens in official communication since the danger of providing false information is always high.

#### **1.4 Situation Assessment & Awareness**

Use of Social Media to get a better and quicker picture of the situation: Situation assessment & Awareness are intimately related to policy, and distinguishing between them is more needed for document structuring than for a real conceptual matter.

Denmark, Sweden and Netherlands use SM within a quite regulated framework. In particular, Denmark use Instagram to have an idea of the situation but the deployment always happens after a validation procedure, e.g. multiple reports from the same location inherently increase the confidence. Sweden doesn't take advantage from SM for tactical objectives, but use them in addition to media scanning. Social Media is used in The Netherlands mainly in flood awareness.

#### **1.5 Technical Issues**

One of the main technical issues which Social Media deal with is Big Data analysis. From finding small signals in large streams, to detecting evolving information flows - since In the field of SM the information (data) are represented by images videos and sound signal - a quite powerful computing capacity is required.

Qatar Computing (QC) has reported some of the main gaps which are often encountered during SM analysis:

- Time of analysis for real time purpose,
- Automatic and semi-automatic analysis
- Data accuracy Vs time of analysis
- Deep web learning

Considering the peculiar algorithms that EMM<sup>2</sup> uses, and some of the technical solutions which are used by QC, a joint activity could lead to an improvement of the analysis systems, enhancing the calculus speed and the automatic analysis. Furthermore, a wider number of different languages could be covered.

### **1.6 Lessons learned from the WS**

Some interesting discussions emerged during the wrap up session of the workshop. Doubts, needs and suggestions were exposed by the participants. Coordination, networking and flexibility of the CM systems were the main debated themes. Participants exposed also some crucial questions discussing on coverage and accuracy, early moments and long term analysis, flexibility or strict regulations.

Networking always represents an important resource. Within a solid network, data, talents and facilities can be shared easier than in a normal context. Nevertheless, information overlapping and data looping could represent an obstacle to the systems effectiveness, a coordination among the network's node has therefore to be strong. An effective network aggregating developers of SM analysis is also beneficial since methods and procedures can be shared and discussed. The Disaster Risk Management Knowledge Center (DRMKC) website<sup>3</sup> could be a good reference point.

### **1.7 Cultural issues**

Cultural differences can control the effectiveness of a SM system in Crisis Management, in one hand the differences of customs and practices could influence regulations and in the other hand cultural peculiarities could deceive analysis algorithms.

Indeed, the various SM analysis systems, are usually developed and deployed in a definite (pilot) area, and then, after a testing period, the range became wider and wider. In this case,

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<sup>2</sup> Europe Media Monitoring

<sup>3</sup> <http://drmkc.jrc.ec.europa.eu/knowledge/Scientific-Results#project-explorer/631/projects/list>

data could contain information and keywords which differ too much or which have not been taken into account writing an analysing algorithm.

Language plays a very critical role in the data mining process. For some kind of languages, SM analytical tools have already a good database for words recognition and mining, e.g. English.

The SM analytical tools that work very well in English, demonstrated poor quality results if deployed in different languages, e.g. during the Nepal Earthquake 2015, the "nepali" language has been a huge obstacle to recognize words in automatic algorithms.

A quite important role is also played by the framework in which authorities are constituted, and by their rules. Indeed, authorities are usually quite conservative, especially in fields like Crisis Management, which entails high responsibility and fragile contexts; a slow reaction to the external stimulus is therefore to be expected. This fact could influence a lot the promptness and efficacy of SM analytical tools in an emergency context.

A common shared objective, which has been defined during the discussion, is that various institutions and authorities should establish an effective dialogue on standards and common practices.

## **1.8 Additional topics**

How to use SM for CM has been the principal of the additional topics. The organization of specific training in the use of Social Media for CM is desirable, especially following the interest of OCHA and ECHO on the matter. The Denmark delegate referred a specific course that Danish institutions have organized for municipalities.

## 2 Conclusions

The workshop has been structured in two parts. During the first day and in the morning of the second day, participants explored topics and/or share case studies and experiences through presentations, on the afternoon of the second day an intensive debate has been carried out. These activities aimed both at identifying the progress and to discuss options and challenges for the future: technological innovations but also latest research developments.

Reliability, completeness, timelessness, Big Data analysis, and geographical coverage are some of the identified challenges. The debate covered technological aspects as well as policy matters and legal constraints. SM analysis allows gathering "authentic" information, which flows amongst users, without mediation (journalists), however this could lead to a lack of reliability and some in-field validation strategy could be essential. Social Media analysis is a good tool also to identify secondary effects, e.g. lack of water or electrical energy after an earthquake but, the SM effectiveness could also be controlled and reduced by the same secondary effects (lack of electrical energy or unavailability of communication systems).

Coordination, early-warning or situation assessment? Small expert groups of large nationwide communication? Strategy and purpose have to be very clear. Various SM services cover most of the needs of End Users, First Responders and Decision Makers, but each one has its own peculiar features that have to be taken into account to obtain best performances.

Cultural matters also play an important role and control the effectiveness of SM in CM.

Language resulted one of the most important factor to take into account, but also the age dependency is a very important factor that can minimize SM effectiveness, e.g. for residents in mountains, bell ringing can be more useful than SM services.

Will SM analysis ever be as reliable as standard systems? And automatic or semi-automatic analysis? Is SM analysis effective in very low developed area?

Some questions have still to be answered but - taking into account the rapidity with which SM services develop, and the interest of political institutions in the matter - some of the unanswered questions will be certainly discussed again in the next ECML workshop on Social Media in Crisis Management.

## Appendix 1 - List of Acronyms

A2C	Authorities to Citizens
ACAPS	Assessment Capacities Project
AIT	Austrian Institute of Technology
C2A	Citizens to Authorities
C2C	Citizens to Citizens
CNVVF	Corpo Nazionale dei Vigili del Fuoco - • Italian National Fire-Fighters Corp
CwC	Communication with Communities
DRMKC	Disaster Risk Management Knowledge Centre
ECML	European Crisis Management Laboratory
EEW	Earthquake Early Warning
EFAS	European Flood Awareness System
EMM	Europe Media Monitoring
GDACS	Global Disaster Alert and Coordination System
JRC	Joint Research Centre
MEDISYS	Medical Information System
PSO	Public Safety Organizations
QC	Qatar Computing
QCRI	QATAR COMPUTING RESEARCH INSTITUTE
SDRC	Cyber Documentation and Research Center
SM	Social Media
SMCM	Social Media in Crisis Management
SN	Social Networks
SOCMINT	Social Media INTelligence
TA	Trust Algorithm

## Appendix 2 - List of Participants

	<b>NAME</b>	<b>ORGANIZATION</b>	<b>COUNTRY/In t ORG</b>	<b>TYP E</b>	<b>EMAIL</b>
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## Appendix 2 - Technical arrangements

The European Crisis Management Laboratory acts as a research, development and test facility for ICT focused solutions which integrate devices, systems, and relevant information sources to support crisis management needs, such as threats analysis, situational awareness, early warning, response and coordination, and collaborative decision making. For the exercise all crisis management systems shall be integrated in the ECML to a reasonable extent (**Figure 12**). Minimum requirement for participation is the streaming of the respective video outputs to the video wall. Individual setups and most practicable solutions to be clarified bilaterally. The ECML has the following setup:

### Video Wall

- 5x3 matrix (5m x 2.22 m) rear projection video wall
- Overall resolution 5120x2304 pixels
- Simultaneous digital & analogue video inputs
- Touchable over the whole surface (single touch, medium precision)

### Other hardware

- Samsung SUR 40 multi-touch table
- BARCO Click-Share WiFi to feed up to four different streams onto the video wall
- AppleTV for AirPlay streaming to video wall
- iPad, iPhones, Windows 8 touch tablets
- Professional video conferencing system (Tandberg), landline phones, webcams, microphones
- A0 plotter
- SMART Board interactive whiteboard (single touch)
- Guest WiFi
- Meeting table

### Computers

- 4 workstations to feed the video wall, 2 used to control it
- 1 server (Windows 7) to control the video inputs and drive the video wall



Figure 12 -European Crisis Management Laboratory (ECML). Briefing of European Commission President Barroso, European Commissioner Geoghegan-Quinn, and EC JRC Director General Ristori


To ensure the best results during the presentations, different tools and technologies were provided to each attendant such as audio and video conferences (Skype® and Google Hangout®, traditional Video Conference System) for live communications, desktop sharing tools (Teamviewer ®, VNC®...) for remote screen streaming and, finally, local mirroring tools from guest devices (Barco Click-Share®, Apple AirPlay®).

Since there were local and remote teams, they were allowed to test and choose in advance the favorite means according to their solutions. Basically, the Web based solutions were directly browsed and mirrored from the operator client computer to the crisis wall screen at the best suitable resolution and commented live while in audio/videoconference with the remote audience.



For the remote teams, the crisis wall screen was split proportionally to stream simultaneously the video of the speaker, the operator screen or presentation and the live screen of the presented tool. The portable solutions like virtual machine and software suite were restored in our environment and used directly on the video wall screen.

## Appendix 3 – Agenda

			
<b>Joint Research Centre</b>			
<b>7th ECML Workshop - Social Media in Crisis Management (SMCM - 2016) JRC Ispra</b>			
<b>October 11 - Amphitheatre, building 36</b>			
<b>10:00</b>	Welcome coffee		
<b>10:30 – 10:45</b>	Welcome by the Head of Unit - I. Clark		
<b>10:45 – 11:00</b>	Introductory Remarks - A. Annunziato (JRC)		
<b>11:00 – 11:15</b>	Social Media and Crisis Management: Open Questions - C. Fonio (JRC)		
<b>11:15 – 11:45</b>	Social media in Emergency Management in France - X. Tytelman (Bureau des Operation et de la Gestion de Crise, Ministry of Interior)		
<b>11:45 – 12:00</b>	Q&A		
<b>12:00 – 12:30</b>	Real-Time Analysis of Social Media for Disaster Response – I. Muhammad (Qatar Computing Research Institute)		
<b>12:30 – 12:40</b>	Q&A		
<b>12:40 – 13:40</b>	Lunch @JRC Canteen		
<b>13:45 – 14:15</b>	Coupling Flood forecasting System (EFAS) with Social Media Analysis and Crowdsourcing to improve situational awareness and emergency response - M. Kalas, V. Lorini (JRC)		
<b>14:15 – 14:30</b>	Q&A		
<b>14:30 – 15:00</b>	Preparing for future large scale manmade disasters with Crowd OSInfo, J. Klerx (Austrian Institute of Technology)		
<b>15:00 – 15:10</b>	Q&A		
<b>15:10 – 15:40</b>	The SOTERIA (FP7) Project: Online and Mobile Communications for Emergencies – A. Stachowicz, M. Przybyszewski (ITTI)		
<b>15:40 – 15:50</b>	Q&A		
<b>15:50 – 16:15</b>	Coffee break		
<b>16:15 – 16:45</b>	Social Media Role in Earling and Early Warning Systems, F. Azima (Circular World)		
<b>16:45 – 17:00</b>	Q&A		
<b>17:00 – 17:30</b>	Krisis Information, K. Palm (MSB)		
<b>17:30 – 17:40</b>	Q&A		
<b>17:45</b>	Hotel transfer		
<b>20:00</b>	Social dinner (Osteria del Sasso Bianco, via Lungolago Isola Virgina 8, Gavirate, VA)		
<b>October 12 - Building 68</b>			
<b>9:00 – 9:30</b>	The European Crisis Management Laboratory (ENCML)		
<b>9:30 – 9:40</b>	Q&A		
<b>9:40 – 10:40</b>	Mining Twitter during Disasters. A case study for the Central Italian Earthquake (Europe Media Monitor, JRC)		
<b>10:40 – 11:00</b>	Q&A		
<b>11:00 – 11:15</b>	Coffee Break		
<b>11:15 – 11:45</b>	Lessons Learned of the Nepal Social Media Monitoring Project, D. Schubel (ACAPS)		
<b>11:45 – 12:00</b>	Q&A		
<b>12:00 – 12:30</b>	Social Media and Disasters: legal concerns, S. Marsella (National Fire Academy)		
<b>12:30 – 12:45</b>	Q&A		
<b>12:45 – 13:45</b>	Lunch @JRC Canteen		
<b>14:00 – 15:30</b>	World Café - <i>Buildings: 36 / 68</i>		
<b>15:30 – 16:00</b>	Wrap-up - Amphitheatre		

## Appendix 4 – Comments

Dear Chiara,

I would like to take this opportunity to thank you again for the organization of the SMCM workshop. I think I really learned a lot during those two days and enjoyed the company of everybody. In terms of feedback I do not have much to say. The only thing that could have been arranged differently is having the hotel somewhat closer to JRC in Ispra or, having the workshop at Sunset Hotel. Both options could save future participants time.

I was wondering, if you could share the contact details and some of the presentations from the workshop with everybody. Because of the abrupt way we left the workshop it was not possible to exchange contact information with all of the other participants. This would be very much appreciated.

Best regards and have a nice rest of the week,

Daniel Schubel

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Dear Chiara,

I'd like to thank you again for your invitation and hospitality during the SMCM event.

The workshop was great and it was nice meeting you and your colleagues at JRC. Also, amazed by the work done in the field of SMCM at JRC. Excellent.

I think there are a number of interesting research directions, plus the ones emerged during the discussion sessions, that we can work together and collaborate on to advance the SMCM field.

Regards,

Dr. Imran Muhammad

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