The Role of Social Media in Crisis

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Agenda

• Contributors List
• Definitions
• Lessons From Past Crisis
• The Role of ICT in Crisis
• The iSAR+ Way: an Approach for Social Media in Crisis
  – The THEO Methodological Approach
  – iSAR+ Platform and Services
• Conclusions
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Definitions

• **Crisis**: In this paper, crisis is defined in the security context as resulting of human activities, technological hazard events or natural phenomena, and understood as the situation in which the priority values, interests, preconditions or critical functions of large social systems are seriously threatened, challenged, impaired or overloaded.

• **Social Media**: Social media refers to “online technologies and practices to share content, opinions and information, promote discussion and build relationships”. Social media services and tools involve a combination of web-based technology, telecommunications and social interaction.

• **Online and Mobile Communications**: Online communications refer to ‘social media’. Mobile communications are based upon the use of mobile devices, such as mobile phones, smartphones, tablets, portable computers and personal digital assistants (PDAs).
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Best Paper Award
Paper 007: The Role of Social Media in Crisis
Lessons From Past Crisis

- September 11th 2001 – Terrorist Attacks on the USA
- 2003 China SARS Epidemic
- March 11th 2004 – Madrid Train Bombings
- December 24th 2004 – The Indian Ocean Tsunami
- July 7th 2005 – London Tube Bombings
- August 29th 2005 – Hurricane Katrina
- 2007 Southern California Wildfires
- January 12th 2010 – The Haiti Earthquake
- January 27th 2010 – The Chilean Earthquake
- 2011 Victorian Floods
- March 11th 2011 – The Great Japanese Earthquake
- 2011 Middle East Upheavals
- 2011 England Riots
- July 22nd 2011 – Norwegian Terrorist Attacks
December 24th 2004 – The Indian Ocean Tsunami

- A 9.3 magnitude earthquake was felt in the Indian Ocean and within minutes a giant tsunami decimated Banda Aceh, on the island of Sumatra, and massively struck twelve countries bordering the Indian Ocean, killing over 280,931 people.
- No advance warning was given. Information on the destruction of Sri Lanka’s coast reached (by telephone) the media, and then the general public, prior to the news of Banda Aceh’s fate.
- The existence of available information was severely hindered by the low connectivity and scarce telecommunications access in developing Asia.
- The **UN Humanitarian Information Centre** in Banda Aceh became the local information hub, BUT the first reports of this disaster came from **tourists** (photos and videos from mobile phones uploaded to WEB).
- More than fifty worldwide contributors built **The South-East Asia Earthquake** and **Tsunami Blog**, which aggregated news and set up a tracker for missing persons’ reports and humanitarian efforts.
Lessons From Past Crisis

July 7th 2005 – London Tube Bombings

- Three bombs detonated on three London Underground trains and a fourth bomb on a double-decker bus. The attacks were the deadliest in London since World War II, killing 52 people and injuring more than 700 others.
- Initial information was scarce causing confusion in passengers.
- FRs with problems with radio communications. Not all radio systems operated in underground and there was interoperability problems between the different systems.
- Legal issues: the United Kingdom's Data Protection Act prohibits sharing personal data without the consent of those concerned.
- Most mobile operators reported capacity problems (excessive usage)
- Victims trapped underground were able to take photos and video of their surroundings but could only be later forwarded to police and broadcasted through the media around the world.
- (media) Local and national radio either suspended regular programming, or provided regular updates, whereas continuous, uninterrupted TV news coverage of the attacks was broadcast throughout the day, empowered by the use of mobile phone footage sent in by members of the public and live pictures from traffic CCTV cameras. This day marked how day-to-day technology undertook a major role in citizen’s journalism.
Lessons From Past Crisis

August 29th, 2005 – Hurricane Katrina

- Hurricane Katrina devastated New Orleans and flooded 80% of the region for weeks, forcing 1.2 million residents to evacuate and killing 1,836 people.
- The emergency 911 service was severely damaged and surviving stations were soon overwhelmed by the awesome volume of calls as desperate people tried to get help.
- The New Orleans Police Department’s communications system was inoperative for three days. 80% of the city’s emergency networks were incompatible.
- Satellite phones worked once the immediate storm passed. Satellite radio, such as XM and Sirius, continued to function.
- The Amateur Radio Emergency Service provided communications in areas where the communications infrastructure had been damaged or totally destroyed, and the SATERN network of amateur radio operators helped to locate more than 25,000 survivors.
- The Federal Emergency Management Agency’s (FEMA) Mobile Emergency Response Support (MERS) teams provided assistance with emergency communications, with limited impact in the first days.
Lessons From Past Crisis

August 29th, 2005 – Hurricane Katrina (2)

• The absence of authoritative and believable information from public officials created a climate of rumour, misinformation and speculation, and added to the loss of citizens’ confidence and the government’s inability to maintain public order.

• Field reporters became conduits for information between victims and authorities, often using internet sites such as blogs, wikis, fora and community journalism.

• The authorities monitored local and network news broadcasts, as well as internet sites, to assist in the rescue efforts coordination.

• NOLA.com (blog) the web affiliate of New Orleans' Times-Picayune accepted and posted thousands of individual pleas for rescue. Much of NOLA’s information came indirectly from trapped victims via SMS messaging of their cell phones.

• Shelters emerged as information hubs for seeking and providing information and the large Red Cross-run shelters had to establish well-organized call centres and processes for recording and transmitting messages.

• A few shelters had computers to access the internet but many users needed computer training. Volunteers assisted with this task and helped them to share information, find missing people and follow-up relief efforts.
Lessons From Past Crisis

2007 Southern California Wildfires (end-October and November)

- Multiple wildfires in Southern California destroyed 1500 homes and burned over 500,000 acres of land, killing 9 people, injuring 85 and provoking the evacuation of more than half a million people. In the process, six counties were declared disaster areas: Los Angeles, Riverside, Orange, San Bernardino, San Diego and Ventura.

- **Prompt evacuation and road blockades** were fundamental to reduce public exposure and maximise firefighters’ access to threatened locations.

- **The Reverse 911 system worked extremely well** notifying residents of danger, in spite of provoking increased congestion on exit routes.

- Several local fire authorities ordered a large number of Public Information Officers (PIO) **providing volunteers the official information and disaster relief contacts** as well as for connecting to the media and the public the vast amount of information they required.

- Unable to learn critical information from the media (too general and often incorrect), people in the affected region used mobile and social media to be informed: mobile phones to contact relatives and friends, information portals and websites to know about road closures and fire-line status.

- During the course of the fires, **citizen journalists used Twitter and Flickr to provide real-time updates** about evacuations, meeting points and places to gather supplies or bring animals. These updates could be combined with **reports from broadcast television news, local radio, streaming video, instant messages, text messages, online scanner radio feed and e-mails from friends in the area**.

- San Diego’s local National Public Radio affiliate turned to **Google Maps and Twitter to report the news online** when excessive web traffic brought down its website. Likewise, some people acted as **information brokers**, distributing information, giving advices and providing console.
Lessons From Past Crisis

January 12th, 2010 – The Haiti Earthquake

- A 7.0 magnitude earthquake struck Haiti, killing 316,000 people, injuring as many as 300,000, destroying 300,000 houses and leaving 1,600,000 people homeless.

- Amidst the collapse of all critical infrastructure, communications withstood a considerable high damage. Still, within hours of the earthquake, most of Haiti’s cell phone towers were still operational and text messages were getting through.

- Being Text messaging (SMS) the primary means of remote communication in Haiti, a free aid service 4636 (via DigiCel) was implemented: hundreds of messages in Kreyol-language were received (about 1000 per day), translated, categorized and geolocated by hundreds of volunteers worldwide.

- The Ushahidi Haiti platform was linked directly to the “4636” live feed and, from this time, the US Marines starting taking the feed of messages and established a dedicated force to monitor and respond to them.
Lessons From Past Crisis

- Banner indicating important numbers to send SMS (integration with Mission4636)
- Incidents over a map (and timeline)
- Incident Statistics over a timeline
- Newsfeeds over the net (twitter, sparked, citizens journalism, etc.)
- Search functions / Overall Statistics / RSS
- Submit an incident
- Subscribe to Alerts (based on geographical area, category, etc)
- Filter by Category
- 3rd Party Apps (Google PFIF)
NOTE:
- Local language is Kreyol
- Hundreds of volunteers translated about 1000 messages per day

Source:
Lessons From Past Crisis

January 12\textsuperscript{th}, 2010 – The Haiti Earthquake (2)

• An increasing number of organisations were using the maps to plan and coordinate relief efforts: Red Cross, Plan International, Charity Water, US State Department, International Medical Corps, AIDG, USAID, FEMA, US Coast Guard Task Force, World Food Program, SOUTHCOM, OFDA and UNDP.

• (\textbf{media}) Radio is the most common medium used by Haitians: thus Radio Lumière resumed broadcasting across most of its network within a week.

• The International Charter on Space and Major Disasters was activated, allowing satellite imagery of affected regions to be shared with rescue organizations.

• Members of social networking sites, such as \textbf{Twitter and Facebook}, spread messages and pleas for help.

• The \textbf{OpenStreetMap community} responded to the disaster by improving the level of mapping available for the area (using post-earthquake satellite photography provided by GeoEye) and tracking website Ushahidi messages to assist Haitians still trapped and keep survivors’ families informed.
Lessons From Past Crisis

Example: January 12\textsuperscript{th}, 2010 Haiti Earthquake

Left image: Before the Earthquake
Center image: Two days after the Earthquake
Right image: on October 14\textsuperscript{th} 2011

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Lessons From Past Crisis

March 11\textsuperscript{th} 2011 – The Great Japan Earthquake

- A powerful 9.0 magnitude earthquake (the seventh most powerful earthquake in recorded History) struck the coast of Japan, causing widespread power outages, fires and a severe tsunami reported to be 40.5 meters high and traveling 10 km inland. At least 15,647 people were killed, 4,643 missing, 5,924 injured, 130,927 displaced and more than 332,395 buildings, 2,126 roads, 56 bridges and 26 railways destroyed or damaged.

- Electricity, gas and water supplies, telecommunications and railway service were disrupted and several reactors severely damaged at Fukushima’s nuclear power plant.

- One minute before the earthquake was felt in Tokyo, the \textbf{Earthquake Early Warning system sent out warnings} of impending strong shaking to millions. It is believed by the Japan Meteorological Agency to have saved many lives.

- Cellular and landline phone service suffered major disruptions in the affected area but internet services were largely unaffected. In an hour, with the Japanese fixed telephone network destroyed, \textbf{Twitter became the emergency service}, with almost 1200 tweets per minute coming from Tokyo, accordingly to Tweet-o-Meter.

20 Tweets per second
Lessons From Past Crisis

March 11th 2011 – The Great Japan Earthquake (2)

• Several Wi-Fi hotspot providers reacted by providing free access to their networks and companies provided free VoIP calls.

• There was no clear decision-making structure that would allow the disparate stakeholders on disaster recovery to work together (local response only). The traditional problem of Japanese decision-making, mixed with the stove-piped tatewarigyousei and protective nawabari cultures, makes the protection of own information the priority, prompting a agency-centric response management instead of a coordinated and integrated capability.

• Cabinet Secretary Yukio Edano, used social media tools to calm public fears and remedy media speculation. As expected, the crisis at the Fukushima power plant was catapulted online almost instantly and within a few days generated 64% of blog links and 32% of Twitter news links.

• Public criticism in the Japanese society both against the government and against Tepco, the operator of the plant, started to rise. Cabinet Secretary Edano’s live press conferences were praised on Twitter, for he was clear, articulate and unafraid of difficult questions, presenting leadership qualities.
Since 2012...

- Boston Marathon bombing (April 15, 2013) highlighted growing citizens' participation in the response effort, with the authorities enlisting the public's assistance to provide information and identify the suspects, resorting to images and videos collected from online and mobile technologies.
Since 2013

• London UK (23rd May 2013): a terrorist incident took place in broad daylight and involved two suspects killing a serving soldier. As the victim lies in the road behind him one suspect turns and gives passers by his justification for the attach encouraging them to use take pictures and social media to record his words.
Since 2013

• Turkey: Ignored in traditional media, Turkish protesters go online

On Facebook and YouTube, users have published videos depicting police officers firing tear gas into unarmed crowds, assaulting women, and, in a particularly disturbing video, surrounding a prostrate protester and taking turns kicking him and clubbing him in the head. This video of police firing tear gas bombs into the crowd has gathered more than 130,000 shares on Facebook.

Since 2012...

- **Hurricane Sandy: Rumour Control**
  - There is a lot of misinformation circulating on social networks regarding the response and recovery effort for Hurricane Sandy. Rumors spread fast: please tell a friend, share this page and help us provide accurate information about the types of assistance available.
  - http://m.fema.gov/sandy-rumor-control
Lessons From Past Crisis

Common Aspects in Studied Crisis:

- Critical infrastructures, namely communications, withstand extreme damage or destruction.
- Internet and cellular connectivity exhibit a resilient performance, especially the capacity to send / receive SMS and text messages.
- 112 or 911 emergency services rapidly becoming overwhelmed by the high volume of incoming calls.
- Traditional unidirectional communication means are too generic (broadcast media). Local channels are very useful.
- ICT tools deployed by independent organizations (or individuals) are adopted by citizens and other organisations.
- Social networks were the first providers of news in a number of cases.
- Citizens were the first sensors *in situ*.
Lessons From Past Crisis

Common Aspects in Studied Crisis (2):

• Public Safety organisations have no bi-direccional communication mechanisms implemented with citizens
  – The implementation of ICT tools for this purpose is mainly driven by individuals or independent organisations.
  – These ICT tools do not conform with Europe’s data privacy legislation of Europe (and US).
• Law restricts most public safety organisations on information sharing concerning the public.
• Public Safety organisations face severe law restrictions even during crisis in what concerns sharing information about victims.
• Citizens have been filling the present gap using social networks (not originally designed for this purpose) and other available tools.
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A plethora of new tools and platforms has been developed and used in crisis.
The Role of ICT in Crisis

Mobile

Gaia GPS Application (for Haitian Disaster Relief)
The Role of ICT in Crisis

Mobile

US FEMA
Wildfire App
Red Cross
North Dakota
State University
Ushahidi
Disaster Alert
(Pacific Disaster Center's World Disaster Alerts)

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The Role of ICT in Crisis

Police goes mobile

North Yorkshire Police Authority Mobile Application

The image on the right refers to a photo of a suspect that was shared by the police to citizens. The image was anonymized in this presentation.
# The Role of ICT in Crisis

## Social Networks / User Uploaded content

<table>
<thead>
<tr>
<th>Social Networking Mobile App</th>
<th>Citizen Main Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>Share messages, images and video with friends or anyone. Most used social media worldwide. EU alternatives are Hyves.nl (in the Netherlands) and Nasza-klasa.pl (in Poland)</td>
</tr>
<tr>
<td>Twitter</td>
<td>Connect with and follow people based on a similar topic. Short text messaging in real-time. Supports geotagging messages.</td>
</tr>
<tr>
<td>YouTube</td>
<td>Share videos. Easy to post a video recorded by a smartphone.</td>
</tr>
<tr>
<td>Flickr</td>
<td>Share images. Supports geotagging images. Alternatives are Picasa, Panoramio (photos of the world).</td>
</tr>
</tbody>
</table>

In flickr, “Haiti” and “Hope for Haiti 2010” have more than 10,000 photos posted.
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The iSAR+ Way

- **Today**

  - Traditional Communication Means (radio, cellular, fixed-line)
  - Internet-based services (intranets)

  - PPDRs (Command Centers – fixed)

  - Traditional Communication Means (TV / Radio Broadcasts)
  - Internet services (email, RSS)
  - Social Network pages available

  - Traditional Communication Means (e.g., E112, SMS) – reverse-112
  - Internet services (email)
  - Posts on social networks (PPDR pages)

  - First Responders (mobile)

  - Traditional Communication Means (e.g., cellular, SMS)
  - Internet services (email)
  - Use of social networks (personal pages)

  - Citizens (unaffected)

  - Signs, Local broadcasts (megaphone)
  - Face-to-face / proximity

  - Citizens (victims)

  - Face-to-face / Proximity
The iSAR+ Way

• Our Vision

Traditional Communication Means
Exploitation of information posted in new social media (data processing, mining and fusion)
Decision Support and Presentation: crowdmapping, geointelligence, etc.

PPDRs (Command Centers – fixed)

First Responders (mobile)

Citizens (victims)

Citizens (unaffected)

Traditional Communication Means
Internet services
New social media:
- bi-directional communications

Traditional Communication Means
Internet services
New social media:
- use of personal and PPDR pages

Traditional Communication Means
(e.g., radio and cellular)
Enriched with higher quality of information from social media
Posts to social media

Face-to-face / Proximity
Mobile applications: geolocation, pre-formatted messages, image and video feeds

Signs, Local broadcasts (megaphone)
Face-to-face / proximity

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The iSAR+ Way

MAIN CHALLENGE
To enable PPDRs and citizens to (rapidly) generate high levels of situational awareness upon the occurrence of a large emergency or crisis event.

MAIN OPPORTUNITY
To exploit the citizens’ (i) high-level of adoption and use of mobile technology and (ii) their pro-active behaviour of online information production and consumption.
## The iSAR+ Way

<table>
<thead>
<tr>
<th>BARRIER (PPDRs)</th>
<th>PPDRs distrust online social media as a credible information source and a viable communication tool with citizens in crises.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BARRIER (PPDRs)</td>
<td>Popular online social media platforms cannot be used as a formal PPDR tool for they do not uphold EU ethical principles and legal framework.</td>
</tr>
<tr>
<td>BARRIER (PPDRs)</td>
<td>Introducing change to PPDRs entails new risks and it is a process to be carefully structured, managed and tested, before implementation.</td>
</tr>
<tr>
<td>BARRIER (Citizens)</td>
<td>Citizens use the online platforms they are accostumed to. Forcing a change of habits and the adoption of an unfamiliar platform will likely result in failure.</td>
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</tbody>
</table>
To enable the engagement of citizens and PPDRs in crisis response efforts, by encouraging the use of the new communication media, requires more than yet another PPDR technological system: it requires a **profound change in PPDR communication principles**

<table>
<thead>
<tr>
<th>PPDR Communication Principles</th>
<th>Today</th>
<th>With New Communication Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>On information exchange policies</td>
<td>Strictly defined; top-bottom approach</td>
<td>Undefined; bottom-up approach</td>
</tr>
<tr>
<td></td>
<td>Unidirectional (from PPDRs to citizens)</td>
<td>Bi-directional (between PPDRs and citizens)</td>
</tr>
<tr>
<td>On control of information</td>
<td>Fully controlled by PPDRs</td>
<td>Control-free and community-driven</td>
</tr>
<tr>
<td>On information trust and quality</td>
<td>Official sources with adequate verification and validation</td>
<td>Anonymous or unofficial sources and self-correcting</td>
</tr>
<tr>
<td>On citizens inclusion</td>
<td>Seen as auxiliary source and reactive</td>
<td>Seen as primary source and proactive</td>
</tr>
<tr>
<td>On communication target</td>
<td>General public</td>
<td>Tailored according to user profile</td>
</tr>
</tbody>
</table>

**PPDR Communication Principles: Today and With the New Communication Media**

*Best Paper Award*

Paper 007: The Role of Social Media in Crisis
The iSAR+ Way

The THEO Approach

- Organisational Dimension
- Human Dimension
- Ethical and Legal Dimension
- Technological Dimension

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Paper 007: The Role of Social Media in Crisis
The iSAR+ Way

Technological Dimension

• Entails the integration of current ICT tools for crisis, equipment, communications, information processing technologies and current standards into a platform.

• Explores the real potential of ICT and mobile technologies in what concerns crisis response and search and rescue actions.
Human Dimension

• Focuses on the citizens’ perspective on the acceptance and adequate employment of state-of-the-art mobile and social media communication technologies in crisis situations.

• Addresses human factor analyses, message delivery channels and message content.
The iSAR+ Way

Ethical and Legal Dimension

• Deals with the ICT/Tools requirements to abide to the ethical principles and legal framework applicable when developing an ethics-by-design project approach.

• Addresses the ethical and legal framework concerns and waivers emerging from the debate on the boundaries of privacy rights and public security, with respect to the integration of new online and mobile technology in crisis response efforts.
The iSAR+ Way

Organisational Dimension

• Focuses on PPDR organisations and their culture, roles, processes, competences, training and technologies.

• How to adapt these organisations to work with social media platforms, building their trust in online networking platforms?

• How to introduce these new technologies into the organisations’ operational processes?
The iSAR+ Way

The iSAR+ Platform and Services

[Diagram showing the integration of PPDRs Space and Citizens/Open Sources Space]

- iSAR+ PPDR Services
- iSAR+ Fusion Centre
- iSAR+ Mobile Services (FRs)

[External Interfaces]
- (Traditional Means – from citizens)
  - 112/E112 (voice)
  - SMS (text)
- (Traditional Means – to citizens)
  - Media (radio and TV)
  - Local Presence

[Citizens/Open Sources Space]
- iSAR+ Existing ICT for Crisis
- iSAR+ Social Networking Interface
- iSAR+ Mobile Services (for citizens)

[Feedback and guidelines]

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The iSAR+ Way

The iSAR+ Platform and Services

• The i112 Portal (for Citizens and for PPDRs)
• Interoperability with Existing Social Media and ICT Tools for Crisis
• The iSAR+ Fusion Centre
• iSAR+ PPDR Services
• iSAR+ Mobile Services
• Advanced Services [study]
The iSAR+ Way

iSAR PPDR Services (examples)

Ushahidi Crowdmapping

Risk/danger map

BRIDGE129 Advanced Alerting Tools

THALES Visualisation and Decision Support Tools

Missing People Tracking

Operationalizing Agility

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The iSAR+ Way

iSAR Mobile Apps (examples)

- Ushahidi Report Form and Mapped Information
- NYPA Mobile Application (warning screen)
- DW’s PermiLoc Public Warning Extension (to be developed)
The iSAR+ Way

SMS / MMS

French Civil Protection Message

HOSPITAL NEAR YOUR LOCATION:
Hôpital Saint-Antoine
184 Rue Fbg St Antoine, 75012 Paris, France
CALL 112 FOR HELP
The iSAR+ Way

Advanced Services

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The iSAR+ Way

iSAR+ Interfaces: international cooperation

Scenario involving sharing of information between different iSAR+ instances in an international environment.
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Conclusions

Social Media offers a crucial communication mechanism for disaster response organisations, First Responders and citizens:

- Faster PPDR response reaction times for the citizens’ benefit
- Improved links amongst prevention, detection, reporting and rescue
- Improved performance of first responders, medical personnel, police and law enforcement agencies
Conclusions

The iSAR+ Way: Today

iSAR+

Online and Mobile Communications for Crisis Response and Search and Rescue

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Conclusions

The iSAR+ Future: Link with SOTERIA
(Social Media for Emergencies)
Conclusions

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