THEO – A Multi-dimension Analysis on the Use of New Communication/Social Media in Crisis Situations

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Recent crisis events clearly demonstrate that information flows through social media is becoming an important asset for the crisis management community, comprised of Citizens, First Responders (FR) and Public Protection and Disaster Relief (PPDR) organizations.

The advantages and disadvantages of using social media information in crisis scenarios are quite well described in literature but the actual exploitation of this resource by the community still raises several important concerns and challenges, especially regarding the bi-directional communication between PPDRs, FRs and the citizen communities. To address these in a structured way, the EU FP7 co-funded the "iSAR+ - Online and Mobile Communications for Crisis Response and Search and Rescue" project to study the usage of social media in crisis management under the lenses of the new THEO multi-dimensional analytical framework, which embraces the Technological, the Human, the Ethical and Legal and the Organizational dimensions.

THEO's Technological dimension considers the integration of current ICT tools for crisis, equipment, communications, information processing technologies and current standards into crisis management systems, whereas the Human dimension focuses on the citizens' multi-cultural perspectives on the acceptance and adequate employment of social media in crisis situations. The perspective of FRs and PPDRs is dealt in the Organizational dimension, which explores how to adapt these organizations to work with social media, building their trust and facilitating the process of introducing social media into their operational processes to deliver a more effective and efficient response. Finally, the Ethical and Legal dimension 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 social media in crisis response efforts.

From January 2013 to June 2015, the iSAR+ Project will validate the THEO multi-dimensional analysis with the development of a set of guidelines and an associated technological platform to provide instructions and recommendations for citizens and PPDRs for an effective and efficient use of new communication/social media in crisis situations.

The social media in Crisis situations

Large-scale natural disasters and human-induced emergencies, or simply crises, disturb routines, raise significant public scrutiny and undivided media attention as well as increased need of information. Recent crises prompted new attention to the role of social media in SAR (Search And Rescue) and disaster response efforts. The sociological study of crises acknowledges the emerging trend of the growing citizens' participation through online (social) media and mobile communications, providing, seeking and brokering information, connecting those within and outside the geographical space of the crisis.

The growing interest of using the internet and mobile technologies have played a major role in recent events that have changed geopolitics, economic contexts and business competitiveness. Social media could also play an important role in crisis: it offers a platform for citizen participation, enables fast distribution of information and creates new possibilities for bidirectional communication between PPDR officials and citizens. These features, among other things, make social media a potential tool for improving response to disasters and crisis response efforts.

Several overwhelming natural disasters and human-induced actions have provided valuable lessons towards understanding how current crisis response efforts are carried out by local FRs and PPDRs and how common citizens are involved in those efforts resorting to the use of mobile technology and online (social) media. Past event lessons-learned reveal that, in emergencies and crisis, amidst the collapse of all critical infrastructures, communication is still possible. Although landline phone networks are unavailable or intermittently available, with the surviving stations of the 112 or 911 emergency service rapidly becoming overwhelmed by the incoming volume of calls, SMS and text messaging communication seem not to be affected by the infrastructural damage caused by the natural disaster, allowing the publication of information on social networks and micro-blogging sites. In fact, these past events show that social media have proven their worth in providing both PPDRs and the public the scarcest and most valuable resource in crisis situations: information. Moreover, because of the proliferation of communication devices equipped with cameras and GPS equipment, the available information is richer. At the same time the number of smartphone owners is increasing rapidly. Citizens' journalism through the online social media has been instrumental in providing eye-witness accounts and first reports, in natural catastrophes like the 2004 Indian Ocean Tsunami, the 2005 Hurricane Katrina and the 2010 Haiti Earthquake, but also in the US, London, Madrid terrorist attacks, and more recently the Boston bombings.

The analysis of past crises also shows that the large majority of official PPDR organisations do not formally include online social media in their list of information sources[1]. Typically, PPDR choose to use the social media as a unidirectional information dissemination model towards the public, and the traditional TV and radio broadcasts are still the channels of choice for most PPDR organisations. In the Californian Wildfires and the Norwegian massacre in the Utøya Island, those media have been heavily criticised for being prone to sensationalism and irresponsive to the local communities' real needs. Past crises also teach us that Data Protection legal framework, which prohibits sharing personal data without the consent of those concerned, also limits the capability for the information officials to provide agencies and families' information on the identity and status of victims. Indeed, this raises the need for debating the thin line that separates individual privacy from public security.

The iSAR+ approach

The First Responders (FRs) and Public Protection and Disaster Relief (PPDR) organisations and their traditional command and control models, do not easily adapt to the new crises' trend of including the global, digitally enabled social arena.

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[1] But recent events (e.g. the Boston bombings) show that this scenario is rapidly changing.

The EU FP7 co-funded the "iSAR+ - Online and Mobile Communications for Crisis Response and Search and Rescue" to explore the integration of ICT tools and functionalities (e.g., web portal, PPDR support tools and mobile applications) that offer additional communication channels between PPDRs and citizens, ultimately enabling PPDRs to (rapidly) generate high levels of awareness, during and after a large emergency or crisis situation, by exploiting the bi-directionality communication potential of the citizens' wide adoption of mobile technology and social media and integrating it into existing PPDR crisis management and response systems.

Indeed, iSAR+ addresses the challenge of incorporating existing social media and mobile tools as a way to significantly engage citizens and PPDRs, and contribute enhanced bidirectional information flow. However, iSAR+ partners are also aware that the answer to the problem is not solely technological. Technology is already available; the challenge is how to use existing technology so that PPDRs and Citizens may mutually trust the channels of bi-directional social media communication. Not surprisingly, this problem cannot be handled without resorting to the organisational, the human, the ethical and legal framework and also the technological perspective of the problem, portrayed in Figure 1 – the THEO approach.
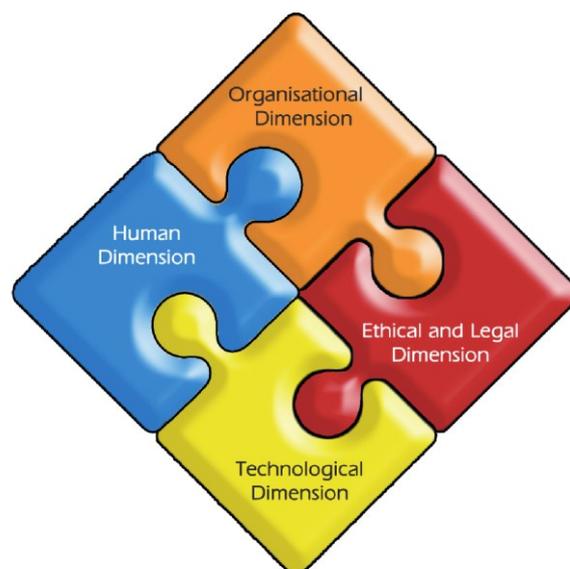
Figure 1 - The iSAR+ multi-dimensional analysis approach is designated as THEO, each letter of the acronym designating one of the iSAR+ analysis dimensions.

The **Technological** dimension entails the integration of current ICT tools for crisis, equipment, communications, information processing technologies and current standards into the iSAR+ platform so as to explore the real potential of ICT and mobile technologies in what concerns crisis response and search and rescue actions.

The **Human** perspective comprises the citizens' perspective on the acceptance and adequate employment of state-of-the-art mobile and social media communication technologies in crisis situations, concerning cultural human factor analyses, message delivery channels and message content.

The **Ethical and Legal** dimension deals with the iSAR+ platform requirement to abide to the ethical principles and legal framework applicable when developing an ethics-by-design project approach, but also with 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.

Finally, the **Organisational** dimension focus on the PPDR organisations and their culture, roles, processes, competences, training and technologies to explore how to adapt these organisations to work with social media platforms, building their trust in online networking platforms and thus facilitate the process of introducing the iSAR+ Prototype into the organisations' operational processes.

The overall goal of iSAR+ is to produce a book of best practices towards the utilisation of social media information for supporting the PPDR decision process during crisis scenarios. In the iSAR+ terminology, this is referred to as the 'guidelines'. The guidelines are therefore the final integrated results of all iSAR+ analytical dimensions: it reflects the perspective of the PPDR organisations (e.g by presenting several possible CONOPS to efficiently exploit the information available in the social media channels); it reflects the perspective of the citizens (e.g. the set of objectives the citizens are expected to meet while sharing data in the social media); the ethical and legal perspectives that ensure the good balance with the EU data privacy and data protection legal framework; and finally, the technological perspective that entails a set of requirements and design recommendations towards the definition of an IT platform that meets the iSAR+ principles.
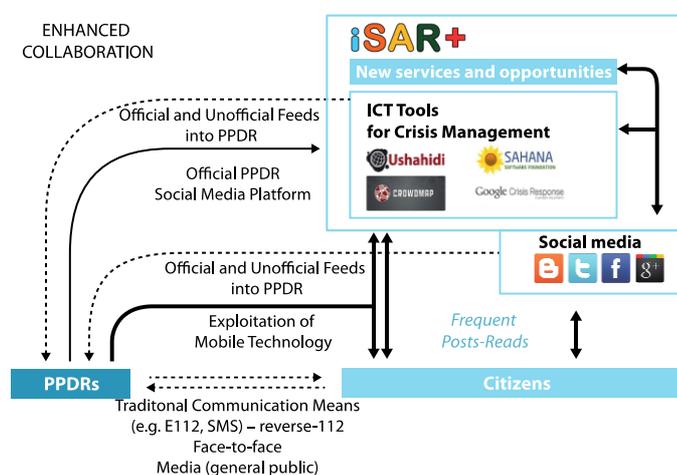

Figure 2 – iSAR+ platform integrates several existing technologies to deliver an IT platform that complies to the iSAR+ guidelines

Another output of iSAR+, the IT prototype, will allow the validation and demonstration of the iSAR+ principles during real world situations.

Social media in Rescue Services - case Finland
Evolution and challenges

Rescue Services in Finland are structured of Regional Rescue Service Departments (22 regions). Fire brigades have all together permanent and contractual staff of 5404 employees (in 2012). In addition Contract Fire Brigades (including voluntary fire brigade) have total of 16 833 employees (2012). *(Reference: Finnish Rescue Service Pocket Statistics 2012, to be published 2013)* Most of these Regional Rescue Departments of Finland are present in social media. Facebook being the most used social media service in Finland, also 16 out of 22 Regional Rescue Departments (Figure 3) have their own page on Facebook. Social media is mainly used for preventive communication: updates on the site are reminders and advices on e.g. proper procedures and preparing. Occasionally Regional Rescue Departments use social media to publish warnings (e.g. about water contamination, flooding) and to some extent to communicate with citizens, answering to questions and feedback citizens have provided. However, the content of communications and activity of the use of social media varies between the departments. During rescue operations rescue authorities have the general commanding responsibility, thus processes of communication are essential.
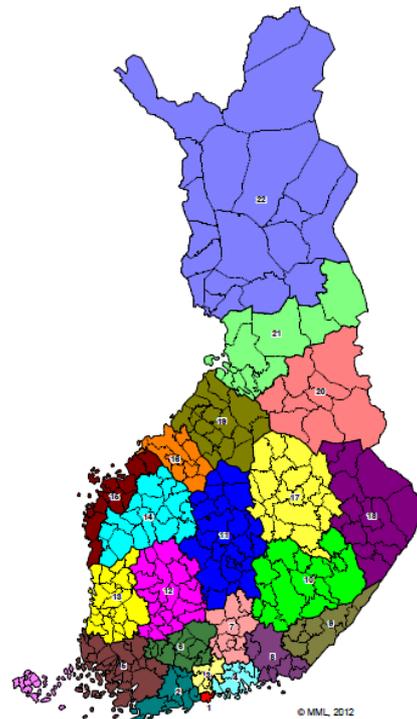
Figure 3 Regional Rescue Service Deparments (Reference: http://www.pelastustoimi.fi/download/41747_Pelastuslaitokset_2013_vari.pdf)

As the field of rescue services in Finland consists of multiple actors, so is the use of social media communications of Regional Rescue Departments fragmented. Use of social media in Finnish Rescue Services is a relatively recent topic. First steps to introduce social media to rescue services were taken in 2011 when Fire Officers' Union initiated a project called "Rescue Services in Social Media". The project consisted of trainings in which for each rescue department their own Facebook pages were constructed. Also rescue services were networked to a joint social media group. For all rescue services a centralized Facebook page, Youtube channel and Twitter account were established. All together 15 departments were trained covering over 100 professionals. *(Reference: Finnish Rescue Services Action report 2012, http://www.sppl.fi/files/1912/Toimintakertomus_2012.pdf, online 13.8.2013)*

In comparison to Finnish Police Forces that have a centralized national Facebook page with 193 500 likes, the 16 rescue departments present at social media have 350 - 2200 likes on their pages. The Department for Rescue Services of the Finnish Ministry of the Interior has an effort to maintain a centralized Facebook page (with 4800 likes), but it hasn't reached as big an audience as the Finnish Police. Since the field is fragmented, localized social media policies have led to local efforts to improve social media services - which results in very diverse concepts between the regions. Therefore defining general guidelines, instructions and recommendations for an effective use of social media - both for PPDR's and citizens - are useful.

Challenges, as the THEO-dimension, are intertwined. There might be, for example, organizational demands for using (online) social media, but the current technology does not enable it or the technology is there, but no resources are assigned to use it.

Technological

- actors in the field rescue services are heterogeneous -> technologies and equipment in use vary between the actors
- restrictions the current ICT-systems pose
- a leap from traditional to new equipment and technology

Human

- organizational hierarchy regulates communication
- the compatibility of new media to the current systems and preferred methods
- acceptance of the use of new media on individual level ; usability and perceived usefulness of social media in SAR
- changes in communicational behavior - moving away from bureaucratic language

Social media in rescue services

Ethical and legal

- information may be partially restricted/classified to certain audiences
- information might include sensitive aspects about an individual / location / objects (e.g. pictures from accident scenes)
- ensuring information security and privacy matters
- defining the boundaries between information needs of the citizens and authorities: what is needed and where - what can be published
- liability of the content
- forgetting civilians' duty to assist over publishing interest

Organizational

- acceptance of the use of new media on organizational level; attitudes towards and understanding of new media
- resources to use, be present and interactive in new media (from individual and organizational point of view)
- procurement policies: who buys / maintains / pays / owns the services & contents
- "specialty" or uniqueness of the social media services developed by individual rescue departments
- authority / authority-like organization (rescue services vs. voluntary fire brigade)

Figure 4 – iSAR+ Challenges in the four dimensions of the THEO framework

The methodology of iSAR+

The process of integrating the outcome from the different analysis dimensions imposes other challenges (cf. Figure 4) that mainly arise from the fact that each dimension is (almost) orthogonal to the other in terms of communication: they address the same problem through different languages, although they share similar techniques and approaches. This poses a considerable risk to the objective of achieving a unified perspective of the problem that is usable to the PPDRs in disaster relief scenarios. To address this risk the iSAR+ relies on an incremental approach. The different dimensions perspectives will be given the chance to frequently meet in time and space for

sharing, discussing, merging and consolidating their visions of the same problems. Moreover, the iSAR+ methodology also defines a process for establishing a common starting point that will produce the input to each THEO dimension. The initial starting point of the study is a joint effort to define the problem more clearly, so that it may be further detailed in each subsequent THEO dimension threads. After a first iteration, all THEO parallel threads re-join in an integrated perspective. This process is repeated until all dimensions are satisfied with the final integrated result. Furthermore, the THEO methodological approach in iSAR+ uses the feedback from the end-user community as the main criteria to determine the need for further iterations. With the purpose of involving the end users in the process, the iSAR+ created an end-user community not only to track the progress of the project but also to pro-actively contribute to fine tuning the activities towards the direction of meeting the real world needs. The end user community not only includes PPDR and FR organisation representatives, but also includes representatives from other organisations that represent the relevant groups of stakeholders of disaster relief operations (e.g. citizens). However, the end users that are also part of the iSAR+ working team, are the most effective resource towards retrieving information from the end user community. The end user feedback is collected resorting to various techniques such as demonstrations, discussion workshops, questionnaires, prototyping, design of experiments (e.g A/B and multivariate testing), that when applied to the end users allow the consortium to extract valuable information, analyse it from the perspective of the different dimensions of the problem, and finally issue recommendations to steer the research activities towards the direction that most improve the effectiveness and efficiency of operations during disaster relief scenarios.

Results & Conclusions

The iSAR+ project is currently in the phase of establishing a common starting point to the THEO dimension threads. A more profound study of past crises and a first attempt at establishing the end user needs and requirements allowed the consortium to fine-tune the underlying concept of using the social media for supporting PPDR and FR response during crisis situations. Furthermore, this initial phase of the project also includes the establishment of an early prototype to drive the discussions with the end user community towards the consolidation of the iSAR+ concept and to establish the foundations of an R&D relationship between the project consortium and the end users. The prototype will actually be used in a CPX (Command Post Exercise) simulation organized by the Portuguese end user community. The event will take place in the October and will involve multiple disaster relief organisations. Following the execution of the showcase, the iSAR+ consortium and the PT end user community will gather in a workshop to discuss how the results of the showcase will actually impact the future work in the project. The results of these two initiatives will be documented in a full report, which will be published in iSAR+ web site around the first days of November.

During this initial stage of the project the consortium already tested several techniques for retrieving information for the end user communities. Several preliminary questionnaires have been undertaken to have a first feel of how the PPDRs and general citizen communities could be approached. Although preliminary, several results show a new (possible) trend amongst the population of future PPDR operators anticipating that social media channels and tools to support the processing of the information originated by these channels, will be of paramount importance in the future years for the PPDR communities.

Finally, because the project is not only driven by scientific and technical motivations, a first discussion of possible business and commercial exploitation in the project has been undertaken with several interesting ideas for business plans arising from different partners. With this respect, the iSAR+ project is still in a middle of a brainstorming process, trying to make sense of some disparate ideas that aim at promoting the commercial sustainability of the iSAR+ technological platform and also of the iSAR+ guidelines. A particularly interesting aspect of the iSAR+ project is its natural ambition to be understood as a first effort towards the definition of a standard approach for incorporating the social media channels in the set of tools used by PPDRs and FR during disaster response.

Acknowledgements

Partners

Organisation	Website	Country
TEKEVER	www.tekever.com	PT
Bridge129	www.bridge129.it	IT
Centre for Science, Society and Citizenship	www.cssc.eu	IT
Deveryware	www.deveryware.com	FR
Emergency Services College	www.pelastusopisto.fi	FI
Ernst-Moritz-Arndt-University Greifswald – Institute of Psychology – Department Health and Prevention	www.uni-greifswald.de	DE
ITTI Sp z o.o.	www.itti.com.pl	PL
National Centre on Emergency Communication in Health	www.kokom.no	NO
North Savo Rescue Department	www.pelastustoimi.fi	FI
Police and Crime Commissioner for North Yorkshire	www.northyorkshire-pcc.gov.uk	UK
Pôle Pilote de Sécurité Locale	www.ppsl.asso.fr	FR
Police College of Finland	www.polamk.fi	FI
University of Dublin – Trinity College – Aerospace Psychology Research Group	www.tcd.ie	IE
Thales Communications and Security	www.thalesgroup.com	FR
University of Eastern Finland	www.uef.fi	FI
Zanasi & Partners	www.zanasi-alessandro.eu	IT

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