Social Media Applications in Crisis Interaction

Karin Rainer
INSET Research & Advisory, Brucknerstrasse 2/2, 1040 Vienna, office@inset-advisory.com, +43 1 505 87 96 10

Verena Grubmüller
INSET Research & Advisory, Brucknerstrasse 2/2, 1040 Vienna, office@inset-advisory.com, +43 1 505 87 96 10

Igor Pejic
INSET Research & Advisory, Brucknerstrasse 2/2, 1040 Vienna, office@inset-advisory.com, +43 1 505 87 96 10

Katharina Götsch
INSET Research & Advisory, Brucknerstrasse 2/2, 1040 Vienna, office@inset-advisory.com, +43 1 505 87 96 10

Peter Leitner
SYNYO Research, Holochergasse 20/4, 1150 Vienna, office@synyo.com, +43 1 99 620 11 7

Abstract: Social media applications are increasingly widespread in modern societies. Internet use and mobile access to information, social networks, entertainment and services are and will be subject to rapid growth and create an essential source for so called “social media analytics” (SMA), which allow to systematically monitor and analyze user generated contents for different purposes. Given this prominence social media have reached in different fields, we identify a crucial importance to promote the application of social media services for effective disaster prevention and preparation, faster and interactive investigation and tracing processes via strategic information search and inclusion of the public, better crisis management as well as positive image development. Based on current possibilities and evolving practices of social media usage as a means of community participation, this paper develops ideas for a future use of social media in disaster management and general crisis mitigation. The opportunities, which are meant to be identified, will be weighed up against potential risks and weaknesses of this approach.

Keywords: Social Media Analytics; Multilevel Crisis Interaction; Crisis Dynamics; Multi Media Integration; Vulnerability Prevention; Crisis Communication
Acknowledgement: The research for this article was conducted in the course of the project SMD4Austria funded in the national Security Research Program KIRAS by the Ministry of Traffic, Innovation and Technology (BMVIT).
1 Introduction

Crisis managers today are increasingly confronted with more complex, hardly predictable crises involving large numbers of people, in which efficient emergency management is more challenging than ever and private companies as well as public organizations are facing almost identical problems. Whereas the procedures, as well as the coordination of internal resources in the case of crises, can be considered efficient already, the potential of improving the external communication is still significant. It is important to note that in this respect, the term “communication” does not solely imply the supply of the public with relevant information, but also the supply of emergency-managers with information from other involved stakeholders, for instance the disaster-stricken population. Communication is a two-way street. Considering the concept of “dialogical emergency management” (Artman et al., 2011) it can be stated that eliciting information from the public is a substantial part of successful emergency communication, a component that has too long been neglected. Only if the crisis management has “strategic awareness” of what the affected stakeholders know, real communication and collaboration can exist (ibid.).

One central challenge of emergency communication is that it needs to deal with rapidly changing factors such as different needs, abilities and characteristics of the involved actors (ibid.), thus making it difficult to receive reliable and real time data. At this point the analysis of social media content constitutes a new way to consider the affected population's information in an efficient way. In recent years the world has witnessed the remarkable popularity of Web 2.0 concepts and social media, in which millions of users communicate, participate, and collaborate. Driven by these new concepts, technologies and features, the web has become more social and interconnected. Global participation platforms and social networks like Facebook, Twitter or YouTube and a mass of local blogs and web communities are an important source for next generation emergency management. O’Reilly (2005) summed it up by the buzzword “Web 2.0” and many others wrote about the phenomenon of social web and the wisdom of crowds.1

According to a study of the American Red Cross (2011) nearly half of the entire population is active in one or more social networks. Also the importance of social media in disasters is increasing, thus it has become the third most popular information channel under these circumstances, right after television and radio. The same is true for other countries: In Austria almost half of the population with internet access is actively using social networks (STATISTIK AUSTRIA 2011), while even two thirds have already visited social networks at least once (Integral 2011). At the same time this soaring significance of social media correlates with heightened demands people pose to security and emergency managing organizations: Almost 70 per cent of the population expect the emergency managers to monitor and to react to social media content generated by the public in one way or another (American Red Cross 2011). But meanwhile the emergency managers are reacting very slowly (Currie 2009), their use of this new communication technology often being limited to manual reading of individual posts or to the unselective posting of information over the organization’s profile. Yet there are examples of the successful and systematic social media usage in the crisis management by public, as well as private actors. The earthquake in Haiti 2010 was the prime example of successful social media usage in the case of emergency.

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1 Especially Surowiecki, J. (2004), analyzed the wisdom of crowds, an aggregation of information in groups, resulting in decisions that are often better than any decision of a single member of the group. Crowdsourcing is a neologism, which was coined by Jeff How (2006) and describes, contrary to outsourcing, not the outsourcing from business tasks and -structures to third party companies, but the outsourcing to the intelligence and the manpower of a mass of voluntary staff on the internet.
Open-source software called Ushahidi helped to match suppliers and health care providers in need of those supplies. Unfortunately, cases like the nuclear-disaster in Fukushima show that the potential of the new media is by far not completely exploited. In the course of this incident social media was not even sufficiently used as a channel for informing the disaster-stricken population, let alone as a means of gathering information (Kwang-Hoong & Mei-Li, 2012). But today’s societies are also witnessing the use of social media in stirring and prolonging crises. Among the most prominent examples are the UK riots 2011 and the Occupy-Wallstreet-movement, both of which were aided by platforms such as Facebook or Twitter and eventually resulted in actions of serious crime. In the case of the latter there were more than 400 Facebook pages and over 170,000 active users (Caren & Gaby, 2011). During the UK riots hundreds of Twitter messages were created every minute (Crump, 2011). This development underlines the need for governments using the very same methods for the prevention and management of such situations. More generally, it can be stated that “[t]he explosion of social media […] has changed the way in which anyone involved in risk communication must look at overall communication plans” (American Public Health Association, n.d.). But how social media interaction works before and during crises and how it could be used to support emergency services, fire brigades, police forces, other forces for civil protection, as well as strategic departments is poorly understood. Therefore this paper investigates some basic questions such as the possibilities, dangers, and constraints (e.g. legal or ethical) of using social media services in crisis management, eventually developing a multi-level approach that can serve as a first blueprint for the successful and efficient implementation of such services.

2 Background

Social media and Web2.0 applications have become an integral part of everyday life. They create new possibilities for the advancement of security and crime prevention, for instance by the strategic collection and exploitation of information, communication and interaction of organizations for citizen-security, media and further crisis-management organizations. In the following section, the manifold possibilities of social media services and analytics as means of data gathering and analysis, information sharing, and interactive communication for different purposes will be described and key terms will be defined.

2.1 Definition and possibilities of social media & social media services

Sterne (2011) refers to the internet as a “many-to-many” communication channel in contrast to other media which communicate in the form of “one-to-one” or “one-to-many”. Social media is defined as consumer-generated content that is distributed in easily accessible online tools (ibid.). The overall term “social media” includes various categories of websites like forums and message boards, opinion sites, blogs, bookmarking as well as social networks (Facebook, Google+, MySpace etc.), which are usually referred to as the main social media. For the purpose of this paper, social media can be defined as digital media or technology which allow their users to share information and other contents individually or within a community. As Prizeman (2011) states, “such tools, notably Facebook and Twitter, represent much more than vehicles of endless, banal updates on movie and dinner choices. They link individuals by providing a common platform for discussion in one centralized, easily accessible place. Such tools also create opportunities to move beyond information
sharing and venting personal frustrations to real action by motivating, inspiring and organizing users”. Therefore, Prizeman considers social media an important tool in human security research, which should not replace conventional media or research, “(...) but rather provide a digestible and creative way to consume and explore mass information flows”. The latter can be achieved via social media analytics (SMA), which is going to be further explored below.

The possibilities of using social media are extensive and multifaceted. From private usage to sharing pictures, music or other content to messaging and discussing, social media are a virtual place of communication and interaction between individuals or within and between communities. Very soon the mass usage of social media for private purposes with all the data produced about personal opinions, sentiments or appraisals inspired its use for other reasons, mainly commercial purposes. The fast amounts of information published and shared in social media soon sparked commercial interests out of which the industry of social media marketing arouse. Companies use sites like Facebook for advertisement on the one side but increasingly aim at obtaining information about potential consumers. Besides, the free and easy accessibility of social networks, blogs and discussion forums fostered political exchange and participation, especially but not only in regions where freedom of speech and assembly are not granted (cf. Arab Spring).

To make the great amounts of user-generated content usable and exploitable for various purposes commercial software tools\(^2\) soon appeared on the market that automatically collect and analyze the data from social media sources. These so-called social media monitoring and social media analytics tools are mainly developed for companies and organizations to gather information about their product placement and general business monitoring, the analysis and identification of new trends, as well as for their broader social marketing campaigns. While there is a great variety of available SMA tools (cf. Jain, 2012; Wetzstein, 2012; Johansson et al. 2012) social media analytics can be defined as “technology tools to implement social listening and measurements programs” using data from social media sites for reporting, dashboarding, visualization, search, event-driven alerting, and text mining” (Jain, 2012). Recently, the application of such originally business-oriented social media analytics tools to public or non-profit sectors has been initiated, such as the development of tools for policy- and decision-making in the governmental context. Examples are the UniteEurope social media analytics tool currently developed as a decision support instrument for municipalities and NGOs in the field of migrant integration\(^3\) or the TrendMiner which aims at elaborating methods for cross-lingual mining and summarization of large-scale stream media.\(^4\)

Next to SMA for the policy-decision-making context, different applications based on social media have been developed in recent years for emergency and crisis management as well as public services. So-called “social media services” include a wide range of applications or software systems that are integrated in social networks (like Facebook, Twitter, YouTube etc.) and allow to communicate or interact with citizens.\(^5\) The capacities and possibilities of social media applications or services are becoming increasingly acknowledged in different fields. In recent years emergency and crisis organizations have become aware of the importance of social media with regards to the amount of published


\(^3\) www.uniteeurope.org

\(^4\) www.trendminer-project.eu

\(^5\) As defined for the project SMD4Austria (http://www.kiras.at/geoererde-projekte/detail/projekt/smd4austria-social-media-dienste-fuer-sicherheit-und-praevention-in-oesterreich/)
information, the number of people that can be reached this way or the rapidity of information in emergency or crisis situations (cf. Kwang-Hoong/Mei-Li, 2012; Council of the European Union, 2011). As described in Section 1, the mass usage of social media by citizens who post relevant information during natural emergencies or social riots has been witnessed during many crises and disaster situations in the last years (earthquake in Haiti, Arab Spring, earthquake and tsunami in Fukushima and others). The systematic analysis and exploitation of these user-generated data for effective disaster prevention, preparation, and management has to be further developed and advanced in upcoming years in order to ensure the widest possible penetration of social media content and its applications for the benefits of societies and citizens. In the next section, we will present the security research project SMD4Austria as an example of how social media services and analyses can be used for the tasks and general mission of the Federal Criminal Agency of Austria.

2.2 Information about the project SMD4Austria

This paper draws to a large part from the experience and the knowledge that was gained by the authors in the course of designing and implementing the project “SMD4Austria”. The goal of the project is to use the new opportunities that the rise of social media and web 2.0 offers on a long-term basis for the Austrian Department of the Interior and other security and prevention organizations in Austria. “SMD4Austria” identifies and analyzes international experience, outstanding projects, as well as risks of social media services and creates concept models for implementation. In order to attain goals such as the early detection of critical incidents like planned crime or riot, the search for missing persons or witnesses, or the prevention of deaths and injuries via information and current warnings. On a broader basis social media services for the use of organizations in Austria are extensively checked and selected on their relevance and practicability by means of adaptable and cross-sector applicable criteria catalogues, evaluation grids, and adaptation- and implementation guidelines, after an extensive overview of social media services and innovative applications, as well as technical concepts and architectures was performed. For the identification and classification of social media services a needs analysis of the Austrian Department of the Interior is conducted with major decision makers. Moreover, a board of experts composed of representatives of Austrian organizations for security and prevention accompanies the project and assures the quality of the results by professional feedback for sustainable use. Due to this implementation of additive needs and perspectives the project results are adaptable for the implementation in other emergency and security organizations with limited measures in the post project phase. The experience of “SMD4Austria” shows that social media can basically be applied in three major fields, with each of them having their specific opportunities and risks.

3 Fields of Application in Crisis Interaction

In the course of a crisis there are multiple ways in which social media can assist the management team. These can be grouped into the following, mutually non-exclusive, three categories of social media applications:
Figure 1: The major fields of social media services assistance to crisis managers

- **Information**
  In this interaction form, relevant information from the social media cloud is gathered and used in the course of strategic and operative work of the security organizations. Usually this involves the collection, filtering, aggregation, and visualization of data. The most sophisticated methods use an automatic algorithm that allows for the treatment of large volumes of data, thereby enabling a valid prioritization and truthfulness of the information based on quantitative figures. These applications are known under the label “social media monitoring” and “social media analytics”.

- **Communication**
  Many emergency managing organizations or departments have started with a rudimentary use of social media. This is the most widespread application area, where social media is simply used as an additional communication channel, serving the mere dissemination of information. It is a channel that is especially important in times of crisis, since traditional infrastructures might be damaged and the advancement of the mobile broadband has made social media sites almost available from any place.

- **Collaboration**
  The immediate bidirectional information-exchange between emergency managing organizations and citizens is the third form of interaction that is enabled by social media services. The services aid in making the interaction more systematic, but yet the collaboration activities are characterized by a comparable high demand for human resources, since the responses to individual entries cannot be automated and in many cases multiple feedback loops are necessary.

### 3.1 Opportunities and capacities of social media crisis interaction

The opportunities that the inclusion of social media into the communication strategy brings along are manifold. They are associated with, but not automatically determined by, the three fields of application. The following taxonomy is a collection of the most important ways...
social media can contribute to a successful crisis management. Most of them are relevant for the private, as well as the public sector.

- **Risk analysis and prediction**: The monitoring of real-time social media data increases the speed and the efficiency with which the emergency managers can react, because it fulfills a predictive function in both man-made and natural crises. By automatic monitoring activities the citizens are not merely used as information brokers, but quantitative processing allows to use social media content as social sensor that can with a certain probability predict mass behavior and get a better grasp of the potential risks.

- **Hazard analysis**: The gathered information can aid first responders in assessing the danger of the situation and aid in the preparation of the task forces’ mission, since many social media users share knowledge about sites of disasters, the extent of the damage, further hazards, number of casualties, etc. (Laad & Lewis, 2012). It is therefore an additional information channel that can be utilized in resource and task planning.

- **Force coordination**: Often social media is used to coordinate task forces or individual helpers after a crisis has hit – internally (due to convenience or breakdown of other communication infrastructures), as well as externally (e.g. volunteers can be directed to the right places based on their available skills and resources).

- **Humanitarian aid** (public crises only): As impressively laid down in several recent studies (e.g. Slagh, 2010; Kumar et al., 2011; Wich, 2011), social media has become an essential factor in organizing humanitarian aid. It contributes to facilitate and coordinate the work of the diverse existing relief organizations, as it has particularly been proven in the aftermath of the earthquake in Haiti in 2010, where a street map service helped to document the catastrophe, to save and publish data about missing people, or to concentrate aid activities in the areas that have been hit most severely.

- **Psychological assistance** (public crises only): By informing the affected people about a crisis it can help them to grasp the magnitude of the crisis and it can also signal the presence of the emergency managers throughout the crisis by keeping up the information flow.

- **Fundraising** (public crises only): Social media has proven to be helpful in organizing and encouraging donations by allowing organizations with the means of an extra “app” to have users donate directly via their community pages. Facebook for example helped to accelerate donations in the aftermath of the earthquake in Haiti 2010 through an online game that allowed buying virtual goods and thereby proved to be an efficient and effective means to collect donations.

- **Information of the affected actors**: The most straightforward function of social media is to quickly disseminate information (directions on where to hide from hazards, what to expect next, how long the crisis will last, etc.) by acting as a communication channel that is using its viral effects. In cases of disaster this additional information channel also has the advantage of reaching those that are cut off from traditional communication infrastructures and therefore can effectively fill the information void.

- **Cleanup planning**: Finally, the intelligence gathered via social media can give hints to emergency managers about where to concentrate the post-crisis efforts (Laad & Lewis, 2012). This is of importance immediately after the emergency in the phase of latent danger, where the probability of further outbreaks should be minimized, as well as when no further emergency situations are to be expected and the primary task is disaster relief.

These capacities of social media that can be realized are of different importance in the four phases of a crisis as defined by Fink (2002): In the prodromal stage the first indicators of an upcoming crisis begin to emerge. This is then followed by the breakout or the acute stage. Subsequently, the chronic stage is characterized by the danger of another outbreak while the cleaning efforts are still in progress. In the resolution phase, the crisis eventually finds its end. The table below shows in which respects the use of social media during each of the respective crisis stages is of importance and in which field of application (i.e. information, communication, collaboration).
As can be seen in figure 2, the three fields of social media application are complementary and a holistic crisis communication strategy needs to incorporate all three. Nevertheless, it has to be mentioned that the information gathering function is the most fundamental one since it runs through each crisis stage. Unfortunately, it is exactly this dimension that is neglected in most cases. The activities performed here are unsystematic. Therefore the most significant improvement potential for most emergency managing organizations lies in automatic social media analytics software tools, since they can serve as a valid decision basis rooted in the analysis of a large amount of real-time data.

3.2 Risks and boundaries of use of social media in crises

As tempting as the opportunities of social media might appear, the incorporation of these new media into the repertoire of crisis communication comes with risks that are not to be neglected. The risks can be classified into two major categories, namely the information affluence generated by social media and the loss of control over the communication process.

The plethora of information can negatively impact the crisis mitigation in multiple ways. First, stakeholders of any kind require more resources (e.g. time, personnel) for filtering out relevant from irrelevant content. While emergency managers can get assistance from social media analytics software in doing so, disaster-struck population for instance cannot. By the same token, the amount of information that is communicated has to be reflected upon by the stakeholders. Hence with each message received the reflection time decreases. Too much data within little time might also trigger fear and anxiety and eventually result in mass panic (Currie, 2009). In a less dramatic scenario, the abundance of information might simply lead to saturation with crisis related news, thus reducing the population’s attention that is assigned to them.

The second big threat that social media constitute for crisis management is the empowerment of organization-external communicators. One reason why most organizations
are hesitating to incorporate social media in their traditional communication strategy is that the mono-directional flow of information evolves into a multi-directional flow where the population can not only publicly respond to the news-issuing organization, but where individuals can communicate with each other without the organization being able to step in as a regulating force (Laad & Lewis, 2012). This is especially problematic in cases of rumors and false information. Due to the extremely intertwined networks that constitute the social web, misinformation spreads rapidly since it uses multiplication effects and is almost impossible to control since it spreads from numerous points. Hence, when misinformation reaches a certain threshold, it becomes almost impossible to counteract it. In order to anticipate and prevent the spread of rumors and false or inaccurate information it is best to identify issues in their inception phase. “An early analysis of web-based content might provide the early warning needed to develop appropriate plans and responses and enable them to avoid bad situations” (Gonzales-Herrero & Smith, 2008, p. 4). Therefore a multi-level approach is needed (c.f. section 5). One threat that is even harder to balance is the vulnerability to deliberate and organized attempts to harm the organization or the general population. Besides the already known threat of cyber-terrorism (e.g. hacking and manipulating of the information infrastructure), the emergency management can be misled on purpose by filling social media with wrong information. This could for example be used to lure task forces to a certain location and then launch a terrorist attack to weaken the resilience of a society in an upcoming crisis.

Besides those two major issues, there are further problems that result from the inclusion of social media. One of them is that social media services need to be adapted to the demands of the institution in question. They have to be optimized for the cause and tailored to the processes that are relevant to the individual organization, which is connected to initial financial investment. Also continuous SMA software causes some operational expenditure. Furthermore, social media content still is strongly associated with triviality and unreliability. The fear of many organizations therefore is that those associations will be transferred to the organization itself. There are two further crucial boundaries that are yet to be discussed namely the legal and the ethical challenges.

4 Challenges and perspectives for the use of social media in crisis interaction

Having emerged in the past couple of years as a fairly new technique of opinion mining, SMA has so far primarily been used for polling, marketing, and commercial purposes where ethical concerns tend to play a marginal role and receive minor consideration. First attempts to apply SMA in public and non-commercial fields have only recently been undertaken and can still be considered in their fledging stages; however it has become apparent from the beginning that, dealing with aspects concerning the general public and often serving public authorities, the usage of SMA becomes more delicate for several reasons. One prominent example pointing out these concerns is the currently running EU research project UniteEurope, which is aiming at applying SMA as an information and decision support mechanism for local governments in the realm of urban migrant integration. Many challenges arising from social media as information source for purposes of public weal, such as those of an ethical, but also of a legal and cultural nature, have been extensively revealed within the frame of the UniteEurope project and can, in large parts, also be
considered valid for social media usage in crisis interaction. To a lesser extent, this section is also based on the experience reported from the project Alert4All\(^6\), which is using SMA for estimating citizen alertness in crises and pointing out the particularities that are stemming from the very nature of SMA technologies when they are applied in crisis situations. In line with Krieger, Grubmüller et al. (2012), this section is focusing on legal, ethical and cultural challenges of SMA usage in public fields in general and in crisis interaction in particular.

4.1 Legal aspects

When talking about SMA usage from a legal point of view, it is data protection and privacy issues that need to be taken into consideration in the first place (Johansson & Brynielsson & Quijano, 2012). Depending on the manner in which results are displayed by the SMA-tool, also aspects of copyright can be concerned, though to a minor extent and thus are not being dealt with in this paper.

SMA tools that are meant to collect information for public purposes are normally limited to publicly accessible social media contents only. Taking the example of Facebook, this means that software such as the UniteEurope tool would not be able to collect information which individuals post on their private profiles, but their access is limited to postings on Facebook sites which are explicitly marked as “public”. From a data protection perspective, this limitation already reduces impacts on privacy issues, but by far not entirely. According to the EU Data Protection Directive 95/46/EC and notably to national regulations in the EU member states, data protection issues are still prevailing even when using publicly available postings only. This is due to the fact that the author of a posting is not necessarily the only “data subject” of that said posting. As a consequence, this author can publish “sensitive data” of another “data subject” which, in turn, would be collected and processed by the said SMA tool. The action of processing of in this manner illegitimately published “sensitive data” of a “data subject” does constitute an issue that is relevant from a data protection point of view and holds the processor, i.e. the provider of the SMA tool, responsible (cf Krieger & Grubmüller et al., 2012).

Krieger, Grubmüller et al. (2012, p. 14ff) suggest a range of safeguarding measures in order to remain in compliance with data protection regulations, which, in principle, can be considered applicable for SMA usage in crisis interaction. These are, for example, the prudent selection of social media sources, anonymization of the authors’ names and acronyms, registering with the Data Protection Commission in charge, awareness raising with end users as well as continuous legal advisory, to name but a few. From a more technical viewpoint, Johansson, Brynielsson and Quijano (2012, p. 195f) mention actions such as “strict data retention periods (…)”, and they are currently exploring “available techniques for privacy-preserving data mining”.

4.2 Ethical aspects

Complying with legal standards can only be considered a minimum requirement when ethical aspects come into play. Whilst Johansson, Brynielsson and Quijano (2012, p. 195) are touching upon the issue of misuse by “the wrong time of regime (e.g., for tracking people that have a negative sentiment against the current regime in a country)”, Krieger,

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6 www.alert4all.eu
7 “The natural or legal person (…) whose data is processed” (Austrian Data Protection Act)
8 “Data relating to natural persons concerning their racial or ethnic origin, political opinion, trade-union membership, religious or philosophical beliefs, and data concerning health or sex life.” (Austrian Data Protection Act)
Grubmüller et al. (2012, p. 31ff) provide a more in depth ethical analysis. They deal with misuse in a broader sense and point out that also data protection issues must be reflected from an ethical point of view, too, which is mainly concerning the question of “informed consent” – a requirement that is normally not fulfilled when it is about SMA. Furthermore, they point at questions such as “who is represented on the web”, “who is active in social media” and “whose voices are being ‘heard’”. Even though the authors understand these questions in the light of the migrant integration debate, which can per se be very value-laden, they are at least to some extent also relevant for crisis interaction issues. Same goes for the follow-up question of how to weigh results (quantitative vs. qualitative approach). Whilst an SMA-tool would be useless without at least some quantitative presentation or a ranking of results, one must be aware that frequencies do have a limited information value because they merely represent the “loudest voices” in social media, which normally do not have much in common with a given population in terms of representativeness (ibid: 34ff). Thus, explanations of a qualitative nature will always be needed in order to make the results sound. A key solution for these ethical challenges offered by Krieger, Grubmüller et al. (2012, p. 44f) is referring to awareness raising measures of all stakeholders of an SMA-tool, notably of the end users.

4.3 Cultural aspects

Challenges also arise from what Krieger, Grubmüller et al. (2012) refer to as a cultural perspective. This dimension comprises aspects such as access to new technologies, notably to the internet and social media, which are very closely linked to the ethical dimension introduced above. In addition to that, in particular with regards to crisis interaction, diversity and gender aspects need to be taken into account. All these points can be covered with the concept of “digital divide”. As defined by the OECD (2001), the term “digital divide” refers to “the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities.” Whilst within modern societies, this gap has generally narrowed within the past decade; it proves to be persisting when adding the aspect of social media usage. This said, as a matter of fact, certain (often disadvantaged) groups of individuals will be excluded from an SMA-based crisis interaction.

On the other hand, for crisis interaction purposes, it is essential to ensure that those who do use social media can actually be “heard”. In this regard, languages and written dialects do obviously play a role, but also communication habits that can differ from one culture to another, but also between men and women. For the latter, the currently running project FemSMA (femsma.ofai.at) is providing essential evidence. An SMA-tool serving crisis interaction needs to take all these aspects into account in order to ensure broad applicability.

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5 Comprehensive multilevel approach for social media use in crisis

As has been developed, the opportunities of use for social media as a collaborative and far reaching information and intelligence system are plentiful but have yet to be critically estimated under the current and dynamic social developments (see e.g. Huiji, 2011). Especially under a comprehensive multilevel approach for crisis management and disaster relief action social media can provide innovative and far reaching new aspects. The developments in the course of the Haiti earthquake 2010 and the international response and support activities made these remarkable developments highly visible. Already mentioned aspects of the rapid development of communication and information exchange in the field of emergencies in general can open new paths to the necessary cooperation of governmental organizations and entities, NGOs, and informed and self-determined citizens as Keim and Noji (2011) state (also see Velev, 2012). Due to the timely accessibility of security relevant information as well as due to the potentially critical and mature exchange about emerging topics among mature users it becomes possible to include citizens earlier, stronger, and with a higher compliance for preventive necessities or currently inevitable emergency measures like evacuations etc..

The possibilities of targeted and valid use of social media in its heterogeneous role as an information and data channel can be developed in addition to the commonly known and elaborate process streams of professional crisis and disaster management. As an example the traditional three-pillar-model for provisional measures e.g. of the Austrian national crisis and disaster protection management (SKKM, 2006, p. 19) will be amended by the components of traditional and new/social media. In the traditional model NGOs (e.g. fire fighter, ambulance service), GOs (police forces, national disaster management organizations,...) and the citizens build the foundation for all provisional measures and a stable crisis management. Figure 3 illustrates the prominent role of traditional media/crisis communication and the promising potential of the multilevel use of social media, applications, and services as a basic layer and channels of open source information in all phases of crisis and disaster management (critically discussed by Neal, 1997).
In the traditional state of the three-pillar-model information flow is mainly provided due to a restrictive one-way system with rigid patterns and hierarchies involving common media channels. Contradicting this narrow model it occurs that in critical events citizens rely less and less solely on authority communication and especially on traditional channels like TV and radio (Velev, 2012). The GOs and NGOs undertake serious efforts to influence the traditional media in order to reach the citizens.10 But besides the direct influence on the citizens, the traditional mass media also reach those people indirectly, namely by first reaching opinion leaders and those then transport the content to opinion followers (Lazarsfeld & Berelson & Gaudet, 1969). This process can nowadays be increasingly observed via social media. Taking into account the ample possibilities and new communicative options of social media channels and implementing the opportunities of this multilevel communication and low threshold data sharing via social media, tackles the deflation of authoritative information and advice. The simple usability and data flow as well as the current standing and problematic but immanent image of social media and its user generated content Kaplan and Haenlein (2011) call democratic and that is esteemed as a rather equalizing medium, could support traditional structures of information flow before, in and after critical situations. The multitude of specific use cases includes the parameters of different directions of data flow, impact and quality of information, different e.g. appellative or advisory functions etc. as well as the complex, flexible and dynamically connected communication agents and their issues resp. targets in the communication field. It also has to be taken into account that different agents in these extreme situations such as citizens (affected, related or only included in the communication process), government and non-governmental organizations including business and science, etc. are coping with different

10 At this point it also needs to be noted, that besides being a communication channel the media are also institutionalized actors i.e. they are companies with organizational structures
issues and have different aims that need to be fulfilled by the use of traditional and social media.

Primary ways that citizens use social media during e.g. natural disasters are as Velev (2012) sums up communication and connection between affected and unaffected relatives and friends, situation updates between neighbors and communities, supplemental awareness to less and less reliable seeming authority communication and service access assistance for the provision of useful contact. Emergency response organizations on the other hand show a different set of communication and information necessities and issues in their professional work. This begins with using social media in prevention and trust building activities before emergency situations, covers the possibilities of command and control support via real time data streams and lead to crises communication issues and emergency messages. Additionally, governmental organizations as well as traditional media providers also have specific issues related to crisis and emergencies that have to be covered in the cyclic phases of the events. These targets also have to be taken into account for the multilevel approach to a scientific model of social media use in crisis situations.

Besides the challenge of modeling a comprehensive and dynamic matrix of the respective core issues and the multilevel interactions between the agents in the emergency situation, quality and reliability of the data have to be included. Traditional statistics and quantitative quality labels seem not to be sufficient for this task as intentional and unintentional misinformation and forwarding of mass data such as those that Agichtein et al. (2008) try to generate in their experimental analysis algorithm. Thus besides the high potential of a multilevel use of social media in crisis the challenges for a reliable, cost effective and ethically as well as legally commitable usage have to be tackled pro-actively from usability-focused research initiatives.

6 Conclusion and outlook

The through consideration of the potentials and risks of social media usage in crisis management yields the conclusion that if they are strategically employed they can be of assistance in all four stages of a crisis. But there are two things that need to be considered: First, the massive gains in effectiveness and efficiency go hand in hand with risks of unprecedented proportions, whether they are caused by intentional manipulation attempts or by the nature of the new media themselves. Second, social media are not a remedy for all problems that emergency management is confronted with. Therefore they need to be seen as an addition to the traditional information and communication channels, not as a substitution. As such, their integration into the overall communication strategy and operational processes is essential, especially with regard to the dangers that are constituted by the speed and dynamic nature of the new medium, since neglecting those might result in serious aggravation. But given the fact that the internet and mobile handheld devices are constantly pushing towards omnipresence, the incorporation of new media as an additional channel is only a matter of time, though their use will vary according to available resources, organization types, and other contextual factors (such as the cultural or the legal background). However, passing on an opportunity to use free data is something that almost no emergency management organization will do.
References


About the Authors

Karin Rainer
Research Manager at INSET Research & Advisory, coordinates national and international initiatives at the intersection of security research, ICT and society. Her research approach combines an interdisciplinary blend of Social Sciences with communication management and an implementation/usability focus. Core themes of her work are (crisis) communication and social media, disaster management, eHealth and Assisted Ambient Living, training and education issues, emergency (medical) services, human factors and civil protection. She graduated with distinction at the philosophic faculty of the University of Vienna, is studying Psychology and Gender Studies and participated in trainings on social sciences, project management, vocational education and emergency medical services. At the Research Institute of the Red Cross in Vienna, she could gain professional experience in leading and contributing to national and international projects focusing on security research, ICT & ageing and eHealth. In her position as PR consultant for NGOs and business clients she gathered experience regarding social media, communication issues and intervention design.

Verena Grubmüller
As Research Manager at INSET Research & Advisory, Verena Grubmüller leads the EU-FP7 project “UniteEurope” and is involved in other national and international research projects in the area of “ICT and Society”. Her research focus lies, amongst others, on social media, eGovernance, Ambient Assisted Living and Gender. Verena studied Sociology and Social Economics at the Johannes Kepler University (JKU) of Linz and the Universities of Helsinki and Copenhagen and graduated with distinction. She obtained her PhD-degree at the Faculty of Social and Economic Sciences of the JKU.
with a dissertation on European immigration policies. At the Max Planck Society for the Advancement of Science in Munich, she could gain professional experience in international project management. Further professional stations were the Austrian Ministry of Foreign Affairs, the Permanent Mission of Austria to the United Nations in Geneva and the Linz’ Institute for qualitative analyses (LIQUA).

Igor Pejic
Igor Pejic is a management consultant at INSET and has advised selected leading national and international clients, including Fortune100 companies. He has experience in communication strategy, marketing, industry analysis, strategic business development, strategic management, and partner strategy. Apart from that, Mr. Pejic is also working on research and consulting projects in the security sector. Before joining INSET, Mr. Pejic has worked as a journalist at leading Austrian newspapers in the business area. He has also taught various courses at the Communications Department at the University of Vienna, covering, among other things, strategic communication, media effects, and the value and applicability of scientific methods in the private sector. Mr. Pejic holds a B.A. and Magister degree in Communications from the University of Vienna, with a particular focus on strategic and corporate communication. He also holds a Magister degree in English and American Studies, where he primarily concentrated on linguistics and the use of language in persuasive communication. In both programs he graduated with distinction. Moreover, Mr. Pejic is a published author in the field of media and communication studies, American studies, as well as English linguistics.

Katharina Götsch
Katharina Götsch works as a research analyst at INSET Research & Advisory. She holds a PhD in Political Science from the University of Vienna and a Master degree in German Literature and Language from the University of Innsbruck. Prior to her appointment at INSET, she worked in the publishing sector for several years as editor and copywriter and she gained professional experience at the Austrian Embassy in Washington, DC and the International Organization for Migration. Her main research fields are international relations, migration and the integration of migrants. She is involved in international and national research projects in the fields of ICT, social inclusion, migrant integration, gender, and diversity.

Peter Leitner
Peter Leitner is Head of Research and Development at SYNYO Research. Mr. Leitner holds two master degrees and accomplished his PhD at the Vienna University of Technology. He is a leading thinker on social dynamics, the future of the internet, and new web concepts with more than 10 years of experience in doing research, development and advisory for leading companies and organizations. Besides his entrepreneurial career he published various articles concerning social media, scalable software services, collaborative systems etc. and is a lecturer at the Vienna University of Technology. Mr. Leitner has valuable experience, especially in the field of innovation management, system design and software engineering with a focus on smart technologies, social media, digital commerce and mobile apps. He is an expert for the planning, steering and monitoring of international projects, the organization of workshops and meetings with decision makers on senior level.