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# From the academic debate to real-world use and back: Theoretical and practical implications of social media as communication channel in crisis and disaster management

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**Abstract:** *Crisis and disaster communication has had a long lasting tradition of relying on new information and communication technologies (ICT). Thus, it is not surprising that since their rise, social media have been embraced by crisis communication practice. At the same time, numerous studies and projects have started to shed light on the potential that social media can have in crisis communication. In this paper, we are taking a two-way approach: We first look at crisis communication practice, where social media undoubtedly have started to play an essential role for several reasons; secondly, we look at pertinent research papers and third party funded projects with the help of a recently conducted meta-study. The analysis reveals gaps as regards research and practice, but also between basic and applied research. Based on our findings, we suggest options how to bridge these gaps with the aim to benefit practical crisis communication from research evidence.*

**Key words:** Crisis communication, disaster communication, social media, meta-study, crisis and disaster management

## 1. Introduction

In autumn 2013, minor earthquakes hit the region of the Eastern outskirts of Austria. They were perceptible in the greater area of Vienna and thereby touching a population not at all familiar with a trembling earth – although living in a zone with regular minor seismic activities ([Hausmann et al. 2010](#)). Within seconds after the shakings, Facebook users shared their impressions within their networks. An individual user with Facebook contacts around the region could quickly gain information and figure out where the earthquake was most noticeable: “Status Updates” reported about incidents such as “fissures in the wall” over “just a slight and short trembling” to “nothing felt at all”. In contrast, it was only a couple of hours later that the official meteorological services first mentioned the incident on their website.

Examples like the above suggest that social media have become an indispensable instrument in crisis communication, yet have revolutionized the way information is spread. This phenomenon has been subject to several research studies and projects from different disciplines, in particular in social and communication sciences. At the same time, practice has shown different approaches how to use social media in actual crisis management,

ranging from spontaneous and informal grass roots exchanges as in the above mentioned example to attempts of an institutionalized employment of social media in different crisis management processes (e.g. Ushahidi crisis mapping in several countries). In this light, the article at hand pursues the following research questions:

- Which role do social media play in disaster management practice?
- In which aspects is the current academic debate supportive to practical social media use in disaster management?
- In which aspects is further research needed to enrich practice?

In responding to these questions, Section 2 of this paper will focus on current practices of institutionalized social media deployment. Section 3 will summarize current and pertinent research, while Section 4 is working out research gaps and provide a conclusive summary.

### **1.1. Method approach**

For answering the research questions introduced above, three sub-studies were used that are based on different methodological approaches: For analysing current practise (Section 2), we identified several practical cases through an iterative and multi-perspective review of relevant web sources, following Petticrew and Roberts, 2006. In addition to that, the knowledge gathering process and the analysis were enriched through first-hand experience from several pertinent research projects in which the authors participated (e.g. QuOIMA and SMD4Austria funded in the Security Research Program KIRAS from the Austrian Ministry of Transport, Innovation and Technology (bmvit), FP7 CAST).

As regards the analysis of pertinent academic papers, numerous academic studies in the area of social media and crises have been conducted in the field of media communications. Consequently, in section 3.1, publications in journals, periodicals and conference proceedings from this discipline are analysed. The respective research material was extracted from the established social-scientific media communications database 'Communication & Mass Media Complete' (CMMC) based on manifold search terms and search term combinations<sup>1</sup> and considering January 2005, when the platform YouTube was launched (the most studied social media, Twitter and Facebook, followed in 2006), through August 2013 as relevant time period. A clear focus on citizen-generated content, public response or interactivity was another important criterion for papers to be selected, meaning that texts covering issues such as PR campaigns using social media for one-way communication purposes, social media crimes (for example in context with cyber-mobbing), and maintaining business reputation were excluded as well as texts focusing on citizen journalism only. Besides those exclusions, there was no focus on a particular shape of crisis with regard to research material selection, as for example natural disasters or technology malfunctions. Instead, any situation or event defined as 'crisis' within the academic texts was considered relevant for the study, provided those events or situations were labelled as 'crises' and related to social media. This broad approach allowed gaining a holistic picture of crisis communication in the realm of social media. Moreover, only papers written in English were considered for this meta-study, which is designed as a full survey. The mentioned selection criteria resulted in a sample containing 66 publications covering crises in connection with

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<sup>1</sup> The following search terms and search term combinations were used for research material collection: social media – crisis; social media – crisis communication; social media – humanitarian; social media – disaster; social media – emergency; crisis – ICT; crisis – digital; crisis – technology; crisis – online; crisis – network; crisis – mobile; social media monitoring; social media analytics; social media analysis.

social media, from which data were collected, coded and analysed with the analysis software SPSS based on 56 nominal and ordinal-scaled variables<sup>2</sup>.

Finally, next to academic publications in journals and conference proceedings that rather represent basic research, we also focused on research projects of a more applied character, notably on EU-level (collaborative projects funded in one of the European Commission's Framework Programmes) (Section 3.2). Applying the same search parameters as in the academic article quests on the European Commission's project database CORDIS, 24 relevant projects were found. The respective project abstracts were collected and analysed with the qualitative analysis software Atlas.ti in shape of a frequency analysis.<sup>3</sup>

## 2. Insights into disaster management practice and the role of social media

### 2.1. The role of social media in crisis and disaster management

The discussion and practice of communication in crisis and disaster management have undergone several paradigmatic changes in history, in large parts initiated by the emblematic earthquake, tsunami and conflagration of Lisbon in 1755 (Chester 2008) which, as a positive outcome, brought along innovations in recovery and preparedness for incidents. In particular, this disastrous event was one of the first to be distributed over mass media and thus marked a major shift in communication practices that paved the way for the inclusion of a wider public through crisis reporting.

Actual risk and crisis communication strategies were developed as of the 1960s, which were marked by the idea to make people more 'rational' in their decision-making in crisis situations by applying top-down communication strategies. It was only in the 1990s that aspects such as 'dialogue' and 'feedback' arose as crucial demands in order to allow for discussion and exchange of opinions and information among citizens. While the idea of creating discussion platforms for citizens was emerging, the rise of the internet opened up new possibilities and changed the entire debate on risks and crises, but also citizens' expectations towards communication patterns. The rapid development of Web 2.0 technologies starting with 2004 has increasingly enabled citizens to author and publish content (postings, videos etc.) and has thus reinforced these tendencies (Wendling et al. 2013: 10f). Nowadays, several social media sources are relevant when it comes to crises and disaster management and communication, which are summarized by Wendling et al. (ibid: 12) as follows:

- Social networking sites (e.g. Facebook, MySpace): Information sharing and updates as well as coordination between volunteers and emergency services;
- Content sharing sites (e.g. YouTube, Flickr): Campaigning as well as exchange of pictures and videos for situational awareness in real time, but also for identifying victims or missing individuals;
- Collaboration/knowledge sharing sites (e.g. wikis, forums): Enhancing dialogues and exchanging information;
- Blogging/micro-blogging (e.g. Blogger, Twitter): Immediate information sharing with feedback possibilities;

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<sup>2</sup> All texts (N=66) were coded by Irmgard Wetzstein (1 coder). Nevertheless, inter-coder reliability using Holsti's formula was measured within numerical categories with 2 coders (.89). Intra-coder reliability (2 weeks interval) was conducted successfully.

<sup>3</sup> A list of research material used for the analyses in sections 3.1 and 3.2 is available at the authors upon request.

- Specialized crisis management platforms (e.g. Ushahidi, Crisis commons, Crisis tracker): Mapping emergencies, “community emergency response team facilitator”.

In addition to that, further authors point to the possibility of information gathering through social media by the means of ‘social media analytics tools’ (SMAT). These tools are able to automatically collect, filter and analyze citizen generated social media contents and are increasingly used as decision support in different policy areas, notably with regard to crises and emergencies (Grubmüller et al. 2013; [Backfried et al. 2013](#)). In particular as regards early warning systems, new technologies have always been embraced in crisis management practice quickly. As a consequence, the usage of new and innovative technologies around social media as new communication channels is not surprising. However, as Wendling et al. (2013: 7) state: *“These technologies have the potential to prevent communication breakdown through reliance on just one platform and thereby to reinforce the diffusion of warning messages but also present policy makers with new challenges”*.

Parts of these challenges must be seen in a wider focus and touch upon ethical, privacy and data protection issues as well as aspects of digital divide that arise with governments retrieving information out of social media – a topic that is comprehensively discussed in Grubmüller et al. (2013). Next to the more general aspects of social media use for governmental purposes, a number of challenges are directly linked to the field of crisis and risk management. These are, amongst others, questions of coordination of the multiplicity of players and channels, varying perceptions between the public and authorities/experts, the combination of objective facts and subjective values, the risk of instrumentalisation, inaccurate information, rumors, the cultural bias or how to assure the right amount and frequency of information (Wendling et al. 2013: 8f). In total, these challenges can be summarized as to how to systematize a rapidly changing multiplayer and multichannel field when assuring bottom-up and top-down inputs while at the same time keeping them clear from inaccurate information, misuse and the confusion of facts and values.

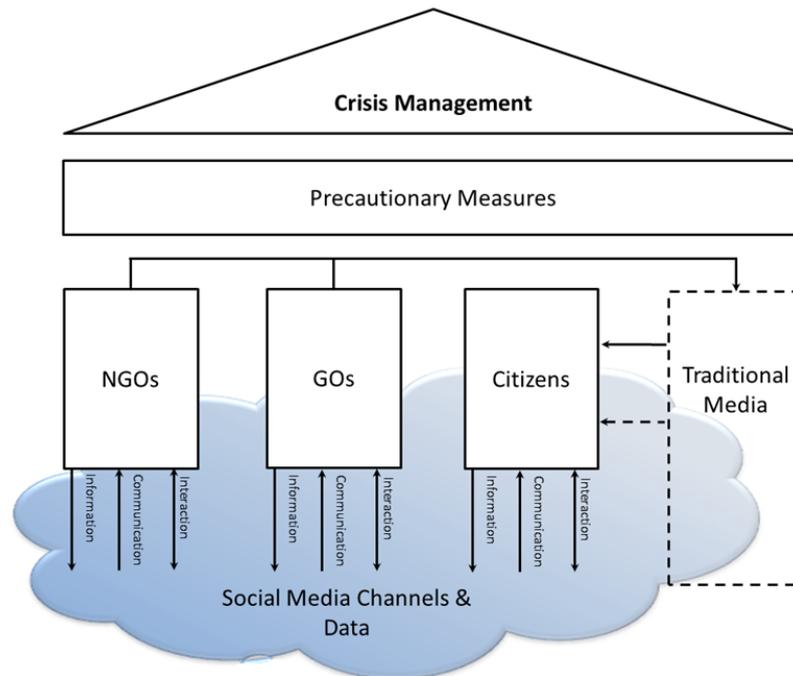
## 2.2. From ad hoc to structured social media usage

As the example in the introduction shows, social media is often used for an ad hoc, basic and unstructured crisis communication, mostly initiated by directly affected persons during or in the aftermath of an incident. In addition to that, according to authors such as [Sutton et al. \(2008\)](#), examples of first responder and disaster management organizations can be found that have been successful in systematically implementing social media in their crisis management practice. Whilst the processes of introducing these practices can only be retraced in detail in few cases (Charlton n.a.), it will be shown that, apart from the vast but mainly unstructured and largely unused potential of social media interaction (in exponentiation of mere one way communication channel use), an institutionalized application of different social media approaches can be more than effective in apt surroundings. This potential becomes much more significant in dynamically and critically changing events that also require the most frictionless coordination and cooperation of various different, often multi-national organizations and in the much larger context of community resilience ([Dufty 2012](#)).

For the compilation of this data, trusted open source information (retrieved with specified search terms in English and German language), social media appearances of governmental agencies and NGOs, emergency first response organizations and disaster management platforms were gathered regarding the focus, e.g. police intervention and natural disasters such as floods. Due to a screening and critical discussion process in thematic teams, strengths and weaknesses as well as the link to current research approaches were identified. The

approach of the selected case studies can be rated sustainable and self-enhancing. The examples presented here mostly focus on the management and mitigation of (naturally induced) disasters and crises, the leverage of the use of social media in crisis communication and interaction for enhanced resilience and participation of the community.

The background for the understanding of these implications, chances and challenges of an integrated and overlapping aggregation of data-, information-, and network dependencies constituting social media is shown in the following figure, which also served as the structural basis for the identification of relevant interactions and practical cases as described in section 1.1:



**Figure 1: Traditional model regarding information, communication and interaction in crisis situations enriched by new social media layer (Rainer et al. 2013: 121)**

Since the 2004 Indian Ocean tsunami, open source and ad-hoc volunteer management (Gao et al. 2011) and later social media networks, platforms and other relevant channels have been used increasingly in a structured way. These developments helped to raise, facilitate and support different sectors of official disaster management and mitigation coordination. A peak of bottom-up social media use was identified, e.g. in the wake of the media coverage of the London bombings 2005, where journalists used citizens' mobile phone footage and social media inputs (Yeomans 2012).

In the following years, severe disasters such as Hurricane Katrina 2005 (Google Official Blog: Hanke 2006), the Southern California Wildfires 2007 (Sutton et al. 2008), the earthquake in Haiti 2010 (Antoniou et al. 2013; Yates et al. 2011) and above all the disaster of Fukushima 2011 (Friedman 2011) were supported by social media and interactive web communities in a manifold but partially uncoordinated way. In essence, these findings led to the conclusion that *“social media support critical information distribution activity among members of the public that [...] needs to be better integrated with official disaster response activities”* (Palen 2008: 78).

Focusing on the earliest and most successful integration of this bottom-up evolution of a new crisis support movement and the transformation into a structured, sustainable and durable tool, the Queensland Police created a unique practical case. Their implementation of

social media in active everyday interaction with the community and, as a consequence, also in their crisis management represents a significant milestone in this development. The Queensland Police started this ambitious step forward with a trial use of social media accounts of Twitter, YouTube and Facebook in 2010. The aims were to claim social media presence, engage an active two-way communication with the online community, form a reliable presence for future crises, and thus building resilience and preparedness (Charlton n.a.). This strategic experiment came right to prepare a solid, widely spread and above all reliable information, communication and interaction system for the following period of natural disasters in the area of Queensland (Cheong and Cheong 2011).

### **2.3 Remaining challenges and gaps**

Although the possibility of 'many to many'-communication is one of the core strengths of social media, the above-mentioned examples revealed, in line with Ehnis and Bunker (2012), that the collaborative potential of social media has not yet been fully exploited. This was especially true for the Queensland Flood event (e.g. requests for support and emergency calls). Social media platforms (e.g. Facebook) or micro-blogging sites (e.g. Twitter) that were designed for supporting and steering interaction in the end were mainly employed for traditional information distribution via a new medium. It can be assumed that this is due to insecurities from the side of emergency management organizations as regards legal aspects such as accountability or general liability with misled calls for assistance in crisis situations via non-prepared social media channels (see for example the meta-study SMD4Austria). On the other hand, the need for trusted first-hand information from the affected areas well as the coordination of help via crowd-tasking is more and more attractive for the institutionalized disaster management and is implemented via pilot projects and research approaches.

The proactive interaction possibilities of social media like crowd sourcing and even more in the case of crowd tasking<sup>4</sup> are more and more implemented into the daily emergency routine of blue light and disaster management organizations which prepares the communities for larger scale events (see e.g. Canadian Red Cross 2012, KIRAS Project RE:ACTA, [Gao et al. 2011](#)). This point will make a difference to common use of social media as an extended tool for information distribution in the traditional way and already enables access to much larger pools of information relevant for situation analysis and rapid and targeted and thus effective disaster management ([Backfried et al. 2013](#)).

## **3. Social media and crisis management in the academic debate**

Scientific research on social media in crisis communication is manifold and can be found in academic articles as well as in research projects of a more applied character. The section at hand will provide an overview of on-going research in this area by highlighting the most debated contents as they were revealed through a meta-study previously conducted by the authors. In line with Wetzstein et al. (2014), this section will be divided in academic articles, reflecting research of a more basic character, and applied research projects. Significant differences and communalities will be discussed and confronted with practical evidence as outlined in the section above.

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<sup>4</sup> Crowdtasking in the context of disaster management can be understood as the structured implementation of locals supporting ad hoc simple but vital activities on site. They are specifically activated and coordinated via social media or similar networks (see e.g. Neubauer et al. 2013).

### 3.1 Academic articles

A large number of academic studies in the area of social media and crises have been conducted in the field of media communications. Consequently, as explained more in-depth in section 1.1, publications in journals, periodicals and conference proceedings from this discipline released from January 2005 until August 2013 were analyzed for this meta-study considering any situation or event defined as 'crisis' instead of pre-defining a certain concept of the certainly complex, multi-faceted and often arbitrarily used term 'crisis'. Nevertheless, most of the crises addressed in the in total 66 analyzed texts (16 texts/24.2%) use natural disasters, such as hurricanes, earthquakes and tsunamis as case examples rather than health crises, terroristic and criminal acts respectively, technology malfunctions, human errors, and social movements and protests.

As regards results, the meta-study, unsurprisingly, showed that the number of academic texts published in journals, periodicals and conference proceedings relevant to the media communications discipline has generally been increasing since 2005, mostly focusing on the micro-blogging service Twitter. Moreover, even though 'one-way' PR campaigns were explicitly excluded from the study, 17 (25.8%) of all 66 relevant texts were published in journals and periodicals with an explicit PR focus, which indicates that crisis communication via social media is generally strongly connected to PR in media communication studies as well as to interactive PR purposes involving citizens and a large social media audience respectively.

A large amount of papers deals with the use and emergence of social media during crises – crisis prevention and post-crisis situations are hardly issued – and respective message strategies (26 texts/29.4%), followed by functions, potentials, limitations and risks of social media in crisis situations (16 texts/24.2%). Intersections and comparisons between traditional media sources and social media are addressed as well (11 texts/16.7%). However, evaluation studies and the elaboration of models and concepts in terms of shaping 'good' crisis communication with social media – aspects that clearly can enrich and improve respective practical applications – occur less often with only 5(7.6%) and 8 (12.1%) publications. In contrast, the frequency of papers addressing a communicator and stakeholder perspective (23 texts/34.8%) and of texts with user and citizen-centered approaches (25 texts/37.9%) is almost balanced.

Quantitative method approaches and literature studies without empirical research generally predominate in the analyzed papers (both 27 texts / 40.9% respectively) in contrast to the use of qualitative methods. The topic of functions, potentials, risks and limitations of social media in context with crisis communications, however, most often appears as literature study only (11 texts/68.8%). The study also demonstrates that negative or rather negative attitudes towards social media hardly occur in the analyzed journal articles, periodicals and conference papers, while there is an upward trend of ambivalent evaluations from 2008 until 2012. A more differentiated attitude towards social media in the realm of crises and crisis communication over the years can be therefore assumed. Positive or rather positive evaluation reached its peak in 2010 and decreased afterwards. Based on this outcome one can argue that critical reflection, analysis and evaluation and ethical implications of (new) phenomena, such as the use of social media for crisis communication, is one of the most important tasks in academic (basic) research.

However, the study also makes obvious that some research gaps do exist: For example, the analyzed papers hardly focus on qualitative approaches and on individual persons and their ways to deal with crises in context with social media. Moreover, limits and potentials of

social media in crisis situations are not issues that are addressed empirically, whereas empirical research might support the development, evaluation and improved social media applications to be used for crisis communication. Last but not least, specific social media tools for crisis communication are hardly ever discussed in the analyzed papers, which is, however, not surprising as the research material was selected from a mainly social-scientific media communications database.

The study also revealed that the academic discourse on crises in connection with social media seems to take place most often in the USA, followed by Europe-based researchers. The African, Asian, Australian and South and Latin American continent are hardly or even not at all represented in the international academic discourse focusing this issue. Therefore, the involvement of authors based in respective regions is an important future task in order to be able to provide even more manifold perspectives on crises in context with social media.

### **3.2 Research projects**

Applying the methodological approach as described in section 1.1, 24 funded projects were found via the CORDIS website from the European Commission under the work programs of 'Information and Communication Technologies', 'Security' and 'European Knowledge Based Bio-Economy'.

As regards project aims, the most prominent can be summarized as 'shaping 'good' crisis communication/management/response' with 45.8%, followed by 'enabling information gathering for decision making/service provision' with 29.2% of all interested projects. Projects grouped in the category 'shaping 'good' crisis communication/management/response' mainly deal with improvements of the information and communication flow and look at the role that social media in particular can take. A very prominent aim that is pursued by four of the 11 projects in that category is to connect existing communication systems, improve the interoperability of communication means and develop a standardized environment. Others aim to establish effective communication and collaboration strategies or to develop communication guides and support for policy makers. Projects in the category 'enabling information gathering for decision making/service provision' mainly deal with data mining techniques and social media monitoring/analytics allowing policy makers gathering user-/citizen-generated information that supports decision making processes in different aspects of disaster and crisis management. On a more operational level, these techniques are also meant to facilitate alerting systems. Both categories appeared equally frequently in all the FP7 project calls between 2007 and 2012. A category that only appeared in projects submitted for the Security call in 2012 is 'fostering citizen participation'. Projects under this category aim at using social media specifically for involving and empowering citizens as 'in situ first responders'.

As to the crisis phases that are covered by the projects, most projects are very specific and directed towards one particular crisis phase. Only three of the 24 projects cover more than one crisis phase. Similarly to the focus of the investigated articles, more than 60% of the projects cover the 'crisis handling' phase. Crisis prevention and post-crisis aspects are each covered by three of 24 projects respectively. In contrast, concerning the shape of the crisis the projects are less specific. The majority of the projects cover more than one crisis type referring rather broadly to 'natural and man-made crises'. Other projects are still less specific and simply refer to 'crises' without further elaborating about their type. The most prominent individual crisis type covered by the five of the projects can be classified as 'terroristic/criminal act'; however, surprisingly enough, all these five projects have been

submitted for the Security call in 2007, whilst in later years, terroristic and criminal aspects have no longer been dealt with.

Finally, in terms of target groups of the projects, the majority (9) aims at supporting first responders with ICT and social media technologies. More recent projects are aiming at involving and empowering citizens as 'de facto' and 'in situ' first responders (for example the Alert4All project, Johansson et al. 2012, etc.). On a more strategic level, decision-making authorities are the designated target group of five of the 24 projects. All of them are aiming at supporting decision-making processes in the realm of security policy, which is traditionally to be found on the national or EU-level only.

### **3.3 Common characteristics and differences**

Out of the analysis it becomes obvious that the foci of the research projects in the sample differ to some extent from those in the investigated academic publications: First of all, research projects have a clear security-related focus, while a large amount of the analyzed academic papers is connected to the field of Public Relations. Moreover, while evaluation studies and shaping good crisis communication is a prominent research area within the field of social media and crises, the analyzed academic papers rather emphasize the use and emergence of social media during crises. Evaluation studies and research for shaping 'good' crisis communication with social media occur only peripherally within the analyzed academic papers, which is, however, the top category among the research projects. More similarities could be found as regards phases of crises, where in both sub-studies the crisis handling phase was found to be the most dominant. In terms of shapes of crises dealt with in research projects, 'terroristic/criminal acts' were very prominent in 2007, though no longer appeared in the subsequent years.

The frequency of centering stakeholders on the one hand and users, recipients and citizens respectively on the other hand is balanced in the analyzed academic publications, while research projects clearly take a stakeholder perspective, meaning that most of them are directed towards a clear target group which, in parts, is even represented within the respective consortia. Whilst first responders were the top target group through the entire investigated period, citizens increasingly appeared as target group as of 2012. This matches with the finding that in terms of topics, projects under the category 'enabling information gathering for decision making/service provision' mainly deal with data mining techniques and social media monitoring/analytics allowing policy makers gathering user-/citizen-generated information that supports decision making processes in different aspects of disaster and crisis management.

Also, most of the research projects can be considered a case study pilot, aiming at a more general implementation after the end of the project. Case examples, often related to natural disasters as within research projects, are used in the research papers as well, however generally not focusing practical implementation but critical reflection, analysis and evaluation, such as ethical implications of social media use in crises situations. Noticeably, a large amount of the analyzed academic papers do not contain empirical research but focus on existing literature only, especially when potentials and limitations of social media in crisis situations are addressed. Despite the mentioned differences, the analyzed research projects and academic papers share their focus on crisis handling rather than crisis prevention or post-crisis situations as a common characteristic.

Finally, it needs to be stated that the overview on academic debate presented as a meta-study comes along with some limitations. Emphasis was put on academic journal

publications focusing media communications and third party-funded project abstracts, while conference contributions were hardly included and books, chapters etc. were completely excluded. Furthermore, the restriction on publications in English-language (section 3.1) and the small sample of analyzed research projects (section 3.2) do not allow for generalisations beyond this study, though are meant to provide deeper understanding and insights into these particular branches of pertinent research.

#### 4. Conclusion: How can research enrich practice

The meta-study presented in this paper reveals, unsurprisingly, that in several aspects, practice is lagging behind research. The numerous functions of social media are far from being fully exploited in actual crisis management and communication. While research papers and projects tend to deal with complex use cases of social media in crises, authorities and first responder organizations rather limit themselves to using social media as 'just another' media channel for distributing information. Examples of a more complex social media communication strategy are rare and mostly limited to organizations participating in consortia of highly innovative research projects: Several of the analyzed projects aim at connecting existing communication systems, improving interoperability and developing standardized environments. It can be assumed that it will take time for these strategies to pervade actual crisis communication practice where flexible, accurate and reliable communication models and tools are needed.

As regards the academic publications used in the meta-study of Wetzstein et al. (2014), we also found a considerable number of contributions taking a rather critical standpoint towards social media usage, in particular concerning legal and ethical aspects. Also in recent projects such as the mentioned SMD4Austria or QuOIMA as well as in contributions from practitioners (Section 2), critical attitudes could be identified. Such critical (scientific) discourse must be considered necessary, especially since delicate aspects such as security and surveillance are concerned. In addition, communication strategies need to be fathomed in the public interest, closely considering societal developments and the potentially economically-driven practical implementation of social media tools.

The meta-study also revealed a stronger prevalence of structural and quantitative research approaches among the analyzed academic publications compared to qualitative ones. However, looking at the actual needs of crisis handling organizations, micro level knowledge as well as evidence about individuals using social media in crisis situations can be useful. After all, both practical and theoretical approaches increasingly show a focus on stakeholders, aiming at enhancing citizens' participation and resilience in crises and disaster situations (Wetzstein et al. 2014). Future research can clearly contribute to improve and advance practical social media usage for crises management by putting citizens into the centre of analysis. Here, interdisciplinary approaches with a strong social scientific contribution will be needed.

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