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## **Social media in disaster management: How social media impact the work of volunteer groups and aid organisations in disaster preparation and response**

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**Abstract:** This study examines forms of social media use in disaster management, focusing on volunteer groups and aid organisations. This research interest emerged from observing several grassroots initiatives using social media to implement aid activities. Approaches to transforming organisations through network structures and to developing community building are applied to the field of disaster management. The aim is to investigate if collective actions via social media can lead to the development of virtual (aid) communities, and how these operate. Two disasters are examined as example cases: the flooding in Germany and the Typhoon Haiyan in the Philippines, both in 2013. Thirteen guided expert interviews are carried out and evaluated. The results show that social media use in disaster management reflects the general trend towards a strengthened participation of the population in public communication. Social media can, however, only be part of a more comprehensive strategy necessary for disaster response and early warning.

**Keywords:** disaster management; social media; participation; volunteering; disaster preparation; disaster response; grassroots initiatives; network effects; organisation.

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## **1 Introduction**

In 2013, Typhoon Haiyan in the Philippines and the flooding in Germany were two extreme events incurring extraordinarily high humanitarian and economic losses. The typhoon raged with such ferocity that almost 8000 people died. The authorities themselves were affected to the extent that aid could only be managed with great difficulty. In Germany in 2013, the total economic loss owing to the natural disaster was just under 13 billion US dollars; the loss owing to Haiyan in the Philippines was 10 billion US dollars (Guha-Sapir et al., 2014; IFRC, 2014). The World Disasters Report by the International Federation of Red Cross and Red Crescent Societies (IFRC) established that in 2013 over 22,000 people in total lost their lives through natural disaster (IFRC, 2014). In the long term, natural disasters have fatal effects on countries repeatedly struck by them. The direct costs of natural disasters alone decrease the annual gross domestic product in the Philippines by 0.8% (Ebbighausen, 2013). A study by Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP) shows that those affected are increasingly dissatisfied with the aid received during and after disasters (Taylor, 2012). Thus, new ways of dealing with natural occurrences should be found to avoid disasters and minimise human and economic losses. As in many other areas where the institutionalised system is deficient, grassroots movements arise, which try to counteract this insufficiency on the macro-level with simple methods on the micro level. For example, in 2013 in the Philippines a group of doctors and other volunteers came together to provide aid on the ground. They collected the necessary donations from their internationally widespread circle of acquaintances via the social network Facebook. In Germany, several Facebook groups were set up to deal with the flood, for example to inform the population and to coordinate volunteers. Although the circumstances and contributions may be very different, in both cases, social media were used to provide emergency relief in the broadest sense. The volunteer groups, and especially the combination of online activities with offline aid, are the focus of this paper. Their approach is contrasted with the use of social media by – rather hierarchically structured – aid organisations (further examples are listed in Table 1).

In this paper, we assume that new communication technologies such as social media are increasingly significant for several steps in the disaster management cycle (see Section 2.2). Section 2 initially gives an overview of the main aspects of disaster management. Subsequently, it explains social media, networks and virtual communities in the context of disaster management. Finally, it brings these aspects together into a framework. Section 3 explains the current state of research and derives the research interest of this paper. Section 4 explains the process of the qualitative empirical investigation. Section 5 presents the results of the interviews. Section 6 critically discusses and evaluates the results in relation to research and practice.

**Table 1** Examples of online tools in the context of disaster management

<i>Technology/ Tool</i>	<i>Usage mode</i>	<i>Description</i>	<i>Place of usage</i>
Betterplace.org	Platform for donations	Users can donate money for their chosen (aid) project directly via the website. ( <i>helpdirect.org</i> has a similar concept.)	Germany
Facebook safety check	Facebook application	In case of a disaster, Facebook recognises the users being located in the affected area. Then, the users can post that they are safe via a simple button	Worldwide
Google person finder	Google application	Users can post their search request for missing persons via the application. Other users can give information for the search thereafter.	Worldwide
KATWARN	Warning system for different communication channels	The warning system automatically informs the people potentially affected by a natural hazard via short messaging, smartphone-app or email	Germany
Rumour control	Website from the authorities	After a lot of misinformation on social media during Hurricane Sandy in 2012, the US disaster management services opened up a website with a “fact check” and distinct information about the substance of the messages being published	USA (Hurrikan Sandy)
Sahana software	Software	The Sahana Software Foundation develops open source software and provides services “that help solve concrete problems and bring efficiencies to disaster response coordination between governments, aid organisations, civil society and the survivors themselves” (Sahana Software Foundation, n.y.)	Indian Ocean/Asia
Twitter lifeline	Twitter application	After the earthquake and the nuclear disaster in Japan in 2011, Twitter launched the application that enables users to search and filter relevant information about their area by means of the postal code	Japan
Ushahidi	Open source platform	First, the Kenian Ushahidi team noted violent outbreaks after the election in 2008 on an online map. Today, the organisation unites volunteers worldwide in order to collect information in crisis situations and provide open source maps	Start in Kenia, today worldwide

## 2 Theoretical background

### 2.1 Disaster management

Disasters and management initially appear to be completely opposing concepts. Events that take human lives and obliterate whole towns appear to be beyond human control, and thus the ability to manage. However, humans have always adapted to nature’s threats. The first forms of organisation on local level developed in pre-modern times, the aim

being survival. Owing to urbanisation and population growth, what had formerly simply been a natural event with no effects on humans turned into a disaster. The forms of organising the handling of such events have been adapted and became more structured and bureaucratised (Kirschenbaum, 2004). We can state that there are no ‘natural’ disasters as such, only natural hazards.

“A disaster’s severity depends on how much impact a hazard has on society and the environment. The scale of the impact in turn depends on the choices we make for our lives and for our environment. These choices relate to how we grow our food, where and how we build our homes, what kind of government we have, how our financial system works and even what we teach in schools. Each decision and action makes us more vulnerable to disasters – or more resilient to them.” (UNISDR, n.y.)

Thus, the vulnerability to disasters is closely connected to economic and social factors. Economic circumstances might, for instance, force people to live in particularly dangerous places, such as near a river or in volcanic areas. Other factors have profound causes, such as social status or inequality in knowledge and information distribution. Current discussions foreground the concept of resilience as the counter-concept to vulnerability (Wisner et al., 2004). Resilience describes the ability to “resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner” (UNISDR, 2007).

Disaster management and risk reduction start from this point, their aim being to minimise the probability and potential consequences of a disaster. The United Nations Office for Disaster Risk Reduction describes disaster risk management as the “systematic process of using administrative directives, organisations, and operational skills and capacities to implement strategies, policies and improved coping capacities to lessen the adverse impacts of hazards and the possibility of disaster” (UNISDR, 2007).

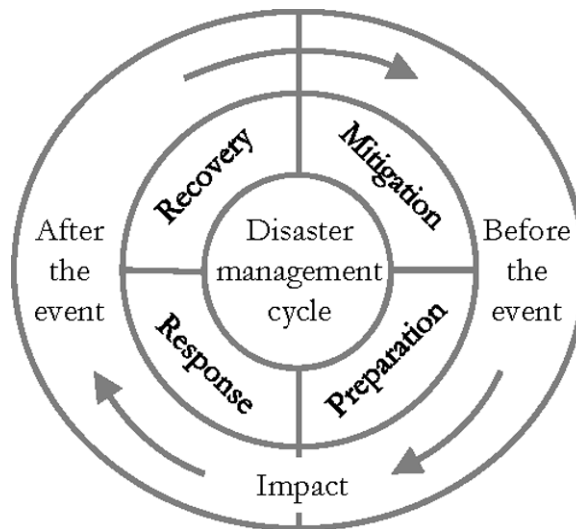
## 2.2 Communication structures in disaster management

The so-called disaster management cycle has been established in disaster management (Alexander, 2002; Coppola, 2011; illustrated in Figure 1). In the following, we will link its phases to the communication processes happening in the event of a disaster. Later on, we will discuss the use of social media related to this concept.

- *Mitigation*: This phase focuses on preventing a natural hazard becoming a disaster, or avoiding, respectively minimising the consequences. Corresponding planning implies communication between the relevant actors and the involvement of regional and local communities. Information on how to deal with natural disasters must be passed on, e.g., from the state, public actors, educational institutions, or from older to younger members of a community.
- *Preparation*: In this phase, people who could be affected by a disaster are equipped with the necessary tools to survive, help others or minimise their losses. Early warning that comes via different channels, via both traditional mass media and newer information systems (such as social media), is crucial for this period.

- *Response*: As soon as a disaster begins, measures must be taken to minimise its effects, i.e., to prevent further suffering and financial losses. The state or private aid organisations must be able to reach and inform those affected. Media companies report on the situation to a broad public, increasingly supplemented by reports from the population itself.
- *Recovery*: This phase ought to return the lives of those affected back to their normal state, although this may take several years or decades. The aims are regeneration and sustainable renewal. Long-term information campaigns may be part of the communication, e.g., on preventative building or sustainable economic activity. Therefore, the recovery phase links back to the mitigation phase.

**Figure 1** The disaster management cycle



### 2.3 Aid organisations and non-profit failure

In cases of disaster, local actors are often unable to provide the necessary steps of response and recovery described in the disaster management cycle on their own. Aid organisations can then provide the required humanitarian aid (Lieser and Dijkzeul, 2013). They generally operate as non-profit organisations (NPOs) and at the same time as non-governmental organisations (NGOs). They often come about when the state as well as the market fail, i.e., when neither state nor market is in a position to provide quantitatively and qualitatively adequate assistance. Ultimately, there can also be non-profit failure, for the gap left by the market and the state is not necessarily filled by NPOs/NGOs (Pennerstorfer and Badelt, 2013). NPOs/NGOs can be inadequate for different reasons:

- insufficient financial means for services
- prioritising or disadvantaging groups on the basis of their religion or ethics

- dealing with problems top-down and without democratic legitimation
- amateurism and low levels of professionalism.

These inadequacies lead to the consequence that communities, in their original sense, remain central in coping with disasters. This is especially true for the assistance emerging spontaneously within the community members. At the same time, these social processes lead to normative ways of dealing with situations, thereby becoming social paradigms that are institutionalised over time. The community starts to organise itself (Kirschenbaum, 2004).

#### *2.4 Social media, networks, virtual communities and their significance for disaster management*

The term ‘social media’ signifies participation, communication and interaction among users (Kaplan and Haenlein, 2010). It operates on three levels: technological, individual and sociological. The different levels affect each other, while only the technological level is making the exchange and new forms of communication possible (Mao, 2014). Modes of usage can far exceed the activities intended by the developers. Conversely, habits on the individual level lead to expectations around the further development of technologies. On the socio-economic level, social media affect the ways different actors in society and the economy communicate, leading to the dissolution of traditional structures of power and hierarchy (Michelis, 2012). While traditional media – especially radio and print media – have their place next to civil society as a mediator towards politics and the economy, this does not apply to social media. Social media have their place at the centre of civil society, thereby promoting the permeability and transparency of erstwhile rigid structures and at the same time disrupting the established social structure (Münker, 2009).

From an economic perspective, communication technologies, in general, and social media, in particular, mean that services with a high degree of specification are no longer necessarily created within hierarchical organisations. Carrying out complex tasks with a large number of participants does not necessitate a hierarchical structure. Instead, the organisation of large groups can be decentralised (Shirky, 2008). Simultaneously, reduced information production costs lead to a significantly broader base. Production is no longer the exclusive business of commercially interested actors. This foregrounds a social, non-market-oriented, collective and non-hierarchical approach (Benkler, 2006). Traditional organisational structures are becoming partially obsolete in many areas, including the media. Media consumers are becoming producers with ambiguously distributed roles (Jenkins, 2006).

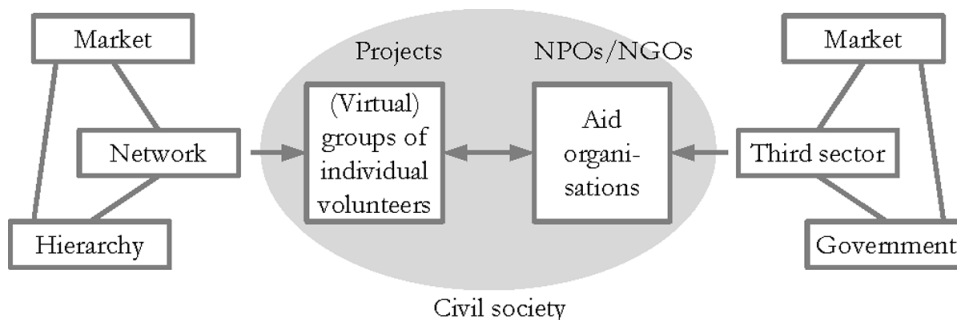
Finally, participation and the collective use of technologies lead to the formation of virtual communities, which increasingly influence the offline sphere (Münker, 2012). According to Thiedeke (2007), virtual communities are social systems with a communicative context based on socio-technical systems. The prerequisites for the functioning of virtual communities are not, in fact, consensus and compromise, but diversity of opinion, independence and decentralised processes (Surowiecki, 2005). Communication technologies, therefore, represent a kind of technical infrastructure of collective intelligence – the hyper-cortex of living communities (Lévy, 1997).

This links to the question of whether virtual communities can connect to offline reality. One possibility is the so-called activist communities who use digital (mobile) communication media (Schlütz et al., 2012). Individual members participate in the collective or in a joint project, sharing their respective competencies. As a result, there are no information monopolies in cases of disaster, nor is there only one (media) reality anymore (Richard, 2008).

### 2.5 Consolidation of theoretical concepts

Participation in communication processes and content creation have been greatly simplified by digital technologies. In cases of disaster, they give rise to an alternative media reality: traditional media companies lose their dominance and the individual user is emancipated. Collectivist coordination mechanisms are replacing hierarchical structures. A collective intelligence emerges, which can ultimately lead to improved group decisions. If the online and offline worlds connect, this can create activist units, which are able to counteract shortcomings in existing humanitarian aid systems in case of disaster. Likewise, aid organisations themselves can use social media to contribute to changes and improvements in the system of humanitarian aid. In both cases, the use of digital communication technologies might increase a community's resilience. However, the community might also dissolve into a swarm of individuals. If this happens, the particular individual takes on more and more responsibility as a user of communication technologies, a creator of media content, an observer and someone affected by natural occurrences. Bauman (2009) argues that, on the one hand, modern individualism promotes the emancipation of the individual, but, on the other hand, leads to uncertainty, demanding a higher degree of personal responsibility. Social media and its emergent forms of usage are catalysts of this change, re-ordering the roles in the disaster management of the future (Sutton et al., 2008). Figure 2 brings together these theoretical concepts.

**Figure 2** Theoretical framework



### 3 Current state of research and research questions

The use of social media in disaster situations has been investigated in recent years using different examples. Studies are differentiated by a focus on social media usage within organisations, within or by communities, and by individuals (Table 2).

**Table 2** Studies on the use of social media in disaster situations

<i>Authors (s)</i>	<i>Study</i>	<i>Results</i>
<i>Use of social media within organisations</i>		
Mersham (2010)	Analysis of a tsunami threat for New Zealand	Shows NPO failure. While the authorities remain passive in their external communication, mass media and social media take on the role of providing information
Yates and Paquette (2011)	Potential social media for decentralised information and communication management; earthquake in Haiti 2010	Compared with centralised information management, social media definitely offer advantages in dynamic situations. Social media make it easier to re-circulate information within teams and minimise reliance on formal liason structures between different teams
Cho and Park (2013)	Twitter as the main channel of information; earthquake in Japan 2011	The high number of users who followed government Twitter accounts shows that public authorities still retain their leading role. Nonetheless, the distribution of information stays rather passive
Chewning et al. (2012)	Resilience of organisations through use of information technologies; Hurricane Katrina 2005	Technologies can be adapted to given situations so as to successfully lead an organisation through periods of transformation. They answer three purposes after a disaster: resumption of communication links with stakeholders, coordination of resources and information, resumption of working routine
<i>Use of social media in or by communities</i>		
Liu and Palen (2007)	Peer-to-peer communication in cases of disaster; Hurricane Katrina 2005 and terror attacks on 11th September 2001	Communication technologies make volunteers more visible and increase the space for participation. The provision of information is changing: predominantly flyers and posters in 2001; increased information hubs in the form of websites (online variant) at emergency accommodation (offline variant) in 2005
Hughes et al. (2008)	Different kinds of social online conferencing	The internet has significantly accelerated the speed with which people and information converge in the event of a disaster. The number of people dealing with a disaster, and the spatial distance between them, are fundamentally limitless. Furthermore, there is little evidence of role-based behaviour in online activities: the emphasis is on interaction
Shklovski et al. (2010)	The use of new communication technologies among 40 musicians from New Orleans; Hurricane Katrina 2005	People external to the disaster zone are information hubs, for only incoming calls can be received without any difficulty. The internet proves a more useful source of information than mass media. After the disaster half the participants integrated the new communication technologies into their everyday lives



**Table 2** Studies on the use of social media in disaster situations (continued)

<i>Authors (s)</i>	<i>Study</i>	<i>Results</i>
<i>Use of social media by individuals</i>		
Sutton et al. (2008)	Comparison of the use of traditional and social media; forest fires in California 2007	Traditional media remain relevant sources of information but are deficient in terms of geographical inaccuracies, preference for larger towns, and the pursuit of sensational stories. The websites of grass roots initiatives proved to be more reliable, for an error correction system was implemented through the participation of numerous users
Murthy and Longwell (2013)	Analysis of Twitter contributions; flooding in Pakistan 2010	Social media allow a local presentation of events, give individuals the opportunity to become aware of their situation, and counterbalance mass news coverage. The use of social media in developing countries can be problematic, as this is frequently the reserve of only a small elite
Bruns and Burgess (2014)	Use of Twitter; floods in Queensland (Australia) and earthquake in Christchurch (New Zealand) 2011	Here, Twitter is classed as supplementing traditional media and other social media. Independent individual users become more important, for repeatedly distributing (retweeting) contributions raises their visibility. Network effects are produced because few key accounts or hashtags dominate the communication

The involvement of the population in dealing with disaster situations is by no means new. First-aiders are often members of local communities and not necessarily trained workers. Liu and Palen (2007) ascribe, for example, great importance to improvised, emergent and temporary groups formed by individuals joining together. The results show that the human ability to improvise in disaster situations and to use technology in a flexible way can transform existing social structures and influence institutional disaster management. The review of the studies implies that as yet there has been no examination of collective action within groups using social media. The cases considered here – the flood disaster in Germany and Typhoon Haiyan in the Philippines – will also shed new light on the discussion. The following research questions emerge from the theoretical considerations and the current state of research; they should be considered within the context of this study:

- To what extent do the participative creation of communication content and collective action via social media lead to the development of (virtual) volunteer communities within disaster management?
- How do these communities operate, and how do they, in comparison with classical aid organisations, use social media?

## 4 Methodology

### 4.1 Research design

The aim of the study is to draw conclusions from individual observations, applying them to general contexts, and to generalise from results, following the principle of

qualitative induction. Any feature discovered will be transferred to existing rules and existing knowledge repositories (Yin, 2003).

This study uses non-standardised interviews; neither the interviewer’s questions nor the interviewee’s answers are subject to standardisation. A guideline structures the course of the conversation, while producing a natural conversational situation and allowing follow-up questions (Gläser and Laudel, 2010). This is useful when experts’ knowledge has to be recorded, as this often exceeds pre-formulated categories in a standardised interview (Scholl, 2009). The guideline represents the link between the theoretical preliminary considerations and the qualitative survey methodology (Strauss and Corbin, 1998). The guideline is adjusted for each group: volunteers, observers and members of aid organisations. The key topics in the guideline can be seen in Appendix 2.

The survey was carried out in July 2014. As part of this, 13 experts were interviewed by telephone using guided interviews. The conversations were taped, anonymised and transcribed, ensuring the evaluation of the material remains intersubjectively comprehensible.

#### 4.2 Sampling and survey

Qualitative research systematically investigates a selection of cases; the spectrum should represent the object in as many variants and peculiarities as possible (Baxter and Jack, 2008). In this study, the selection of cases (Typhoon Haiyan in the Philippines and flooding disaster in Germany) is based on their topicality (2013), the review of current research and the possibilities for investigating group activities and communities. The selection of 13 interviewees (I-01–I-13) covers a broad spectrum of possible social media usage by volunteers, enabling comparison with the usage by aid organisations. This involves an open approach (theoretical sampling), taking into account as many aspects as possible (Glaser et al., 2010). Figure 3 gives an overview of the interviewees; there is a detailed description in Appendix 1.

**Figure 3** Survey of interviewees

Country/ Region	Experts/ observers	Aid organisations	Individual helpers
Germany/ Europe	I-01 Social science perspective	I-05 Umbrella organisation	I-08 Facebook group
		I-06 Church organisation	I-09 Creator of a Google map
		I-07 Ambulance organisation	I-13 Help-coordinator
Philippines/A sia	I-02 Technical perspective		I-10 Member of an activist group
	I-03 Social science perspective		I-11 Member of an activist group
	I-04 Urban planning perspective		I-12 Member of an activist group

### 4.3 Evaluation

The chosen evaluative method is based on content structuring analysis, combining open coding with qualitative content analysis. In open coding, text passages in the transcripts that contain relevant information are identified and allocated a code. The codes can originate from preliminary considerations as well as directly from the text; they contribute to further analysis (Glaser et al., 2010). The technique of structuring content analysis has been chosen to systematise the extensive material to be analysed and identify patterns. In *Step 1*, the units of analysis are defined (Mayring, 2010). This involves selecting a text passage consisting of at least one sentence, which, in terms of content, contains a coherent statement. In *Step 2*, the main categories of analysis are defined (Parent I): volunteers, aid organisations, disaster management, communication and social media. They are based on the theoretical preliminary considerations as well as the current state of research, fulfilling the study's claim to theoretical grounding. In *Step 3*, a category system consisting of the main categories identified is developed, enabling the formation of sub-categories according to the inductive method of open coding (using the computer program MAXQDA). Coding was carried out until theoretical saturation was achieved (Glaser et al., 2010). In *Step 4*, the categories are systematised and, where necessary, summarised again so as to avoid doubling. This creates a further level. Individual codes – also called sub-categories – are, in part, summarised again into a main category (Parent III). In *Step 5*, the category system is checked again using the material, i.e., the transcripts are examined against the categories and, where necessary, new text passages are supplemented. In *Step 6*, the categorised text passages (codings) are absorbed into the main categories (728 codings into 137 categories). *Step 7* involves paraphrasing, i.e., deleting text passages with no content, with the result that the important text passages are grammatically abridged. In so doing, one summary per category (code) is undertaken. The analysis concludes with *Step 8*, viz., editing the material and summarising the main categories, as presented in the following section.

## 5 Results

Here, the results of the interviews are presented with regard to the mentioned main categories (volunteers, aid organisations, disaster management, communication and social media) and their coherences.

### 5.1 *Relevance of communication in disaster management*

Preparing for and warning the population of a disaster is of great relevance. I-03: “When a disaster is about to strike, there is a window of opportunities for early warning. That is when communication plays a critical role”. Various means of communication with different usage features can be identified here as represented in Figure 4.

Communication plays an important role in all phases of a disaster management cycle. The availability of technical prerequisites of electronic communication, such as a telephone network, internet connection, terminal equipment and electricity, is crucial. Economic factors and the natural disaster itself might prevent this. The essential tasks of communication are:

- *Strengthening the group identity*: Communication can strengthen the group identity among volunteer groups in the run-up to their aid work; actors get to know one another and define their roles without there being an information monopoly. I-12: “Everybody should be heard and not just a dominating voice in the group”.
- *Obtaining information*: To obtain information, the volunteers (and volunteer groups) interviewed turned to mass media (radio and TV), personal acquaintances, crisis management groups, the military and the fire service. Only in a few countries (e.g., in Sweden) can information about (potential) disasters be retrieved centrally from the authorities’ websites. Social media are, therefore, highly relevant in obtaining information. I-09: “We just waited passively for the information. With Facebook and Twitter the biggest advantage is that you simply follow; you receive the information, but you yourself decide how to evaluate it”. People affected can supply useful information, too, but aid organisations and volunteer groups must check if this information is accurate before passing it on.
- *Conveying information*: In the event of a disaster, it is important to pass on information – e.g., early warnings, advice on how to behave – as quickly and accurately as possible to those affected. This can be done by official centres, aid organisations and also by the population and the volunteers themselves. Here, social media are one possible usable channel among many. I-11: “A lot of areas were totally spared with no deaths, because they were informed correctly. Information is crazy important”.

**Figure 4** Relevance of communication media in disaster management

Face-to-face communication	Print media	Web-based media
Communication among staff members and volunteers; Communication between volunteers and aggrieved parties; Communication among aggrieved people, relatives, and friends	Early warning; Public relations (aid organisations)	File exchange (e.g. Dropbox); Emails for information, coordination, and fundraising; Websites (e.g. banner ads, donation campaigns, bulletins); Intranet (aid organisations); Social media
	Broadcasting	
	Early warning; Advertising on TV/radio (aid org.)	
	Mobile phone/text messaging	
	Early warning (text messaging); Gathering and communication of information; People with needs can reach help; Conference calls	

### 5.2 Influence of social media on communication in disaster management

The interview data show that volunteers’ aid campaigns proceed very differently. What they have in common is that they emerge spontaneously at first, then over time acquire a fixed place within the structure of aid actors. The range of elaboration of communication

via social media, however, is broad. Some volunteer groups used social media to form networks, gather or filter information, and pass this on to the population. In other cases, the activities extended beyond this. Volunteers took on managerial tasks and coordinated the many like-minded volunteers and their deployment – online and offline. For other actors, social media were, rather, a tool for communication and for coordinating a relatively closed group of volunteers acting offline and operating in the disaster area on the ground. In addition, social media were used to communicate ‘to the outside world’ and, for instance, collect donations.

One problem when disasters happen is that sometimes the state and authorities provide incomplete or inaccurate information. Meanwhile, people can counteract the state’s (information) inefficiency by using alternative information sources, such as social media. When this happens, state information channels, social media and mass media necessarily influence and ‘cross-fertilise’ (I-01) one another within disaster communication. First, social media authors obtain much information from traditional mass media and their (online) live updates to check their own sources and avoid passing on any ‘unreliable information’ (I-09). Second, mass media pick up on social media activities, and this is the only way some projects attract significant media attention. I-13: “The media of course pounced on Facebook. They actually would not accept that we did not coordinate via Facebook, but only distributed information”. Third, aid organisations use social media (primarily Twitter) to reach journalists from established media organisations who then use social media to disseminate news. Social media have a time advantage, for people often learn of natural occurrences faster than the authorities can release explanations. This potential is not sufficiently exploited on the official side. Some interviewees believe town councils, primarily, must engage more with social media. I-13: “They simply have to intervene more and regulate, and perhaps everyone just has to have some training in social media. But I think that will happen in the future”. Noticeably, public participation means authorities and mass media lose their information monopoly. This was already evident in approaches after the 2004 tsunami in the Indian Ocean; the 2010 earthquake in Haiti marks the turning point in the pervasiveness of social media. I-03:

“In a way, until a few years ago, governments had an official narrative. That has changed. Now, there are many more writers, who are doing their own documentation and they are providing counter narratives. (...) So, sociologically and historically, from around 2008 onwards, we will have multiple narratives of the way that disasters are documented for history.”

### 5.3 *Function of social media in communication and collaboration among helpers and aid organisations*

Social media fulfil specific functions of communication and collaboration in disaster management. Social media are characterised, in particular, by the speed of information distribution. The mobile and constant use of social media via smartphones continually shortens the ‘pathways’ taken by communication messages. I-10: “Within the time frame, we could not have done it without social media”. Also, those addressed can react immediately. I-11: “You get an instant acknowledgement, when you send out a cry for help”. Further functions and aims of social media for communication in disaster management:

- *Dialogue and backward channel*: The interviewees focus on the dialogic function of social media. In contrast to unidirectional websites, they have a backward channel via which enquiries about warnings can be resolved or feedback can be obtained within volunteer groups. Aid organisations use the dialogue tool to establish relationships with donors or stakeholders, respond to questions or criticism, and answer requests by those affected. I-06: “*Communication is no longer a one-way street*”.
- *Collecting donations and organising resources*: Aid organisations and independent volunteer groups can use social media to collect donations. Aid organisations try to extend their reach with social media, inviting a broad public to donate. For volunteer groups, the focus is the network of friends and acquaintances; this also determines which channel they decide to use. I-10: “*All our good friends are on Facebook. Well, it is easier to raise funds from friends, because they have known you for a long time*”.
- *Informing*: The information function of social media initially relates to early warning and preparation before a disaster. I-04: “*Infographics can be very helpful; this one photo that can help people to prepare better*”. Second, during the disaster practical tips, assistance and information on the current situation can be given. Online communication, therefore, leads to offline activities. I-06: “*The flooding showed me again that the social web is more than just this purely virtual space, rather it really also enables people to help other people*”. Here, the communication of information has, as already explained, shifted from a purely governmental task to non-governmental actors (e.g., volunteers and aid organisations).
- *Creating transparency*: Social media make aid activities transparent and comprehensible; for example, by publishing donations, expenditure and volunteers’ activities. Aid organisations also recognise that their supporters demand more and more openness. I-05: “*That’s why you have to operate transparently and just be prepared to talk to them [the supporters]. There is no way back from this*”.
- *Organisation and coordination of volunteers*: Social media can be used to channel volunteers and organise and coordinate them. Because these are often relatively closed groups, it can at least be assumed that there is a certain degree of collective collaboration. Social media can strengthen the group identity. I-04: “*It helped us bonding with the teammates, to know them before we meet them*”. However, the interviewees were also of the opinion that social media are not wholly suitable for organising a group, as long-term planning is frequently inadequate and no open discussions take place.

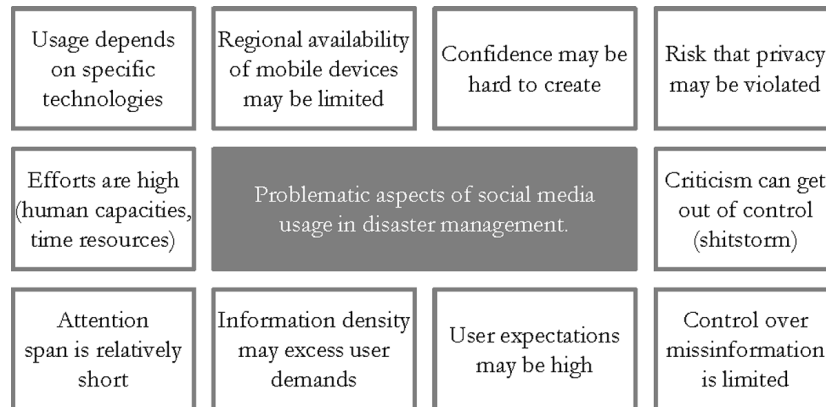
#### 5.4 Critical implications of social media usage in the context of disasters

Finally, the results of the study show that the use of social media is also given critical consideration by the interviewees. The speedy dissemination of false information is repeatedly cited as the main problem in communication via social media; it can lead to errors and panic. This is because information can be shared in an uncomplicated way, so it is difficult to understand which information is correct. I-03: “*It is very easy for social media to bruit panic, particularly if promiscuous people are deliberately spreading*

*misinformation, panic can happen*". Communication via social media must continue ceaselessly, otherwise the distribution of information will take on a life of its own. Social media activities, therefore, require the right amount of time and manpower. I-01: "In the worst case scenario, when you actually need all your staff to deal with the crisis, you need to appoint another five people for the social media". In so doing, social media should always be incorporated into a broader communication framework and not treated as a discrete unit. I-12: "Communication is very important beyond social media, because social media is just one component of the whole thing". Initially, it is essential to always use the technologies that already play a role in the daily lives of the users. The most-used channels are the most suitable in the event of disaster. I-02: "The technology that is used every day is far more effective in communicating emergency information during a disaster than any other specialised device".

In the case of aid organisations, a certain 'institutional readiness' (I-05) is necessary, i.e., readiness for transparency and dialogue with stakeholders. Furthermore, the aim must always be to add value for users and respond to donors' wishes. Trust is the key. Trust in information sources develops if over a longer period of time they disseminate serious, reliable and verifiable information. It is particularly important that independent volunteer groups make the recipients of the donations public, so as to prevent malpractice. If there is trust, the will to donate can even be greater in comparison with the big aid organisations, as donors see more clearly where their donation is going. I-11: "A lot of people were thinking about sending money to Red Cross and the Salvation Army, but there were so many stories about 50 or 60% of the money being lost in administration". If an aid organisation loses trust, it should again adapt to the dialogic quality of social media and be prepared for severe criticism. Figure 5 presents a summary of the problems associated with social media usage.

**Figure 5** Problematic aspects of social media usage in disaster management



### 5.5 Results' summary and recourse to the research questions

In summary, social media are a fast, changeable and transparent means of communication used for information dissemination, dialogue and fundraising by aid organisations and individuals (volunteers, donors and those affected). But, it also has negative impacts such as the rapid dissemination of false information, technical limitations or the lacking ability by the users to filter and assess the information.

Social media support the volunteer groups in their activities and enable them to work together in a collaborative way. Also, they obviously manage well to connect the online with the offline world. Compared with aid organisations, they invent and implement new forms of usage, which bring them closer together and facilitate communication and collaboration not only within the group, but also externally, e.g., with potential donors, with the people affected by the disaster as well as with other volunteer groups. It can be said that aid organisations are rather reluctant when it comes to the innovative use of social media in their disaster management activities.

Results show that social media mainly play a role in the phases of disaster preparation and disaster response, at least for volunteers and aid organisations. This leads to the conclusion that social media are not in the focus for long time planning, e.g., mitigation and recovery or in other words, volunteers only communicate via social media over a limited period of time.

## **6 Discussion, implications and conclusion**

### *6.1 Discussion of results*

*Individual vs. collective:* Social media shift volunteer groups to the centre of civil society. Participation in communication processes and aid efforts means the individual becomes an important factor in disaster response. Although this development is not wholly new, social media can activate a large mass of people quickly and simply. Help on the scale of the projects described here is only possible within a collective. This uniting of people, however, is restricted to one event and, therefore, to a short period of time. So far, there is barely any evidence of long-term efforts by volunteer groups. The individual has increasingly become the focus of disaster management, possibly owing to the dissolution of the boundaries of formally structured organisations. This might be true for those affected, who are increasingly helping themselves (out of necessity), as well as for volunteers, who no longer (want to) integrate into hierarchical structures.

*Resilience vs. vulnerability:* Access to information helps people prepare for possible dangers, and in the event of disaster this can mean life or death. Those affected must be informed about their own situation if they are to react adequately. Social media can, therefore, contribute to increasing resilience – the prerequisite for this is being well practised and reflective in dealing with the channels and tools. Long-term and sustained efforts to avoid disaster cannot, however, be replaced by social media. These must respond to deeper underlying problems such as social and economic inequality, which increases vulnerability. Social media, however, integrate into the structure of disaster management because, for instance, they are increasingly used to understand people's needs, include the population in the planning processes and create feedback loops for strategy development.

### *6.2 Practical implications*

Social media cannot be expected to become less relevant in the future, but developing further in the form of tools and application scenarios, such as early warning systems, apps for searching missing persons and information filters. However, when asked about the



use of new technologies, the interviewees had little enthusiasm for the development of disaster-specific platforms aside from the existing channels of Facebook and Twitter. However, new tools and application scenarios were already being developed over the course of this study. Alongside software programs or apps developed independently of the common social media websites, operators also implement functions for their platforms (e.g., Facebook Safety Check; see Table 1). Social media companies are increasingly urged to offer their platforms and advertising space for important information such as disaster warnings. Furthermore, social media allow for a targeted search to source people with specific qualifications useful in cases of disaster (e.g., LinkedIn). Also, there is a European research project running with the aim to integrate existing disaster response systems and platforms (BRIDGE Project). Finally, social media in disaster management offer the individual the opportunity for more participation. This is, however, also accompanied by a shift in responsibility in the event of disaster – away from the state and aid organisations and towards the individual and people helping themselves.

### *6.3 Limitations and further research*

The criteria for the quality of the research conform to the research design of qualitative social research and to applied methodology (Mays and Pope, 2000). This study explores how volunteer groups are formed through social media and the use of social media in aid organisations, exemplified by two cases in a qualitative design. The method can be measured against the quality criteria of qualitative research.

The study combines inductive and deductive elements: the research question and the hypotheses derived are based on general theories; the empirical investigation, however, is based on inductively established results with a limitation on the main categories within the evaluation method. The methodology does not cover statistical representivity. This means it offers no conclusions as to what (quantitative) extent social media are used in disaster management. Nonetheless, a qualitative approach, too, must establish the cases and rules for the generalisation of the study. Fundamental to qualitative research is that subjects are studied in their natural environment, not in the laboratory, and that results can be generalised (Mayring, 2010). Because different forms of aid project have been selected, the results have a certain validity for online or offline volunteer groups. The use of social media to support activities is, however, a prerequisite for this. Aid organisations, too, represent particular formats (amalgamations of aid organisations, Red Cross organisations and church organisations) within the humanitarian system. In addition, the selection of neutral observers ensures the results are as balanced as possible and not one-sided. The study represents a snapshot; subsequent studies can consider the following points more specifically:

- interviewing those affected by the disaster concerning their view on the usefulness of social media in disaster preparation and response
- the different features of virtual volunteer communities, helper identities and their motives
- users' attention spans regarding disasters in social media in comparison with mass media

- the type of media formats (images, videos and text) shared in social media after disasters
- aspects of organisation and trust in (virtual) helper communities vs. hierarchically structured organisations.

#### 6.4 Conclusion

To conclude, it is to be said that social media will play an increasingly important role in disaster management in the future. Nevertheless, it should not be neglected to force long-term measures. Considering the disaster management cycle, the two phases of disaster mitigation and disaster response have to be at the centre of attention. So far, social media have mainly been used in the urgent stages of early warning (disaster preparation) and relief activities (disaster response). But, social media have the potential to lead to a growing participation of the population in strategic planning in mitigation and recovery, e.g., using the feedback function of social media to gather ideas and opinions from the people (potentially) affected.

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## Appendix 1: Characterisation of interviewees

I-01 researches the development of warning solutions in the event of disaster, focusing on communal warning systems and guidelines for warning strategies which improve the perception and following of warning messages.

I-02 researches emergency communication and early warning systems from a mathematical and computer engineering perspective.

I-03 is an academic author, journalist and blogger. For more than 15 years he has reported on disasters in Asia from a social science and cultural science perspective (e.g., social media and mobile technologies in the event of disaster).

I-04 is a specialist in the field of disaster risk reduction and town planning. After Typhoon Haiyan he was in charge of preparing plans for disaster provision and rebuilding several towns.

I-05 works for an amalgamation of German aid organisations operating predominantly within humanitarian foreign aid. The core activity is the collective appeal for donations in acute cases of disaster.

I-06 works in the field of new media for a Protestant humanitarian aid organisation that for 60 years has provided emergency aid for victims of natural disasters, fleeing, displacement, drought and hunger.

I-07 works in online marketing for the German Red Cross (DRK). The DRK provides humanitarian aid in armed conflicts and after natural disasters, and propagates international humanitarian law.

I-08 is an independent social media advisor who set up several Facebook sites during the 2013 flood disaster in Germany. The aim was to inform the population and volunteers about events connected to the flood.

I-09 was significantly involved in creating a Google map for his home town during the flooding in Germany, containing information on road blocks, evacuation areas and aid intervention points.

I-10–I-12 were involved in aid intervention in the Philippines after the severe typhoon in November 2013. They joined forces to form a privately organised group. After preparation and fundraising (Facebook) the team travelled to Tacloban four weeks after the typhoon to provide aid in areas more difficult to access.

I-13 coordinated volunteers using an email distribution list during the flood disaster in Germany. Originally a student project, the town later declared it the official operations centre for civilian helpers.

## **Appendix 2: Interview guideline**

### **1 Introductionary Questions**

- Please, shortly describe your expertise/profession.
- Please, shortly describe your activities/your research in the field of disaster communication and management in general.
- Please, shortly describe your activities in a specific disaster event.

### **2 Role of communication and communication channels**

- Which communication channels did you use during the disaster mission?
- Who did you mainly communicate with?
- How did communication processes take place/work?
- How important was the communication for your activities?

### **3 Role of social media for the communication**

- How did you use social media during your disaster relief mission? (Reminders: channels, preferences, goals)
- Who did you mainly communicate with via social media? (Reminders: private, aid organisations, public, affected people)

- 4 Effects of the use of social media
  - Have you been involved in disaster relief on other occasions? Please compare several missions! To what extent has the use of social media changed your activities?
  - Can you imagine any future scenarios regarding social media use in case of disaster?
- 5 Summary of the potentials and threats
  - Which opportunities or advantages do you see in the use of social media?
  - Which problems could be caused by the use of social media?
- 6 Conclusion
  - Do you have anything to add to our conversation yourself?