Combining Real and Virtual Volunteers through Social Media

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ABSTRACT

Recent studies have called attention to the improvement of "collaborative resilience" by fostering the collaboration potentials of public and private stakeholders during disasters. With our research we consider real and virtual volunteers in order to detect conditions for cooperation among those citizen groups through social media. Therefore we analysed the usage of Twitter during a tornado crisis to look for role patterns and aspects that helped volunteer groups in the virtual to emerge, and matched the data with an interview study on experiences, attitudes, concerns and potentials professional emergency services recounted in the emergence of volunteer groups in the real. While virtual groups seem to easily form and collaborate, the engagement of real volunteers is decreasing according to the perception of professionals. We discuss the dynamics in both tendencies and suggest design implications (use of existing social networks, promotion and awareness, connection among volunteers, connection to emergency services and systems) to support both types of volunteer groups, which lead to a software prototype.

Keywords

Collaborative Resilience, Disasters, Volunteers, Emergent Groups, Collaboration, Social Media

INTRODUCTION

Disasters such as the Indian Ocean tsunami 2004, the Japanese earthquake and tsunami 2011 or the Hurricanes Katrina 2005 and Sandy 2012, but also smaller events, require public authorities and relevant organizations to engage in urgent and lifesaving actions very fast and effectively. This requires resources that are only available if people who are not part of the official crisis management initiatives - these are especially the citizens affected - can help themselves. "Collaboration between the private and public sectors could improve the ability of a community to prepare for, respond to, and recover from disasters." (Board on Earth Sciences and Resources, 2011). This ability is called "collaborative resilience" (Goldstein, 2011) and the great challenge is to establish reliable cooperation patterns between heterogeneous stakeholder groups like police, fire-fighters, infrastructure operators, public administration and the (affected) citizens that sustain even in disasters. Stallings & Quarantelli (1985) define those volunteers or "emergent groups" as "private citizens who work together in pursuit of collective goals relevant to actual or potential disasters but whose organization has not yet become institutionalized". According to the crisis communication matrix, mainly volunteers represent the communication among the public (Reuter et al., 2011). The essential influencing factors for their emergence are (a) an extra community setting, which legitimizes the group; (b) a crucial event, which is perceived as a threat; (c) a supportive social climate with positive values, norms and beliefs regarding the necessity of collaborative actions; (d) an existing social network, so that communication can take place; and (e) available resources such as information, knowledge or skills (Quarantelli, 1984). Contrary to myths, citizens of affected areas seldom panic, are not helpless or dependent on external rescuers and do not loot (Helsloot & Ruitenberg, 2004). Mostly, they are even the first to care for victims and to conduct search and rescue activities. The primary motivation for volunteering in such an group is a "compelling need to help in some way, particularly a need to assist victims, and a desire – even obsession – to 'do something' in order to contribute something positive and find something meaningful in the midst of a disaster" (Lowe & Fothergill, 2003). About 30 years ago Quarantelli (1984) identified three different groups: an active core (~1%); a larger supporting circle for specific tasks (~10%); and a great number of primarily nominal supporters who occasionally assist (~90%). The constantly changing environment due to the crisis situation results in "unstable task definitions and flexible task assignments, fleeting membership, and pursuit of multiple simultaneous, possibly conflicting purposes" (Majchrzak et al. 2007). Emergent volunteers have to operate in a permanently changing environment. Activities, which happen simultaneously, depend on or should not interfere with each other, have to be coordinated under time pressure (Petrescu-Prahova & Butts, 2008). For that, intensive communication between the group members is needed.

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The evolution of social software established infrastructures for virtual collaboration, which enable emergent activities during crises in different ways and may influence established behaviours (Palen & Liu, 2007).

As it is common to distinguish between real and virtual communities, a distinction within volunteer groups seems reasonable: Virtual volunteer groups originate in the internet and mainly carry out their activities online. The analogous term "digital volunteers" (Starbird & Palen, 2011) is described as people with "new behaviours of mass interaction that ICT enables". Real volunteer groups fight against the effects of a crisis locally and may appear in the form of neighborly help. They may use the internet as a potential supportive resource among many others. Of course, those groups can and often do overlap. The literature explores emergent volunteer groups from the real (e.g. Dynes, 2006; Stallings & Quarantelli, 1985) as well as from the virtual (e.g. Palen & Liu, 2007) perspective. While virtual volunteers may be located anywhere and thus can help through digital contributions, real volunteers are always on-site. So far, a combined view of those groups for detecting possibilities for cooperation and of fostering "collaborative resilience" has rarely been considered in research.

RESEARCH OUTLINE

Our work aims to combine the views on virtual and real emergent volunteer groups in order to detect conditions for cooperation and synergies through social software. Therefore our research question is: How can social media support the cooperation between virtual and real emergent volunteer groups?

Firstly, we will focus on virtual activities by studying related work about social media use by volunteers in crises and by empirically analysing the usage of Twitter during a tornado crisis in the USA in April 2011. We chose an event, which took place in the US because of the country's already widespread use of social media and especially Twitter. Our study aims to

Figure 1: Virtual and Real Emergent Volunteer Groups

extend research of virtual volunteer groups by illustrating temporal developments and, building on this, by categorizing different types of user behaviour. These factors are of interest in order to search for possible combinations and overlapping features. Secondly, we will focus on real volunteer activities. After presenting related work on volunteers in emergencies we will describe the results of our study based on interviews with emergency services.. In doing so, we intend to research how they perceive emergent volunteer groups and whether points of intersection can be created for a close cooperation between these groups. Subsequently we discuss our findings on which software-based support potentials can be identified, present the preliminary results of the evaluation of our prototype and summarize the most important results.
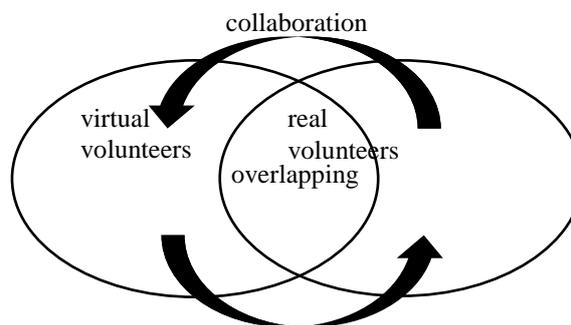
TWITTER STUDY: VIRTUAL ACTIVITIES, TEMPORAL DEVEOPMENTS AND ROLE PATTERNS

Related work: Social media use in emergencies

Social media is widely used by private citizens collaboratively coping with a crisis. Studies show that *microblogging* is used for collecting and distributing information, communicating and answering help requests (Starbird & Palen, 2011). Twitter serves as resource for situation updates (Vieweg et al., 2010) and as platform for coordinating activities, exchanging opinions and emotionally coping with a crisis (Qu et al., 2011). For intensive coordination work, however, Twitter-users switch to other software, such as Skype (Starbird & Palen, 2011). *Social networking services* enable its users - who are represented by profiles - to connect with each other and offer various interaction tools, such as sending messages, sharing photos and videos, providing information within a profile or group profile, publishing notifications, reporting the current status, announcing events and discussing in forums. They are intensively used to create collective intelligence, serve as information source and contain quality control mechanisms (Palen et al., 2009). Existing services like Facebook have the advantages that they already possess a net of social relationships before the actual crisis takes place and its functionalities do not have to be learned in crises. *Wikis*, like Emergency Wiki, Quake Help Wiki or Scipionus, are useful to collaboratively collect information and knowledge and to create collective intelligence but have deficits in the aspects of communication and, as a consequence, of coordination (White et al. 2008). Sahana, Ushahidi and Google Crisis Map are examples for crisis-related platforms, which are specifically customized for crises and which integrate several web-based applications. They are used by people who are physically present on-site as well as by "digital volunteers" (Starbird & Palen, 2011).

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Twitter is applicable for studying virtual volunteers because it is intensively used during crises and the communication of its users takes place publicly. Therefore many studies focus on the usage of Twitter in crises. While looking into the habits of Twitter users, it was discovered that there are so-called 'information brokers' (Hughes & Palen, 2009), who collect information from various valid sources and pass it on to help victims of the crisis (Sutton et al., 2008). In these exceptional situations, broadcast and brokerage of information play a more important role than in everyday Twitter activities (Hughes & Palen, 2009). The information itself can be classified in four distinguishable types: generative (original), synthetic (synthesizing external information), derivative (as a result of informational interaction) and innovative information (inclusion of cross-domain expertise and interpretation) (Starbird et al., 2010). Another categorization of Twittered contents includes situation update, opinion expression, emotional support and calling for action (Qu et al., 2011). According to the study the attention of these categories shift over time and information is spread differently. As mechanisms of self-organization, resources, activities, tasks and domains are relevant (Starbird & Palen, 2011).

'Retweets', which are re-published tweets by another user, are regarded as an important tool on Twitter and are used as a recommendation system for information and the original author of a message. Local media are valued sources but retweets are used for more specific and local information (Starbird et al., 2010). People, who are not affected or only slightly affected, use Twitter more often than citizens and organizations that are affected much more seriously. The first group may refer to virtual volunteers, the second group more to real volunteers. However, the information generated by those who are not physically involved is of great help to those affected (Sutton, 2010). Starbird et al. (2012) tested the hypothesis that „crowd behaviour can serve as a collaborative filter for identifying people tweeting from the ground" and found that „machine learning techniques […] can be effective in identifying those likely to be on the ground". Although all these papers allow insights on virtual activities during crisis, a systematic distinction between different role patterns is missing, which seems to be important in order to detect possibilities to combine real and virtual volunteers. Based on the illustration of temporal developments the following empirical analysis aims to extend research by creating a possible categorization of those role patterns.

Methodology: Event description and data collection

This study investigates Twitter activity during the 2011 "Super Outbreak". On Wednesday, April 27, 2011, and on the following day, 211 tornados were registered in the USA. More than 340 people died during this tornado crisis. High material damages on houses, streets and cars were reported. According to Governor Bentley, about one million people had no electricity in Alabama. Because of this disastrous situation, rescue forces searched for dead and survivors in plenty of cities. The tornado peaked on Wednesday. Further torrential rainfalls and tornados were recorded on Thursday. The data collected dates from Thursday when several tornados, tornado warnings and tornado watches were active. The number of tornados and the geographical distribution of the warnings and watches decreased in the course of the day.

Our research bases on Twitter data collected with the aid of 'The Archivist' (http://visitmix.com/ work/archivist-desktop/) which uses the Twitter Search API. Our search keyword was "tornado". 79,318 tweets were accumulated which were published between 12:17 (EDT, 2011/04/28) and 03:16 am (EDT, 2011/04/29) and written by 59,282 different users. The timeframe corresponds to the warning phase with current tornado warnings, the emergency phase with active tornados as well as the recovery phase in those areas, in which tornados raged on Wednesday. Information about the user name, the publishing date and the publishing time is available. The abbreviation 'RT' indicates whether a message is a retweet or contains retweets. The term '@username' signifies a possible recipient. The messages are listed in form of an Excel table. Besides the usage of quantitative analytical functionalities, several tweets were selected, read and classified manually with the help of qualitative coding. Because our work aims to derive further requirements for social software supporting emergent volunteer groups, we believe that the aspects of timeliness in a fast changing environment as well as user types including their different behaviours and interests are of great importance. The purpose of this study is made clear by the following questions: (1) Which temporal developments and shifts can be observed? (2) Which behaviours of the Twitter users can be distinguished (role patterns)?

Time Analysis: In order to reveal temporal developments and differences, the messages are divided into one-hour intervals beginning from 12:17 until 01:16 pm. Hence, 15 intervals arise as a result. Moreover, all messages are searched for key words, which can unveil a message's content. Not only is the word itself captured but also those words, which contain the key word.

Identification of Role Patterns: After getting an understanding about temporal developments and contents in help activities, we aimed to categorize users, who are actively involved in these activities on Twitter, and to describe different role patterns. The aim is to figure out which kinds of users need to be supported by social software for emergent volunteer groups. Such a view is lacking in other studies. The relevant criteria are the behavior of the users and the content of their tweets. Because of the high amount of data, we analysed the most

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active Twitter members which may correspond to the active core or supporting circle of virtual volunteers (as outlined by Quarantelli, 1984). Not necessarily all volunteers and activities are of digital origin but this study focused on role patterns of virtual volunteers. We chose those users who outstood by publishing a high number of tweets or by being retweeted particularly frequently. We selected and analysed 41 Twitterers with the most tweets (1982 tweets, 2.50% of all collected tweets) and 51 Twitterers who were retweeted the most (7742 retweets, 22.32% of all retweets). The fact that 22.32% of all retweets were written by only 51 users shows that many retweets focus on very few users, whose information is probably extremely valuable. In total, the 85 most active users were analysed. They are not the sum of 41 and 52 due to overlaps. We searched for structural characteristics. We used open coding (Strauss, 1987) to analyse the material and to uncover interesting phenomena. We tried to find different combinations, which represent attitudes or role patterns, which we could summarize under a short descriptive title.

Findings (1): Temporal Developments

At first, it can be stated that the number of tweets decreases almost steadily. Whereas over 10,000 messages per hour are tweeted on early afternoon, only 5,494 messages per hour are published on early evening and 1,209 messages between 02:17 am and 3:16 am. This development matches the circumstance mentioned above that the number of tornados and warnings decreases in the course of the day. Thus, the higher the danger or the perception of the threat is the more active virtual volunteer groups become. The decreasing number of tornado warnings is also reflected by the declining number of the terms 'warning' and 'tornado watches' (figure 2). A contrary development results when the key word 'help' is searched for. From these opposing trends of warn and help activities it can be concluded that a gradual shift of the activity focus takes place. For virtual volunteers, help activities are especially then of interest when potential threats have faded away.
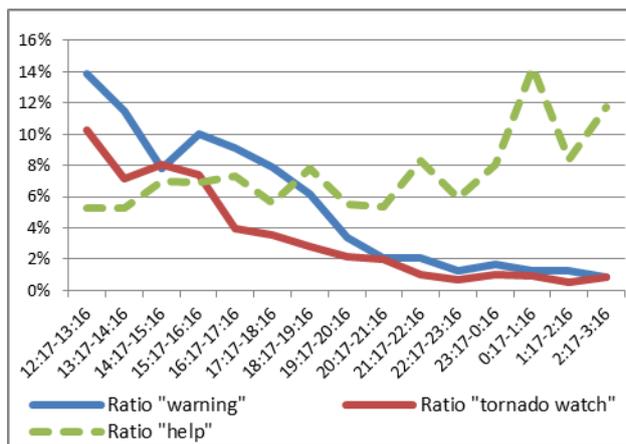

Figure 2: „warning", „tornado watch" und „help": When the help activities begin to shift to the focus, linking external sites increases while the percentage of retweets decreases.
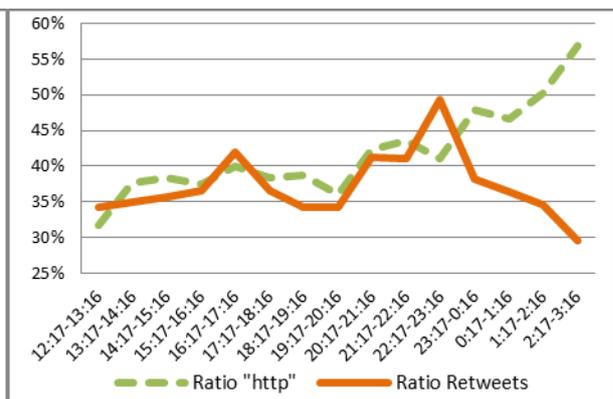
Figure 3: Links and retweets: For virtual emergent volunteer groups, help activities are especially then of interest when potential threats have faded away.

Within the analysis it becomes apparent that retweets and the usage of links play an outstanding role. 39% of the messages contain links and 37% of the tweets are or contain retweets, which are an important instrument for distributing information. When the help activities begin to shift to the focus, linking external sites increases while the percentage of retweets decreases. A possible explanation is that the external offers of news, photos, videos and help constantly grow and, therefore, the necessity of distributing important information recedes. When exploring the contents, to which the links refer, it is noticed that there is a great variety of websites referred to, but no central point for self-help activities exists (figure 3). During the day there were clear shifts concerning the activities. The reasons are not always clear. At the beginning, warnings are in the focus, afterwards the damage reports. The emotional support shows like the entire relief activities, a slight upward trend. The analysis suggests that informing and helping are typical activities of volunteer communities.

Findings (2): Role Patterns

After finding temporal developments we searched for role patterns. Our analysis for role patterns (see methodology) provides four types of users with specific and differencing characteristics. They are given following names: the helper, the reporter, the retweeter, and the repeater. As the categories are not disjoint and users can belong to more than one of them, the sum of their percentage is over 100% (table 1).

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The *helper* is the kind of Twitterer who is involved in various helping activities and can be especially distinguished by their tweet-content. They make emergency appeals, show ways of donating clothes or participating in search and rescue groups, give advice about correct behavior or emotionally support victims. People experienced in crisis give general tips and instructions for the affected. Participants of real emergent volunteer groups use Twitter to publish their status and also belong to the category of helpers. Participants of virtual groups support their activities. Helpers are less fixed on information processing, but are more involved in communicating, connecting with other people and coordinating activities. Because the range of help activities is big, it would surely be possible to divide them in further subcategories, like real or virtual helpers, charity fundraiser or emotional supporters, citizens or organizations.

The *reporter* makes sure that information enters the Twitter-space and provides generative, synthetic and innovative information (see Starbird et al., 2010). They often correspond to organized news channels, which, per definition, cannot be part of an emergent group and can rather be seen as intermediaries between such groups and the official crisis management. It can be stated that media is intensively used as external information source for help activities. Eyewitnesses, who report about the crisis on the internet are an important component of an emergent group and belong to the category of reporters.

Many users concentrate on retweeting information, which was brought in by the reporters, and are called *retweeters*. They distribute the most important information (e.g. emergency appeals, warnings, news, photos), which was generated by other users, to their followers or directly to certain users. Followers are those twitterers who subscribe to messages of other users. The retweeter produces derivative information and is characterized by a high number of tweets. They are not retweeted themselves since they are never the original source. The retweeter may correspond with the already identified 'information broker' (Hughes & Palen, 2009),

The *repeater* possesses only one or very few main messages (e.g. charity appeal, political opinion, important information) which they want to make known to many Twitter-users. In order to be heard, they repeat the message again and again. That is why a high number of tweets characterizes them. The repeater provides generative as well as synthetic information, which they then try to distribute. Amongst repeaters, a popular method is to write to prominent twitterers, who have a high number of followers, in order to win attention.

There is another group which could not be identified by analysing the data but obviously exists: the group of the *readers*. We assume that the readers make up the vast majority of all users. They can be seen as passive participants and consumers of the data the other four groups provide. The readers inform themselves about the crisis situation because they are interested in or even affected by the crisis. Although they do not make any own contributions the great number of readers and the potential switch from a passive to an active participant make them worthy to be considered.

The categories presented here show typical and definable ways of using Twitter as a social platform in crises. The analysis reveals that every twitterer, who is particularly active within a crisis, can be matched to at least one of the categories mentioned above. The combination of a reporter and retweeter can be commonly found, that means a person who focuses on generating and distributing information. Another widespread combination is the one of a helper and repeater. Amongst the reporters, professional news and weather channels are the overwhelming majority. It can be stated that participants of self-help activities seldom exploit all possible means to participate but only cover a partial area, for example, the area of informing about damages or coordinating donations. Furthermore not all Twitterers represent volunteers, but especially the helpers are strongly involved in help activities. In order to detect possibilities for these virtual groups to interact with real volunteers, the next section focuses on their perception by emergency services.

Role pattern	Characteristic	Task	%
The helper	Is often retweeted and publishes many tweets	Involved in help activities	28%
The reporter	Is often retweeted	Generates information	68%
The retweeter	Publishes many tweets	Distributes information	16%
The repeater	Publishes many tweets	Spreads a message	19%
The reader	Reads tweets	Reads information	-

Table 1: Role-patterns of Twitterers

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INTERVIEW STUDY: REAL VOLUNTEERS IN THE PERCEPTION OF EMERGENCY SERVICES

Related work: Volunteers in emergencies

In the previous section we saw temporal developments and a possible categorization of role patterns of virtual emergent volunteers. This section focuses on real volunteers and their perception by emergency services. Several studies address the perception of official emergency services on real emergent volunteer groups. Lanzara (1983) points out that when procedures cannot be pursued effectively in emergencies, the need for higher learning capacities like social identity, deeper socialization, or commitment to action of the society affected comes to the foreground and societies then rely less on formal but more on informal, ephemeral actions. Dynes (2006) adds that emergencies create new social capital (obligations/expectations, norms/sanctions, authority relations, social organizations, intentional organizations) which might be used. Stallings & Quarantelli (1985) state that emergency management has to take emergent volunteer groups into account because these are not necessarily dysfunctional, not inherently in opposition to public authorities and cannot be eliminated by prior planning. A survey with citizens and emergency services (Lorenzen, 2005) presents deficits in the communication between these two groups and in taking self-responsibility. Pfeil (2000) shows regional differences in the structures of emergency management (e.g. collective self-help in Cologne and individual self-help in Bonn). Further differences are found in the acceptance of participation of citizens. In general, official emergency management defines limits for involving citizens. Pfeil (2000) reveals that citizens' initiatives strengthen the willingness for self-help activities. To summarize, the findings of the studies are partly contradictory and show an ambivalent attitude towards self-help on behalf of the officials. On the one hand, volunteer groups are conceived negatively (Lanzara, 1983; Pfeil, 2000) and on the other hand their existence is valued as an essential factor when fighting a crisis (Lorenzen, 2005). Furthermore, it is stated that official plans do not consider self-help (Dynes, 2006; Stallings & Quarantelli, 1985) although, as spotted by another study, self-help is an important part of official relief actions (Lorenzen, 2005). The reasons for these contradictions are probably local and temporal differences. Furthermore most of the research in that field was done before the emergence of social media and virtual volunteers. The following empirical study aims to highlight which points of intersection can be created for a close cooperation between emergency services and volunteers.

Methodology: Research field and data collection

The basis for the data analysis was the result of various empirical works in the application field. The studies were embedded in a scenario framework, which was developed together with actors from police and fire department, county administration and an electricity provider. It includes a windstorm with many incidents and energy breakdowns. The purpose of the scenario was to be able to quickly create a common understanding of an occurring emergency and therefore it helped to increase the validity and comparability in our interviews. One part of our study focused on self-help activities of citizens and on the cooperation with them. We conducted 5 inter-organisational group discussions, each lasted about 4 hours. The aim of the group discussions was to understand communication practice of inter-organisational crisis management. Furthermore, we conducted 22 individual interviews with actors from the participating organisations (table 1). Each interview lasted between 1 and 2 hours and followed a guideline, which was separated into three parts. The first part focused on the participants' role, qualification, tasks and work activities under normal conditions. The second part covered the participants' tasks during emergencies in our developed scenario framework. The third part covered applied information and communication systems and perceived problems with these tools. Group discussions and interviews were audio recorded and later transcribed for subsequent data analysis.

No	Count	Organizatio	Role	N	Count	Organizatio	Role
I1	A	Administrat	Regulatory Authority	I1	B	Fire	Clerical Grade Watch
I2	A	Police	Head of Control Centre	I1	B	Fire	Control Centre
I3	A	Police	Head of Section	I1	B	Fire	Head of Control Centre
I4	A	Police	Patrol Duty	I1	B	Police	Member of the
I5	A	Fire	District Fire Chief	I1	B	Police	Head of Control Centre
I6	A	Fire	Deputy Head of Control	I1	B	Police	Head of Group
I7	A	Fire	Workmanship	I1	-	ENO	Higher Area, High
I24	A	Fire	Head of Control Centre	I1	-	ENO	Operation Engineer,
I8	B	Administrat	Office Civil Protection	I2	-	ENO	Operation Technician,
I9	B	Fire	Chief Officer / Chief of	I2	-	ENO	Dispatcher, Low
I10	B	Fire	Operation Controllers	I2	-	ENO	Workmanship

Table 2: Interviews

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Findings: Real volunteers in the perception of emergency services

From the fire service's point of view self-help should especially take place for rather easy activities: "particularly during heavy rainfalls self-help would sometimes be very helpful; if you know that you keep several things in the basement, you can wipe away 2 cm by yourself. […] Instead of calling us and writing down that you have 2 cm water in the basement." (I05). Activities which can be done by oneself should not be reported to official bodies in order to not unnecessarily impede the fire service's work by reporting bagatelles. One informant mentioned „People call us and say: ‚The road is closed, tell me where I should go now!', and that of course overwhelms us, and of course we cannot do the thinking for so many people" (I06). This shows that self-help is desired by official emergency services and helps to reduce their workload.

Real volunteer groups are also seen as valuable because they often have an information advantage. This advantage consists of a more detailed knowledge about damages and the environment: "*When somebody calls us, who has seen something and then can talk to the operations manager or group leader on site, then we certainly ask whether they live nearby or came around at random or whether they have a gas tank or the like behind their house or what kind of a heating system they have.*" (I07). With digital media, such as pictures, "*citizens cannot contribute to the description of a situation*" (I03), anyway the Police use "*pictures, which were made by reporters, to get appropriate information about the situation*" (I04). According to the fire service, a close cooperation between official emergency services and emergent volunteer groups is hardly realizable, not because of unwillingness or contemptuousness but especially because of a missing legal basis: "*Everything we do must have a legal basis. […] A civil self-help group is not a unit of the emergency service. After all, we couldn't utilize them, even if we wanted to.*" (I06).

A widespread phenomena regarding self-help is mentioned by three fire-fighters (I07, I06, and I09). Collaborative self-help is much more pronounced in small villages than in big cities: "*The more you are in the countryside the more the citizens support each other and the less they call for the state. The denser and more anonymous the population becomes the oftener they call for the state.*" (I09). One describes the attitude as follows: "*There has to be someone who is responsible for clearing my empty basement and ideally for free, because I'm a taxpayer*" (I06). Sometimes people are not willing to help because of legal objections: "*Who is liable for that if I clear the tree to one side, or vandalize a different vehicle?*" (I06). The last quotes already suggest that unduly high expectations from the citizens are seen negatively. In addition, a temporal shift is perceived. A change in the citizen's mentality to pass on the own responsibility to others is complained about: "*You can notice very clearly that the demanding attitude has risen extremely in the last 15 to 20 years. You receive a call that a gully cover is slightly off the mark. Normally, somebody just puts it inside again. But no, nowadays you call for the state.*" (I19). "*We had some cases where trees were reported on the street, which were only thick like one arm. You just need to get out of the car, take it and bring it to the side, then the street is free*" (I06). That is why a higher sensitivity for self-help is recommended: „*It would be in our interest to sensitize the people so that self-help becomes effective again.* " (I15).

Overall it can be stated that official emergency services appreciate the existence and the activities of volunteers. However, they complain about a decreasing willingness of citizens to get involved in such activities and therefore wish to encourage self-help mechanisms. They also appreciate and make use of certain information advantages on behalf of the local volunteers regarding the environment. That means that additional information provided by volunteers can improve the work of emergency services, Because of the missing legal basis it can be assumed that emergent volunteer groups play a rather minor role in the formal plans for dealing with crises.

SUPPORTING COLLABORATION BETWEEN REAL AND VIRTUAL EMERGENT VOLUNTEER GROUPS

The aim of this paper is to describe paths to better connect the overlapping groups of virtual and real volunteers. The Twitter study has revealed developments in the activity focus and has figured out different user types of virtual activities: the helper, reporter, retweeter, repeater and the reader. Especially the group of 'helpers' is involved in real and virtual help activities. The interview study resulted in several findings regarding the perception of official emergency services on real volunteers. Virtual as well as real emergent volunteer groups come into existence in order to fight against the negative effects of a crisis and draw their legitimacy from this activity. The interviews indicate that their existence is also appreciated by official emergency services. Social media is a driver for virtual groups especially to express warnings, to generate and spread information, to distribute offers of help and to generally communicate. Real volunteers utilize such platforms especially for the coordination of their activities by, for example, publishing status reports via Twitter or using more complex forms of social software, like Ushahidi, Sahana or Google Crisis Map.

The procedures that are currently established within virtual and real volunteer groups do not manifest their full potential and provide room for improvement in addressing (a) the missing central point for both virtual and real groups; (b) a coordination platform specifically designed for real volunteer groups and taking those specifics

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into consideration; and (c) the emergency services' perception of decreasing self-initiative regarding real self-help. Social media could be used to support both kinds of groups and to foster their existence. By connecting virtual help communities, which have an increasing importance, with real communities, synergetic effects could be achieved and a necessary strengthening of local self-help could follow. Based on the results of both studies and related work the following implications are proposed and implemented in a web-based software prototype (figure 4), that is connected to an existing emergency management system (Ley, Pipek, Reuter, & Wiedenhoefer, 2012b):

Use of existing social networks: The existence of a social network before the crisis is a condition for the emergence of volunteer groups in the real (Quarantelli, 1984). For virtual volunteers these networks are already established via current social networking services, like Twitter or Facebook. Furthermore they are used as a communication infrastructure, even on-site. A tool for collaboration in crises could theoretically try to create such a network or, even better, make use of existing social networks by establishing connections or building plugins in those social networking services. We decided to develop a prototype connected to Twitter and integrated in Facebook to use existing connections, users and publicity, but isolated from a technical point of view in order to have the data even if the network service is unavailable.

Figure 4: Screenshot of the prototype with groups, activities, tasks and comments (anonymized)

Promotion and awareness: The interview study emphasizes the importance and necessity of promoting self-help activities by exhibiting the wish of emergency services to encourage self-help mechanisms. Awareness about the existence of volunteer groups and knowledge about the possibility to support them can foster their emergence. If volunteers use existing social networks, information is easy to spread. The existence of a crucial event, which is perceived as a threat, is another precondition for the emergence of volunteer groups (Quarantelli, 1984). Our Twitter study shows that the level of virtual activities is strongly dependent on how the threat is perceived: The decreasing number of tornado warnings is also reflected by the declining number of the terms 'warning', which are contrary to the use of the word "help". Therefore, illustrating increasing or decreasing threat could motivate potential volunteers to participate even in the real. Our Twitter study detected four different role patterns, but the probably largest group of user types is that of the readers, who do not actively participate. They could be encouraged to participate, even for small efforts, such as assessing the usefulness of pictures related to a disaster. Furthermore organizations have the possibility to publish information from their crisis management system and ask for (virtual) volunteers.

Connection among volunteers*:* In order to achieve synergetic effects between the virtual and the real, these groups must be internally connected to each other. Virtual emergent volunteer groups could directly support both people affected and real communities by providing relevant information. The system provides the possibility to plan activities and to coordinate actions. In contrast, actors who concentrate on virtual self-help could be encouraged to get involved in real emergent volunteer groups. One approach to foster collaboration is to display users or user-names in a specific way or colour related to the role patterns, based on data about their current usage and their kind of contributions. On-site twitterers, detected by algorithms (Starbird et al., 2012), who need digital or real help would be easier to recognize if displayed. The identification of active users, which are not on-site, but are willing to support on-site helpers or other stakeholders, are other possible use cases. With the help of this, concerns about the reliability of information contributed by anonymous users, as also mentioned in our interview study, could be partly reduced.

Connection to emergency services and systems*:* In our Twitter study we detected that social software handles various kinds of information, e.g. photos, videos, documents or external, medial information, which are important for virtual volunteer groups. Mechanisms to enable the identification of valuable information, for instance, based on the judgment of the crowd (e.g. rather passive users, who do not help on-site), could especially be useful for disaster relief agencies. Therefore social software should support external points of intersection between private citizens and emergency services. According to the results of our interview study, a close cooperation between official emergency services and real volunteers groups currently seems hardly viable. However, the studies show that an exchange or the use of information is reasonable and realistic because of

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information advantages by different groups, such as "the reporters". They sometimes represent news channels, can act as intermediaries and their information is also esteemed by the authorities, as seen in our interview study. A monitoring of the activity of specific roles (on-site; active), as detected in our Twitter study, could be valuable in order to get important and trustful information. The prototype is connected to an existing emergency management system in order to enable emergency services to easier use that information.

Preliminary evaluation results: An intensive participation of potential users is necessary in order to research collaboration potentials. We continuously tested the prototype described above with several users, with different background, social media use and connection to emergency management. Furthermore we did 6 scenario-based walkthroughs using "thinking aloud" (U1-6; age between 22-55; duration: 30-60 minutes). They covered (a) local neighbourly help and coordination as well as (b) virtual activities and information exchange using the prototype. The informants mentioned conditions to use such a platform: own consternation, mobile access, publicity of the platform, and the lack of information from the media. The possibility to use it on mobile devices is crucial (U4, 5). In order to strengthen the trust within the community, it was proposed to expand the profile information with an activity overview (U3, 4): "*I think it would be a good idea [...] to add a crisis relevant timeline to each profile*" (U3). Others suggested to add the possibility to explicit confirm information (U5, 6). Nearly all users mentioned that it is necessary to use geographical representations of the situation instead of simply using text from other social media, and that geo-related information should be summarized based on the location or topic (U2, 3, 4, 5). The possibility to use the application when the internet is unavailable for some time was also mentioned (U4). Therefore the relevant information, based on the own location or profile information, should be downloaded when internet connection is available. Others suggested the installation of virtual contact points in order to be able to request information from authorities or volunteers (U5). A critical requirement that has not been considered is the support for resource mobilization: U6 proposed a central, semi-automated resource location in order to list existing community resources that are already specified and resources required in order to "*have a central point of contact and resources that everyone who needs a water pump, can go there and borrow*" (U6). The perceptions listed above present first insights and show possible concerns and further requirements in collaboration systems for volunteer groups.

CONCLUSION

A research agenda aiming to increase the collaborative resilience of communities has to understand and address all possible cooperation scenarios between the stakeholders involved. In this contribution, we turned to emergent volunteer groups as one of the most volatile social constructs we can observe in crises. We distinguished two kinds: the virtual and the real, which are partly overlapping. There seems to be an obvious contradiction between tendencies of a stronger engagement in disaster relief activities via social media versus a decreasing feeling of immediate responsibility and engagement of real volunteer groups in the perception of professional organizations. We were able to observe and identify different role patterns, and have identified challenges for 'real' emergent volunteer groups that may be at least partially met with the help of social media.

The section of collaborative resilience we were looking into here also made very clear, that aside from improving the technological support, we also have to work on cultural and organizational challenges. Maybe caused by public pressure, authorities react with a strong articulation of 'we are taking care' to the challenges a disaster poses. But that also manifests a division of work between the citizens and professional crisis response organizations that - depending on the nature of the crisis - ultimately will overstrain any resources of professional actors. When discussing the activation of the ordinary citizen as a resource in crisis management, we encountered different attitudes. Collaborative resilience research should also explore and support a gentler slope of responsibilities, expertise and direct engagement in and around crisis management.

This paper presented how synergies between those real and virtual emergent volunteer groups could be fostered through social media. The contributions are (1) the results of a study about the use of social software during a tornado crisis in order to detect different types of user behaviour leading to role patterns (see also Reuter et al., 2012), (2) the results of interviews with emergency services in order to research how emergent volunteer groups are perceived, and (3) concepts for possible synergies between real and virtual volunteer groups (see also Heger & Reuter, 2013) including the preliminary results of the evaluation of a software prototype. Our design implications include to (a) use existing social networks, to (b) support promotion and awareness, to (c) foster connection among (virtual and real) volunteers, as well as with (d) emergency services and systems.

Limitations and future work: The empirical methods we used have limits. The Twitter data we collected does not contain all relevant tweets which were published in the timeframe we analysed. Our methods of analysis could also not capture the exact content of all tweets. However, they allowed us to draw conclusions beyond the literature. The interviews were conducted on a different location than the Twitter data and may not be comparable in all questions. However, they gave us some insights. The prototype was only tested by a few

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users. Open fields of research are supporting the perception of threat as mentioned in the concept, and improving coordination, decision-making and resource-management of real emergent volunteer groups, which have not been addressed here.

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