# Crowdtasking – A New Concept for Volunteer Management in Disaster Relief

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**Abstract.** Based on governmental institutions and strong volunteer organizations, Austria provides a comprehensive and well developed emergency response system. As an important factor for the maintenance of the current quality standard of Austria's protection and emergency system, the further engagement of voluntariness has to be ensured and enhanced in the light of the ongoing societal change. On the one hand, the involvement of new media provides opportunities to expand the organizations' service portfolio to create a broader participation for citizens' engagement; on the other hand, long lasting and formal memberships are often a challenge for the current dynamic lifestyle. To face this situation, the involvement of new media services for volunteer management in order to enable new modes of voluntary binding is a promising strategically effort. A new process called "crowdtasking" dedicated to the improvement of volunteer management applying new media is discussed; new processes of volunteer management are presented by exemplary initiatives of humanitarian non-governmental organizations, such as the Austrian Red Cross.

**Keywords:** crisis and disaster management, volunteer management, humanitarian non-governmental organizations, new media, crowdtasking.

## 1 Introduction

A major concern of current crisis and disaster management approaches is to enhance the resilience of all involved actors such as authorities, emergency services and mainly the affected population in the various phases of the disaster life cycle. As defined by the International Federation of Red Cross and Red Crescent Societies a resilient society is characterized through the abilities to anticipate, manage and analyze their own risks and the development of new procedures to prevent crisis or reduce the damage caused by crisis and/or disasters [1]. In Austria, the National Crisis and Disaster Protection Management (SKKM) is guided by the principles of self-protection on local areas and subsidiarity on higher levels of public authority [2]. Based on governmental institutions and strong volunteer organizations, Austria provides a compre-

adfa, p. 1, 2011.

hensive emergency response system. As an important factor for the maintenance of the current quality standard of Austria's civil protection and emergency response system, the further engagement of voluntariness has to be ensured and promoted in the light of the debate on the societal change. On the one hand, societal change accounts for changing volunteering patterns: long lasting and formal memberships nowadays appear as hardly compatible to the more individualistic and flexible lifestyles taking place particularly in urban environments. On the other hand, it provides opportunities for new and advanced forms of citizen's participation by developing a multifaceted range of voluntary engagement. In the order of preparedness measures, the recruitment of volunteers to mobilize them in the case of a hazardous event is a significant factor to match the requirements of crisis and disaster management. With the term readiness, which describes the ability of an affected society to quickly and appropriately respond when required, the time-critical dimension of crisis and disasters might be expressed very well [3]. Therefore, current disaster risk reduction strategies aim to foster the resilience of the public while at the same time relieving emergency and humanitarian organizations from an uncoordinated influx of information or spontaneous volunteers. As one strategically effort, complementary offers of voluntary engagement is envisaged by humanitarian non-governmental organizations, e.g. the Red Cross, to create loose forms of organization and providing a low-threshold participation offers for potential volunteers. A promising approach to enable such new modes of voluntary binding is the use of new media services for recruiting and mobilizing volunteers.

## 2 Traditional voluntary engagement

In Austria, voluntarism can be regarded as a main pillar of the social system, with volunteers providing services in manifold areas such as education, sports, culture, politics or disaster relief – the latter being the main scope of our paper. While the concept of voluntarism is often bound to national traditions and differing cultural contexts a generic aspect of voluntarism is that the actions provided by volunteers are undertaken of their own choice and motivation without concern for financial gain, and they benefit the individual volunteer, communities and society as a whole [4]. For this paper we refer to broad definitions of voluntarism which address both formal and informal forms of volunteering regardless of their duration (full-time / part-time) or their locality (at home / abroad). While formal voluntary engagement is provided within an institutionalized context (organization, association or other institution), informal forms of volunteering are triggered by individual engagement beyond the context of an organization and are often referred to as "neighborly help". For many years dedicated disaster relief actors in Austria, such as fire brigade or Red Cross have relied on formal forms of volunteering. Thus the typical Austrian volunteer is between the age of 30 and 50, married, Austrian citizen, employed or self-employed and volunteering within an organization [5]. Especially in the younger parts of society as well as on the upper scope (over 50) there is still great and partly un-addressed potential. With societal change mainly younger generations are less willing to bind

themselves to one single organization for a lifetime, but more eager to help in a flexible and task based way, where they can see the results of their doing in their immediate area of life. A phenomenon of informal volunteering particularly specific for disaster relief organizations are convergent volunteers: They are individuals or groups that spontaneously offer their help in the aftermath of a disaster or an emergency and may arrive unsolicited at the scene. Convergent volunteers have not been specially recruited and are not affiliated to the existing emergency management system. They provide service without additional or specific compensation [6]. Just as younger parts of Austrian society seek for more flexible forms of voluntary engagement, convergent volunteers also want to temporarily provide their help in case of an emergency without affiliating to traditional volunteering response organizations. For the response system on the other side, they are still hard to address and pose a major challenge. While not all European response systems may rely on volunteers and must subsequently address societal change, convergent volunteering is a more universal pattern, analogous to more altruistic behaviors like neighborly help, why its relevance is not confined to single countries but is at least a European one [7].

## 3 Existing solutions

There are various examples of existing solutions for volunteer management; mainly in the Anglo-American area various forms of voluntary engagement have been already established. Different approaches to mobilize volunteers by non-conventional procedures will be discussed below to identify starting-points for the Austrian use case. In 2007, an initiative called Team Österreich[1] was established in Austria. Those people willing to become a member of the team have to undergo an extensive online registration process - having an e-mail address and a cell phone is compulsory. After creating an initial profile they have to fill in their personal data, their knowledge and skills and must state what kind of contributions they wish to make (e.g. physical work, administrative help, and contributions only in case of disaster). After a training course they become an active member in case-specific events. By April 2013 about 30.000 people registered in this database and became members of the Team Österreich. This form of coordinating and mobilizing volunteers has several positive effects: The number of people potentially willing to help (potential convergent volunteers), their skills and their location are known to emergency managers. Following the principle of neighborly help, local people respond to local disasters. The knowledge and skills of the members become accessible and usable – as long as they are specified in the database. Team Österreich follows a "bring your own skills"- principle with members bringing in their individual skills and knowledge and only getting a basic training on alarming procedure and deployment. If an event occurs, the alerting and communication process is initiated by an alerting-SMS and an e-mail with detailed information about the emergency mission. Members themselves decide whether they want to be on the mission by replying either with "yes" or "no". Their answers are automatically processed

[1] http://apps.teamoesterreich.at/

and positive requests are immediately seen by Red Cross coordinators. For their time on mission, members have insurance coverage like regular Red Cross volunteers and stand under commandment and supervision of an emergency service officer. Furthermore people are only alarmed when they are really needed – conversely when there is need they will be solicited according to their profile and proximity to the scene. In this way Team Österreich minimizes the convergence to a disaster site, while transforming the potential of voluntary work into a low-threshold structure of coordination and mobilization for those people willing to help only in case of emergency but not wanting to become regularly involved in a voluntary response organization. The projects Team CP[2] and SAVE.regions[3], both launched by the Red Cross are aimed at enhancing the societal resilience. The project Team CP places emphasis on strengthening the voluntary engagement by IT-supported coordination and mobilization of volunteers. The approach of SAVE.regions focuses on transferring knowledge between the emergency aid organizations in Southern Moravia (Czech Republic) and Lower Austria (Austria). The Czech platform TEAM MORAWA[4] provides a service for volunteers to registry themselves for delivering aid in future events. Training courses in the area of emergency assistance are offered to registered volunteers. If an event occurs, registered volunteers will be notified by SMS to deliver low-threshold engagement, e.g. filling sandbags, providing management report. Similarly, the approach of Team MV[5] in Northern Germany, an initiative of the German Red Cross and the Norddeutscher Rundfunk (NDR) works on the principle of an online platform to register potentially volunteers. The focus lies on supporting the emergency staff by low-threshold assistance. Team Morawa and Team MV were launched in the aftermath of the initiative Team Österreich and were coming into practice through co-financed projects funded by the European Union. The Swiss platform Benevol Jobs[6] allocates jobs or single tasks for engaging volunteers. Particularly the service includes location based tasks in the non-profit area aimed at strengthening the capacity of citizen's self-help. The citizen's mobilization at the pre-crisis level appears as a main concern to cause a mutual benefit for the community and emergency services. A process-driven approach including coordination activities, e.g. communication with volunteers is not taken into account. ZiviCloud[7], a web-application providing services for creating and completing tasks for civil society projects enables a flexible temporary management by online and micro volunteering. It supports every user in creating tasks or engaging for jobs, there is no restriction relates to the individuals' legal status. The UN Disaster Relief Report 2.0 asserts that there is the willingness of volunteers to support emergency services in the case of crisis or disasters. During the Libyan conflict in 2011, it was observed, how non trained volunteers had taken on tasks, e.g. translating contents or visualizing of important information from the crisis area on the Libya Crisis Map, via mobile phones and internet [8], [9]. The platform United Na-

[2] http://www.roteskreuz.at/site/team-civil-protection/home/
[3] http://www.roteskreuz.at/site/saveregions
[4] http://www.teammorava.cz/en/who-is-team-morava
[5] http://www.team-mv.info/
[6] https://www.benevol-jobs.ch/
[7] http://zivicloud.roteskreuz.at/

tions Volunteers[8] enabled the recruitment and mobilizing of the majority of the volunteers. In case of crisis or disasters, volunteers receive the opportunity to participate in a tender of several UN organizations. The initiative CrisisCommons[9], organizes training camps for volunteers who are comfortable with technology to support crisis management activities through programming of web sites or blogs, preparing campaigns and developing apps. The platform VolunteerMatch[10] is an American non-profit organization aimed at strengthening communities by bringing together non-profit organizations and volunteers. For volunteers this platform is free to use, while several modes of accounts are available for organizations. Inspired by the concept of virtual volunteering, this organization is focusing disaster-related volunteering by providing tools for corporate volunteer engagement. Subsequent on Hurricane Katrina in 2005, a relationship with the American Red Cross was established. As one innovative product, VolunteerMatch introduced a live map, which displays search activity in its network in real-time [10]. As argued in a Danish project to develop and test a mobile application to engage people in volunteering, the system architectures of many existing approaches are not appropriate to meet the challenge of national voluntarism. Nations have their own volunteering structure, and this particularity is provided by the slogan "every nation extra". In the Danish's approach the focus is set on an open access, this means that both organizations as well as individuals can create new tasks or request, as long as they are registered in the system. The application "can't be controlled by a single cause or organization", and the responsibility for the processing of the tasks is not limited to humanitarian organizations [11].

## 4 The need for new approaches

The described developments and the limitations of existing solutions stress the importance of searching for new, alternative and lasting ways on how to involve people in a response, and more general in civil protection, by developing new flexible and task based offers. Relief organizations dependent on volunteers are exposed to various influences such as globalization, rapid technologic transition, continuous societal change or even the uncoordinated influx of convergent volunteers on-site. One of their major challenges is adapting their structures and offers to these (changing) realities in order to meet the needs of the beneficiaries. In this sense, the described decline of formal engagement in various European countries doesn't mean necessary the end of voluntarism; instead people are becoming more selective regarding the voluntary work. They are willing to spend their time with and are at the same time more critic regarding considerable expenditure of time due to lack of adequate opportunities. The result from a micro-census survey, conducted in 2006, demonstrates the strength of willingness for voluntarism: more than 58% of interviewed people without any voluntary engagement stated, the cause for their non-engagement, was that they haven't been asked for participating [12]. In Austria the tendency for informal and flexible

[8] http://unv.org
[9] http://crisiscommons.org
[10] http://www.volunteermatch.org/

forms of voluntary work is clearly increasing, particularly within younger groups and more in urban than in rural areas where formal membership (i.e. voluntary fire services) is still widely common among young (male) Austrians [14]. Thus the organizations within this field need to adapt themselves to these changing needs of people and provide additional and more flexible offers for people to contribute within disaster relief. Notwithstanding the future informal voluntary engagement in disaster relief should be regarded as an additional offer to the public and support to the existing disaster management system, since informal volunteers cannot provide the same type of activities as dedicated, continuously trained volunteers which are part of the professional response system. One novel approach within disaster management for meeting the above needs of volunteers and addressing the changing realities might be the combination of new media with informal ways of voluntary engagement. In this sense disaster response organizations could seize the opportunities given by new media to bi-directionally communicate with and coordinate a large crowd with little personnel resources and offering people a more task based, time and location independent means of assisting the response.

## 5 A new approach to classify different types of volunteers

As already discussed in chapter "Traditionally voluntary engagement", voluntary work can be classified into formal and informal voluntary services. Formal voluntary services are understood as activities, which are embedded in the framework of organizations, institutions and incorporated associations. In contrast, informal voluntary engagement is given on basis of a personal initiative without an institutional embedment, e.g. neighborly help [15]. Our observations show that conventional types of voluntary work, like permanently engagements in a preferred organization over decades, don't harmonize with recent draws on life in urbanized societies even more. Since some years, more flexible types of voluntary engagement have been requested. As a consequence, emergency organizations have been faced with new challenges, for instance, to redefine formal and informal voluntary engagement [14]. Therefore, new target groups for volunteers' management with different characteristics have to be addressed with new methods. An investigation of the population's willingness to participate voluntarily led to the following classification as illustrated by Fig. 1 below.


**Fig. 1.** Classification of target groups for disaster prevention, coordination and mobilization of volunteers.

The types of volunteers shown in Fig. 1 differ in regard of their degree of binding to an organization. Pre-registered citizens are characterized by their general willingness to participate with focus on a less-formal organization structure and no special training for crisis response. They would be willing to register themselves on a platform, but they don't want to become member of an organization. Pre-organized volunteers are belonging to another category of voluntary group. Although they are not specifically trained and are dedicated for case-specific assistance like the pre-registered citizens, they seem less reluctant for joining an organization. With the introduction of these two analytic categories we can better assess and address the needs of different target groups of informal volunteers, which were formally subsumed under broader categories such as "spontaneous volunteers". The new concept of crowdtasking described in chapter "The concept of crowdtasking" is addressing both types of informal voluntary engagement (pre-registered citizens and pre-organized volunteers).

## 6 The concept of crowdtasking

Depending on the selected volunteer management approach the definition of requirements or demands on volunteers can be rather generic, the way of executing tasks can be left to volunteers. This approach has the advantage to provide everybody from the crowd the opportunity to participate in relief activities but the disadvantage that aspects such as qualification, reliability and credibility of the volunteering group are a priori unknown. This can lead to several problems such as unknown reliability, but also a hardly predictable number of volunteers available in case of incidents making resource planning challenging. Exact definition of tasks accompanied by a registration process may lead to the opposite situation, i.e. smaller number of available volunteers but in average higher degrees of qualification and reliability of the volunteers. In this context a registration process may allow better prediction of the degree of execution of tasks. Moreover, the degree of freedom for volunteers executing tasks, including

the way tasks are specified and the workflow management of tasks is implemented, is also open to the selected strategy of volunteer management. In the frame of this paper we focus on the management of a priori selected volunteers that are managed by processes with low degree of freedoms in process execution, i.e. pre-registered citizens according to Fig. 1. We call this approach Crowdtasking and define it as a comprehensive concept, composed of structures, processes and tools with the goal (1) to build up and maintain an informal community of pre-defined and informal volunteers, (2) to mobilize them when needed, (3) to control their activity and (4) to collect data generated by the mobilized volunteers for enhancing situation awareness of the disaster relief effort as a whole. The following paragraphs describe this concept step by step.

**1. Volunteers Community Building and Maintenance**

The management of the network of volunteers is a basic and continuous process. Therefore, a specific role is dedicated to the continuous execution of this process. We call this role the "volunteer's community manager". As a result of the volunteer's community building and maintenance, a network of registered potential volunteers shall be available, which can be addressed for mobilization. In order to achieve this, the following tasks have to be performed:

- **Community building** – the volunteers community manager promotes the idea and motivates persons to register themselves as potential volunteers, efforts which proved to be the most effective when accompanied by different forms of media campaigning [7]. By registering, they become members of an informal online-community without the need to join an established response organization and undergo specific training.
- **Registration** – volunteers use a web portal to register to the community by providing specific information on their skills and their availability. During the registration phase specific tools allowing the volunteers to perform their tasks are provided, e.g. downloading of a crowdtasking app for their smartphones.
- **Data maintenance** – the data of the registered volunteers are to be stored, updated and secured.

In the course of the community building process, requirements and needs of involved actors play an important role. Crisis managers and emergency services have specific requirements on the type and quality of services they may need from the volunteers. Volunteers themselves do have individual personal needs and motivations. In the context of these needs and requirements, basic information from the volunteers, such as their individual qualifications, limitations, or objections to perform certain kind of tasks can help to improve the quality of the entire process.

**2. Mobilization**

The goal of this process is the mobilization of selected volunteers for the execution of a specific task within the context of the whole crisis- and disaster relief effort. Again,

this process is controlled by a specific role. We call this role the "crowdtask manager". The process consists of the following tasks:

- **Crowdtask set-up** – the crowdtask manager defines and describes the specific task to be performed by the volunteers. This crowdtask will be a single effort, which can be executed within a limited amount of time. Examples are: Taking of two pictures with the smartphone out of the window plus answering a set of short and simple questions after an earthquake. Crowdtasking requires definition and description of the tasks in a concise way including a simple and structured form for reporting. Reporting may involve sending of a picture or ticking of a few selection boxes within a multiple choice system. As part of the preparation phase of crisis management, crowdtasks can be configured and stored in a database for later use.
- **Selection of volunteers** – the crowdtask manager selects a group of volunteers from the database according to the area and the type of task to be performed.
- **Initiation of crowdtask** – the pre-configured or newly defined crowdtask is activated and sent to the selected volunteers after release by the authorized official. The addressed volunteers receive the crowdtask e.g. on their smartphone.

### 3. Crowdtask execution and control of the activity

The process not only includes the activities by the volunteers, but also the interaction with the crowdtasking system and the crowdtask manager behind.

- **Execution of the tasks** – this implies reception and execution of tasks by the addressed volunteers, workflow management of single or multiple tasks and provision of reports. The whole process can be supported by using specific user-interfaces provided by dedicated crowdtasking apps on the volunteer's smartphones.
- **Compensation** – Volunteers may receive compensation. "Compensation" in this context is not referring to monetary aspects since this would contravene the concept of voluntarism, but more to aspects directly related to the motivation behind the engagement of the volunteers. The compensation may include specific "insider" information on the development of the crisis-situation (e.g. location based rain forecast), guidance for personal behavior or measures to be better prepared for an emergency, etc.
- **Information gathering** – all the information gathered from volunteers is collected, stored and processed. The processing of the information has the purpose to derive crisis management relevant knowledge out of the obtained information. This process needs also validation of the obtained information such as plausibility checks.

### 4. Reporting and Visualization

A specific crowdtasking action shall provide its impact not only in the field, but also for the decision making of the emergency management organizations and crisis managers by enhancing their situation awareness. The goal of the reporting process therefore comprises the generation of intelligence from the field out of the data provided by the volunteers. Situation reports are generated and may be forwarded to other or-

ganizations involved into the disaster relief effort e.g. as contribution to a common operational picture. This process is composed of two important tasks:

- **Reporting** – Generation of specific reports and visualizations based on the data received from the volunteers
- **Distribution** – Distribution of reports and visualizations via open interfaces to other organizations.

### Functional blocks of a crowdtasking tool

In order to implement the process described above a system consisting of several functional blocks as shown in Fig. 2 is proposed.

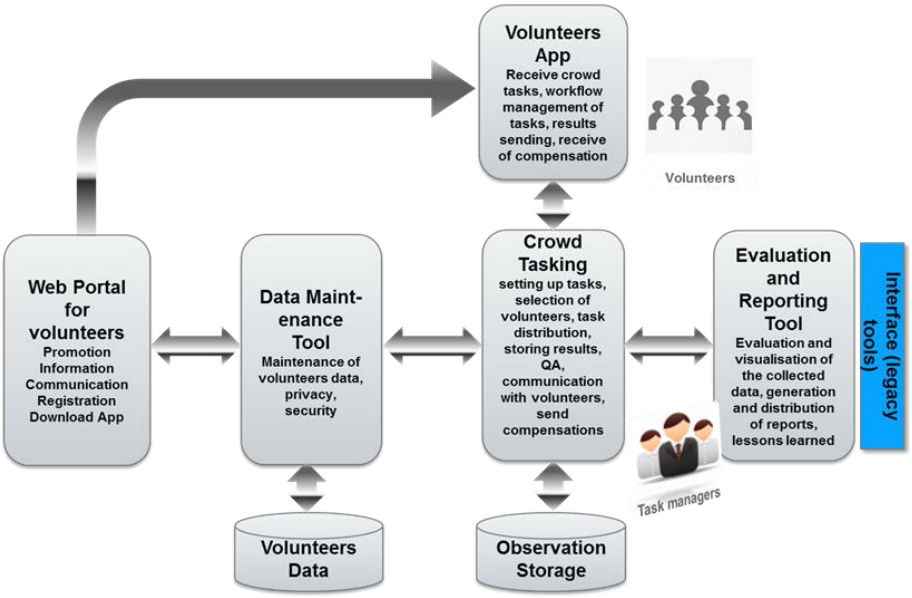


**Fig. 2.** Structural concept of an advanced volunteer management system.

The starting point is a web portal for registration and supervision of volunteers. This portal allows promotion of the approach, communication between existing and potential volunteers and finally downloading of services such as apps. Data obtained via the portal needs to be maintained taking into account privacy and security aspects. Data managed in the maintenance tool have to be stored in an adequate deposit. The core component is the crowdtasking management module dedicated to allow setting up of tasks, selection of volunteers by adequate filter tools, task distribution, storing of results and communication with volunteers in case of incidents. Apart from the crowdtasking management module the mobile application is another major component providing the volunteers the possibility to receive tasks, to ensure an adequate

workflow management, to document the execution of these tasks and finally to establish a communication process with the crisis managers including the possibility to document different types of observations such as text, photos or videos. An imperative pre-requirement the mobile application needs is a well-designed graphical user interface, allowing a distinct workflow of the tasks making the possibility of misunderstandings very unlikely. Finally, there is need to evaluate the obtained information in order to extract knowledge out of it. This encompasses the verification of the information by checking the plausibility, inspecting the credibility of the information provider, filtering, e.g. in terms of relevance, and finally the aggregation of the information. Reporting and storing in a data repository are other requirements to be fulfilled by a crowdtasking system.

## 7 Discussion and Conclusions

The application of the new concept of crowdtasking in the crisis and disaster management is accompanied by several challenges. First of all, there is a need to take into account the acceptance of a future system by the users, i.e. both the volunteers and the volunteer's community managers. The processes have to be designed in a way ensuring that tasks are in line with volunteer's capabilities on one hand and do not require activities incompatible with individual ethic values of volunteers on the other, e.g. collection of sensible private information,. Moreover, readiness to use a future system in case of incidents has to be ensured. For this purpose adequate user interfaces have to be provided and the availability of the service needs to be ensured. In addition, there is need to ensure social inclusion for volunteers from multiple social groups in order to avoid exclusion effects due to parameters such as age, social class or gender. Temporarily and loose forms of voluntary engagement require legal certainty both for volunteers and crisis managing organizations. A major question is the liability in case of accidents of volunteers. Currently, a statutory accident insurance is established to volunteers of one of the Austrian emergency service organizations, when the performed tasks were related either to training, exercise or an operation. In these cases, they are regarded as occupational accidents and are regulated by Austrian law § 176 Abs 1 lit. 7a ASVG [17]. In other areas of voluntarism there is no statutory insurance in the case of an accident, but organizations, which engage volunteers, have the opportunity to insure volunteers privately, wherever necessary. An additional important question is the liability in case of mistakes, e.g. provision of false critical information. Owed to the employee-like relationship between humanitarian non-profit organizations and professional volunteers, the obligation to compensate in the case of volunteer's fault during a mission, is regulated as specified in the employees liability act [19]. The formulation of this law precludes the application to loose commitments without a regular and appointed task area. In this case other alternatives have to be explored to ensure an optimal protection of informal volunteers (see Fig. 1). On the legal side, organizations might need to insure informal volunteers privately, i.e. by procuring an all-in insurance. To avoid many risks a priori, it would be reasonable to follow a strategically approach by defining a limited area of assisting as well as risk-

less activities for those volunteers being not protected by insurance. Furthermore, equality between different social groups has to be ensured. This encompasses several aspects, e.g. developing special offers to female volunteers and the creation of adequate recruitment procedures by considering gender-specific preferences of voluntary engagement. For single mothers, elderly people or people with disabilities, an engagement will not fail due to lack of willingness, but rather due to lack of opportunities caused by multiple constraints such as lack of time or physical limitations. Another very important aspect is to ensure privacy protection. Both critical data of volunteers as well as potential victims from an affected population have to be treated confidentially. A future volunteer management system has to ensure therefore that requirements of data protection laws are fulfilled and, if necessary, requests of volunteers beyond the legal requirements are also implemented in order to ensure the acceptance of the system. In order to test the presented crowdtasking concept the authors intend to implement a demonstrator designed to manage volunteer's contribution for the Team Österreich. Evaluation and analysis of user-specific requirements shall lead to an application focused concept. Validation efforts lead to an improved process concept for the mentioned demonstrator. Based on the outcome of the evaluation of the above mentioned demonstrator, the application and adaption of the developed crowdtasking concept for crisis and disaster management organizations with a similar structure, e.g. the volunteer fire brigade, will be examined. The individual structures and procedures of different organizations with voluntary engagement will require specifically adapted concepts and solutions.

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