

# Using Volunteers for Emergency Response in Rural Areas – Network Collaboration Factors and IT support in the Case of Enhanced Neighbors

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## ABSTRACT

In public services, there is a trend to increasingly utilize collaborations with non-professional volunteers for certain tasks, one example being emergency response. In many of these collaborations, information technology (IT) is an essential tool, and inadequate IT support can have far-reaching consequences—including even the loss of lives. Since a volunteer is a different type of actor, and may have different technical requirements, compared to professionals, there is a need to explore how collaborations between professionals and volunteers can be successfully developed. This paper is based on a case study of the Enhanced Neighbor project, which uses volunteers as first responders in emergency response. The study highlights important factors to consider when involving volunteers, including how IT can foster the collaboration, and the volunteers' needs for IT support.

## Keywords

Emergency response, IT support, volunteers, policy network collaboration.

## INTRODUCTION

In contemporary society, there is a rising demand for increased flexibility, efficiency, and quality in public services. This, in combination with increasing societal challenges has affected the way the public sector is organized, with more responsibilities shared between different actors, who cooperate to deliver services (Agranoff and McGuire, 2010; Wankhade and Murphy, 2012). The way different actors collaborate within for example the area of emergency management can be explained through *policy networks* where social interactions between inter-dependent actors form a network with the purpose to gain more effective public services (Kickert et al., 1997). The collaboration form is sometimes seen as a necessary process in order to adjust to changing conditions and be able to reach innovative and flexible solutions in public sector (Alter and Hage, 1993). In the specific area of crisis management and emergency response, research has highlighted the potential of using volunteers as first responders, since they might be close to the incident site, and can arrive before professional response (Jack, 2005; Linders, 2012; Venema et al., 2010; Whittaker 2015). Specific methods for integrating this type of actor into emergency response have also been studied. Jaeger et al., (2007), for example, present the concept of “emergency community grids,” where local authorities provide mobile technologies, e-services and information systems that volunteers can use to support others during a disaster.

In Swedish emergency response there are currently several emerging policy network collaboration forms. Examples include professions such as security guards, home care personnel, taxi drivers, and caretakers sharing certain tasks and equipment with the municipal fire and rescue services and emergency medical services; the increasing involvement of non-profit organizations; and, last but not least, citizens engaging as volunteers, for

example in sparsely populated areas. Research stress that more knowledge of the actors' needs is required in order to further develop these collaborations and provide improved support. Examples of areas for further exploration include investigating in which type of emergency the volunteers can participate, and to identify needed tasks and responsibilities, skills, training, and organizational structures (Alexander, 2010; Havlik et al., 2016; Pardess, 2008; Schmeltz et al., 2011; Weinholt and Andersson Granberg, 2015; Yousefi Mojir and Pilemalm, 2016). These studies, however, mainly concern volunteers who are professionals engaging in inter-organizational collaborations or spontaneous voluntarism.

Previous research on citizen volunteer engagement (e.g., Diaz et al., 2016; Kawasaki et al., 2013; Ludwig et al., 2015; Palen et al., 2010; Ringh et al., 2011; Romano et al., 2014), thus mainly looks at spontaneous voluntarism in terms of large groups of citizens and/or from the professional response organizations' perspective. It does not specifically explore the needs of volunteers with an end-user, participatory focus. Those practical studies that exist are usually from a crowdsourcing perspective with ad-hoc organization where the volunteers responding could be almost anyone (Harrison-Paul et al., 2006; Howe, 2008; Ringh et al., 2011). In this study, we address this perceived knowledge gap by exploring important factors to consider when involving volunteers as first responders in the establishment of pre-planned, long-term, day-to-day emergency response, including the need for information technology (IT support). We achieve this by analyzing an on-going collaboration between Swedish municipal rescue services and volunteers, actively involving the volunteers as end-users. More specifically, our *research objectives* include:

- identifying collaboration related challenges and needs, such as training, equipment, communication, and IT.
- suggesting some solutions to the identified needs.

The study was carried out within the Swedish Emergency Response System (ERS), defined here as the organizations, personnel, methods, equipment and IT involved in carrying out rescue operations. The specific case studied is the Enhanced Neighbors project where volunteers collaborate with the municipal rescue services long-term to provide help with day-to-day emergencies. To increase the transferability of our findings, we have applied an analytical framework using general theories of policy networks and IT support to frame and support the analysis. As such, the results may be transferable to other actors within emergency management, or even large scale emergencies such as vast forest fires (e.g. regarding recourses and needs), and may also be relevant to other areas in the public sector and a wider IT audience.

## METHODS

In this section, we provide an explanation of the study setting and the research approach, followed by a description of the empirical data collection and the analysis methods applied.

### Case Study

The study is an exploratory case study (Myers, 2009) of the Enhanced Neighbors project, which involves volunteers as first responders to emergency incidents in rural areas. The response context is dynamic whereas different volunteers respond to different emergencies, preconditions changes over time and new needs arise.

At the time of the study, five remote villages in the county of Medelpad participated in the project. Medelpad is a sparsely populated area in the northern part of Sweden consisting of three municipalities, with a population of approximately 125,000 and an area of 7,000 square meters. The rescue services provides basic training in cardiac resuscitation, first aid and extinguishing small fires, and related practical exercises to the volunteers. The volunteers then receive text messages on their personal cellphones when there is an emergency in their village area, and are free to choose whether they want to act on the alert provided by SOS Alarm (the national alarm centre). If they decide to respond, they can provide assistance while waiting for the rescue services, e.g. by keeping a victim's airway open, or extinguishing a small fire.

### Data Collection

During approximately one year (2014-2015), we employed several different types of data collection methods, including interviews, focus groups, document studies, a future workshop, and an exercise (Kensing and Halskov Madsen, 1991; Myers, 2009). Our goal was to use different data sources to achieve the triangulation and multiple perspectives usually associated with the collective knowledge creation, enhanced understanding, and credibility of case study research (Flyvbjerg, 2006). Our goal was also to involve the volunteers actively and concretely. Several data collection methods, e.g. the focus groups, the future workshop and the exercise, foster dynamic and active user participation.

Interviews were performed with volunteers (three focus groups and one interview), the municipal rescue services and SOS Alarm (six interviews). In addition, a future workshop specifically aimed to enable active user participation was arranged with 11 participants (three rescue service professionals and eight volunteers) to discuss the volunteers' situation and needs for improvements. The interviews and workshop were documented with written notes, and audiotaped for further transcription and analysis. An exercise involving a simulated single-car traffic accident with three injured—one cardiac arrest victim, one person trapped in the wreck, and one person in chock with minor injuries—was also performed in one of the villages. Volunteers, as well as professional fire and rescue services, were dispatched to the site. The exercise was filmed, audiotaped, and observed by two researchers on site and one at the emergency center. After the exercise, an after action review was held with volunteers, the fire and rescue services, and the call operator/dispatcher from SOS Alarm.

### Data Analysis—ICT collaboration through a Policy Network Framework

Our study focuses on a collaboration between rescue services and volunteers aiming to improve the local emergency response – i.e. a policy network to improve the local safety. The emphasis is on what the volunteers need in order to be successfully integrated into the response operations.

Initially, we read through all the transcribed scripts and notes from the data collection, and from there, using thematic analysis, implicit and explicit ideas and patterns were identified (Guest et al., 2012). These were then structured with the support of a conceptual analytical framework containing different factors of policy networks. The framework emanates from collective action theory, with reference to the institutional analysis and framework development (Carlsson, 2000). It has previously been tested and applied to collaboration in local crisis management (Palm and Ramsell, 2007). For this study, we adapted the framework by removing two factors that were incompatible with our research, and another that overlapped with other factors within the study context. Also, the factor of IT support, was added to the framework. Finally, challenges and needs associated with each factor, as found in the data, were identified, and solutions were suggested. The complete analytical framework is composed of four factors:

- Problem Definition
  - Policy networks emerge and are shaped depending on the definition of the policy problem in question. In our case study, this means how the project was defined and how the scope of the collaboration is described and perceived.
- Contextual Factors
  - Policy networks emerge and are shaped differently in different contexts. This include how contextual factors such as demographics, resources, skills, and social relations influence the development of the collaboration between the actors, e.g. the rescue services and the volunteers.
- Formal and Social control
  - Networks are subject to both social control, emerging from the processes of interaction between the actors, and formal control, which can stem from regulations, agreements and laws. Here, this involves investigating which kind of control factors that affect the volunteers' engagement, and if these can influence the development of the collaboration.
- IT Support
  - IT is an essential tool for collaboration between actors, since it facilitates information and knowledge handling in networks (Margetts, 2005). As such, IT can foster collaboration. Especially interesting for our study are the IT needs of the volunteers, and if IT plays a facilitating role in the collaboration.

An overview of the framework is shown in Figure 1.

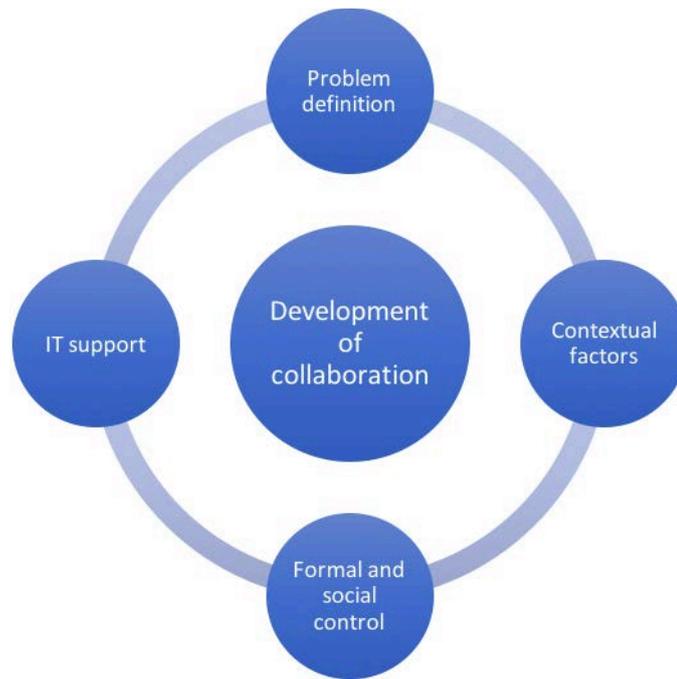


Figure 1. Adapted analytical framework based on Carlsson (2000)

## RESULTS

In this section, we present and analyze identified important factors to consider when involving volunteers as first responders. Each sub-section starts with a general analysis of how the project has managed each factor in the analytical framework. Thereafter the challenges, needs and solutions relating to respective factor are analyzed.

### Problem Definition

Both rescue service officials and volunteers involved in the Enhanced Neighbors project defined the problem in the same way: geographical distances made emergency response times unacceptably long. Before the rescue service arrived, residents' lives could be at stake, and serious material damage might occur. Without the ability to employ more staff and expand their own organization (due to scarce economic resources), the rescue service needed external (free of charge) support: volunteers. The volunteers, on their part, were clearly aware that, despite Swedish legislation requiring fire and rescue services to deliver equivalent service, this was difficult in their villages. By collaborating with the rescue services, they could increase safety for themselves and their neighbors. The collaboration between the rescue service and the volunteers seemed to be clearly defined. When volunteers were asked what was expected of them, a common reply was "To arrive quickly at the emergency site and do whatever you can" (volunteer, focus group). Some respondents, however, expressed concern that this collaboration might result in even less support from the rescue services:

*If there is high [volunteer] engagement in one village, the rescue service might prioritize another [village] if there are several emergencies at the same time... (volunteer, focus group)*

To define the assignment, the rescue service compiled a list of emergencies that volunteers could be dispatched to: heart failures, traffic accidents, drownings, and selected fires. All these incidents are urgent and require an immediate response, and it is also possible to provide initial assistance without professional skills in medicine or rescue.

### Challenges—Redefining the Assignment and Addressing the Lack of Practical Experience

One challenge relating to the understanding of the assignment was that, at the time of the study, many of the volunteers had not yet responded to a real emergency, since these seldom occur in small villages in sparsely populated areas. They understood the overall assignment, but several had no real experience of performing concrete emergency-response-related tasks. Even though the volunteers themselves said that their

responsibilities in potential incidents were relatively clear, in the course of the study it became evident that several central issues were still undefined. It was not clear for example, if the volunteers were supposed to respond to an emergency by themselves: “No, of course you don’t want to go by yourself; you need to have someone else with you...” (volunteer, focus group) and there was no structured way of knowing anyone else was going.

To compensate for the volunteers’ lack of experience, practical exercises relating to the list of emergencies were conducted jointly with the ambulance and rescue services, e.g. carrying out cardiac resuscitation and extinguish small fires. Challenges observed during the exercise in the case study included uncertainty on the part of the volunteers in terms of the distribution of tasks, such as when and how to hand the operation over to the rescue services, inability to know the number and identities of volunteers responding to the alarm, and the lack of information regarding when the rescue services would arrive. Furthermore, there was no way of knowing who had done what at an emergency site, resulting in the risk that some tasks were left undone, while other tasks were repeated. All of this created uncertainty for the volunteers.

#### *Needs and Solutions—Exercises and Feedback*

*Hands-on exercises:* The “hands-on” exercise performed as part of the study (i.e. the simulated car accident) proved useful in clarifying concrete tasks and responsibilities. The volunteers wanted to have more exercises. The rescue services, on the other hand, struggling even to provide basic training and education, hopes that the volunteer groups gradually will become more self-sufficient. A possible solution might be for already-educated volunteers to become responsible for conducting small drills in between the exercises run by the rescue services, in order to maintain the volunteers’ preparation levels.

*Feedback/debriefing:* The volunteer respondents also requested procedures for post-emergency feedback and debriefing in order to clarify tasks and identify further needs. Some volunteers also felt that it was vital to talk to someone, to help them feel emotionally and psychologically ready to respond to future emergencies.

#### **Contextual Factors**

The structural context is the Swedish ERS while the physical context is Medelpad county. Among the volunteers, there are many long relationships: several have known each other for more than 20 years, and spouses and parents with their adult children also participate. Some of the volunteers have ERS related skills, and feel they can contribute to increasing the village’s safety. In addition, several of the volunteers are middle aged or older, and recognize their own vulnerability:

*Because of our age, we belong to a risk category, and that also contributed to our motivation to become volunteers (volunteer, focus group)*

For some volunteers, the health and property of the village’s inhabitants seemed to be more important than helping strangers. They were not very interested in responding to traffic accidents on the highway, for example, even if they could reach the accident site faster than the rescue services. This points to another reason for volunteer engagement: contributing to the village’s “survival.” Public services in many villages have decayed. The volunteers perceive the Enhanced Neighbors project as a positive development, with the installation of an automatic external defibrillator (AED) in the village being one concrete example.

In terms of the volunteer group context, some groups were created in connection with the project, while others were pre-existing, including voluntary fire brigades and part-time firefighters. Other volunteers had been engaged in different sorts of village communities involving both social activities and safety activities, such as fire prevention. An early project strategy was to recruit, wherever possible, already-established groups of volunteers in order to facilitate the collaboration.

#### *Challenges—Resources and Inter-Agency Collaboration*

The contextual factors have also generated specific challenges. Since many of the volunteers work during the day, for example, the rescue services had to provide education and practical exercises mainly on evenings and weekends. Both the rescue services manager and staff reported that working in their spare-time was stressful. The amount of residents interested in volunteering was also higher than anticipated, and even though it was commonly agreed that it would be better to start with a limited group, there was frustration within the rescue services when the development and expansion was hindered by a lack of resources. “The thing is, we started this project basically within the existing budget” (interview with rescue manager responsible for the project).

### Needs and Solutions—Personnel Resources

*Adding personnel resources:* To create a feasible work environment for the rescue service staff, additional employees need to be allocated to this and similar projects. The rescue service had already realized this when we conducted our study, but there were delays due to organizational restraints.

### Formal and Social Control

There are not many formal agreements between the actors. SOS Alarm and the rescue services signed an agreement for the alarm company to receive a fixed amount of money for sending emergency response alerts to the volunteers. Another agreement involves SOS Alarm to develop and adapt their current decision support system for dynamic resource allocation for incoming emergencies, and here the rescue services wish to integrate volunteers as resources. There is no formal agreement, however, between the rescue services and the volunteers. The volunteers have no obligation to respond to an emergency. Despite this, according to the rescue services, at least one, and usually several volunteers have responded to all emergencies to date, and have arrived swiftly, reaching the emergency sites before the rescue services: “The first alert I received, I arrived 45 seconds later at the site—it was just across the street” (volunteer, focus group).

### Challenges—Volunteer Safety and Degree of Collaboration Structure

One challenge generated by the collaboration is the voluntarism itself: Since volunteers are free to decide whether or not they will respond to an alert, the rescue service cannot rely on them—they are only a complement<sup>1</sup>. According to the rescue services, this is within the core idea behind Enhanced Neighbors. As one of the employees explained:

*... an ordinary private person with no special obligations or rights, receives information about an accident nearby, and can decide whether or not to go and help (rescue service professional, interview).*

This definition of the volunteers is problematic, since Swedish law on this matter is unclear, and legal protection for the volunteers is insufficient. If a volunteer is injured during a response operation, or cause damage to victims, material or property, he or she has no specific insurance coverage. When asked about current regulations and insurance, the rescue service project manager only mentioned the volunteers’ own personal home insurance. The rescue services had thus not verified if volunteers have appropriate insurance. As for the volunteers themselves, the question of insurance seems to be a non-issue; it was the researchers who brought it up during the interviews.

In addition, the volunteers are not financially compensated for any expenses they may incur in relation to a rescue operation and need to make their own investments as to basic equipment (ranging from defibrillators to first aid kits to blankets). Initially, they seemed untroubled by this. But as the collaboration lengthened and their expenses increased, they requested some sort of economic support. One of the defibrillator components must be exchanged after each use, for example, and costs approximately 200 euros. Overall, the volunteers want the collaboration to be more structured. The rescue services, however, wants it to remain as informal as possible, with the volunteer groups eventually evolving into more self-sufficient entities. Building up an administrative structure for the collaboration that requires resources to maintain is not an option for the rescue services.

Another challenge relates to privacy and ethical issues. The Swedish personal data act stipulates that names of accident victims cannot be provided in the SMS alerts or via any IT solution the volunteers can access. As a result, volunteers use the Internet to find out who lives at the address they receive in the SMS alert. Even if this information were openly available, and conformed to the regulations, however, it may pose ethical dilemmas, since people may not be willing to help, or receive help from, someone they have had differences with in the past. The other way around, respondents in one focus group mentioned that they were more willing to respond to an emergency if they knew the victim.

### Needs and Solutions—Availability Issues, Insurance, Basic Equipment and Ethical Aspects

*Dealing with uncertain availability:* As there is currently no way of knowing in advance which of the volunteers that are actually available any technical support developed needs to be accompanied by a strategy that addresses

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<sup>1</sup> In Sweden there is no legislation for a general obligation to assist a person in distress, e.g. see SOU [Swedish official investigation] 2011:16, Allmän skyldighet att hjälpa nödställda? [General obligation to assist distressed?]

this uncertainty. For example, such a strategy might be to confirm which and how many volunteers that have responded to the emergency alert and dispatch additional volunteers if those first alerted acknowledge that they will not go.

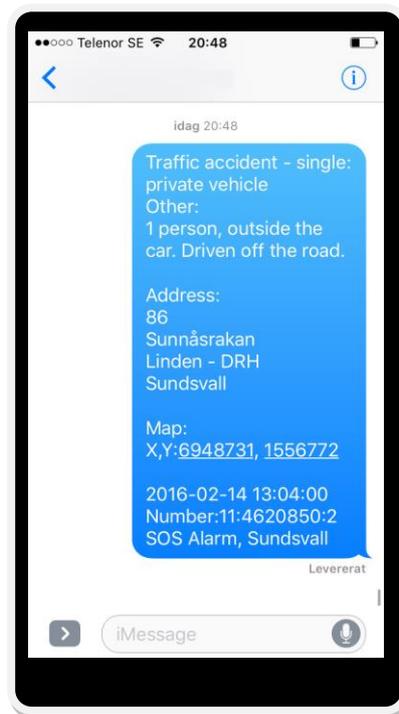
*Insurance:* A juridical investigation conducted in connection with our study clearly showed that volunteers do not currently have sufficient legal protection. The rescue services and/or municipalities clearly need to provide collective insurance for the volunteers, possibly with support from small local insurance companies.

*Need for basic equipment:* Above all the exercise demonstrated a clear need to invest in medical equipment, such as first aid kits and blankets, and practical equipment, such as flashlights and reflective vests. The question is who should pay; the volunteers or the rescue services? Either solution has drawbacks as to structure versus informality. The rescue service may need to support the volunteers to some extent in order to keep them engaged.

*Privacy and ethical aspects:* Even if formal regulations concerning privacy remain in place, and ethical guidelines concerning whom to help—due to the voluntary character of the project—are difficult to define, discussions with volunteers about the ethical dilemmas that may arise are needed. These could be incorporated into the volunteer education and practical exercises.

## IT Support

The current IT solution is a very basic system in which volunteers receive an alert in the form of a simple text message to their personal cellphones (see Figure 2). There is no current integration with the national digital emergency communication system, Rakel, nor with SOS Alarm's decision support system for dynamic resource allocation, and therefore limited communication and no positioning functionality.



**Figure 2.** Example of an SMS alert, translated from Swedish

### *Challenges—Absence of Important Functions and One-Way Communication*

All actors—rescue services and SOS Alarm employees, as well as volunteers—agreed that using SMS technology, while not an optimal solution, is the only solution available at present. However, its functions are much limited, presenting many obstacles to communicating and collaborating with the rescue services. Above all, SMS is a one-way communication solution. Volunteers are unable to indicate if they will respond to the emergency, nor can they communicate with the ambulance or rescue services either en route or on site. The only option available to them is calling the 112 national emergency number, a situation that both volunteers and the rescue services viewed as problematic.

In addition, the lack of positioning functionality clearly affects the viability of the current SMS solution. At present, volunteers receive an alert regardless of their current location—even, for example, if they are on holiday in another country. Conversely, a volunteer might be in another village—visiting friends, for example—where an accident occurs, and not receive an alert since he or she is not registered in that particular village. There is also the risk that a volunteer will not immediately observe an emergency-related SMS, since there is no specific signal indicating an emergency.

Although the rescue services had been promised that the volunteers would be integrated into the dynamic resource allocation system soon, there were delays in development from the supplier, SOS Alarm. In order to provide an interim solution, the rescue services tried to find another supplier, and located a company within their budget. This supplier, however, was not allowed to take on the rescue services as a customer, since company policy allowed them to take on only private, non-government clients. As such, the rescue services and volunteers are forced to wait for SOS Alarm to finish the integration work. This also relates to the formal control factor, since the rescue service's status as a governmental organization restricted them to one supplier, delaying the development of IT support, and hindering the collaboration between the rescue services and volunteers.

### *Needs and Solutions—Two Way Communication and other Necessary Functions*

*Expanded SMS communication functions:* Many of the communication challenges can be addressed by simply improving the SMS functionality, including the ability to acknowledge receipt of the alerts and communicate with the rescue services en route and at the emergency site. The volunteers also proposed having access to a direct telephone number to the rescue services, though current regulations need to be studied to see if this is permitted. More structured forms for communication among the volunteers themselves (to know who is on the way and who brings the relevant equipment) were also requested and can be sustained by various chat functions.

*Technical integration with professional response organization's resource management system:* Technical integration with SOS Alarms' decision support system for dynamic resource allocation would make it possible to manage the volunteers as professional resources, including positioning, dispatching and communication. This would e.g. solve the problem of not knowing how many, or who, that responds to an incident.

*GPS positioning:* The ability to geographically locate volunteers is clearly needed, so that only those volunteers who are actually near the emergency site are alerted. As mentioned above, this, however, requires integration with the professional resource management system. Meanwhile, the volunteers want to be given directions to the incident site, since sometimes it is difficult to find the way. A link to Google Maps with driving instructions to the emergency site could easily be integrated into the SMS.

*Mobile checklists:* The volunteers request mobile checklists that include information such as telephone numbers, and what equipment to bring when responding to different types of emergencies. An application providing instructions for CPR and first aid was also suggested, however the volunteers underlined this should not replace direct communication with the rescue and ambulance services.

The challenges and solutions connected to each factor important for development of collaboration are summarized in Table 1 below.

## **ANALYSIS**

In this study, we set out to explore collaboration and needs for IT support when establishing long-term policy networks of pre-planned voluntary engagement in day-to-day emergency response. Even though IT needs and requirements thus were part of our focus, the results indicate that these are not substantially different comparing to those of professional end-users. Surely, the volunteers may have some specific needs such as checklists and SMS group chats compared to the professionals. However, the most prominent critical factors identified in the Enhanced Neighbors project concerns the social and organizational context of the technical solutions. Even though the project had been in progress for half a year, and some volunteers had been dispatched to real emergencies when we started the study, they did not have insurance, basic equipment or routines for feedback. In addition, the rescue services had to adjust to the volunteers' availability to perform education and training, and do this during evenings, i.e. they had to have a dynamic and flexible organization. There were also uncertainties about tasks, responsibilities, regulations, and legal issues, as well as the challenge to educate the large amount of volunteers who signed up (in order to maintain interest), in combination with finite resources.

Another critical factor was the need to develop emergency strategies handling uncertainty of volunteer's ability and willingness to respond. This may be compared to professional response organizations whose personnel who will always respond, if dispatched. Not even the challenge of integrating the volunteers in the rescue

services' IT-system were actually a technical issue; it was rather about organizational boundaries, regulations and administrative hindrances. Consequently, the technical solution became very simple and low tech and did not meet the volunteers IT needs. As such, the current IT solution can be said to be an important pre-requisite for the collaboration, but not actually fostering it.

<i>Factor</i>	<i>Result</i>	
	<i>Challenges</i>	<i>Needs and Solutions</i>
Problem Definition	<ul style="list-style-type: none"> <li>- To define and continuously redefine the assignment, as well as clarify the expectations, for volunteers in a dynamic context.</li> <li>- Lack of experience from real emergencies.</li> </ul>	<ul style="list-style-type: none"> <li>- Practical hands-on exercises.</li> <li>- Routine for feedback/debriefing.</li> </ul>
Contextual Factors	<ul style="list-style-type: none"> <li>- Contextual hindrances e.g. organizational borders.</li> <li>- Stressful for the rescue service to devote spare time.</li> <li>- Lack of staff resources to enhance the development.</li> </ul>	<ul style="list-style-type: none"> <li>- Additional employees to be allocated.</li> </ul>
Formal and Social Control	<ul style="list-style-type: none"> <li>- Lack of agreements between the parties; the rescue service cannot rely on the volunteers to respond.</li> <li>- Insufficient insurance coverage of the volunteers.</li> <li>- No financial compensation for expenses, e.g. equipment.</li> <li>- Open but sensitive personal information used by the volunteers.</li> </ul>	<ul style="list-style-type: none"> <li>- Strategy dealing with uncertain availability</li> <li>- Collective insurance for the volunteers.</li> <li>- Economic support to the volunteers to keep them engaged.</li> <li>- Discussion about privacy and ethical aspects.</li> </ul>
IT Support	<ul style="list-style-type: none"> <li>- Difficult to develop and integrate adapted IT-support.</li> <li>- Limitations in the current IT-system functionality.</li> <li>- One-way communication—volunteers cannot communicate/ask questions to the rescue services during a response</li> </ul>	<ul style="list-style-type: none"> <li>- Acknowledge receipt of the alerts; enable two-way communication between volunteers and rescue services.</li> <li>- Integration with the decision support system for dynamic resource allocation.</li> <li>- GPS functionality; link to Google Maps; mobile checklists.</li> </ul>

**Table 1. Development of collaboration – summary of important factors structured by challenges, needs and suggested solutions**

## CONCLUSION AND FUTURE WORK

In contemporary society, reduced professional resources in combination with increasing societal challenges have led to an increasing trend of including citizens in public services—for example as first responders in emergency response (Diaz et al., 2016; Jaeger et al., 2007; Pilemalm et al., 2016). Even if the challenges and needs for improvement regarding such involvement have been in focus in this study, the Enhanced Neighbors project is still deemed a successful example. Here, actors other than public actually perform functions—respond to alarms and carry out tasks at the emergency site—to contribute to higher quality in public services. This form of self-government can, if carried out successfully, increase the safety of both the volunteers and their neighbors (Bekkers et al., 2007).

However, pre-planned, long-term and structured collaboration with volunteers also bring additional substantial intricate issues compared to other emerging forms of collaboration in emergency response, e.g., inter-organizational among professionals and cross-sector collaboration among professionals and semi-professionals. The reported challenges of identifying tasks and responsibilities, skills and organizational structures in such settings involving e.g. guard companies and home care personnel (e.g. Weinholt and Andersson Granberg, 2015; Yousefi Mojir and Pilemalm, 2016), become even more complex in the case of volunteers. This is much due to

that they do not have any organizational belonging and no formal employer—they simply have no basic structure for the collaboration. It also results in entirely new challenges, as to alarm strategies, regulations and legal issues and IT integration. Also, the volunteer long-term establishment of policy network collaboration requires other solutions in the above aspects as compared to crisis management relying on crowdsourcing and ad-hoc organization. On the other hand, some of the results, above all the concept of using (the same) trained and pre-equipped volunteers both for day-to-day emergencies and in large-scale crises seem applicable, and also the need for two-way communication (Havlik et al., 2016).

When citizen volunteers act as first responders, they thus need to be provided access to, and be integrated in, the public organizations' information systems and IT tools, such as their decision support systems. This means that they should be actively involved in development of these same systems. As part of this study, we set out to explore whether the IT support used could be seen as fostering the collaboration. This was not really the case. Actually, even though the project had been running for some time, many concrete needs (IT and other) were not identified until active user participation was enabled. The importance—and difficulties—of involving the end-user has been emphasized many times in earlier research (e.g. Holgersson and Karlsson, 2014). It has also been argued that the overall complexity and difficulties associated with active user participation increase in the case of using volunteers in public services, including emergency response (Pilemalm et al., 2016), requiring further study. In conclusion, the concept of establishing long-term and regular involvement of volunteers in day-to-day emergency response thus seems to generate specific research issues to be dealt with, regarding both the policy networks themselves and the associated IT support. Within the context of Enhanced Neighbors, we will study the integration of the volunteers into the professional emergency resource management system further. We will also apply drawn conclusions and experience from the project to other similar projects in Sweden, but in urban settings and socio-economic vulnerable areas.

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