Digitalized Cross-Sector Collaboration for an Effective Emergency Response: Emerging Forms of Network Governance

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Abstract Digitalization has transformed the public sector and ICT has enabled the pooling of emergency response resources. Here, we explore and compare three cases of cross-sector collaboration: co-location, co-use of resources, and semiprofessionals as first responders. Identified opportunities include shared facilities and equipment and a positive attitude toward the new collaboration. Challenges include undefined roles, responsibilities, difficulties in prioritizing among ordinary and new tasks in resource-strained organizations, and lack of legislation and agreements. Reported needs are related to improved training and joint exercises and to trauma support and basic supplies, e.g., blankets, reflective vests, and warning triangles. ICT suggestions included, e.g., systems for errand handling, joint assessment of information, status and acknowledgment of available and dispatched resources, and smartphone-based dispatch management. The emerging collaborations can be seen as hybrid forms of government and network governance. Network governance may thus support the development of their institutional aspects but needs to be complemented with practical elements relating to the emergency response context. We also argue that ICT as a key factor enabling collaborations must receive more attention in network governance, which is currently the case.

Keywords Emergency response · Digitalization · Information and communication technology · Cross-sector collaboration · Network governance

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Introduction

In recent decades, the public sector across the world has had to deal with increasing challenges, natural disasters, increased socioeconomic gaps, urbanization with depopulation of rural areas, aging populations, migration streams, war, and terrorism (e.g., Haddow et al., 2013). This has taken place against a background in which the sector has often experienced substantial financial cutbacks and resource shortages. In early 2020, the ongoing Covid-19 pandemic struck globally, both putting an increased pressure on emergency response organizations and through its enormous costs and further contributing to strained public sector budgets. Emergency response organizations, at the same time, have to deal with the increasing frequency of extraordinary events, crises, and catastrophes, e.g., due to climate change, and must continue to respond to everyday frequent emergencies, for example, traffic accidents, fires, drownings, heart failures, and criminal actions. This puts a tremendous strain on contemporary response organizations and will continue to do so in a financially strained environment and a context of scarce personnel resources.

One way to cope with these societal developments is to create cross-sector collaborations combining resources from different sectors, including private organizations, various public organizations, nongovernmental organizations, and civil citizens. Cross-sector collaboration has been applied in a range of areas, for example, addressing climate change, environmental protection, tackling poverty, natural resource management, bridging the educational achievement gap, and crisis and emergency management (Agranoff, 2007; Agranoff & McGuire, 2010; O'Leary & Bingham, 2009; Bryson et al., 2006; Vigoda, 2003). As for emergency response, using security officers in the USA to assist in life-threatening emergencies is one example (Valenzuela et al., 2000). Patton (2007) listed several possible groups that are helpful in completing and strengthening local capacity to deal with emergencies; for example, subject-matter experts, community-based organizations, social service agencies, civic groups, private businesses, and media organizations. In Sweden, groups such as guard companies, nurses, taxi drivers, and civil volunteers have been engaged in various collaborations with the municipal rescue services, the national alarm center, and the police (e.g., Pilemalm & Yousefi Mojir, 2020; Pilemalm, 2020; Ramsell et al., 2017).

Cross-sector collaborations have been studied from various perspectives and employing different theories, including network governance coproduction, policy networks, and new public management (e.g., Pestoff et al., 2013; Agranoff, 2007; Carlsson, 2000). "Network governance" and "cross-sector collaboration" are terms that are actually sometimes used interchangeably in the research literature (e.g., Agranoff, 2007; Jones et al., 1997). From a theoretical perspective, it is thus possible to see the emergency response collaborations as an emerging form of network governance, i.e., autonomous partners engage in addressing a common issue or problem, insufficient professional first-response resources, and joint delivery of public services through horizontal networking and the sharing of resources (Klijn & Koppenjan, 2012; Jones et al., 1997). Network governance does assume or explicitly

include ICT as a key factor enabling the collaborations. There are, however, studies that focus on the relation between ICT and network governance (e.g., Loukis et al., 2016). There are also studies that argue that perspectives taken from the information systems (IS) research field are increasingly needed to complement policy science and public administration at a general level (Melin & Wihlborg, 2018; Janowski et al., 2012; Dawes, 2009). In our previous research, we argue that emerging governance forms are rather enabled by governments' digitalization and access to ICT and argue that more focus should be given to the ICT artefacts themselves (Pilemalm & Yousefi Mojir, 2020; Yousefi Mojir & Pilemalm, 2016).

In the domain of emergency response/cross-sector collaboration, most studies have focused on such aspects as medical issues (Weisfeldt et al., 2010), economics (Weinholt & Andersson Granberg, 2015), technological improvement (Jaeger et al., 2007), or on the general effect of the collaborations (Drezner et al., 2009), mainly in relation to large-scale emergencies and ad hoc organization. Our own research has also included accidents on a smaller scale and includes collaboration opportunities, challenges, and the need for support as well as on the related business and development processes (e.g., Yousefi Mojir and Pilemalm., 2016; Yousefi Mojir & Pilemalm, 2014; Pilemalm et al., 2013). However, to enable the development of more systemized knowledge and general conclusions, it seems crucial to compare various collaborative initiatives, identify similarities and differences, and relate them to factors such as steering mechanisms, policy analysis, and juridical matters and to basic needs for training, equipment, and ICT support. Also, there are scarce, if any except our own, studies that explicitly connect network governance and emergency response to the digitalization/ICT perspective. Finally, it should be of interest to connect the application domain to theory and a broader public sector perspective where ICT is used to enable and sustain cross-sector networks in pursuit of societal goals.

Study Aim and Objectives

In this study, we focus and cross-compare three cases of cross-sector collaboration and the pooling of resources from different professions in day-to-day Swedish emergency response in order to as follows:

- Identify similarities and differences regarding opportunities, challenges, and needs for support in terms of organization, legal matters, training, and ICT artefacts
- Perform an analysis under the theoretical lens of network governance to place the collaborations in a wider emergency response/public sector context and assess the theory's usefulness when developing and implementing future emergency response cross-sector collaborations

The study thus takes place within the Swedish emergency response system (ERS) but should also be of interest to similar emerging cross-sector collaborations and

public sector network contexts. Specifically, it may apply to emergency response in other countries since many basic tasks and goals of first response are similar and, thus, they have the same basic needs. From a theoretical point of view, the results may be useful to researchers generally interested in the interplay between digitalization, public sector governance, and networks, with a specific focus on network governance in emerging emergency response cross-sector collaborations and on ICT artefacts.

Background

In this section, we first describe the emerging trends in public sector cross-sector collaboration with specific focus on the emergency response study context. Then we provide an overview of network governance.

Emerging Trends in Public Sector Cross-Sector Collaboration

In this study, we define cross-sector collaboration as a process in which different autonomous actors from different societal sectors (e.g., the public sector, private sector, nonprofit sector) or even within the public sector (e.g., healthcare, emergency response, social care) attempt to create a new joint setting. This, by establishing new ways of sharing information, resources, and capabilities and to collaborate in response operations to achieve shared goals, i.e., saving lives and minimizing environmental damage.

Greater efficiency, reduced bias, higher quality of services, and improved organizational accountability are some examples of the perceived benefits of cross-sector collaboration (e.g., Alford & O'Flynn, 2012; Brinkerhoff, 2002). Meanwhile, several studies also argue that achieving collaboration is difficult (Bryson et al., 2006; Greve & Hodge, 2005; Huxham & Vangen, 2000). Identified challenges include distrust, managerial complexity, cultural conflict, power imbalances, risk of dependence, and lack of incentive for collaboration (Babiak & Thibault, 2009; Gazley & Brudney, 2007; Young, 2000). The perceived increase in cross-sector collaboration in recent years seems to be closely related to digitalization and accessible ICT that supports communication, information sharing, decision-making, and so on, However, this has not been the focus of previous research. There are a few recent exceptions, but they take a different perspective than this study, e.g., in cross-sector collaboration for developing artificial intelligence (Mikhaylov et al., 2018).

In relation to emergency response, cross-sector collaboration has mainly focused on large-scale crisis management; for example, in the role of nonprofits in natural disasters (Chatfield & Reddick, 2018; Simon & Angela, 2007) and the ongoing Covid-19 pandemics (Arslan et al., 2020). Meanwhile, cross-sector collaborations

have started to emerge in relation to frequent small accidents, not least in Sweden. Here, public sector challenges also include the continuing depopulation of rural areas, specifically in the country's northern parts, and a corresponding rapid growth of cities, to which recent immigration has contributed. This, in combination with the previously mentioned challenges, has led to difficulties in providing continuous high-quality public service delivery and in maintaining or reducing response times (e.g., Pilemalm, 2018; Yousefi Mojir & Pilemalm, 2016). To address these issues, new constellations and cross-sector collaboration forms have been developed and successively implemented. Examples include municipal rescue services and elderly care nurses being dispatched together on some medical alarms, "while waiting for the ambulance" (Swedish abbreviation: IVPA). Another is when various occupations, e.g., nurses/care staff, taxi drivers, technicians/caretakers, and guard companies, receive basic training in first response and are dispatched on certain alerts if they are close to an emergency site to provide first response while waiting for the professional response resources (Yousefi Mojir et al., 2018). This study reports from three different examples of cross-sector collaboration in emergency response that have emerged in the past decade as follows:

- *Co-location* of professional response actors and nonprofit organizations in the Safety House in Östersund.
- *Co-use of resources* and collaboration between the rescue services, the social care unit, and the technical division in Nyköping municipality.
- Collaboration of the municipal rescue services with home care personnel, fire services day personnel, guards, and technicians in Norrköping municipality, in a study called *semiprofessionals*.

Cross-Sector Collaboration as Network Governance

Emerging trends in cross-sector collaboration can thus be discussed and studied from various perspectives and employing various theories. In this study, we have chosen to focus on network governance. Network governance is primarily described as a phenomenon referring to horizontal collaboration between autonomous actors with shared interests, leading to collective service delivery or decision-making. Its core assumption is that the network consists of autonomous actors who interact to make policies and perform service delivery in a horizontal pattern without any clear top-down governing mechanism. Collaboration is rather based on mutual interests or contracts (Jones et al., 1997). There have also been attempts to theorize around the term to explain under what conditions networks emerge, thrive, and have advantages (e.g., Jones et al., 1997). As mentioned, the terms have sometimes been used interchangeably in the research literature (e.g., Agranoff, 2007). However, here we distinguish between them and consider network governance as a broad perspective for collaboration (including also citizen engagement). It includes identified key factors, theoretical components, and subcategories, as described below. Cross-sector

collaboration is considered as a phenomenon, process, and instantiation of network governance.

Network governance is usually categorized into three major types (Antivachis & Angelis, 2015). *Participant networks governance* is based on meetings and shared interests, an equal basis for all participants, and is markedly decentralized. *Lead organization governance* occurs when an organization undertakes the lead role in the coordination of members. *Network administration organization* has a distinct and external governance entity that is not a member of the network. Network governance usually includes several key factors, for example, trust, conflict, institutional rules, collaboration, and decision-making, which can either promote or hinder the network, sometimes depending on their prevalence or absence (Klijn & Koppenjan, 2014).

Thus far, network governance theory or perspectives have been applied mainly when studying public administration, interorganizational relationships, new public management, public-private partnerships, stakeholder and citizen involvement, network societies, horizontal interactive decision-making, and public sector innovation, with no explicit connection to ICT (e.g., Pestoff et al., 2013; Agranoff & McGuire, 2010; O'Leary & Bingham, 2009; Carlsson, 2005). However, Loukis et al. (2016) have pointed out that the relationship between network governance and technology is bidirectional. In their preface to a special issue aimed to contribute to the investigation and understanding of the relationships between ICT and network governance, they write that "evolutions in IT enable the development of new types of network collaborations and governance, whereas governance of collaboration networks is critical for the development of complex IT infrastructures" (p.7). They argue that network governance should be conceptualized as socio-technical processes that are directly shaped by the involved actors when tackling complex and dynamic contemporary challenges. Even if the word "enabled" is thus used here, the chapter of the special issue rather focuses on relations. For instance, Sun and Wallis (2012) examine the geographic concentration of the e-business sector of China and analyze factors that influence it. Jacobson (2016) focuses on the relationships between technology/ICT and the National Justice Network of the USA, over a 40-year perspective, and concludes that this network remained successful because the network organization was able to make governance changes in response to new technologies. Janowski et al. (2012) described how organizations and sectors increasingly must work through networks claiming that the new paradigm increasingly relies on IT to connect the actors and to build, manage, and sustain relationships between them. Janssen and Estevez (2013) describe a new wave of "i-Government," transcending traditional public sector organizational boundaries and relying on recent developments in technology. In conclusion, we see how previous research surfaces the ICT aspect. At the same time, we miss studies of the type where digitalization or ICT is seen as key factor, component of the organizational or institutional types exemplified and where ICT needs are identified to enable specific network governance types.

Since the emerging emergency response cross-sector collaborations are new and emerging, we have not found any studies focusing on cross-sector emergency

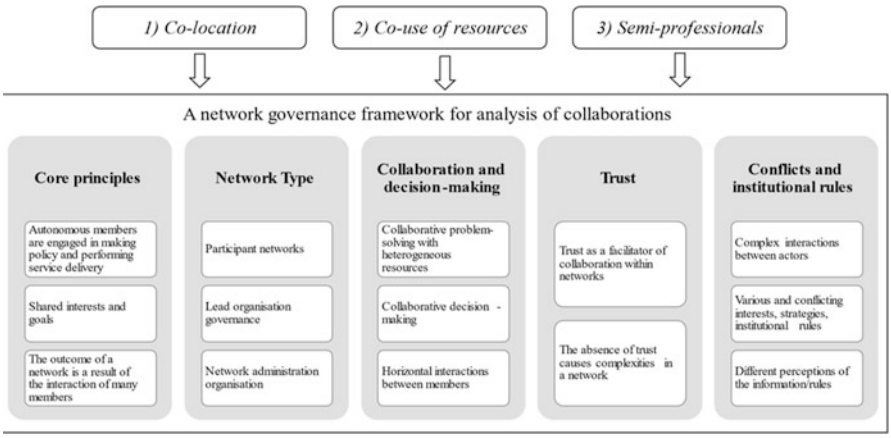

Fig. 1 A network governance framework for analysis of cross-sector collaboration

response from a network governance perspective. Meng et al. (2016) studied the governance of an emergency/crisis management network developed by a government agency and using social media but do not refer to this as cross-sector collaboration. Therefore, in this study, we will apply network governance as a theoretical lens for the cross-case comparison analysis. We reviewed about 20 scientific articles about network governance to formulate an analytical framework. The articles were from the past four decades and their focus was on how network governance has been defined and been used in research. Since network governance stems from different research disciplines with various application areas, we created a network governance framework which contains the core principles and those key factors that seem relevant for the analysis of the collaboration forms in this study. It will be used to explore the cross-sector collaborations, and in what sense, they may be seen as network governance forms and, thus, whether the theory is usable when analyzing and developing future emergency response collaborations. We have chosen to include the identified relevant key factors in Fig. 1 (Jones et al., 1997; Powell, 1990; Klijn & Koppenjan, 2014; Weber & Khademian, 2008). Other key factors were identified but not included in the framework since they did not seem applicable to the current study. An example is "network management" (Peters et al., 2017), which focuses on the internal mechanism of networks. Another is "network performance" (Klijn & Koppenjan, 2014), which can only be assessed over the long term, not where the networks do not yet exist or are new (Peters et al., 2017). Also, we have not included ICT in the framework since it does not recur in the existing literature (as a key factor), but we will pay explicit attention to ICT in relation to the chosen key factors.

Methods and Material

In this section, we briefly describe the study methods. For a more detailed description of the methods applied in the separate cases, see Yousefi Mojir et al. (2018) and Yousefi Mojir and Pilemalm (2014).

Methodological Approach: Case Study Research

Case studies seek to study actual social, organizational, or political phenomena (Stake, 2000). Accordingly, the case is understood through social construction and the meaning that people bring to the study object through various data collection methods. Case study research may include a single case or stretch over several case studies, relating to the same or similar phenomena, thus allowing for comparisons and conclusions on the transferability of the study results. Our study is carried out as a triple qualitative case study revolving around the same overall phenomenon: cross-sector collaboration in emergency response as an instantiation of public sector network governance.

In the study, we focus specifically on three cases involving the following:

- *Co-location* of professional response actors (e.g., the municipal rescue services and the police) and nonprofit organizations (e.g., the Swedish Church) in the Safety House in Östersund, northern Sweden.
- *Co-use of resources* and collaboration between the rescue services, the social care unit, and the technical division in Nyköping municipality, middle Sweden.
- Collaboration of the municipal rescue services with home care personnel, fire services day personnel, guards, and technicians in Norrköping municipality, middle Sweden, in a study where *semiprofessionals* were engaged as first responders.

This study is a further development and comparison of the separate cases presented in Pilemalm and Yousefi Mojir (2020) with an extended analysis and update. The co-location case also has been reported in Yousefi Mojir and Pilemalm (2014) and the semiprofessional case in Yousefi Mojir et al., 2018. It should be noted that this is a qualitative study where the overall phenomenon explored is emergency response cross-sector collaboration. This means that we have not replicated the research design exactly in each different case (since they stem from different projects). However, we have used similar approaches for data collection in each case, relying mostly on interviews, workshops, and a framework as a template for data collection and data analysis. Therefore, the results from each separate case are not entirely comparable to the other cases. Rather, we try to identify key factors that either reoccur through the cases or that stand out in a specific case to be able to provide a knowledge base whose transferability can be tested by future research, as similar initiatives emerge. Finally, it should be noted that there may

be a risk of potential cross-contamination of case 2 and 3 since they are somewhat similar, and the involved municipalities are comparatively adjacent in time and place (the municipalities are situated about 50 km from the other). However, we deem the risk as low, except for the potential bias in the analysis performed by the researchers, which is present in all qualitative research. The co-location case is an own initiative from within the municipality, while the case of semiprofessionals is a research project and no municipality initiative. At the time of the study, initiatives in Sweden where largely local with little or no knowledge on what took place in other communities.

Interviews and Focus Groups

Interviewing is one of the most used techniques for data collection in qualitative methods and case study research. In focus group interviews, it is possible to ascertain collective views on a particular phenomenon from a group of people who have interests, experience, or knowledge concerning the topic in question (Myers, 2009). In all the cases, interviews lasting between 60 and 90 min were conducted with representatives from groups including project management, the municipal rescue services, and the SOS Alarm and national alarm center. Additional focus groups of similar length were held in the third case. They included 13 representatives from four selected groups of semiprofessionals, including both operative personnel and the managerial level from each respective group (Table 1).

Scenario-Based Future Workshops

Jungk and Müllert (1987) developed the original concept of future workshops as a technique allowing participants to reflect upon their current work situation and develop innovative ideas to enhance it. It has since been applied in various formats and application areas, not least as part of participatory design (Schuler & Namioka, 1993). In our study, full-day and half-day scenario-based future workshops were held in all three cases and involved representatives from the municipalities, the rescue services, SOS Alarm, social care units, and various semiprofessional groups (Table 1). In all cases, some of the workshop participants had also been involved in the interviews/focus groups. While future workshops is a design technique rather than a method, it can be used for qualitative data collection, e.g., by asking about the current situation, challenges, and future needs and documenting the data, as in our case.

Experiment and After-Action Review

In the case of semiprofessionals, an additional experiment was arranged (Table 1). A car accident was simulated and two semiprofessionals, along with the rescue

Table 1 The three cases and data collection involved in each case

Case	Interviews	Focus groups	Future workshop	Experiment/AAR
Safety House, Östersund	Four interviews with the project manager, police representative, fire and rescue services representative, and Swedish Defense representative	–	One workshop with eight participants from the police, the municipalities, the fire services, and the Swedish Defense	_
Co-use in Nyköping	Three interviews with representatives from fire services, social care unit, and facility services	–	One workshop with ten participants from the fire services, the social care unit, and the technical division/facility services	_
Semiprofessionals in Norrköping	_	4 focus groups with a total of 13 representatives from guard company, home care personnel, facility services, and fire services day personnel	One workshop with eight representatives from the fire services, the municipality, the police, and the healthcare sector One workshop with four representatives from the fire service day personnel and the fire services	Experiment/AAR with two semiprofessionals (fire services day personnel), one representative from the fire services, and two representatives from the ambulance services

services and the ambulance services, were sent on the response. The experiment had several purposes (e.g., measuring response times) but for this study, we observed the semiprofessionals arriving at the incident site about 15 min before the professional resources providing first response. We then held an after-action review (AAR) with all the participants. AAR is a debriefing/learning method, originating in the military domain that aims to capture and reflect upon the strengths and weaknesses of past events to improve future situations (Bolton, 2016).

Data Analysis

A data analysis approach based on thematic analysis was applied in each case. All the interviews and focus groups were audio-recorded and transcribed. The future workshops and experiment/AAR were documented using post-it notes, memory notes, and audio-recording of the AAR. The thematic analysis evolved in an iterative process around themes that were successively identified as relevant to the emerging collaborations. A conceptual framework including the categories *type/role*, *attitude*, *training*, *background*, *task and responsibility*, *availability/accessibility*, *incident type*, *communication method*, *information technology*, *emergency supplies*, *organizational structure*, *leadership*, *costs/benefits*, *environment*, and *regulations* and *legal issues* was used as support (Yousefi Mojir & Pilemalm, 2016). Opportunities, challenges, and related needs were then identified in relation to each theme. In the subsequent cross-case comparison, network governance was applied. A network governance analysis was first performed for each case, but only the cross-case comparison is displayed in this study. The authors of the study have been involved in all the cases, in data collection and data analysis, and in the network governance analysis. Two additional researchers were involved in the case of the semiprofessionals.

Results and Analysis

In this section, we first describe the three cases and then present the identified themes with their associated opportunities, challenges, and needs in each case. We also characterize the cases as various forms of cross-sector collaboration and relate them to the core principles of network governance and relevant key factors.

Co-location in Safety House in Östersund Jämtland is a sparsely populated province in mid-Sweden with a population of about 112,000. This population triples during the summer season because of tourism. The "Safety House" building is in the province capital, the city of Östersund. Both professional response organizations and other organizations supporting or having strategic responsibilities for response operations reside at the Safety House. Examples include the municipal rescue services, the police, SOS Alarm, the Swedish Defense, the church, and several

authorities, for example, the city council and the county board of Jämtland, the prison and probation service and the customs. The co-location arrangement, at the time of the study, was designed to improve alarm management in order to reduce the dispatch time of professional response resources. This, by improving collaboration between actors, allows actors to quickly gain a common understanding of the emergency and creates a platform and citizen-centered service for shared information management and the dissemination of information to the public. The main characteristic of the Safety House is the interorganizational collaboration among professional response organizations. However, they also include elements of cross-sector collaboration. This, since that the defense sector and nonprofit sector (the Church) and other organizations not typically working with first response (e.g., the customs) are part of the co-location. Also, it aims to involve civil citizens.

Relating this to the *core principles of network governance*, the organizations are still autonomous in the new setting and have their own organizational rules. They share interests and goals, i.e., reducing response time, providing a more effective response, and reaching a shared understanding of the situation. Therefore, it is possible to consider the collaborations as an instantiation of network governance in the form of *participant networks governance* (Antivachis & Angelis, 2015). This is also reflected in that the participant organizations have received no regulation of mandates, no joint or common training or equipment. Rather they are supposed to build their network collaboration on routines existing in their respective organization. The same goes for ICT applications. Those in use at the time of the study (2012) included mostly stationary (non-portable) tools, for example, an alarm management system and a map system. Communication between actors took place via e-mail, telephone, and mobile phones. Some actors also had RAKEL, which is a shared radio-based platform for communication among response organizations. The ICT applications had not been designed specifically for the new collaboration/co-location setting but were basically the same as those actors were using before entering this collaboration, also when they were shared/used for collaborative purposes.

Co-use of Resources in Nyköping Municipality Nyköping is a municipality in the middle of Sweden, about 100 km south of the capital, Stockholm, and with a population of approximately 55,000. In Nyköping, the fire and rescue services, the social care division, and the municipality facility services are co-located in the new fire station. They also share certain vehicles, equipment, and technologies in order to reduce costs. Both personal security alarms and automatic fire alarms are located at the fire station to be managed more efficiently by social care operators. At the time of the study (2014), the fire services still performed the response operations, but they sometimes requested support or information from the co-located actors, such as exact addresses or keys to buildings. As the collaboration progressed, the facility services were also expected to become more involved in the project and the related alarms (e.g., water damage to streets, elevators breaking down in the municipality's properties), and the social care night patrols were planned to be dispatched on some medical alarms.

Nyköping municipality displays public sector cross-sector collaboration as its main characteristic, focusing on the pooling of resources. Even if it also embraces the vision of creating a safer society with its citizens in focus, the collaboration was mainly based on economic motives and efficient use of resources. From a network governance perspective, it is also possible to see the collaboration as a form of *participant networks governance*, even though the division of tasks is somewhat more pronounced than in the case of the Safety House. But also, in Nyköping, there were no top management mechanism or mandate to control the collaboration. Rather, none of the organizations had priority over others, and they collaborated in a network governance pattern when necessary. Certain equipment was shared but not accompanied by common training. Also, the involved actors did not have ICT applications developed specifically for the new collaboration but used the existing systems of alarm management, with separate systems for each organization. For communication they used e-mail, telephone, and mobile phones.

Cooperative Use of Resources in Norrköping Municipality Norrköping is a municipality in south Sweden with about 140,000 inhabitants. Here, emergency response cross-sector collaboration is not yet established, but between 2015 and 2017, a project was carried out in preparation for the collaboration. It was supported by participation from the municipality and its fire and rescue services and was based on the concept of the cooperative use of resources. The project was intended to identify, train, equip, dispatch, and evaluate potential resources, *semiprofessionals*, who included facility services, taxi drivers, security guards, fire services day personnel, and eldercare personnel. Semiprofessionals' primary jobs are not first response, but they have competence (e.g., medical) or equipment that is useful and they often patrol the community, thus being closer to emergency sites than professional response resources. Semiprofessionals will be alerted simultaneously with the fire services and are free in certain, but far from all, decision-making at an emergency site. They are also restricted in performing certain actions to protect their own safety (e.g., smoke diving, managing explosive material) or by the law (e.g., giving medicine to victims).

The Norrköping study explores the recent trend in cross-sector collaboration of using entirely new occupations as first responders, and it also involves various groups from the private sector (security guard companies) in the collaboration. Potential groups of semiprofessionals have their own organizations and associated rules. Their regular tasks are sometimes, but not always, like those of first response. The fire services and semiprofessionals share interests in saving lives and helping others in emergencies. In network governance terms, it is possible to view the collaboration as being of the type "lead organization governance" (Antivachis & Angelis, 2015). However, as we will discuss later, it probably makes more sense to consider it as a *hybrid form of network governance and more hierarchical government forms*. This, since the semiprofessionals will receive their training and guidelines from the fire services. Their actions are thus influenced by the fire services' regulation mandate in a top-down manner, and they are not to be considered as independent and autonomous actors in the new collaboration. Training

is also provided in a top-down manner rather than joint training among rescue services and semiprofessionals. At the time of the study, semiprofessionals did not have any ICT tools to support the emerging collaboration. There was also no fixed method for communication between actors. However, the project aimed to develop a mobile app prototype for the semiprofessionals to enable them to receive alerts and be dispatched to the incident site.

Theme: Responsibility, Availability, and Attitude

Several *opportunities* related to *the use of heterogeneous resources and competencies* (Jones et al., 1997) can be identified in our studies. The interviewees and participants in the *Safety House* Future Workshop all confirmed the potential of their new work environment, and the shared facilities enable more comprehensive collaboration, exchange of information, and collective solutions. In network governance terms, the co-location of actors was thus deemed to facilitate *communication*, *collective problem-solving*, and *horizontal collaboration* (Powell, 1990; Klijn & Koppenjan, 2014), all designed to gain a shared understanding of emergencies.

In Nyköping, the interviewee from the fire services saw their organization as resource intensive but not adequately utilizing current resources:

> We pay 33 part-time firefighters in four municipalities, but we do not use them in an efficient way compared with the police, who have six resources in the same area.

Similarly, the interviewee from the social care division pointed out that their 30 staff often work on patrol and can, for example, help the police to report an event or hand keys to the rescue services. The interviewee from the facility services mentioned providing lifting assistance and intervening in incidents of damage to properties, streets, parks, and ports. Participants in the Future Workshop argued that municipal alarms can be managed completely from within the joint alarm center, including camera surveillance and burglar alarms. Thus, actors at the new fire station in Nyköping municipality also pooled their resources and competencies to help each other. However, in this case it seemed that economic motivations in terms of cost reduction played a more important role than the collaboration itself.

In Norrköping, the interviewees were in general positive about the potential new role of semiprofessionals, regarding it as both individual development and an organizational bonus. Except for home care, they agreed that, if they received an alarm, most of the time they would be able to interrupt their current tasks and leave within about 5 min. Opportunities included being on patrol during daytime (home care) or at night (security guards) and the pooling of cars. Potential tasks at the emergency site included stopping simple bleeding, performing heart and lung rescue, calming down shocked people, dispersing onlookers, extinguishing smaller fires, putting warning triangles on the road, and putting injured individuals in the recovery position. The opportunities identified in the study, from a network perspective, are thus most notable in relation to the pooling of resources, since

the number of potential semiprofessionals is much higher than that of professional resources and they are spread across the entire municipality. This implies that creating a network by involving them would create a pool of huge capacity and resources to use in emergency response and might promote collective problem-solving.

The major identified *challenges* in all three studies were ambiguities in actors' roles, responsibilities, and tasks in response operations. Actors at the *Safety House* had joint meetings to manage emergencies and made decisions based on mutual discussions. However, representatives at the Future Workshop identified a lack of clarity as to who/which response organizations can command the others and said that there is no available documentation concerning related decision-making. This can be related to network government incentives for democratic *decision-making* (Klijn & Koppenjan, 2014), indicating ambiguities and a need for greater formalization in the new setting.

In Nyköping, the representative from the fire services expressed concerns as to:

> Who is responsible (and for what) when performing a response operation with the social care division or other actors? How many new tasks can one take on while simultaneously doing the regular work?

It is also somewhat unclear as to who is responsible for the joint work environment when the fire station is shared, raising primarily financial and management questions. In the Nyköping fire station, actors did not interfere in each other's work but took decisions together in certain situations as needed. But nevertheless, there were sometimes conflicts in decision-making, about budget allocation, and management processes that could potentially become an obstacle to collaborations/networking.

In Norrköping, similar concerns about ambiguities when prioritizing among ordinary and "first-response" task were expressed, both by the interviewees from the facility services and the home care personnel:

> [. . .] while fixing a big water leak at a school [. . .], we might receive an alarm about an accident nearby. To leave the school would lead to very big damage but of course if it was a matter of life and death, you'd need to attend to it [the accident] first. But there can be complications.

> You may think that it's easy to interrupt a stroll [to go and help others in an accident], but it's not possible to just leave an elderly person [client] in the street and walk away.

The semiprofessionals also expressed uncertainty and sometimes fear about acting as first responders, not being able to manage the situation, making a wrong decision, and putting people's lives in danger (e.g., moving a person with a neck injury). The interviewees from fire services day personnel also claimed that being semiprofessionals might be stressful, knowing that at any moment you might suddenly receive an alarm. This may prevent people from being able to perform their new tasks correctly and be harmful to themselves or others. Relating the challenges of semiprofessionals to network governance democratic decision-making, their autonomy is more restricted than in the other studies. They cannot replace and do not have the same scope for action as the fire services in

emergencies over who administrates the collaboration and who has decided the range of semiprofessional tasks and responsibilities. In some critical situations, they need to wait for professionals. At the same time, this has the consequence that semiprofessionals must choose their main tasks and thus may not act as first responders if they come into a situation where they need to prioritize.

As to *needs*, all actors at the *Safety House* Future Workshop saw the need to formulate and document the roles and responsibilities of actors and the hierarchy of different actors and command structures. In Nyköping, the needs similarly concerned roles, responsibilities, priorities, and tasks, for example, having a reasonable workload in the new setting, clear mission goals, and related established knowledge among the different parties. In Norrköping, the identified needs again concerned clearly defined expectations and responsibilities for the semiprofessionals, including defined tasks at the emergency site; but also, that there should be supported to help them handle potential stress, and emotional or psychological consequences. Interviewees from the fire services day personnel said they would feel safer if two semiprofessionals worked together. The interviewees from the facility services claimed that a higher salary might encourage some personnel to take part in emergency response, while the other groups felt this would not be a good way to motivate people. Again, taking the network governance perspective, some of the main identified *conflicts* in network governance include conflicts of interests and strategy, perceptions of information and problems by members, and institutional rules, mostly because of the lack of a formal governing mechanism (e.g., Klijn & Koppenjan, 2014; Weber & Khademian, 2008). The studies display similar challenges but in various forms and degrees. However, they share the need for steering mechanism to govern the emerging collaboration.

Theme: Organizational Aspects: Laws, Regulations, and Work Environment

As to *opportunities*, all *Safety House* participants agreed that regular formal and informal meetings and social contacts between actors had increased their knowledge about each other's organizations, their tasks, and skills. This knowledge might lead to better trust between actors and was considered an important factor in collaborations:

> The fact that the Safety House has done it this way [to share facilities] has resulted in me knowing people in all the sections available here, including SOS, the police and ambulance services. I know exactly who I should call if I need to collaborate with someone.

The interviewees from the police and the fire and services emphasized the positive role of receiving feedback about completed response operations in the aftermath meetings from the respective actors who had participated. In the Nyköping Future Workshop, all participants believed that shared cars and premises had reduced costs and created better communication between actors. They also said that the

centralization of municipal alarms had worked well and that essential money could be saved in this way. *Trust* is usually discussed as a key factor, a central coordination mechanism, and a facilitator (e.g., mutual interests and goals) or hindrance (e.g., inhibiting information exchange) for collaboration within networks (Klijn et al., 2010). According to the results, the co-location of actors in the Safety House and the new fire station in Nyköping seems to have increased trust between actors because they have better opportunities (e.g., informal meetings, nearby offices) to get to know each other. In Norrköping, the interviewees saw no need to change their current work setting, if the numbers of alarms are relatively few and, according to the management-level interviewees, there is no formal organizational obstacle, regulation, or law to prevent them from acting as semiprofessionals in emergencies:

> Of course, if there is an accident or injury where we can help, surely, we can dispatch our resources, it is possible for us and it does not feel strange at all to me.

As to *challenges*, in the *Safety House*, the issue of information confidentiality was identified as a major problem that inhibited the sharing of information (e.g., pictures, movies, documents) between different actors:

> We [the fire services] have a confidentiality rule, the county council has another confidentiality rule [regarding ambulance services] that's a bit stricter than ours, SOS has its confidentiality and the police its own. Here, we have at least four different confidentiality laws that steer collaborations.

Other reported challenges included very limited and informal feedback on their work and response operations. In Nyköping, the interviewee from facility services said that privacy is not a problem for them because they generally deal with alarms in which the information does not need confidentiality. The interviewee from the social care division on the other hand saw confidentiality as a key problem, and the participants in the Future Workshop agreed that it is a common problem when different actors collaborate and share information. Furthermore, the difficulty of calculating the costs and benefits of the emerging collaborations was emphasized both by the interviewee from fire services and by participants in the Future Workshop:

> It's very difficult to calculate costs and benefits. It's mostly in theory that you can do it.

In other words, when insufficient information exchange, inhibiting a shared understanding of situations, or preventing resource sharing occurred at Safety House and in Nyköping, this did not seem to have to do with a lack of trust between parties but more with confidentiality matters.

In Norrköping, there was a perceived lack of clarity as to what the consequences would be, not least in terms of insurance coverage, if a semiprofessional is harmed at an emergency site or unintentionally harms another person, for example, a victim. Several representatives also pointed out that there are not any particular laws at the organizational or national level concerning these new cross-sector collaborations. From a network governance perspective, the identified ambiguity in supportive laws and the lack of insurance can be related to conflicting, or even absent or insufficient, institutional rules. From an ethical point of view, some interviewees from home care

and the fire services day personnel were not comfortable with being continuously positioned by a dispatch system. Interviewees from facility services and the fire services day personnel claimed that traffic rules are not clear when they are driving their car to save somebody's life. For example:

> I think it's a bit stressful [. . .] You know that you're on your way [to help a dying person] but you can't exceed the speed limit.

As regards *needs*, those identified at the *Safety House* were related to the secrecy issues and concerned aspects like the identification and handling of legal issues and potential obstacles. The police and fire services also noted the necessity of involving other actors, such as the municipalities and the County Administrative Board, in regular meetings. All participants pointed out the need to involve other actors who have local knowledge and may be used as volunteer resources, for example, the nonprofit organization "Missing People," the Swedish National Home Guard, and civil citizens. Another need identified by all Future Workshop participants was a steering group to handle internal feedback and questions from the authorities and citizens, thus once more emphasizing the need for steering mechanisms:

> Now we've grown, developed and we're so complex that we need an official group/function that can drive issues . . . we can't answer all development queries and feedback internally because of the limited resources we have. It's an obstacle to development. (Police representative)

In Nyköping, as well as the perceived need to address the secrecy issues, the participants in the Future Workshop argued that they should revise decision-making methods because decisions are based on old principles and agreements, thus again addressing the need for improved decision-making and steering mechanisms. An important example is how to allocate money and budgets to the co-located organizations. They also pointed out the lack of a forum where involved actors can sit down and talk about what they can do together, answer various issues, and discuss new ideas and ways of interacting.

As to Norrköping, the identified needs concerned clarification of roles, tasks, and responsibilities and legal and ethical aspects such as what semiprofessionals are allowed to do, how they should deal with alarm information, and what kind of insurance they need. Again, this can be related to ambiguities in, or the absence of, adequate institutional rules. The interviewees from facility services mentioned the need for a system by which they can inform their managers that they have left their current workplace. Similarly, their manager said that they need to know the number of resources and time their employees should spend as semiprofessionals. The interviewees from home care and the fire services day personnel also said that it is important that other people inside the organization know about semiprofessionals' responsibilities. Otherwise, they might be questioned by their colleagues, for example, if they fail to do something or if the people they tried to help die. In network governance terms, this can be related to a lack of culture within their organization about being semiprofessionals. Semiprofessionals mentioned their trust both in each other and in relation to the professional response organizations. At the same time, some of them did not have full trust in taking

part in the collaborations due to ambiguities in the involved goals and how to prioritize between first-response tasks and ordinary tasks. The home care personnel thus expressed a need to create *internal trust* in their own organization/employer, rather than among the network participants, so as not to create internal suspicion about their new assignment.

Theme: Training and Emergency Supply

As to *opportunities*, at the *Safety House*, the interviewees from the police and the fire services mentioned that they had gained basic knowledge about each other's organizations, the new collaborations, and information exchange through work-related education and feedback exchange between actors and informal meetings. This had led to increasing trust between actors and facilitated collaborations. In Nyköping, the participants in the Future Workshop said that staff in social care and facility services receive "municipal training" in risk management, fire, and healthcare and learn how to act in different situations. In the case of the Norrköping semiprofessionals, most of the interviewees said that they had received some training in heart and lung rescue and some also in basic firefighting as part of their current employment contract. Interviewees from home care knew that some of the home care personnel had training as assistant nurses. Security guard interviewees pointed out that they had been trained, to some extent, to act as first responders. Interviewees from the fire services day personnel mentioned that a few of them have previously worked as firefighters or fire engineers. Regarding equipment, all the interviewees except home care said that they have cars with equipment, for example, first aid kits and fire extinguishers. Home care interviewees said that they have digital keys with which they can easily open their clients' apartment doors.

As regards *challenges*, the *Safety House* interviewees from the police and fire services mentioned the difficulties of applying the knowledge they had gained about the new collaboration to their practical work. As an example, the police are trained in information confidentiality and what should or should not be shared with others. However, in their daily routines, the personnel did not exchange sufficient information about response operations because of the false understanding that all information is confidential. Thus, from a network governance perspective, the lack of training can once again be related to insufficient knowledge about relevant institutional rules and information handling, rather than not trusting each other.

In Nyköping, the interviewee from the fire services and the Future Workshop participants agreed that there is currently no dedicated training focusing on the cooperative use of resources or co-location of actors. In Norrköping, the semiprofessional interviewees mentioned the difficulties of applying previous training because they had forgotten it, had not repeated it, or would not dare to use it in real situations. The manager of facility services claimed:

> [. . .] it's fresh the first year; however, then you start to forget. [. . .] we have training in CPR and similar types every four years but, as I said, it's not sufficient if we're expected to help in this way.

Even though all the interviewees acknowledged that they had already received some training, this was not always true for other employees working in their organization. Regarding equipment, interviewees from the security guards and facility services said that their cars did not have much space to locate additional emergency supplies. The manager interviewees said that some equipment (e.g., defibrillators) is expensive and additional training is needed to use it properly.

In terms of related *needs,* in the *Safety House* Future Workshop, methods for transferring theoretical training/knowledge about the new collaboration into practice in terms of simulations and exercises were requested. Regarding confidentiality, there was a need for regular education to inform people about the correct handling of information and correct restrictions on information exchange between actors:

> We thought it [confidentiality] was a bigger problem than it really is. We received training and could find good ways to not break the confidentiality rules while communicating. (Project manager)

In Nyköping, training about the new roles was requested by the fire services:

> You should also receive training and knowledge about each other's roles to be able to have a better interaction. As an example, when actors have shared tasks, sometimes an actor may not intervene in an emergency because the actor may think that another actor is going to intervene and solve the problem and that is because roles and responsibilities are not clear.

The interviewee from facility services also believed that education is sometimes important when, for example, responding to alarms. However, this interviewee did not think the training for new tasks had the same importance for them:

> In many cases and situations, it is handwork that is needed.

The interviewee from the social care division and the Future Workshop participants believed that training for alarm management and the categorization of alarms is central when invoking on-call resources. Joint training can also be a part of creating consensus about the new collaborations and the benefits of, for example, creating common interests and goals within the networks. As to hands-on equipment supporting the collaboration, the interviewee from the fire services mentioned RAKEL,[1] mobile phones, computers, and physical offices as most important. In Norrköping, the training needs of the semiprofessionals concerned updated training in heart and lung rescue and basic fire extinguishing at least once a year and practical exercises with the professional resources. The interviewee from the fire services day personnel also mentioned a need for training on traffic rules to act appropriately in traffic accidents, in managing shocked persons and injured

[1] RAKEL is the Swedish national digital communications system used by the fire services and others in the fields of civil protection, public safety and security, emergency medical services and healthcare (www.msb.se, 2013).

relatives, and familiarity with routines relating to professional resources. The fire day personnel representatives highlighted more advanced training on managing suicide cases and traffic accidents, as well as how to use the alarm management systems and perform risk assessment. In terms of equipment, their needs were basic and concrete and included dedicated smartphones for receiving alarms, blankets, reflective vests, warning triangles, pocket breathing masks, warning lights, defibrillators, extinguishing grenades, and car chargers for mobile phones.

Theme: Information Technology and Communication

As to *opportunities*, at the *Safety House* both interviewees and workshop participants claimed that real-life face-to-face communication before a response operation often leads to a more accurate interpretation of an incident and that relying solely on digital data, such as emails and digital records, may not be as effective. On the other hand, both at the Safety House and in Nyköping, most respondents emphasized the usefulness of the RAKEL communication system by which they could talk to each other using a shared platform, individually or in groups. The RAKEL coverage in the Safety House area is more extensive in comparison with the generally limited coverage of mobile phones in forests and mountains. In Nyköping, the social care unit argued that the use of RAKEL has already shortened the response time for the personal security alarms and has simplified the positioning of night patrols. The interviewee from the fire services mentioned email and telephone as the main communication methods for sending response operation reports. However, all the semiprofessionals in Norrköping emphasized their preference for using smartphone-based solutions for receiving alarms, communicating with others, and taking photos of the emergencies. Interviewees from home care and the security guards said that they already receive work-related alarms concerning urgent events on their mobile phones and would prefer to continue using the same devices. The security guards also already had extra equipment for communication, such as handheld PCs.

As regards *challenges*, not all actors at the *Safety House* had RAKEL since it is expensive and not affordable/prioritized by some organizations, which thus have to rely on mobile phones. In Nyköping, the facility services said they do not have RAKEL because it is too expensive. Also, in Norrköping, the semiprofessionals claimed that, in a purely mobile phone-based system, network coverage might be inadequate in some areas such as forests, rural areas, and the basements of buildings. For example, the interviewee from facility services said:

> [. . .] one problem can be when you are in the basement of buildings or are working in some underground centers [. . .] and there is no mobile phone coverage. This can be a problem since you spend a lot of time there, at least I often work in underground centers.

The Safety House interviewees from the fire services and the police mentioned that it was difficult to access other actors' information (e.g., their position or their status) or their information about an incident. Regular meetings and face-to-

face conversations are not deemed sufficient in larger emergencies involving more information and many response actors. Difficulties with information exchange were discussed in the Future Workshop because actors might not know exactly what kind of information is needed by other actors. The interviewee from the fire services mentioned difficulties in viewing and browsing information from the incident site due to the absence of more sophisticated ICT, especially mobile tools. Moreover, not having sufficient communication channels to exchange information with the public had inhibited one of the main aims of the Safety House, to provide a citizen-centered service. In Norrköping, several semiprofessional representatives pointed out that more comprehensive information systems are not an important part of their current job and that they do not have their own system (e.g., an alarm management system or positioning system) that can be used in their new tasks.

As to *needs,* those identified at *Safety House* included a shared platform for communication and data exchange in response operations that would facilitate a shared understanding of a situation and an information system that provides a facility for actors to share maps and other visual and spatial information. The interviewee from the Swedish Defense also mentioned the potential usefulness of an integrated system for exchanging information with other actors located physically outside the Safety House. The interviewee from the fire services mentioned the need for sophisticated portable tools to view, analyze, and disseminate information, for example, portable digital maps. Participants in the Future Workshop suggested a document management system to both facilitate incident information seeking and learning from previous experiences (feedback). In Nyköping, the most important identified needs included a joint alarm management system, IT support displaying the geographical location, and a map of the emergency site. Others concerned digital channels to the public and support to extract relevant statistics from existing data. A future shared platform for accessing information was deemed important. Being able to document directly in the night patrol using IT was a key requirement of the social care division. In the Future Workshop, participants thought that a joint forum for thoughts and ideas could simplify the development of new collaborations.

As regards the semiprofessionals in Norrköping, all the interviewees emphasized the need to talk to the alarm center and the professional resources in case they need to receive more information. They also requested a dedicated ICT application for receiving alarms that could be integrated with their current mobile phones. The system should provide short but precise information about the type of incident, its location, a brief description of the incident, a navigation function, and information about when professional resources would arrive. The interviewees from home care mentioned the possibility to easily send information (video, photos, text) relevant to emergencies to the alarm center or the fire services. Interviewees from the fire services day personnel and home care highlighted the need for an acknowledgment function by which semiprofessionals can inform others that they are at the emergency site and for a function by which they can inform the alarm center whether they are available. In the Future Workshop, an additional set of functions were identified, including to support report back after the response operation, to automatically inform their employers about interrupting their current

task, and a status function by which a semiprofessional can inform others (e.g., the alarm central) when he or she is on the way, has arrived, or needs extra help. Quick checklists about what a semiprofessional should do in a specific emergency were also identified as helpful.

Network Governance Analysis Summary

The results and analysis indicate that emerging forms of collaboration in Swedish emergency response in many respects resemble but also differ from more traditional network governance patterns and display a hybrid form of governance and government. A main finding is that all three studies uncovered a distinct need for steering mechanisms, the clearing of responsibilities, and agreements – much more distinct than has been reported in network governance based more on informal, dynamic interactions among members. In the cross-case comparison, it was also notable that this need increases with the cross-sector character of the collaboration and the heterogeneity of the involved actors. The Safety House, which is currently more of an interorganizational than a pure cross-sector collaboration, most resembles traditional network governance structures based on shared interests. The Nyköping municipality's ongoing cross-sector collaboration also resembles network governance in many respects but is more based on economic incentives than shared interests and displays a larger complexity in terms of power, responsibilities, and task prioritization. The semiprofessionals in Norrköping, who embrace cross-sector collaboration both within the public sector itself and with the private sector, involving entirely new occupation groups as first responders, display the most complexity and can be characterized as the most hybrid form of governance and government. Their cross-sector collaboration takes place in a more hierarchical decision-making pattern than a pure network governance structure. An additional explanation for the complexity and substantial need for steering mechanisms is that, here, the collaboration concept has not yet been implemented and thus the tasks are not defined.

More specifically, the cross-sector collaborations fit comparatively well into an overall network governance framework in terms of institutional perspectives, most notably in the identified themes 1 and 2. This includes the key factors of *shared interests*, *collaboration between heterogeneous autonomous actors*, *democratic decision-making*, *the importance of trust*, and *related conflicts in collaborations and institutional rules*. An example is when complexities in interactions between members of the Safety House relate to difficulties in decision-making in emergencies due to ambiguities about responsibilities and conflicts of opinion. In Nyköping municipality, related questions arose, such as "who is the main body responsible for the new shared environment?," and it was also possible to discern conflicts around the new budget allocation. A third example is when institutional rules in Norrköping are not only unclear but also do not yet actually exist; agreements are not yet written, and existing laws are insufficient.

At the same time, there are also concrete key factors that enable – or hinder – emergency response cross-sector collaboration, which falls outside the network governance institutional perspective. They are notable above all in relation to themes 3 and 4. One of these factors is the obvious need for training and joint exercises, discernible in all cases. Another is the need for basic equipment, relating specifically to the assignment of first response and thus most visible in the case of the semiprofessionals. While Nyköping municipality spoke mostly about a need for office equipment, and basic equipment was available at the Safety House, the semiprofessionals requested checklists, reflective vests, fire extinguishers, and defibrillators, among other things. The semiprofessionals also mentioned fear and stress as a potentially key factor hindering collaboration and requested trauma support. Finally, ICT support should be considered a prerequisite/key factor for the emerging cross-sector collaborations, even though this is not part of previous identified network governance key factors. This, at the time of studies, included GPS, mobile applications, and decision-support systems for dynamic resource allocation, dispatching the new resources as ICT enablers of the collaborations. Others, for instance, RAKEL and mobile solutions, could work both as facilitators (if existing and working) or hindrances (if too expensive and with insufficient coverage).

The cross-case network governance analysis is summarized in Table 2.

At a more general level, it is notable that besides the absence of regulations of mandates, joint training, and new ICT to support the new collaboration in each case/collaborative space, within the time frame of the study, there was no inventory or reinforcement of structures, equipment, and ICT solutions across networks. We will return to this in the discussion section together with how the network governance collaborations have evolved over time, not the least in a digitalization perspective.

Discussion

In this section, we first discuss the results in light of the emerging need for emergency response cross-sector collaborations and digitalization/ICT as an enabler. We then discuss the potential usefulness of network governance perspectives when analyzing and developing these emergency response collaborations. Finally, we discuss potential transferability of study results to wider public sector cross-sector collaboration contexts.

Table 2 Comparison between network governance and emerging forms of collaboration in the three cases

Network governance (NG)	Co-location	Cooperative use	Semiprofessionals
Core principles	*Similarities NG:* Heterogeneous actors with shared interests Collaboration between independent organizations with their own rules		
	Differences to NG: Present need for steering mechanism for command/control and decision-making	*Differences to NG:* Present need for steering mechanism for decision-making and budget allocation	*Difference to NG:* Existing hierarchical control of semiprofessionals' actions
Collaboration and decision-making	*Similarities to NG:* Collaborative action and problem-solving Democratic decision-making	*Similarities: to NG:* Democratic decision-making Resource sharing and collaboration in certain alarms	*Similarities: to NG:* Collaborative action and problem-solving
	Differences to network governance: N/A	*Differences to NG:* Visible focus on cost reduction which is not a common factor in NG	*Differences to NG:* Limited decision-making by semiprofessionals
Trust	*Similarities to NG:* Facilitator of collaboration Can reduce institutional complexities		
	Differences to NG: Potential lack of trust stems mostly from ambiguity, conflicts, and lack of training in institutional rules about confidentiality, not from a lack of respect for each other's interests		*Differences to NG:* "Internal trust" not discussed in network governance
Conflicts and institutional rules	*Similarities to NG:* Ambiguities in responsibilities and conflicts in opinions and strategies Institutional rules/laws as obstacles	*Similarities to NG:* Ambiguities in institutional rules, most appearing in budget allocation and the prioritization of tasks	*Similarities to NG:* Complexities/conflicts, e.g., ambiguities in responsibilities, and how to prioritize between tasks Institutional rules/laws as obstacles
	Differences to NG: Visible factors such as "fear" and "motivation" may cause conflicts, not discussed in NG literature Prevalent ethical challenges not discussed in NG literature		*Differences to NG:* Visible factors such as "fear" and "motivation" may cause conflicts, not discussed in NG literature Prevalent ethical challenges not discussed in NG literature

Emerging Emergency Response Cross-Sector Collaborations and New Research Needs

Public sector cross-sector collaborations are global trends (e.g., Johnston & Finegood, 2015; Jones et al., 2015; Grudinschi et al., 2013; Alford & O'Flynn, 2012; Agranoff & McGuire, 2010; O'Leary & Bingham, 2009; Bryson et al., 2009). In the past decades, they have become important to emergency response (e.g., Barsky et al., 2007; Venema et al., 2010; Waugh & Streib, 2006), not the least in Sweden (e.g., Weinholt & Andersson Granberg, 2015; Pilemalm et al., 2013). Natural large-scale disasters, man-made incidents, and the ongoing pandemics have become increasing threats to our society and will continue to be so. At the same time, regular accidents on a smaller scale will continue to occur and public sector resources available for emergency response will likely decrease. In Sweden, the municipal rescue services, for example, expect further cut in budgets, aggravated by the Covid-19 economic effects. This combination means that the professional emergency response organizations responsible for delivering essential services are often placed under extreme pressure while having to meet increased demands for efficiency. Cross-sector collaborations are thus likely to grow. As we will discuss below, since the time of this study, above all the collaboration type of using semiprofessionals as first responders has expanded to many Swedish municipalities. Since the trend is comparatively recent, corresponding research is needed. However, emergency response studies are seldom *explicitly* connected to cross-sector collaborations. Furthermore, they are fragmented and focus a specific topic (e.g., techniques, human elements, teamwork, exercises). This study contributes to an overview and a more comprehensive picture, by providing knowledge from three different cases in Swedish cross-sector collaboration emergency response and identifying common opportunities and challenges, as a starting point for future research.

Cross-Sector Collaboration as Network Governance: Capturing the Institutional Perspectives But Missing Out on Digitalization and ICT

This chapter contributes to the analysis and development of future cross-sector collaborations to help ensure that network governance key institutional factors for progress are enabled and hindrances reduced. In retrospect, we deem the network governance perspective useful in that it helped us to identify the key institutional factors relevant for emergency response cross-sector collaborations. Such identification is crucial as starting point for developing and improving the collaborations. At the same time, the studied collaborations are generally more formalized than pure network governance dynamic patterns because they are more tightly coupled with the respective organizations' own contexts. This, in turn, requires more formalization and steering mechanisms of the collaboration form

that is usually the case in network governance networks. In other words, hierarchical governing mechanisms and regulations may need to supplement network governance mechanisms for cross-sector collaborations. This notion is supported if we return to the various cases in 2021, several years after respective study was performed. At the Safety House, things much remain the same as in 2012, with the same organizations participating using the same shared facilities, equipment, and technical systems but with no new development. The citizen platform has not been realized even though this should a rather straightforward process if using social media. Perhaps this can be attributed to lack of steering. The same goes for co-use at Nyköping municipality which still relies on collaboration and joint handling of incoming alerts between the rescue services and social care. The technical division was never further integrated in the co-use, i.e., did not take on new tasks or providing new equipment. This may have several explanations but, again, lack of formalization and steering of the collaboration might have contributed. On the other hand, other actors, for example, authorities and security offers, have been co-located at the fire station, implying some similarity with co-location at the Safety House. As a hybrid network government form of using semiprofessionals as first responders, this is the cross-sector collaboration type that has expanded most rapidly in the past few years. There are currently numerous municipalities using semiprofessionals, both in urban and rural settings. Norrköping will start in 2022. The most common group is security guards, but we also see some municipality rescue services engaging in collaboration with the home care night personnel (the night personnel is not so occupied as the day personnel making prioritization of tasks easier). Since the time of the study, it is possible to see an increased steering and regulation of this collaboration forms. This is in terms of agreements between employers where the ordinary employer usually takes the responsibility for work environment and insurance and sometimes through own training programs. Nevertheless, it is still possible to see it as a hybrid network governance form, since it is the rescue services who have the mandate/decision-making right at the incident site. In conclusion, we believe that network governance in its current form may well be used but is not sufficient when capturing the institutional aspects of emergency response cross-sector collaborations. Complementary perspectives, including theories from policy networks (Carlsson, 2000) and new public management (Gruening, 2001), may be used to address the potential need for hierarchical governing mechanisms and regulations.

In our study, we also identified a need for *internal trust*, which has rarely been discussed in network governance (to our knowledge and the overview of network governance literature in relation to this study), which rather focuses on trust among network organization (e.g., Jones et al., 1997; Klijn & Koppenjan, 2014). This is not surprising given the nature of many network collaborations. However, including internal trust, i.e., trust from managers and colleagues in the ordinary organization, seems crucial when new occupations are to be involved in first response and thus must switch among work tasks, role, and organizational "belonging." Actors in all three studies seem having achieved this internal trust, which is likely to enhance the prospects for collaboration. There are also key factors or practical needs in

the collaborations that cannot be captured solely by using a network governance perspective, most notably in the case of the semiprofessionals, but that must be addressed when developing the collaborations. For example, basic equipment and training/exercises play a specific role, given the emergency context.

Somewhat more surprisingly, we have not found any descriptions of network governance including ICT as an explicit key factor, in our literature overview, even though ICT support should play an important role, not only in emergency response but also in any contemporary network governance context. When digitalization or ICT is in focus, it is rather from a perspective focusing *relations* between organizations and ICT (e.g., Sun et al., 2016; Loukis et al., 2016). There are a few studies also embracing ICT as an enabler, e.g., the Janowsky et al. (2012) meta-study of 12 cases on various networks all being enabled by ICT. In the background section, it is argued that ICT as a *key factor* should be included as part of future network governance theory and that this is of special importance when analyzing emerging response cross-sector collaborations, which are indeed time-critical and involve attempts to save lives. The study results support this claim. In all cases, digitalization and ICT are or will be crucial for the network cross-sector collaborations, which we will elaborate on below.

ICT as an Enabler of Emergency Response Cross-Sector Collaborations

Some of the organizational needs and challenges identified in this study are in line with the previous literature. Studies on Swedish emergency response highlight difficulties in building trust and legitimacy, in gaining a shared understanding of incidents and insufficient categorization of responsibilities, ambiguities about actors' needs, uncertainty in communication, and a lack of incentives when involving other resources and creating networks (e.g., Yousefi Mojir & Pilemalm, 2016; Pilemalm et al., 2013; Berlin & Carlström, 2011; Palm & Törnqvist, 2008). When it comes to ICT, in the area of emergency response, the need for proper and optimized positioning of both professional resources and volunteers for faster response has been demonstrated in several technically oriented studies (e.g., Matinrad et al., 2019; Leknes et al., 2017; Andersson Granberg and Värbrand, 2007). Turoff et al. (2004) further identifies the needs for systems training, accessing vital, up-to-date, and correct information, and the free exchange of information.

However, we believe that (also) when taking the cross-sector collaboration perspective, it is important to view and handle ICT as a key factor – enabler or hindrance of collaboration. This is also something that has been highlighted by Yousefi Mojir and Pilemalm et al. (2016). This becomes clear, not the least, when taking a linear time perspective. The study illustrates the fast evolution of technological development. Whereas the Safety House and Nyköping municipality express future needs for mobile solutions, in Norrköping (2016–2017) the mobile

solutions are already in place and part of the user's own existing applications or requested. The perceived ICT enablers such as GPS, mobile applications, and decision-support systems for dynamic resource allocation for dispatching exist – for professional response resources. The major challenge, identified in the study, not the least in the case of semiprofessionals, lies instead in reconfiguring this ICT. This implies to add cross-sector functions in line with identified needs and according to proper organizational structures and matters of confidentiality, agreements, and laws, when integrating the new technologies into dispatch of new resources. At the time of writing (late 2021), digitalization permeates society, has become something of a buzzword, and the ICT for Swedish emergency response has further developed (e.g., Pilemalm & Yousefi Mojir, 2020; Pilemalm, 2020, 2022; Matinrad et al., 2019). An example is commercial app solution for dispatching volunteers as first responders (another emerging collaboration form referred to as "digitalized coproduction") (Pilemalm, 2020). At the same time, it tends to act as a barrier or hindrance for the cross-sector collaboration forms in this study. For instance, no new technology has been developed at the Safety House or in Nyköping and the civil citizen platform was never realized. In our study, several respondents spoke good about RAKEL, but, in several initiatives involving semiprofessionals as first responders, the semiprofessional express frustration over limitations with this audio-based technology. They await a joint app solution currently under development by the Swedish public safety answering point (PSAP). However, this app has been under development for 5 years, with no release (Pilemalm, 2021). All this also serve as illustrations of how ICT – as a key factor – can become a hindrance for the emerging collaboration/network governance forms.

Network Governance, Cross-Sector Collaboration, and Information Systems: Implications for Research and Practice

Relating the study to a larger public sector perspective, studies highlighting the significant role of networks, information sharing and resources, private sector partnering, and public sector cross-sector collaborations have been discussed under different names, including network governance, new public management, public-private partnerships, and e-government, as a potential solution to many public challenges (Agranoff, 2007; Waugh & Streib, 2006). That digitalization/ICT thus far has not been included as network governance key factors might have to do with that it is usually applied from a public management or public administration perspective. Here, we want to relate to the discussion by Loukis et al. (2016) arguing "that network governance should be conceptualized as an evolving socio-technical process shaped by actors and aimed at tackling complex and dynamic contemporary challenges" and to the Gil-Garcia et al. (2018) macro-level claims about the need to bridge the research disciplines of IS and political science, reflecting the recent

proposed merging of digital government and public administration research. It also has been proposed that public policymaking and project management in the field of IS can be balanced and thereby reach a more sustainable outcome at this juncture (Melin & Wihlborg, 2018).

In relation, we suggest that network governance analysis of, for example, cross-sector collaborations could benefit from combinations of approaches and perspectives taken from the IS research field. One example is the *socio-technical ensemble view* which conceptualizes IS as a *package of people*, *tasks*, *devices*, *artefacts*, *and policies*, and focuses on the interactions between people and technology, whether during construction, implementation, or use in social contexts (Orlikowski & Iacono, 2001). The socio-technical ensemble view is a perspective rather than a theory, and while it has some overlaps with network governance, it is broader in scope while remaining at a more abstract level and providing concepts, rather than explaining how to use them. Socio-technical ensembles may thus be used as a point of departure to ensure that aspects such as tasks, devices (here: equipment), and ICT artifacts are included and combined with network governance. This, to concretize and focus the key institutional aspects that were central to, but mainly unsolved in, the emerging emergency response collaborations. In relation, it would be possible to argue that network governance is rather descriptive and explanatory, while this study is mainly exploratory. However, we believe that it is a necessary first to explore whether a theory or perspective is suitable to address a certain phenomenon (here: emergency response cross-sector collaboration), and if it is, in the next step see to it that associated key factors are handled in the collaborations.

We believe that it is equally important to translate these macro-level perspectives to concrete cross-sector collaborations, in other words, taking a more pragmatic perspective. In relation to practical IS development, the need for interdisciplinary design teams for the cross-sector collaborations, including political science and juridical perspectives, has been suggested (Yousefi Mojir & Pilemalm, 2016). Our study points in the same direction.

Study Transferability and Limitations

The study is a triple case study on cross-sector collaboration in first response to small-scale, frequent emergencies in Sweden spanning from 2012–2017. As noted in the analysis section, there were, at the time, no transfer of lessons identified, e.g., in terms of equipment inventory, need for joint regulations of mandates, and joint ICT support across the cases. This is not surprising, given that cross-sector collaboration in emergency response was a new phenomenon and that two of the cases differed in both character and space (co-location and co-use) and the third case (semiprofessionals) was a research project. Nevertheless, since all cases pointed at similar needs, this is something that should be, and is, to some extent, addressed by current emergency cross-sector collaborations. In terms of network governance, the cases in the study (co-location, co-use, semiprofessionals) have been viewed as

instantiations of a hybrid form or specific governance regime, i.e., emerging when occupations that previously did not work together perform joint collaborations. Of course, it is a limitation of study that only three cases were included. It is difficult to say whether they are transferable to similar emerging governance regimes, nationally and internationally. However, since the time of the study, in particular the concept of using semiprofessionals as first responders has expanded and been implemented in various municipalities, as discussed above. Recent related studies of this cross-sector collaboration or hybrid network governance form in Swedish emergency response point at similar present key factors (e.g., the need for steering mechanisms, mandate, trust, work agreements, task prioritization, ICT as facilitator or hindrance) (Pilemalm, 2020, 2022). This indicates the transferability of the study findings at a national level. As for international applicability, more research is needed. Possibly, the emerging network forms with identified key factors are most applicable to countries with similar decentralized structures, regulations for confidentiality, and legal systems as in Sweden where, for instance, the decision to engage in cross-sector collaborations resides at the local level (e.g., with involved municipal rescue services). On the other hand, other more hands-on aspects of the emergency response cross-sector collaborations (e.g., resources deployed, main tasks, lifesaving goals, basic needs for equipment, training, and ICT support) should be similar in many countries.

Also, as to the potential transferability of the study results in a wider perspective, they specifically refer to emergency response of frequent accidents. But it is also of interest to comparing scale, i.e., routine accidents versus large-scale crises and catastrophes. Quarantelli (2000) argues that, despite both quantitative and qualitative differences between everyday emergencies and large-scale disasters, research and development work in both types of emergencies can learn from each other. Large-scale crises are more demanding in terms of resources and more unpredictable than small, frequent accidents. The infrastructure and services in a society may become unavailable, and response operations generally involve a huge number of actors from different sectors, regions, and even countries, in the form of "mega communities" (Kleiner & Delurey, 2007). Nevertheless, similar resources, ICT and IS, and equipment are often deployed. Also, we know that people (e.g., semiprofessionals) who are trained in, and have some experience of providing, first response in routine emergencies will be better prepared to act in large-scale crisis management, especially if they have already learnt how to use the technology employed. At a more general level, while various public sector cross-sector collaborations have different aims, there are also similarities because the actors are from different sectors and have to collaborate within the frame of their respective organizations. In relation, clarification of the roles, practices, interests, and duties of involved partners is always necessary. For example, Bryson et al. (2006) argue for the complexity of the interaction between actors and the need for continuous trust building between them. Also, in a healthcare cross-sector collaboration involving both the public and private sectors, trust was found to be a key success factor (Johnston & Finegood, 2015). Therefore, other parts of the public sector are likely to benefit from parts of the results and can adapt them or use them as

inspiration for their own cross-sector collaboration development. Of course, some sectors are more like emergency response than others. One potential example of the former is healthcare, in which dealing with patient care (compared with victim care) might include similar medical tasks, where the ambulance services are often involved and where the same laws and regulations sometimes apply.

Conclusions and Future Work

Cross-sector collaborations are highly relevant to emergency response, in a society where crises occur frequently and where at the same time emergency response organizations need to continue their day-to-day first response in a resource-strained public sector. To our knowledge, this is the first study juxtaposing and comparing the opportunities, challenges, and needs from several cases of emergency response cross-sector collaboration, and this should be seen as the study's major contribution. The major opportunities identified included shared facilities and equipment and a positive attitude toward the new assignment/collaboration. Major challenges included the undefined roles, responsibilities, and tasks of new actors in response operations, difficulties in prioritizing among ordinary tasks and new tasks in resource-strained organizations, and a lack of legislation, routines, and insurance. Needs are related to improved and repeated training and joint exercises and to trauma support and basic supplies, including blankets, reflective vests, warning triangles, and pocket breathing masks. ICT suggestions included improved shared communication platforms, systems for errand handling, joint assessment of information, status, and acknowledgment of available and dispatched resources, and smartphone-based alarm management. The study's cross-comparison network governance analysis suggested that emergency response cross-sector collaborations can be characterized as a hybrid form of government and network governance, especially when new occupations are brought in to act as first responders. In retrospect, it seems that these hybrid forms will continue to grow in importance. In Sweden, since the time of the study, the concept of semiprofessionals has expanded to several municipalities and the needs for steering identified in the study have been addressed by agreements among employers, insurances, and new training programs. However, it is still the rescue services who has the mandate at the incident site.

In the study, we also argue that previous network governance research when taking the digitalization or ICT perspective focuses its relations to governance at institutional or macro-level. Here, the study provides a theoretical contribution in arguing for the explicit inclusion of ICT as a *key factor* in network governance, complementing the institutional key factors. In relation, we discuss the potential benefits of combining network government analyses with perspectives from the IS field, for example, the socio-technical ensemble view.

Some possible directions for future work include exploring the potential co-use of new resources in ordinary accidents and large-scale crises. From a wider public sector perspective, studies should also include the development of effect

measures, methods, and cost-benefit models to evaluate emerging cross-sector collaborations. As to the connection of network governance and emergency cross-sector collaboration, future work may also incorporate other related theories, for example, public administration, new public management, and policy networks theory. Also, the connection between the fields of IS and policy science research in areas of public policymaking is interesting to explore, because they must both be involved in future cross-sector collaborations. This also calls for method studies on how to carry out IS development in an interdisciplinary manner. Finally, in line with the study limitations outlined above, it would be, if possible, of great interest to compare the emerging cross-sector collaborations/network governance forms to similar initiatives in emergency response in other countries.

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