

Integrating Virtual Operations Support Teams (VOSTs) into
domestic crisis and disaster management structures –
An exploratory study of challenges and requirements for improvement

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Abstract

Social media (SM) use in crisis and disaster management (CDM) is resource-intensive and can overwhelm emergency management authorities (EMAs). Digital voluntarism offers SM capacities for EMAs. A significant approach to reap benefits from digital voluntarism for domestic CDM is introducing Virtual Operations Support Teams (VOSTs). While VOSTs have been proven valuable in increasing capacities, they are far from being an established part of practices in domestic CDM. Limited research has been dedicated to understanding challenges and requirements to improve VOSTs' integration into CDM structures. The objective of the thesis was to address this research gap. Building on secondary data from a scoping study, qualitative expert interviews served as primary data to explore the topic in question. The country of the investigation was Germany. Major findings are that VOSTs' integration is challenged by an insufficient recognition of VOSTs as a new, valuable actor in the field and lacking official support for VOSTs. However, many of the identified challenges do not directly relate to the new organisational form of VOSTs but originate from underlying issues. It concerns conditions for SM use, missing structures for digital-working teams generally, and digital volunteer teams specifically, as well as innovation-hampering structures in CDM. The research significantly reveals that unidirectional attempts of aligning organisational structures and work approaches of VOSTs to fit into established CDM structures reach their limits if the structures do not simultaneously adapt to the new form of volunteerism. Without changes within the structures, barriers will remain, hindering digital voluntarism from becoming an established part of CDM practices.

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Abbreviations & acronyms

AKNZ	Academy for Crisis Management, Emergency Preparedness and Civil Defence (in German: Akademie für Krisenmanagement, Notfallplanung und Zivilschutz)
BBK	German Federal Office of Civil Protection and Disaster Assistance (in German: Bundesamt für Bevölkerungsschutz und Katastrophenhilfe)
BMI	German Federal Ministry of the Interior, Building and Community (in German: Bundesministerium des Inneren, Bau und Heimat)
CDM	Crisis and disaster management
EMA(s)	Emergency management authority(ies)
EU	European Union
FwDV100	Fire brigade service regulation 100 (in German: Feuerwehr-Dienstvorschrift 100)
GDPR	General Data Protection Regulation
GMLZ	Joint Reporting and Situation Centre of the Federal Government and the Federal States (in German: Gemeinsames Lagezentrum von Bund und Ländern)
ICTs	Information and Communication Technologies
IT	Information technology
LÜKEX	Interministerial and Interstate Crisis Management Exercise (in German: Länder- und Ressortübergreifende Krisenmanagement-Exercise)
NWS(s)	National weather service(s)
PIO(s)	Public information officer(s)
SM	Social media
THW	Federal Agency for Technical Relief (in German: Bundesanstalt Technisches Hilfswerk)
US	United States of America
UK	United Kingdom
VGI	Volunteered geographic information
VOSG	Virtual Operations Support Group
VOST(s)	Virtual Operations Support Team(s)
VOSTbw	VOST Baden-Wurttemberg
VOSThh	VOST Hanseatic city of Hamburg
VOSTthw	VOST Federal Agency for Technical Relief
VOSTmh	VOST Mühlheim an der Ruhr
VOSTuk	VOST United Kingdom
V&TCs	Volunteer & Technical Communities

Definitions

There are no universal definitions of central terms used in this thesis. The sections below serves therefore to introduce and clarify the understanding of used terms. Due to the research focus on Germany, many terms follow the understanding by the German Federal Office of Civil Protection and Disaster Assistance (BBK), which is the superior federal government authority for civil protection in Germany (BMI, 2020). The terms are organised alphabetically.

Certified volunteer(s)

‘Volunteer’ is a very general term describing any person who contributes their workforce, commonly unpaid. Distinctions can be made between certified volunteers as part of the formal crisis and disaster management structures and informal volunteers. The latter engage as individuals or organised groups in crisis or disaster response without a formal affiliation to authorities in charge (Roth & Prior, 2019b, pp.6-7).

The thesis focuses on certified volunteers in Germany. In Germany, certified volunteers do not only exist in the Red Cross but are an essential part of the formal crisis and disaster management structures (also refer to 2.1.2).

Crisis

A crisis is a situation deviating from the normal state with the potential for or with damage to protected assets (human life, property, infrastructure, etc.), which cannot longer be handled with standard organisational and operational structures of routine emergency management. Special management structures are required (BBK, 2019a, p.32).

Crisis and disaster management (CDM)

Crisis or disaster events deviate from regular emergencies. They demand increased use of resources and greater coordination and therefore special organisational structure. The special structures are time-limited special forms of organisation and control and command for extensive and complex tasks. CDM refers in delimitation to civil protection exclusively to measures in peace times (BBK, 2019a & 2012a).

In the context of this thesis CDM refers always to **domestic CDM**, hence CDM within a national, federal state or local setting. CDM is non-routine and extraordinary emergency management.

Disaster	A disaster is an event in which the life or health of a large number of people, livelihoods, or significant material assets are endangered or damaged to an unusual and extreme extent. The danger can only be averted, or the disturbance coped with, if the authorities, organisations, and institutions involved in disaster management operate under the unified leadership and direction of the disaster control authority in charge (BBK, 2019a, p.29). In comparison to a crisis, a disaster is characterised by a more devastating impact that has occurred or is expected to occur and demand a greater need for resources and coordination of resources for managing the situation (Wahl, 2020, p.18).
Emergency	Emergency is the overall term for a situation with the potential for, or with damage to protected assets (human life, property, infrastructure, etc.) which, in addition to self-help measures by individuals, may require state-organised assistance (BBK, 2019a, p.40).
Emergency management authorities (EMAs)	EMAs are government or official organisations with a mandate over the management of emergencies, including CDM (Wahl, 2020, p.19). In the German context, EMAs are understood as the civil administration and law enforcement authorities responsible for hazard control as well as the police at the local, district, and state level (BBK, 2019a, p.23). In addition to the police, central authorities are the fire brigade, the rescue service, the Federal Agency for Technical Relief (THW), and the disaster control authorities of the federal states primarily (Wahl, 2020, p.19). In accordance with the regulations of the German federal states, the disaster control authorities are the district administrators in the districts and the mayors in the independent cities, the ministries or senate administrations responsible for disaster control and, where applicable, the middle levels of government in the federal states (BBK, 2019a, p.30).
Formal actors/structures/system/etc.	‘Formal actors’ is used equally to EMAs, and ‘formal structures’ or ‘formal system’ refers to all processes and practices which take place in and among EMAs and are defined and approved by governmental/official protocols and standards. For instance, when referring to volunteers being “formally trained” it means that they received training similar to professional actors. The thesis sets a sole focus on formal structures and excludes ‘informal’ structures and actors, which are present in any crisis and disaster event, e.g., the affected public helping each other or spontaneously formed support groups. Hence, when referring to CDM structures, it exclusively concerns the formal structures and excludes all informal activities in the context of crisis and disaster events.

**Information and
Communication
Technologies
(ICTs)**

ICTs is an umbrella term. It refers to the diverse set of technological tools and resources used to transmit, store, create, share or exchange information. Old ICTs are e.g. newspapers, radio or television. When talking about ‘new’ ICTs, it is referred to recent developments due to digitalisation, such as the internet, mobile devices as phones and laptops, and social media (UNESCO, 2021; Giroux et al., 2013).

**Social media
(SM)**

SM are internet-based applications. Specifics of SM are the two-way reciprocal communication flow. SM allows the interactive creation and two-way real-time information flow and exchange of content. A central distinction to classical media and old ICTs (Kaplan & Haenlein, 2010, pp.60-62). SM is a diverse field. SM platforms or channels have different properties and are used for diverse purposes. SM offers the exchange of information, collaborative projects, information gathering, entertainment, private use, professional use, etc. (Giroux et al., 2013, pp.5-6). Examples of SM channels or platforms are YouTube, Facebook, Twitter, Instagram, TikTok, Snapchat, and messenger services such as Signal or Telegram.

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Summary

Digitalisation and the spread of new information and communication technologies (ICTs) significantly affect emergencies and crisis and disaster management (CDM). A remarkable aspect in this regard is the increasing relevance of social media (SM). For emergency management authorities (EMAs), SM offers new opportunities for improved CDM; however, it also creates significant new challenges due to a new range of demanding tasks.

New ICTs offer new collaborative methods for providing support in crises and disasters, among it ‘digital volunteerism’. Internationally different initiatives have emerged to reap benefits from capacities offered by digital voluntarism for EMAs. A significant development for domestic CDM is introducing Virtual Operations Support Teams (VOSTs). The purpose of VOSTs as digital volunteer-based teams is to support EMAs by increasing their capacities to handle the workload in the SM sphere during CDM. VOSTs have been field-tested and proven to be a vital opportunity and asset for increasing EMAs’ SM capacities and hereby the overall CDM. Practice actors have been adapting the VOST-approach to serve their own needs, and VOSTs are spreading. Nevertheless, VOSTs are far from being an established part of practices in domestic CDM.

Very limited research has been dedicated to a better understanding of structural conditions for integrating new digital volunteer teams into domestic CDM structures. VOSTs with their specific profile constitute a valuable research subject to improve the knowledge body in this regard. The objective of the thesis is to address the current research gap in improving the understanding of factors hampering the integration of VOSTs into domestic CDM structures and identify entry points in support of their integration.

Since currently available research on the topic in question is in the early stages of understanding, the thesis adopted an exploratory research approach. A scoping study served to perform a structured review of scientific and grey literature to extract and systematise currently available knowledge on the topic in question. The review provided a preliminary knowledge basis for the primary data collection, the centre of the research. As primary data served expert interviews. The whole investigation covered the specific perspective of VOST-members. The focus was further set on one specific country, namely Germany. Certified volunteers are a central part of CDM in Germany, providing a basis for integrating VOSTs as volunteer-based teams.

Central findings of the conducted exploratory study are that VOSTs’ integration is challenged by a lacking recognition of VOSTs as new and valuable actor in the field and lacking official

support for VOSTs. However, many of the identified challenges are not directly related to the new organisational form of VOSTs but originate from fundamental underlying issues. It concerns lacking conditions for SM use, missing structures for digital-working teams generally, and for digital volunteer teams specifically, as well as innovation-hampering structures in the CDM field. The findings indicate the need for further measures to be taken within the VOST-community to forward the integration of VOSTs. The research nevertheless significantly also reveals that unidirectional attempts of aligning organisational structures and work approaches of VOSTs to fit into established CDM structures reach their limits if the structures do not simultaneously adapt to the new form of volunteerism. Without changes, barriers will remain hindering VOSTs to become an established actor type in domestic CDM and their deployment a common practice. EMAs are asked to take action and provide conditions enabling the use of capacities digital voluntarism can offer for effective SM coverage in CDM.

The main value of the exploratory study was the identification of broader implications not only specific to the research case, but offering a contribution to the knowledge body on obstacles and requirements in general for integrating new digital volunteer teams into domestic CDM structures. The thesis project contributes to a growing knowledge body on a widely unexploited topic. Nevertheless, this thesis project is only one contribution in a widely under-researched area and findings are based on a few literature sources, and a small number of expert interviews from one country context, Germany. Overall, the research covers solely one perspective on the topic – the perspective of VOST-members.

Digital voluntarism offers valuable resources for increasing EMAs capacities in the SM sphere. The possibilities are by no means exhausted, but rather various difficulties apparent in adapting to and benefiting from this new volunteering type. The scientific community can support overcoming obstacles by contributing with analysing and improving the understanding of concerns and supporting a transition within CDM practices. Therefore, it calls for increased attention to the topic among the scientific community contributing to the CDM field.

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1 Introduction

Digitalisation and the spread of new information and communication technologies (ICTs) pose substantial changes to societal life with lasting effects on information availability and interaction patterns. These socio-technological changes also significantly affect emergencies and crisis and disaster management (CDM) (Roth & Prior, 2019a; Giroux et al., 2013). A remarkable aspect in this regard is the increasing relevance of social media (SM) (Reuter et al., 2018). From the perspective of emergency management authorities (EMAs), SM offers new opportunities for improved CDM; however, it also creates significant new challenges (Hughes et al., 2020; Saroj & Pal, 2020; Elbanna et al., 2019; Alexander, 2014).

As people's habit of SM use increases in daily life (Statista, 2021), SM gain equal importance in crisis and disaster events (Kim & Hastak, 2018; Reuter & Spielhofer, 2016). On the positive side, SM provides EMAs with additional communication channels and allows reaching a large public quickly and directly (Palen & Hughes, 2018; St.Denis et al., 2014). On the negative side, SM increases the risk of rapid spreading of rumours and fake news (Plotnick et al., 2018). To keep the sovereignty over the interpretation of the event, EMAs need timely awareness of false and misleading information and maintain active communication on SM (Fathi et al., 2019).

SM also offers a new dimension of information availability for EMAs for better situational awareness and hence decision-making (Saroj & Pal, 2020; Vieweg et al., 2010). Numerous people post, share and comment immediately and simultaneously on events. To make use of SM-generated content, it has to be filtered, verified, validated and transformed into a tangible format to serve the needs of decision-makers (Fathi et al., 2020; Soden & Palen, 2016). Instead of traditionally having too little information in CDM, managing data overload becomes the challenge (Stieglitz et al., 2018; Meier, 2015; Hiltz & Plotnick, 2013).

The above descriptions illustrate only some impact of SM on CDM. To benefit from the opportunities that SM offers and use it effectively, EMAs have to perform resource-intensive tasks in addition to the already high demands of CDM (Elbanna et al., 2019; Hughes, 2012). Nevertheless, EMAs are asked to keep abreast with new conditions to stay relevant and maintain up-to-date work practices, the reason there is a need to provide capacities for adequate SM coverage in CDM (Saroj & Pal, 2020; UNOCHA, 2013). However, past events and evidence from research illustrate that too often EMAs lack such capacities (Kaufhold & Reuter, 2017; Reuter et al., 2016; Wukich, 2015; St.Denis et al., 2014).

The past decade has shown that many people globally are willing to voluntarily dedicate their time, skills and knowledge to support CDM virtually (Bout, 2019; McLennan et al., 2016). Such

engagement has been termed ‘digital volunteerism’ (Bout, 2019; DRK, 2019; Hughes & Tapia, 2015). Digital volunteers can be loose individuals, which often engage spontaneously, but they also organise in groups with different specialisations. Such groups have been labelled differently but are often known as ‘Volunteer & Technical Communities’ (V&TCs) (Fathi et al., 2020; Abdulhamid, 2018). V&TCs offer resources and skills, which in principle can directly relieve the workload of EMAs in the SM sphere (van Gorp, 2014; Starbird & Palen, 2013).

EMAs have, however, difficulties engaging with V&TCs to benefit from their capacities (Hughes & Tapia, 2015). Different work focuses are leading to gaps between the data produced by V&TCs and the needs of EMAs, while trust issues complicate formal actors’ collaboration with V&TCs (Bout, 2019; van Gorp, 2014). Ultimately, it leads to valuable resources provided by digital voluntarism, often remaining outside of formal structures. On the one hand, this leads to a missing out on opportunities to improve response practices. On the other hand, digital voluntarism takes place with – or without – formal actors. Crisis and disaster events have a virtual dimension nowadays. The public uses SM, and digital volunteers and V&TCs engage in crisis and disaster relief (Fathi et al., 2019; Palen & Hughes, 2018; Alexander, 2014). If formal actors do not engage and adapt to this change, parallel structures develop. As one consequence, past events have already provided evidence that the public can feel more supported by informal digital actors than official EMAs (Harrison, 2016; Heinzelman & Waters, 2010).

Various international initiatives have emerged to reap benefits from capacities offered by digital voluntarism for EMAs. Simultaneously, developments are observable in the international humanitarian context and domestic CDM (Bout, 2019; Fiedrich & Fathi, 2018). With a focus on domestic CDM, a significant development are Virtual Operations Support Teams (VOSTs) (Roth & Prior, 2019a; St.Denis, 2015). An emergency manager, Jeff Phillipps, presented the VOST-idea in the US in 2011. Phillipps thought of creating digital support teams of ‘trusted agents’, who work explicitly for emergency managers, assist them on request during major emergencies, and reduce their work overload in the SM realm (Phillipps, 2011). Building on Phillipps’s idea, VOSTs have been launched internationally, with currently over 50 VOSTs in the Americas, Europe and Oceania (VOSG, 2021b).

1.1 Research rationale, objective & approach

The genesis of new approaches and new organisational forms, and roles in response to changing condition and improve capacities within the CDM context have been documented for a long time (Dynes, 1970; Quarantelli, 1994). VOSTs are one significant example in this regard. They

are a substantial approach for adapting to new demands created by the impact of SM (Fathi et al., 2020; Müller-Tischer, 2018; Hughes, 2012).

The VOST-approach has been field-tested, and proven to be a vital opportunity and asset for increasing EMAs' SM capacities and hereby supporting the overall CDM (VOSTNY, 2018; Kaminska et al., 2015). VOSTs can support the two-way information flow between the public and EMAs, increase situational awareness and also support EMAs collaboration with digital volunteers/V&TCs (Dulloo et al., 2020; Fathi et al., 2020; Auferbauer & Tellioglu, 2019; St.Denis et al., 2014).

Practice actors have been adapting the VOST-approach to serve their own context and needs, and VOSTs are spreading (VOSG, 2021b). Nevertheless, VOSTs are far from being an established part of CDM practices. Only a few pioneering and innovative EMAs use VOSTs (Fathi et al., 2020; St.Denis et al., 2014). The integration of VOSTs into CDM structures seems to be meeting severe obstacles (Roth & Prior, 2019a).

The VOST-approach is a clear example of harnessing the benefits of digital voluntarism for increasing capacities of EMAs (Dulloo et al., 2020). VOSTs can support and improve practices of EMAs in CDM. This being the underlying premise of the thesis research, a better understanding of structural conditions for VOSTs' integration into formal structures is assumed valuable to support overcoming current obstacles to improve their integration. The specific volunteer phenomenon was further seen as a significant research case to enhance the knowledge body on challenges and requirements in general for integrating new digital volunteer teams into domestic CDM structures.

In the field of digital voluntarism, research has been largely focusing on V&TCs (Abdulhamid et al., 2020). Under investigation have been obstacles and improvement needs for collaboration between V&TCs and EMAs (van Gorp, 2014). Much research interest has been on international aid contexts and prerequisites for event-specific coordination and cooperation between V&TCs and 'traditional' humanitarian organisations or local EMAs (Sabou & Klein, 2016; Weinandy, 2016; de Albuquerque & Bakillah, 2013; Meier, 2011). The phenomenon VOSTs and especially their integration as new actor type into domestic CDM structures has however received limited attention so far.

The available research on VOSTs evaluated single deployments in different operational contexts (Kaminska et al., 2015; St.Denis et al., 2014). Research focuses further on VOSTs' internal organisational and working structures as on technical and procedural approaches and

requirements (Fathi et al., 2020; St.Denis, 2015). A significant research gap is on a better understanding of structural conditions for integrating VOSTs into domestic CDM structures.

The overall objective of the thesis is to address this current research gap in *improving the understanding of factors hampering the integration of VOSTs into domestic CDM structures and identify entry points in support of their integration.* Therefore, the thesis investigates the following research question:

What are the challenges for and requirements to improve the integration of Virtual Operations Support Teams into domestic crisis and disaster management structures?

Since currently available research on the topic in question is in its infancy and early stages, the thesis constituted an exploratory study (Stebbins, 2001). The study followed three consecutive steps. The first step built a scoping study of scientific and grey literature. The purpose of the scoping study was to extract and systematise the currently available knowledge on the subject in question. Building on that secondary data from the literature, qualitative expert interviews were conducted to gain primary data to further explore the topic in question. The underlying assumption was that much more information is available among relevant practice actors than has been documented in the literature so far. The primary data was at the centre of the research. As a last step, secondary and primary data were synthesised, findings discussed to draw conclusions concerning the outset overall research objective and reflected in the face of broader research implications.

1.2 Research scope & limitations

The presented investigation solely covers the perspective of VOST-members. This decision represents a significant limitation regarding the covered scope of the thesis but the benefits of this choice outweigh the limitations. Through the limited available research, investigating the topic from the various perspectives at once posed a risk of providing too broad and fuzzy results. In contrast, limiting the scope allowed sharpening the research.

A further research limitation concerns the choice of consulted experts. Every country's CDM structures differ and reflect different socio-historical conditions for the integration of VOSTs. Differences include the political system, legal conditions and responsibilities in CDM. The inclusion of volunteers into the formal system also highly varies between different contexts. Due to this specific embedment, it was reasonable to set the research focus on a particular country. It allowed making the findings comparable as all interviewed experts related to the same general conditions. The choice further enabled the specification of factors, which could

later become relevant for using or comparing the research results to other contexts – with Germany being the country of choice for the investigation. Certified volunteers are a central part of CDM in Germany, providing a basis for integrating VOSTs as volunteer-based teams into CDM structures.

In contrast to the expert consultation, a global review of scientific and grey literature was conducted. Regardless of each country specifics for VOSTs' integration, such an approach was beneficial. The wide perspective allowed establishing a knowledge base on already identified challenges and requirements for VOSTs' integration, which could be assessed later in the primary data in their relevance for the German context. Limitations arose due to the language skills of the author of the thesis. Only English and German literature could be sighted. This limitation concerns all sources used throughout the whole thesis.

1.3 Thesis outline

The structure of the thesis is as follows: *Chapter 2* outlines the German research context and expands on the VOST phenomena. *Chapter 3* explains the applied research methodologies, the data collection and analysis. *Chapter 4* presents the results of the literature review. *Chapter 5* presents the results of the analysis of the primary data, namely the expert interview analysis. *Chapter 6* compares, conceptualises and reflects the results and outlines broader implications of the research. *Chapter 7* offers conclusions from the thesis and suggestions for future research prospects.

2 Research context

This chapter presents relevant contextual information regarding the conducted research.

2.1 Crisis & disaster management structures in Germany

The sections below outline central elements of the German crisis and disaster management (CDM) structures.

2.1.1 Key governmental actors & responsibilities

In Germany, the 16 federal states are responsible for everyday emergencies and CDM. The independence of the federal states leads to variations regarding legislation, approaches, and responsibilities (Wahl, 2020; Reitter, 2018; Domres et al., 2000). In general, the federal states have transferred the primary responsibility for CDM further to the local administrative level, districts and district-free towns (Geier, 2021; BBK, 2012a). As shown in Figure 1, depending on the impact of an adverse event, higher-level disaster control authorities can support situation management.

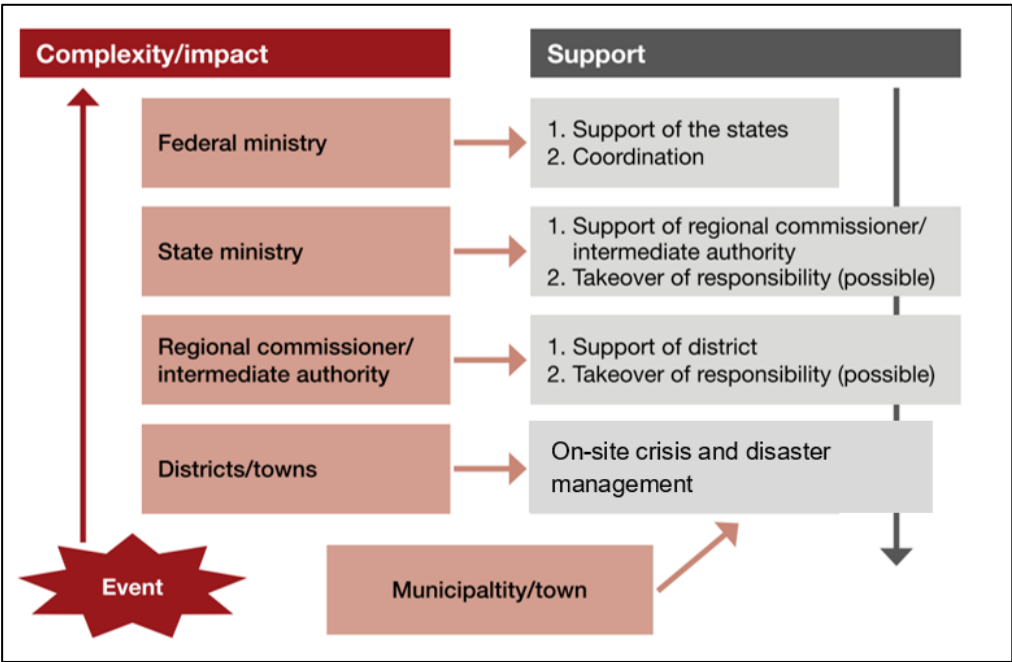


Figure 1: Structure of governmental responsibilities in CDM (adapted after BBK, 2012a).

Besides the disaster control authorities, central EMAs in Germany are the police, rescue services, the municipality-based fire brigades, and the Federal Agency for Technical Relief (THW) (Geier, 2021; Wahl, 2020). The special role of the THW is that it only becomes active at the request of other EMAs. When additional capacities are needed, EMAs can request THW forces nationwide (THW, 2021a & b).

2.1.2 Volunteers

The reliance on voluntarism is a specific characteristic of the German CDM system. In Germany, 1.7 million volunteers provide the basis for emergency management and play a central role in CDM (BBK, 2021d). For instance, the vast amount of fire brigades in Germany are volunteer fire brigades. Only large cities have professional fire brigades leading to 95% of all members in fire brigades being volunteers (Hegemann, 2020). Also 98% of THW-members are volunteers. A quite extraordinary structure for a federal agency (THW, 2021a).

The THW and volunteer fire brigades have clear hierarchies, command-and-control structures, and clearly defined protocols. To be deployed, volunteers receive specific qualifications and need to attend regular training and exercises (BBK, 2021d; THW, 2021a & c; BBK, 2012b). The formal affiliation of volunteers also ensures legal protection as coverage in case something happens to the volunteer during her or his work as well as protection against involuntary possible caused damages (THW, 2021b; BAS, 2018; BBK, 2012b). It is further common that volunteers (like professionals) need to provide credentials from a police certification of conduct to relevant security checks depending on the position they fill and tasks they do (HS, 2021; BMJV, 1994). To ensure the availability of volunteers, employers are obliged by law to allow certified volunteers to leave work for operations and without financial disadvantages; hence certified volunteers continue to receive their payment while volunteering. Employers receive compensations for missed working hours of their employees due to volunteer duties (THW, 2021b; Hegemann, 2020; Schmid, 2018).

German CDM builds significantly on long-term committed and qualified people who are willing to volunteer their time and skills, and structures are in place for certified volunteer integration (BBK, 2021d). However, certified digital volunteer teams are not yet common and new to CDM structures in Germany (DRK, 2019).

2.1.3 Crisis units

All relevant actors in Germany among the different administrative levels need to have strategies and plans for CDM (Geier, 2021; BBK, 2012a). A central element in managing crises or disasters is the provision of crisis units (Hofinger & Heimann, 2016). Crisis units are temporary organisational forms to increase internal capacities and relieve regular structures. Crisis units are set-up in fire brigades, police, the THW, among others. The political authority responsible for managing a specific crisis or disaster event can also summon crisis units in support of situation management (Gißler & Fiedrich, 2021; BBK, 2012a). Crisis units divide broadly into two main types: a) operational-tactical and b) administrative-organisational (Gißler & Fiedrich,

2021). The latter are commonly activated to increase capacities in and improve collaboration among ministries or other administrative authorities. Figure 2 exemplifies a structure of an administrative-organisational crisis unit:

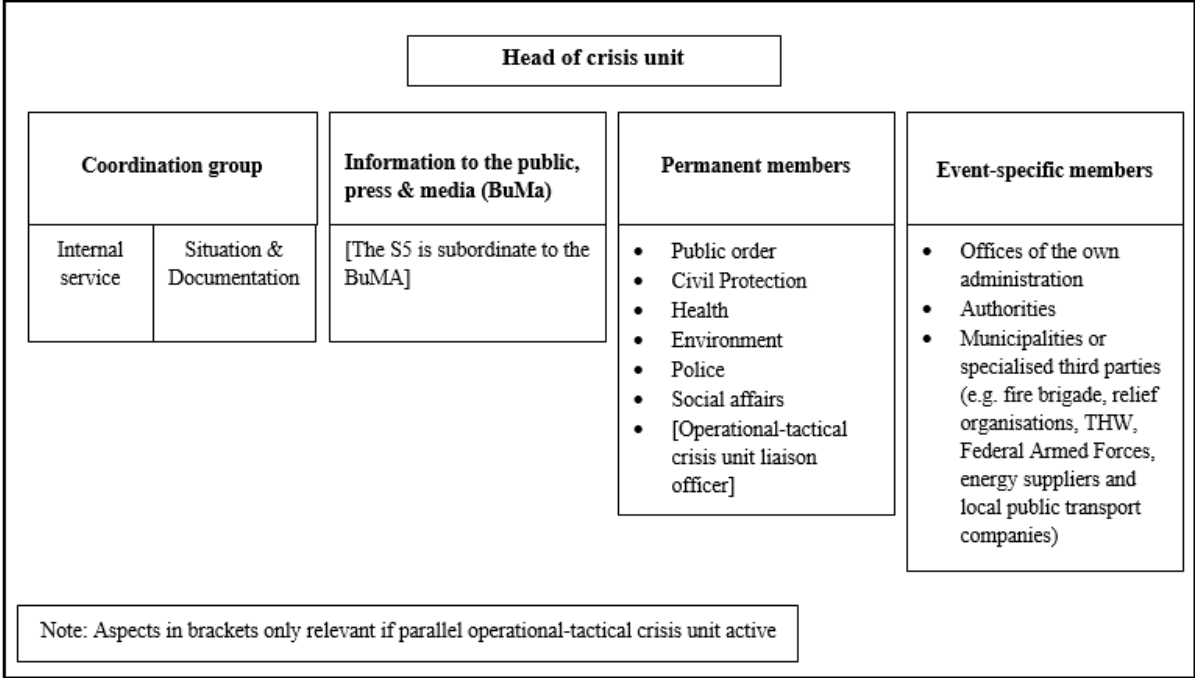


Figure 2: Exemplary structure of an administrative-organisational crisis unit (design after BBK, 2003).

As a basis for operational-tactical crisis units serve in general service regulations usually titled as ‘Leading and Managing in Operations’ with the code ‘DV 100’ (Hofinger & Heimann, 2016). DV100-regulations are adapted accordingly to the organisation, like the police or THW. The fire brigade service regulation 100 (FwDV100) is of central importance. It builds the countrywide basis for operational-tactical crisis units for disaster control (Gißler & Fiedrich, 2021). Figure 3 exemplifies the structural design of an operational-tactical unit based on the FwDV100:

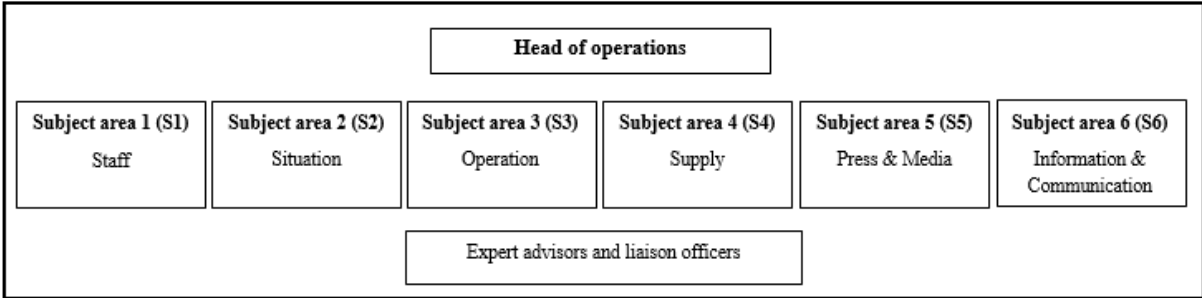


Figure 3: Exemplary structure of an operational-tactical crisis unit (adapted after AFKzV, 1999, p.14).

2.2 Virtual Operations Support Teams (VOSTs)

The sections below elaborate on the VOST-approach. As VOSTs are an international phenomenon, it serves to locate and delimit the German VOSTs within the VOST-community and to introduce the different German VOSTs.

2.2.1 The VOST-community

Jeff Phillips introduced the VOST-idea in 2011 in the US. Phillips conceptualised VOSTs as support teams to relieve emergency managers' workload in CDM by assigning them SM coverage tasks (Phillips, 2011). Beginning in the US, diverse actors used Phillips's idea as basis, and have implemented VOSTs internationally as shown in Figure 4.

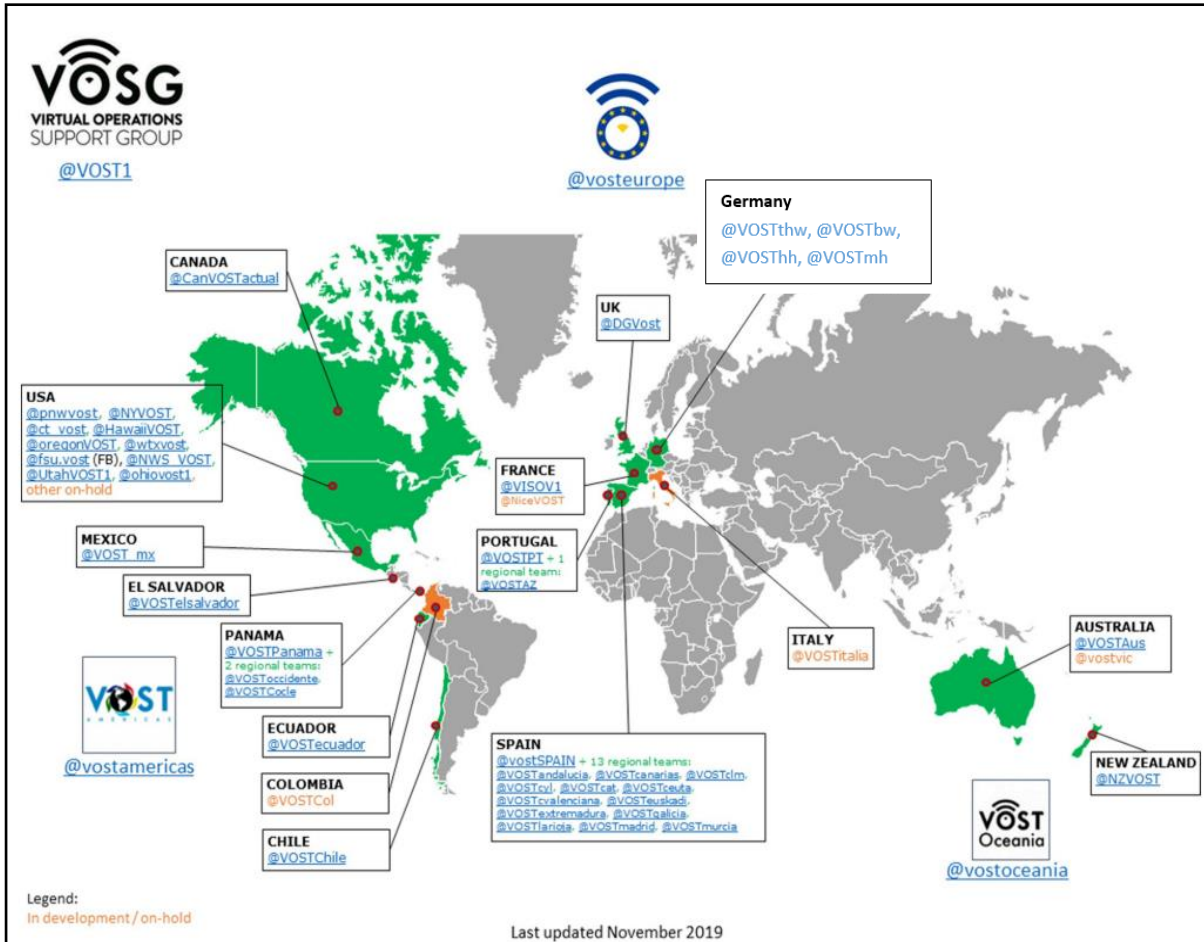


Figure 4: VOSTs organised in the VOSG (adapted after Fathi et al., 2020, p.4).¹

The first VOST in Germany, the VOSTthw², was founded in 2017. Since then three further VOSTs have been established at different EMAs (Fathi & Hugenbusch, 2020; refer to Table 1).

VOSTs	Affiliated emergency management authority (EMA)
VOSTthw	Federal Agency for Technical Relief (THW)
VOSTbw	Ministry of Interior, Digitisation & Migration of the federal state Baden-Wuerttemberg
VOSThh	The professional fire brigade of the Hanseatic city of Hamburg
VOSTmh	The professional fire brigade of the city Mühlheim an der Ruhr

Table 1: VOSTs in Germany.

¹ This map is the most recent official record available of the status of the official VOST-community.

² As the VOSTthw was the first in Germany it is sometimes referred to as the German VOST (VOSTde). The official term of the VOST is however VOSTthw (Fathi et al., 2018; Martini et al., 2015).

In 2012, the international Virtual Operations Support Group (VOSG) was founded. The VOSG oversees that teams working under the label ‘VOST’ follow similar ideals to create a “trusted brand” (VOSG, 2019), and support for the implementation of more VOSTs. Only when the VOSG approves a team, it officially joins the VOST-community (ibid.; Weaver, 2018). The term ‘Virtual Operations Support Team / VOST’ nevertheless is not protected. Hence, not all teams operating under the label ‘VOST’ are inevitable part of the official VOST-community. There are further three regional networks: VOST Americas, VOST Europe and VOST Oceania (VOSG, 2021b; VOSTEU, 2021). Among others, the networks support the development of the VOST-community in their respective region (Fathi et al., 2018; St.Denis, 2015). The different German VOSTs also cooperate and are in exchange (Fathi & Hugenschub, 2020).

Philipps did not refer to volunteers when introducing the VOST-idea and the VOST-community stresses that “‘V’ in VOST stands for ‘virtual’ and not ‘volunteer’” (St.Denis, 2015, p.92). Nevertheless, dominantly VOSTs are run by volunteer force, and built hence a volunteer community (Fathi et al., 2020; Cobb et al., 2014). One reason pointed out in literature why VOSTs are commonly volunteer-based is the lack of funding within EMAs for SM coverage (Duffy, 2016; St.Denis, 2015; refer to 4.2, 5.6 and 6.3).

2.2.2 Conceptualising & specifying the German VOSTs

Following Reuter and Kaufholds’s (2018) role typology, VOSTs can be conceptualised as a specific type of actor within the CDM field (refer to Figure 5).

		<i>Role type 1</i> Emergent groups	<i>Role type 2</i> Virtual & Technical Communities (V&TCs)
		<i>Explanation:</i> Affected citizens and volunteers form spontaneously groups to overcome the crisis or disaster event on-site.	<i>Explanation:</i> Digital volunteers organise in V&TCs to provide virtually aid to a crisis and disaster event.
Affiliation	<i>Citizen / Public</i>	<i>Role type 3</i> Incident Management Teams (IMTs)	<i>Role type 4</i> Virtual Operations Support Teams (VOSTs)
	<i>Authority</i>	<i>Explanation:</i> Emergency management authorities deploy IMTs for professional onsite CDM.	<i>Explanation:</i> Trusted digital volunteers are organised in VOSTs to assist professional CDM in the virtual realm.
		<i>Real</i>	<i>Virtual</i>
Realm			

Figure 5: Role typology matrix (adapted after Reuter & Kaufhold, 2018, pp.50-51).

Table 2 serves to stress further central differences of VOSTs to other organised digital volunteers in V&TCs (Fathi et al., 2020; Cobb et al., 2014; van Gorp, 2014).

	VOSTs	V&TCs
Modus operandi / Purpose	Become active on request by a formal actor. Purpose is to serve explicitly the VOST-activating actors SM needs. The VOSTs deploy for their affiliated EMA either directly or on request of other EMAs.	Become autonomously active when need is assessed. Work focus is towards helping the affected population by using SM and virtual means. Collaboration with official actors takes place but is not solely work purpose.
Internal organisational structure	Different degree of but have hierarchical leadership structures. Provides the basis for VOSTs to fit in well into command and control structures common in CDM.	Maintain usually a flat and lateral internal organisational structure.
Volunteer type	Trusted digital volunteers: To be employed legitimately, VOSTs aim at being “trusted agents” within the CDM structures.	Digital volunteers: V&TCs do not set a focus on fulfilling formal requirements to be accepted as trusted agents within formal structures.

Table 2: Contrasting VOSTs and V&TCs.

Modus operandi / Purpose of the German VOSTs

The specific purpose of a VOST and the tasks a VOST fulfils depend on the needs and requests of the respective EMA.

Philipps included crisis communication with the public in the task list of a VOST, and many VOSTs engage in such activities (VOSG, 2021a; St.Denis, 2015). VOSTs have also excluded it from their portfolio and focus solely on providing the deploying actor with information generate from SM (Fathi et al., 2020; Weaver, 2018). Task-based there are hence two VOST-types a) VOSTs actively engaging with the public and b) VOSTs mostly invisible to the public during deployments. In Germany, only the two fire brigade VOSTs engage in crisis communication. The other two VOSTs focus on providing the deploying actor with information generate from SM. Table 3 (p.12) provides a broad overview of central tasks (German) VOSTs can cover.

Philipps thought of distributed teams when introducing the VOST-idea, where the members can work from anywhere, especially outside the impacted area (VOSG, 2021a; Philipps, 2011). VOSTs usually work in such way. There have been however also adaptations. In Germany, it has become common that if possible the VOSTs’ point-of-contact (team leader/liaison officer) is physically present at the command centre of the CDM operation (Fathi et al., 2020). As within

fire brigade’s command structures the head of operations is usually on-scene, VOSTh plans even to be physically present with the VOST on-scene in an operational vehicle.

Purpose	Tasks
Increasing EMAs’ situational awareness	SM monitoring (information publicly available / openly accessible) ³
	SM data processing: collecting, filtering, assessment (verification & validation), preparation & presentation (e.g. creating & updating internal virtual situation maps)
	Identifying public needs, damages, misinformation or fake news, analysing trends and sentiments of the public in SM
VOSTs as intermediary between EMAs & digital volunteers/ V&TCs	Conducting and engaging in crowdsourcing
	Collaborating with other VOSTs and coordinating with V&TCs
Supporting the two-way, reciprocal information flow between the public and EMAs	Creating and updating public available virtual crisis/ disaster maps
	Communicating with the public
	Disseminating important information via SM

Table 3: Overview of the main tasks of VOSTs.

Every country’s CDM structures are different, providing different contextual conditions for VOSTs. The same concerns the different EMAs, which provide even in the same spatial-political context different conditions for VOSTs as their mandates, working areas and approaches differ. The contextual influencing factors and the different adaptation of Philipp’s concept to the specific needs of the EMAs lead to heterogeneous approaches of VOST not only internationally but also within Germany (Roth & Prior, 2019b; Müller-Tischer, 2021).

Philipps presented the VOST-idea as support for emergency managers to classical natural-hazard response (Philipps, 2011). Many VOSTs follow this purpose but VOSTs are also active in other operational contexts. For instance, VOSTs support the police in security incidents, e.g. school shootings (Roth & Prior, 2019a). Another example build VOSTs for weather service agencies to improve early warning (Weaver, 2018). VOSTs are active on different administrative levels and jurisdictions, from local to national and some have been deployed in cross-border operations⁴ (St.Denis, 2015; Kaminska et al., 2015).

VOSTs in Germany deploy among a variety of operational CDM contexts with different actors in lead of the operation. It ranges from natural-hazard response to non-emergency large-scale security operations as sports or political events (Fathi et al., 2020; Unger, 2020). The specific

³ Ethical concerns in using SM are important to acknowledge. For instance, data compliance is an issue as people are often not aware that their information is valuable to EMAs. VOST use only publicly available data, and methods are developed to ensure privacy-aware social media data processing (Löchner et al., 2020).

⁴ Conditions and challenges for the deployment of VOSTs in cross-border and internationally operations has not been of investigation interest of this thesis.

field of operation and operative scale varies depending on the allocation of the teams and the mandates of the affiliated EMA (refer to Table 4). Overall, VOSTs in Germany can be deployed by operative-tactical and administrative-organisational crisis units (BBK, 2019b; Unger, 2020; refer to 2.1.3). Additionally, within the VOST Europe and among the German VOSTs, VOSTs prepare to support each other during deployments (Fathi et al., 2018).

VOSTs	Operational primary field
VOSTthw	Can be requested nation-wide by all German EMAs (Fathi et al., 2020; refer to 2.1.1).
VOSTbw	Deploys within the federal state Baden-Wuerttemberg either as support to the Ministry of Interior, Digitisation & Migration of the federal state Baden-Wuerttemberg or on request of other EMAs within the federal state (MoIDM, 2018).
VOSThh & VOSTmh	Deploy in the working sphere of the municipality-based fire brigades. The focus is to increase the capacities of the respectively associated fire brigades in large-scale events when the regular structure outreach their capacities (Unger, 2020), and to support disaster control authorities when needed within the federal states they are allocated (VOSTMH, 2021).

Table 4: Primary operational field of the German VOSTs.

Internal organisational structure of the German VOSTs

To fit well into command structures in CDM, all German VOSTs have clear defined team leaders but the specific internal hierarchal structures differ (Müller-Tischer, 2021; Fathi & Hugenbusch, 2020). Exemplary, Figure 6 illustrates the organisational structure of the VOSTthw during deployment.

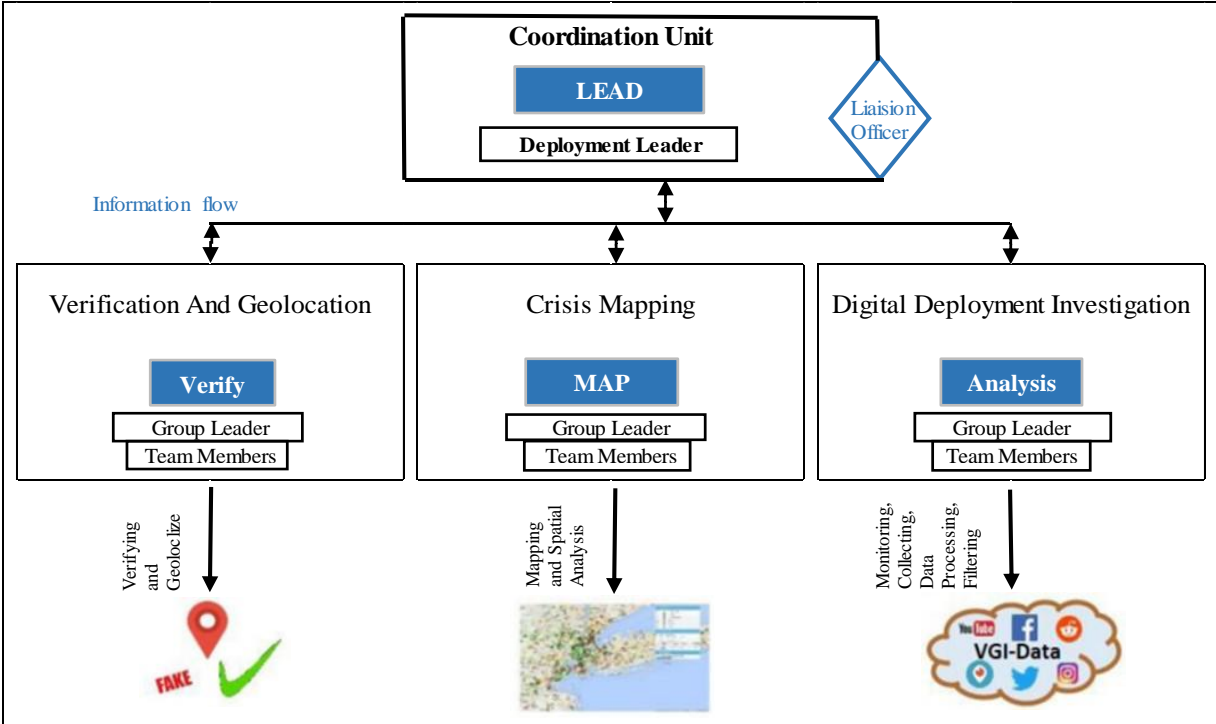


Figure 6: Organisational structure of the VOSTthw during deployment (Fathi et al., 2020, p.11).

German VOSTs: Volunteer type ‘trusted digital volunteers’

While the status of ‘trusted agents’ is generally emphasised and highlighted as a distinction to V&TCs, literature and information available often lack in making explicit or defining what characterises VOSTs and their members as ‘trusted’ (VOSG, 2021a; Reuter & Kaufhold, 2018; St.Denis et al., 2012). Also Philips basic concept of the VOST-approach lacked in defining which criteria need to be fulfilled for the status of ‘trusted’ (Philipps, 2011). Due to the differences of CDM structures, it is assumable that criteria will differ depending on the respective context. This is why it requires context-specific assessments.

Internationally VOSTs’ affiliation with authorities is achieved mainly by forming partnerships with EMAs, while VOSTs organise independently (St.Denis, 2015). However, the German system demands VOSTs to become part of formal organisations to achieve the basis for their integration into CDM structures. That is why all German VOSTs are official parts of EMAs (Fathi et al., 2020). VOST-volunteers’ memberships in established volunteer organisations (refer to Table 5) provides the basis for being legitimate actors and thus trusted agents.

Comparing the German VOSTs to V&TCs, the entry requirements for becoming a member are hence higher as VOST-members are obligated to be or be willing to become part of established relevant organisations (Fathi et al., 2020).

Issues concerning VOSTs status as trusted agents have become apparent throughout the research as relevant in understanding conditions for VOSTs’ integration (refer to 4.1, 5.4 & 6.).

VOSTs	VOST-volunteers memberships
VOSTthw	VOST-members are formal members at the THW (Fathi et al., 2020).
VOSTbw	VOST-members recruit from different established volunteer organisations as for example, the German Red Cross or volunteer fire brigades (MoIDM, 2018).
VOSThh	VOST-members recruit from the professional and volunteer fire brigades of the federal city-state Hamburg (Unger, 2020).
VOSTmh	VOST-members recruit from the professional and volunteer fire brigades of the city Mühlheim an der Ruhr (VOSTMH, 2021).

Table 5: German VOST-volunteers memberships in established volunteer organisations.

3 Research methodology

This chapter elaborates on the chosen approaches and tools for data collection and analysis.

3.1 Scoping study

To the best knowledge of the author, literature reviews on the topic in research are not available. It was therefore decided to start the research by exploring the available knowledge on already identified challenges and requirements for VOSTs' integration in a structured manner. The purpose was to extract and systematise the currently available literature to establish a preliminary knowledge basis as foundation for the interviews.

3.1.1 Methodological approach

The methodological choice for the literature review was to conduct a scoping study. The aim was to assess available knowledge in a structured manner but without focusing on specific study designs as intended by systematic reviews, why the concept matched well the literature review purpose (Arksey & O'Malley, 2005).

“Scoping studies aim to map the literature on a particular topic or research area and provide an opportunity to identify key concepts; [...] and types and sources of evidence to inform [...] research.” (Daudt et al., 2013, p.8)

The provided definition of scoping studies is in line with Arksey and O'Malley's (2005), who developed a six-step framework for scoping studies, which served as guidance for the conducted literature review (refer to Table 6). This framework appeared appropriate as it is established in the field of CDM research (Beerens & Tehler, 2016). The sixth step of the framework further addresses the relevance of consulting experts in complementing the literature review. It hence fitted firmly with the research design of this thesis.

Step	Description
Step 1	Identifying the research question
Step 2	Identifying relevant literature
Step 3	Literature selection
Step 4	Charting the data: organising, sorting, & analysing the selected literature
Step 5	Collating, summarising, & reporting the analysis results
Step 6	Consulting relevant stakeholders

Table 6: Six-step framework for scoping studies (Arksey & O'Malley, 2005).

3.1.2 Data collection & analysis

According to the overall research objective, the research question (step 1) for the scoping study was:

What is known in literature regarding the challenges for and requirements to improve the integration of Virtual Operations Support Teams into domestic crisis and disaster management structures?

To identify relevant literature (step 2), first, a search in the database Scopus was conducted. Scopus was chosen, as it is the largest abstract and citation database of peer-reviewed literature (Lund University, n.d.). After some test searches, it appeared as most beneficiary to use as search query string simply the overall subject under research without further key words: ‘Virtual Operations Support Team(s)’ including the varying different terms’ spellings used among authors⁵. The search revealed 18 hits (refer to Figure 7, p.17).

Due to the highly limited number of identified scientific literature on the topic VOSTs in Scopus and following Paez (2017), who emphasises the value of including grey literature in structured literature reviews to make them more comprehensive, it was decided to include grey literature in the review. Grey literature is understood as literature sources, which commercial publishers do not release as “theses and dissertations, research and committee reports, government reports, conference papers” (ibid., pp.233-234). This decision was made by being aware that scientific and grey literature cannot be seen as equal types of information source within a literature review. Therefore, within the analysis of the literature sources the type of the literature included in the review were made explicit (refer to step 4 *Overall analysis*, p.18).

A search in Google Scholar supplemented the Scopus search. It allowed the possibility of accessing a broad range of scientific and especially grey literature. The search led to 221 hits, providing a total number of 239 data sources as the starting point for the review (refer to Figure 7). Both searches took place at the end of May 2020.

The literature selection (step 3) followed three main rounds and were based on formal, content-related and information-source-related criteria (refer to Figure 7). The formal exclusion criteria reduced the number of literature sources to 177. Keyword searches of ‘virtual operation’ and ‘VOST’ were conducted within all remaining sources and a quick read-through was performed. This approach was chosen as it became quickly apparent that a missing connection to VOSTs in the title or abstract of a literature source did not mean that the source was irrelevant.

⁵ As authors, do not only use the official term but also refer to VOSTs as ‘Virtual Operation Support Team’ (e.g. Roth & Prior, 2019a) or ‘Virtual Operational Support Team’ (e.g. St.Denis, 2015) it was necessary to include these variations into the search.

The sifting disclosed overall that VOSTs mostly play a peripheral role in many publications. The literature often only introduced VOSTs as an example of a current phenomenon of supporting EMAs in tackling the SM sphere in crisis and disaster contexts (e.g. Purohit & Peterson, 2020; Wukich & Mergel, 2016; Wybo et al., 2015). Other sources simply referred to VOSTs as an example of a new type of volunteer teams in the (digital) volunteer sphere (e.g. Philipps, 2020; McLennan et al., 2016; Burns, 2014). As a result after the first sifting, only 35 literature sources remained as potential relevant in the context of the outset research interest.

The 35 sources were reread thoroughly. Reviewing the literature sources multiple times allowed determining if the remaining sources definitely (not) addressed challenges and requirements as the growing familiarity with the literature allowed a better understanding of the variety of challenges and requirements. A narrow read-through further enabled to identify whether the literature sources covered the perspective of VOST-members and hence could be included in the review (refer to 1.2). Figure 7 presents the collection and selection process at which end 10 literature source were identified as relevant to be included in the analysis (refer to Annex A).

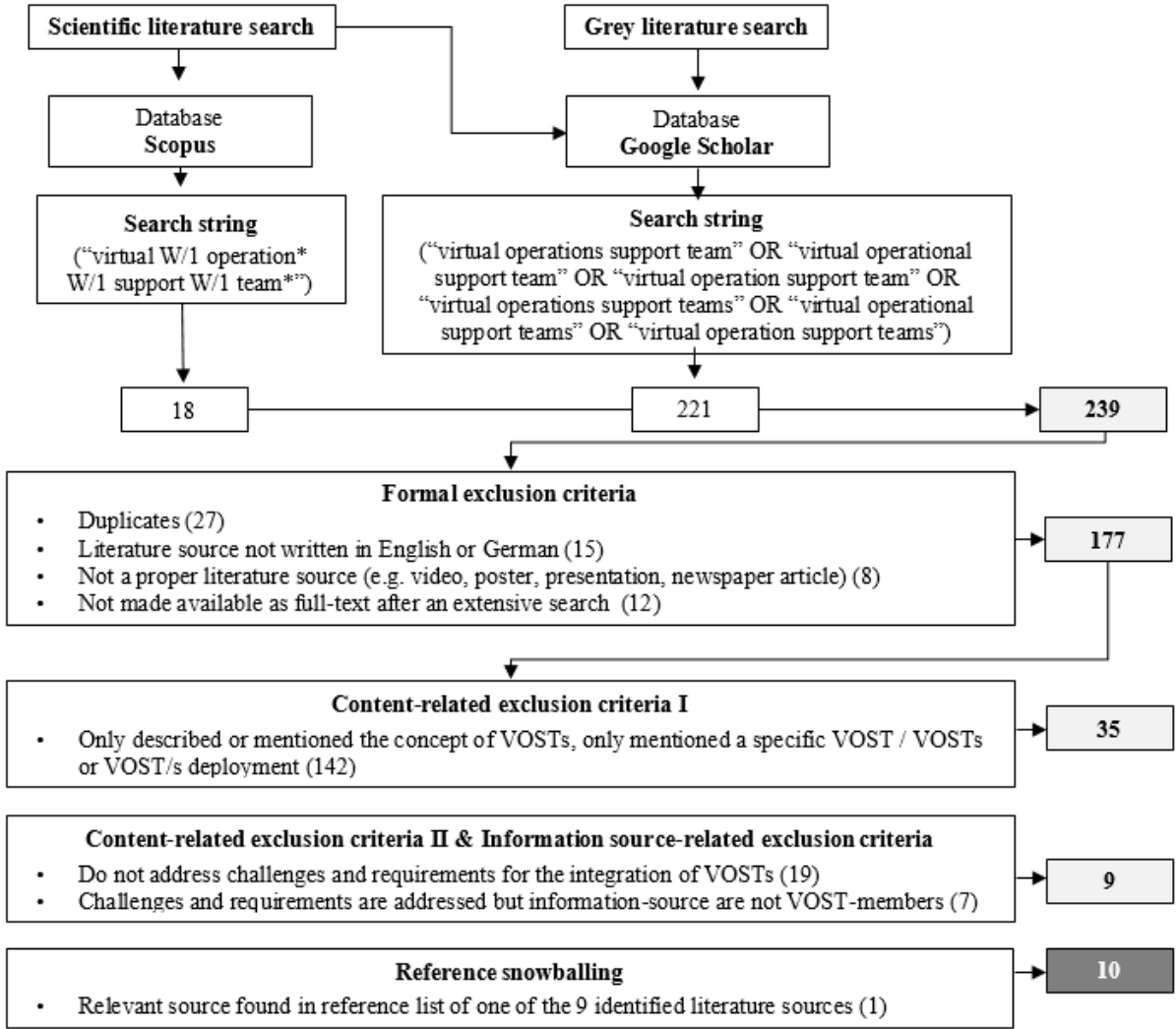


Figure 7: Literature collection and selection process.

Following Beerens and Tehler (2016) adaptation of the six-step framework, step 4 was split into two parts. First, an ‘overall analysis’ of the 10 literature sources was conducted focusing on major characteristics of the literature. Afterwards an ‘in-depth’ analysis of the content was performed. Therefore, each of the 10 literature source was reread again multiple times, relevant text passages marked, extracted and categories inductively developed to systematise information regarding challenges and requirements. The presentation of results (step 5) of the overall analysis are found below. The results of the in-depth analysis are presented in Chapter 4. Step 6 of the applied framework is covered by the expert interviews (refer to 3.2 & 5).

Overall analysis

The overall analysis revealed that most of the identified sources allocate in the category of grey literature. Only two of the ten sources are peer-reviewed scientific papers (refer to Table 7). Furthermore, much knowledge has been generated in the context of doctoral projects and by action research, where researchers were VOST-members at the time of the research themselves or sources present experience-based reports of VOST-members (refer to Table 8). It is therefore important to note, that findings made in the literature review are mostly based on none peer-reviewed article and sources largely provide contextualised and operational insights from the direct perspective of VOST-members.

Literature type	Publication type	Number	Literature
Grey	Dissertation	4	Asmolov (2016) Hughes (2012) St.Denis (2015) Weaver (2018)
	Conference paper	2	Cobb et al. (2014) St.Denis et al. (2012)
	Trade journal article	2	Blay & Lagadec (2016) Fathi et al. (2018)
Scientific	Peer-reviewed article	2	Fathi et al. (2020) Roth & Prior (2019a)
Total		10	

Table 7: Characteristics of the reviewed literature – Literature and publication type.

Data collection method / Source of information	Number	Literature
Action research / Researcher/author of the publication are VOST-member / Own experience as VOST-member	5	Blay & Lagadec (2016) Fathi et al. (2018) Hughes (2012) St.Denis (2015) Weaver (2018)
Interviews with VOST-members	4	Asmolov (2016) Cobb et al. (2014) Fathi et al. (2020) St.Denis et al. (2012)
Open-question survey among VOST-members	1	Roth & Prior (2019a)
Total		10

Table 8: Characteristics of the reviewed literature - Data collection method/Source of information.

Apart from Roth and Prior’s (2019a) international survey among seven countries – one of them Germany – all literature sources have a specific country focus. A large number of identified relevant literature sources were written in the US context. Only two literature sources originate singly from the German context (refer to Table 9).

Country context of publication	Number	Literature
US	5	Cobb et al. (2014) Hughes (2012) St.Denis et al. (2012) St.Denis (2015) Weaver (2018)
Germany	2	Fathi et al. (2018) Fathi et al. (2020)
UK	1	Asmolov (2016)
France	1	Blay & Lagadec (2016)
Multiple (Canada, France, US, Panama, Scotland, Spain, Germany)	1	Roth & Prior (2019a)
Total	10	

Table 9: Characteristics of the reviewed literature - Country context of publications.

The reviewed publications have a diverse overall thematic focus in which challenges for VOSTs’ integration and requirements for improvement are addressed. Roth and Prior (2019a) present the only study, which explicitly investigated challenges and requirements for a better integration of VOSTs (refer to Table 10).

Overall focus of the publication	Number	Literature
Crisis Communication / Practices of Public Information Officers (PIOs)	2	St.Denis (2015) Hughes (2012)
VOST deployment case study	2	Fathi et al. (2020) St. Denis et al. (2012)
International investigation of VOSTs integration in CDM structures with focus on challenges & requirements for their better integration	1	Roth & Prior (2019a)
Participatory design / VOSTs as mediator between citizens & meteorologist	1	Weaver (2018)
VOSTs for improved situational awareness	1	Fathi et al. (2018)
VOSTs for embracing SM for emergency management	1	Blay & Lagadec (2016)
Crisis mapping / Digital tools & platforms in emergency response	1	Asmolov (2016)
Digital voluntarism	1	Cobb et al. (2014)
Total	10	

Table 10: Characteristics of the reviewed literature - Overall focus of the publications.

3.2 Qualitative expert interviews

Using qualitative research methods is especially valuable in a context where little research has been conducted and few profound hypotheses formulated (Flick, 2018; Bryman, 2016; Corbin & Strauss, 2008; Stebbins, 2001). A qualitative approach appeared therefore highly suitable for the primary data collection, as it was not aimed at testing hypotheses but on providing a better understanding of the phenomenon under research.

3.2.1 Methodological approach

The specific chosen methodological approach for generating the primary data were qualitative expert interviews. Expert interviews are a well-established approach in qualitative research (Bogner et al., 2018; Gläser & Laudel, 2010) and fitted perfectly with the research interest of generating and systematising practice actors' knowledge.

Among the different approaches on selecting experts, not a random but purposeful sample was chosen (Gläser & Laudel, 2010; Corbin & Strauss, 2008). A clear defined sample allowed making explicit which perspective on challenges and requirements on integrating VOSTs in Germany is covered. Chosen experts needed to meet two main criteria (refer to 1.2):

- a. Be German VOST-members themselves.
- b. Be highly familiar with the German CDM structures.

For conducting the expert interviews a semi-structured approach was chosen as most suitable data collection tool. Semi-structured interviews provide informants with flexibility in shaping the interview direction and focus as well as enough structure for the interviewer to follow-up on the information established in the previous conducted literature review (Bryman, 2016; Kallio et al., 2016; Gläser & Laudel, 2010).

For the interview analysis, an inductive, open coding approach was chosen. Open coding follows an iterative process of repeated reading of the interviews and (re-)grouping and structuring of codes. Approaching the data analysis in this way ensures that the analysis results are well-grounded in the interview data (Gläser & Laudel, 2010; Corbin & Strauss, 2008).

3.2.2 Data collection & analysis

Six interviews were conducted in June 2020 via telephone or video-call. Each interview lasted between 90 and 180 minutes.

Experts were found by using the 'gatekeeper' approach and 'cold calling' (Flowerdew & Martin, 2005). 'Gatekeepers' are persons who can support contacting others by facilitating the

contact to potential valuable informants. Contact to a gatekeeper was initially made during an internship. The gatekeeper initiated the contact to experts and already interviewed VOST-members facilitated further contacts. This circumstance probably leads to a certain bias in the experts' sample due to experts' acquaintance. An internet search led to identifying people who were deemed interesting in the research context and were contacted by 'cold calling', hence without a pre-established contact. Cold calling was used to reduce the bias in the sample and two interviewed experts were found this way.

To ensure the anonymity of the interviewed experts, a general overview of their characteristics is provided, instead of a specific description of each expert. Table 11 characterises the experts with reference to the outset expert sample criteria (refer to 3.2.1).

a. Consulted experts' relation to VOSTs	
<ul style="list-style-type: none"> • All are active members in different German VOSTs • Have different positions within the VOSTs • Some were involved in establishing a VOST from the start • Some joined a VOST after the initial phase 	
b. Consulted experts' familiarity with the German CDM structures	
<ul style="list-style-type: none"> • All have many years of working experience as volunteers and/or professionals in the emergency / CDM field • The field of work range from the fire brigade, to police, medical services, and federal agencies 	

Table 11: Characteristics of consulted experts.

In preparation for the semi-structured interviews, an interview guide was conceptualised. The interview guide served as an orientation to ensure that central aspects were covered in each interview to allow comparison. Following the concept of semi-structured interviews, questions were, however, neither orthodoxly readout nor followed linearly (Bryman, 2016; Mayer, 2012). Four types of questions were developed as presented in Table 12 (p.22).

Annex B.3 presents the prepared follow-up questions based on the findings from the literature review. When respondents highlighted new aspects regarding challenges or requirements during the interviews, they were added to the questions prepared for follow-up. It allowed in the subsequent interviews to assess the perspective of the other experts regarding these aspects.

Two versions of the interview guide were created – one extensive version for the interviewer, including all question types and notes. The second was a shortened version. This guide only contained the open impulse questions and was sent to the informants before the interview to provide them with an idea of the interview direction (refer to Annex B.1/B.2). A test interview was conducted and based on the experience, the question guide adapted.

Type of question	Central purpose & use within the interview context
<i>Entry-questions</i>	Establish that the respondents fulfill the predefined requirements to qualify as expert
	Gain first overall insights into the experts' perspective on the research topic
<i>Open impulse questions</i>	Are broadly oriented on the findings of the literature review but hold very general not to influence the informants' answers
<i>Follow-up</i>	To get the experts' perspective if and how the identified factors in the literature were considered challenges and entail requirements in the German context
	Enclose statements and keywords as discussion impulse to assess the respondents' perspective towards specific topics
	Are only asked if the respondents do not address the related topic by themselves
<i>Resuming questions</i>	Stimulate the summary of the key challenges and priority requirements considered by the interviewed experts
	By asking the respondents, what they would do if they had the power to forward the integration process, stimulating an opening-up of perspectives away from current determinants

Table 12: Interview guide design - Question types.

As all interviewed experts and the interviewer were native German-speakers, the interviews were held in German. It made the interview situation more comfortable and easier to speak about the topics in question. Translations throughout the data collection and analysis were therefore inevitable and posed challenges, but were done with care to avoid misinterpretations because of translation issues.

The interviews were recorded and later transcribed. The interview transcripts were read and reviewed multiple times, and codes inductively developed. During the analysis process, codes were grouped, compared, and organised into sub- and overarching categories to synthesise and systematise the information provided by the respondents. When analysing the last interviews, it became apparent that similarities rather than differences dominated the data. At this point, sufficient 'saturation' was assessed (Corbin & Strauss, 2008). Saturation within the data is always artificial, and more interviews would have enlightened the topic under research further. The pattern in the data appeared however dense enough for being able to represent core challenges and requirements for the exploratory and not hypotheses testing purpose of the thesis.

It would have improved the analysis outcome if (at least) one other person had coded the interviews too, to assess interrater reliability. Due to the available resources, such an approach was not possible. However, throughout the analysis process, the building of categories was discussed with two other people, hence their perspectives on the analysis obtained.

The research followed the ethical research principles stated by the Swedish Research Council (2017), including consent, confidentiality, and data protection. The information issued to the interviewed experts and the acquired consent form are available in Annex B.4/B.5.

4 Challenges & requirements identified in the literature

The comparison and grouping of challenges and requirements found in the reviewed literature led to identifying three overarching topics under which the diverse number of found aspects could be categorised. To structure the results, Roth and Prior's (2019a) survey among VOSTs from seven countries serves as the point of reference by presenting their findings first, followed by the other literature sources, which have one specific country context (refer to 3.1.2). German-context literature is not compared with the other literature sources, as it would have provided little benefit due to the limited number of German references included in the review.

4.1 Recognition of VOSTs as valuable & trusted agents

Roth and Prior's (2019a) international survey revealed that the questioned VOST-members assess the VOST-approach as not recognised enough within the CDM field. It is claimed that VOSTs are yet not sufficiently accepted as a new actor. Officials lack understanding of and confidence in VOSTs' capabilities and trustworthiness. To improve the current situation, the questioned VOST-members assess first the need to get chances to demonstrate the capabilities VOSTs can offer to more EMAs. Secondly, respondents estimate that "without formal training or experience, volunteers without a background in emergency management or related fields are unlikely to be recognised as suitable partners" (p.58). For building trust in VOST-volunteers, the questioned VOST-members further address the need for introducing "policies for verification and background checks" (p.57). The respondents also point to VOSTs unsatisfying degree of integration into CDM, which too often "has been largely *ad hoc*" (ibid.). Especially possibilities for participation in official exercises are reported as lacking, which would be a root for formal integration. In addition to challenges in gaining the status of trusted and valuable agents among formal actors, questioned VOST-members declare a lacking understanding of VOSTs among the public.

In line with Roth and Prior's (2019a) survey findings, several other literature sources address challenges regarding the official recognition of VOSTs. Asmolov (2016) presents a challenge for the status of trust of VOST-members arising from the virtual working sphere of VOSTs. A coordinator for VOSTuk interviewed by Asmolov considers the physical availability of VOST-members as a requirement for generating trust in the later virtually working volunteers. Weaver (2018) highlights the significance of official training as the primary way for VOST-members to gain the trust of the deploying formal actors and hence to legitimate the VOST. Official training guarantee familiarity with the working processes and needs of the deploying actor.

Blay and Lagadec (2016) stress the significance of deployments of VOSTs as each event where VOSTs become active enhances their official recognition.

St.Denis et al. (2012) and St.Denis (2015) highlight a fundamental issue of the recognition of VOSTs originating from their purpose, namely to increase capacities of EMAs for SM use in crises and disasters. Both sources point to an adverse climate, including mandates against the use of SM as a communication medium in general and present deployments of VOSTs as a reaction to finding ways around current SM use restrictions to respond to the need to make use of SM by the public information officers (PIOs) in CDM. St.Denis et al. address practitioners and policymakers directly and call it an “imperative that the institutions of EM [emergency management] become open about the possibilities of social media” (p.8).

Asmolov (2016) provides further insights into challenges regarding VOSTs recognition related to the label of the teams. He reports the decision not to use ‘VOST’ as team name but a contextual connectable term, depending on where and for whom they work:

“In fact, when we are talking to especially police officers, we are trying not to use VOST because we’ve decided that’s a pretty unhelpful term, so we talk about digital wardens, online wardens. That feels a bit more British and people map it then onto things like flood wardens in local areas.” (Asmolov, 2016, p.125)

St.Denis et al. (2012) and Hughes (2012) point to open questions and legal concerns regarding the deployment of VOSTs. Hughes calls for the need to clearly define accountability questions, e.g. “if VOST members share information that inadvertently ends up putting people in harm’s way” (p.158). St.Denis et al. advocate for a formalisation of VOST-volunteers similarly to Red Cross volunteers, which are protected by the agency to whom they belong and from whom they received training.

Hughes (2012) also claims the need to provide the public with a clear understanding of the authority VOSTs have within the formal response setting. She refers to a VOST-engagement in a wildfire event, where the public was insecure if the information issued by the VOST “came from ‘official’ sources and whether they could trust it” (p.157). In the context of trust in VOSTs as a legitimate communicator, Blay and Lagadec (2016) point to the value of official Twitter-account certification of VOST-accounts.

4.2 Conditions for & adapting to needs of volunteer-based VOSTs

Roth and Prior present challenges originating from the volunteer base of VOSTs. The authors point to challenges regarding the availability and commitment of volunteers who are willing and able to devote their time to VOSTs. The authors portray recruiting of volunteers as a

challenge. Their questioned VOST-members report further that the VOST-work is “physically and psychologically stressful” (p.58), especially as the high workload is split often only among a few people. VOST-volunteers from other teams could assist in unburdening local VOSTs, but such collaboration brings new challenges along as “collaboration among teams can be hampered by insufficient interoperability of structures and processes” (ibid.). The questioned VOST-members also stress the negative effect of remote and isolated work for motivation and team spirit.

In line with Roth and Prior’s study findings, additional literature resources address challenges related to the availability of sufficient volunteers to staff VOSTs. Cobb et al. (2014) stress maintaining the motivation of VOST-volunteers as a central obstacle and an essential requirement for a long-term commitment. The authors point to differences in motivation for becoming a VOST-member and for continuing as such. They report that several interviewed volunteers describe that “responding to event after event could produce a kind of disaster fatigue” (p.894). Cobb et al. stress that altruism is a central factor for continuous membership as well as the awareness that their work has a definitive impact and provides valuable information, which could not have been generated otherwise. Weaver (2018) highlights in this regard the need for active feedback from the VOST-deploying agency, which she claims as too often missing.

Another central challenge highlighted in Roth and Prior’s (2019a) study is insufficient financial and material support of VOSTs from EMAs. To maintain VOSTs and ensure their development, questioned VOST-members stress the need for increased support of VOSTs in resource provision and equipment. It is even claimed, that “agencies – especially in states that are known to have lots of natural disasters – should consider hiring VOST experts and team leads and also some team members in order to have reliable resources available when needed” (p.57). Roth and Prior point to a much-needed increase in resource support of VOSTs by formal actors. The authors primarily address the need to provide a budget for training, equipment, and psychological after-care.

Different literature sources expand on required support and address additional needs of VOST-volunteers and conditions for the functioning of VOSTs. Different literature sources point herby to concerns related to the safety and health of VOST-members. Cobb et al. (2014) stress the potential of VOST-work to become traumatising as, for instance, reviewed SM posts can contain devastating pictures. Cobb et al. and Fathi et al. (2020) point further to the specific deployment situation of VOSTs for processing work stress. VOST-members work (usually)

spatially separated from other volunteers and response coordinators. The distributed VOST-members have hence not the same access as physically deployed volunteers to a tangible network of individuals for coping with stressful situations. The different authors emphasise the need for developing adequate structures to mitigate stress impact and prevent harm to virtual working VOST-members and to establish psychological support structures through access to psychologists. Additionally, St.Denis et al. (2012) stress the necessity for providing VOST-volunteers with legal protection in the form of insurance regarding potential mistakes, which can occur through their work.

Hughes (2012) and Cobb et al. (2014) discuss task-specific training for VOST-members as problematic. Hughes sees the form of VOST-training in need of improvement, which mainly place takes in ad-hoc as “Just-In-Time-Training” (p.157). She claims such type of training only works in small groups and is inadequate for larger teams. Cobb et al. report that interviewed US VOST-members claim a current lack of, but need for structured training material for SM monitoring. It is argued that such training material needs to be developed and shared among teams to improve the training situation of VOST-volunteers.

Fathi et al. (2020) and Weaver (2018) further report challenges in the context of adequate equipment and working tools. Weaver claims insufficient equipment in hardware to the VOST-work well, while Fathi et al. address inadequate software provision. Fathi et al. report further the need for automated tools to enable VOSTs to carry out their work effectively, which are currently missing. Researchers and tool developers are addressed to “seek out partnerships with the various VOSTs” (p.23) to improve the equipment situation

Overall, Hughes (2012) assesses current models in EMAs in the US for working with volunteers as not adequate for cooperating with digital volunteers and hence VOSTs and therefore in need of refinement.

4.3 Official support, anchoring & development of VOSTs

Roth and Priors’ (2019a) survey provides insights into challenges arising from different degrees of official support for VOSTs’ integration in CDM structures. They report that in countries where VOSTs are numerous and positive support is high, “team organisation is largely driven by middle management officials with a personal interest in achieving high-level capabilities” (p.56) in CDM.

In line with Roth and Priors study, Asmolov (2016) points to obstacles originating from the fundamental purpose of VOSTs explicitly to support formal actors why efforts of establishing

VOSTs are fruitless if there is no institutional interest. A VOSTuk-coordinator interviewed by Asmolov reports that the VOST-idea first met many rejections from formal actors in the UK despite “pockets of interest within the state to set up VOSTs in different areas” (p.131). Asmolov does not provide further information on potential reasons for the lack of interest of formal agencies. Weaver (2018), in turn, presents central factors, which led to the establishment of a VOST at the West Texas National Weather Service (NWS) in the US. Initiative for the establishment of the VOST came from within the West Texas NWS, which Weaver highlights as central. She describes the initiator as innovative-open meteorologists, who had acknowledged the need for additional support in extreme weather events in the SM sphere. Weaver further assesses the previous establishment of VOSTs in the same type of organisations supporting the implementation as it legitimised the use of VOSTs within NWSs as well as the support of the VOSG as central factor for the successful establishment of the VOST.

Additionally, the literature highlights challenges concerning the further development of the VOST-approach. St.Denis (2015) outlines that a bottom-up organic development of VOSTs has managed to increase SM capacities of EMAs while other top-down mandates have failed. St.Denis points to different perspectives within the US VOST-community on the needed development direction of the VOST-approach, which create challenges: She reports actor’s claims of lacking standardisation and establishment of best practices as cause for VOSTs not gaining broader acceptance within the larger CDM structures. These actors argue for establishing a level of governance to ensure clear messaging, standardising and credentialing of teams as needed to resource type VOSTs and hence order VOSTs like other resources within the US CDM structures. In contrast, most VOST-leaders in the US would stress the value of a dynamic evolution of the VOST-approach and are against rigid governance and standardisation. St.Denis (2015) also opposes narrow standards for VOSTs as there “is no one-size-fits-all solution for either individual teams or that is appropriate across all incidents” (p.180). Nevertheless, for VOSTs becoming established within the US CDM structure, St.Denis assesses the need to achieve agreements of certain standards within the US VOST-community, taking into account a balance between individual teams’ needs and the concept as a whole.

In line with St.Denis (2015) also Blay and Lagadec (2016) address challenges regarding the growth and development of the French VOST-community. They claim the need of achieving a “dynamic equilibrium” (p.35) between the need for formalisation and professionalising of tools and processes but not losing the “spirit of a citizen association” (ibid.).

Other challenges and requirements addressed by the literature relate to the anchoring of VOSTs in deployments. Hughes (2012) and St.Denis et al. (2012) report that the point of contact in the US has been, so far, mainly PIOs. Such connection assess the authors as limiting the benefit of VOSTs. As SM use and hence the work of VOSTs offers not only value to the work of a PIO (e.g. SM content offers information relevant for better situational awareness, on damages and needs of the public, etc.), Hughes favours shifting the point-of-contact to a central position within the larger response setting. She argues for creating a new role within the national incident management system. St.Denis et al. point to the need of incorporating VOSTs into a clear chain of command to clarify to whom the VOST is responsible and their relationships across the response effort.

In addition, Fathi et al. (2018) point to the inter-organisational settings of CDM as origins of challenges for the embedment of VOSTs into deployments. They assess the institutionalisation of the German VOSTs as a central basis for the legitimate deployment of VOSTs by different actors within the CDM structures. It would provide, however, only formal legitimation. They claim informal recognition of VOSTs in deployments largely depending on where the teams are anchored. The authors stress the reservations of actors in the field towards certain other actors, which could hinder or hamper collaboration why the thoughtful placement of teams needs to be taken into account for VOSTs' integration into CDM structures.

5 Primary data: Identified challenges & requirements in the German context

The coding and comparison process of the interview material led to identifying six overarching thematic categories. The analysis disclosed significantly that many by the respondents addressed challenges could be structured by relating them to different properties and characteristics of the VOSTs: being social media support teams (5.1), being a significant innovation (5.2), being digital-working teams (5.3), being new actors in the CDM landscape (5.4), and being volunteer-based teams (5.5). It was decided to use these five overarching issues to structure the result presentation instead of categorising them based on challenges relating to laws and regulations, mind-set, cultural or technical aspects of VOSTs' integration, among others. A reflection on the findings following these kind of aspects can be found in section 6.2. Some central concerns identified in the primary data could not be allocated to the five above named categories why one additional category was created. This category covers reported challenges concerning the strategic placement of VOSTs and the developments within the VOST-community (5.6).

5.1 Conditions for social media use

The interview analysis revealed crucial challenges for integrating VOSTs originating from missing bases for SM use within the German CDM field. Improving the conditions, the respondents address as a central foundation for efforts for VOSTs' integration. Specifically, the respondents address five aspects.

Awareness & acknowledgement

Regardless of attempts over the last years to raise awareness of the benefit and demand of SM use, the urgency to take action for increasing SM capacities is not sufficiently acknowledged among CDM actors. As roots for the misrecognition, respondents point to a disregard of the digital dimension of crises and disasters and neglect of the importance of proactive crisis communication. Respondents identify this circumstance especially among senior managers and decision-makers within EMAs and on the different political levels.

“Knowing what happens in social media is not understood, still too often not understood, in its significance for the on-site response. That social media play an active role, affect the situation on-site, yes, too many still do not understand that yet.”

“There is a severe lacking mind-set of the importance of proactive crisis communication in the civil protection field. Active communication for achieving trust and understanding in governmental actions [...] The importance of explaining, justifying governmental actions to the public. Engaging actively with the public. [...] That's so lacking. It's a severe issue.”

Without acknowledging the need to make better use of SM, a basal but central foundation for the interest in VOSTs is absent, wherefore increased efforts for awareness-raising for SM use are highlighted as a central requirement.

“Before we can actually talk about VOSTs, we still need to raise awareness that it is out of question whether we use social media or not. Social media has to be used because that is where the citizens are. Unfortunately, we are still at this point. Awareness-raising is taking place, it has for years but we still need to continue, increase efforts for raising awareness. If not, we will not get anywhere with the topic of VOSTs.”

Legal certainty & data protection compliance

A significant part of the purpose of VOSTs is collecting and processing data. To promote the VOST-concept respondents point to a needed improvement in the legal situation on SM use in the governmental sector. SM platforms are private-owned, and the use of data by the companies is non-transparent. Additionally, as SM content entails personal data, citizens’ data protection questions arise. The EU General Data Protection Regulation (GDPR) complexity has increased uncertainty of what is legal.

“There have been cases where the new EU data regulation [the GDPR] has led to such uncertainty, what is allowed at all still now. And I know cases [...] where it has led to a complete ban of using SM in disaster control authorities and fire brigades.”

Legal certainty is needed if and under which conditions governmental actors are authorised to be active on SM and openly shared SM data can be stored and further processed.

“You need to store some data to analyse SM content. And it entails of course personal data [...] It’s often copy and paste. It’s too much data to clear that out. That’s an issue. The interest is in the content, not who has written it [...] But when you look at data protection [...] There needs to be a regulation for disaster management.”

“Yeah there are issues with SM accounts in the public sector. Uncertainty, if regulations permit public actors to have accounts [...] even though many do it, many do not and somebody comes up with new concerns, the topic is discussed again.”

Responsibilities & strategies

Respondents assess further a missing but needed attribution of responsibilities for SM in CDM. On the one hand, the lack of defined responsibility concerns how EMAs should provide capacities for SM use. As long as SM responsibilities are not defined, it also remains unclear where VOSTs should be strategically allocated (refer to 5.6). On the other hand, central CDM regulations do not address how SM coverage should be integrated into operational contexts.

“Take the fire service regulation 100 [refer to 2.1.3], great example. It still has not been updated. It is from 1999 [...] it lacks defining how we integrate such – not really new but new for public authorities - field of action of social media use into operational response structures.”

The diverse frameworks and strategies that serve as the baseline for task definitions and procedures are generally from a pre-SM era and have usually not been updated yet. Due to the lack of a strategic decision to integrate SM best into CDM operations, a dynamic and situated assignment of responsibility occurs. There is a trend of the same staff in charge of press and media (S5 or BuMa; refer to 2.1.3) often covering SM on top of their already demanding tasks – neither with a clear definition of what SM duties should cover, nor often with proper training.

“Connecting social media to the S5 [refer to 2.1.3] seems the current dominant opinion as it is media and public relations. There are, however, also people who say that social media belongs in the S2 area because it’s relevant for situational awareness or even to another S [refer to 2.1.3]. But from the officials, the authorities, no one has written anything about it so far. There is no guidance.”

While an unplanned use of SM makes its benefit for CDM less effective, respondents stress further that it creates significant complications for integrating VOSTs into operational contexts. Among others, it leads to a lack of pre-defined point-of-contacts for VOSTs.

Resources & competence

Lacking SM competence among staff in crisis units and EMAs in general is addressed as another concern for VOSTs’ integration into deployments. Without proper understanding of and training in SM for CDM, VOST-employing actors have difficulties processing and making use of products provided by VOSTs for their work. On the other hand, it can hamper the effectiveness of VOSTs’ work if the VOST is not provided with a clear work assignment and a briefing on the SM context they are asked to cover.

“We need a contact person in the crisis unit who gives us information on the social media behaviours of the public, and says ‘watch out, in this region, you do not need to focus on Twitter. Facebook is important here; check out this and that group’ [...] Then we can work well. If we don’t have that, we’re starting from scratch.”

One root for missing SM competence is seen in lacking SM use in routine work in EMAs. For effective and strategic SM use, permanent job positions have to be devoted to the topic. Funding for such work positions is often not made available. A lack of resource provision “concerns especially the municipality or district level, where budgets are always low”. Adequate SM “capacities are only available in large professional fire brigades and large police stations”.

“You have to create at least one full-time job position and pay people adequately to do the job [social media]. And that’s where it fails, that’s the problem, because the people in charge, even if they tell you ‘yes, I can understand that social media is very important, but in politics [e.g. district council] I can’t get that additional staff position.’ This is a central problem for us in [the federal state]. Here I know it, and in others, I suspect it is the same.”

A further concern addressed in need of improvement is the absence of qualification opportunities. SM is not sufficiently integrated into relevant qualification programmes and training for staff for crisis units.

“There are some [social media] courses at the AKNZ⁵, yes. But no hands-on trainings. They are about general awareness what’s important, but they are more for management staff, to get the topic. They do not teach you practical stuff. From people who have profound experience in how you do it in a specific situation: ‘think on that, set up this, in this way’. There are few useful, hands-on courses, for example, [name of the person] does courses, they are great. It needs more of them.”

Exercise opportunities

Another addressed issue is the insufficient inclusion of SM in crisis and disaster preparedness exercises. There is a lack of available tools to simulate a realistic use of SM by the population during crisis or disaster events making SM simulations very resource-intensive. Consequently, only large-scale exercises as the LÜKEX⁷ can facilitate adequate simulations.

“What is needed are tools [for SM simulation], which are easily applicable, in the sense of easily manageable that even small units [...] can integrate social media into their exercises.”

Adequate tools need to be developed and broadly made available to EMAs. Such tools would make it also easier to integrate VOSTs into exercises. Cooperation with the private sector for developing such tools are advocated. Still, respondents also stress such collaborations are not yet common, often not favoured, and associated with complications and, therefore, in need to be more promoted in the CDM field.

5.2 Implementing a significant innovation into rigid structures

The interview analysis exposed challenges originating from the circumstance that VOSTs constitute a significant innovation. Respondents outline the introduction of innovation into EMAs and CDM as challenging endeavour.

Overall, respondents indicate a structural lack of external pressure and, in return, a lack of driver for innovation in the CDM field. Missing pressure hinders searching for new approaches and improving practices. Respondents assess the drastic impact of the Covid-19 pandemic as potential game-changer as its response revealed the inadequacy of current practices and the severe need for updating and changing practices.

⁶ The Academy for Crisis Management, Emergency Preparedness and Civil Defence (AKNZ) is the central training centre of the German Federal Office of Civil Protection and Disaster Assistance (BBK). CDM actors nationwide can take a variety of courses there (BBK, 2021e).

⁷ The Interministerial and Interstate Crisis Management Exercise (LÜKEX) is the largest German CDM exercise and takes place usually every two years and is conducted nationwide and sector-overarching (BBK, 2021c).

“Now the crisis management field as such is under pressure. However, this is since the beginning of this year [when the Covid-19 pandemic started]. Until then disaster control authorities in the federal states [...] did not feel the need to legitimise themselves. And innovation always happens where organisations have to legitimise themselves or have to stand out. And doesn't happen where one doesn't have to legitimise themselves.”

In addition, the rigidity of structures within the CDM field is assessed as hampering innovation and thus the establishment of the VOSTs. The respondents discuss several origins of rigidity.

“Rigidity. That is the key message. These rigid structures in civil protection agencies quite hinder innovation [...] I think it's exactly the same in other countries, and maybe that's the crucial reason that all over the world VOSTs continue to work somehow semi-organised and are not incorporated well into formal structures yet.”

Hierarchical structures render decision-making processes lengthy as measures often need approval by various management levels. Adding to it, decision-making bodies often only meet at long intervals. Such long processes offer “no basis for quick solutions to immediate needs”.

“From an appeal, even a presumed small one, to a decision of approval and its implementation, it can easily take [...] three to five years - or longer.”

Decision-making in the governmental sector demands further the provision of data-based assessments, e.g. cost-effectiveness assessments. In the case of a significant innovation such as VOSTs much uncertainty is present why the demand of such assessments cannot be fully complied.

“When it comes to VOSTs, you can't present an assessment and then say, ‘In five years it will have these consequences and those follow-up costs.’ That's just not possible. It's new [...].”

Establishing VOSTs therefore requires deviating from common practices and “decision-makers courage” to take responsibility for the implementation of new approaches, which have not been (much) tried and tested yet. A lack of such approaches and character is assessed.

“People are needed who simply do that without knowing how it will develop. And there are few of those in German authorities. I don't know if it's a German phenomenon or if it's a phenomenon in the public sector in general.”

To improve innovation culture in EMAs, respondents stress the need for action-taking of the high-management level (e.g. head of agencies). Better communication towards the subordinate management levels is seen as required to what extent they support and bear responsibility for exploring new approaches. Another direction of power, the relationship between leading staff and their subordinates, is further thematised. The need is seen for more openness and trust of superiors in their specialist employees. Managing staff should be willing to “listen to ideas and trust that the staff is competent to assess whether innovations have potential”. Respondents report that such conditions were given where VOSTs have been established.

Rigidity also creates the circumstance that EMAs as fire brigades and the THW are traditional organisations where changes often face scepticism.

“These are also highly traditional organisations [...] And to get involved in a change at all, even regarding technical equipment [...] If you introduce something new, everybody is familiar everywhere in this field with responses like ‘Yes, but we used to do it this way, it always worked out well. It should continue to work like that.’”

SM as a new task and introducing “VOSTs mean a more significant change than a new pump”. Embedding such novelty and getting used to the new resource requires “time, patience, much patience and small steps and persistence”.

5.3 Including digital-working teams into deployments

The analysis of the interviews disclosed central challenges for the integration of VOSTs rooting in missing conditions for the integration of digital-working teams into CDM operations. Respondents stress general deficits in IT-infrastructure as major factor in this regard, which is not seen as a specific issue in CDM but of general concern within German government structures.

“And whenever you talk to someone, what is the biggest obstacle for VOSTs? It is always IT. It’s obvious that if we are lagging behind digitally, we can’t be innovative there. [...] IT-infrastructure is a fundamental problem. Germany has completely missed the call. We do not have to catch up. We have to move forward. Otherwise, we cannot establish a VOST anywhere.”

Manual methods and fax devices are still often used for internal communication in operations and within crisis units. Staff in crisis units often do not have open internet access when working. These conditions make the integration of VOSTs’ work products highly challenging, as one of the respondents illustrates in the form of a thought experiment vividly:

“You sit in a crisis unit [...] and want to distribute information your [VOS]team has produced. Ok. How do you do it? You can, of course, write links on the quadruple preprint form [German: Vierfachvordruck; standard internal paper forms for communication]. And then people type out them later. That would not be wrong, but it would be pretty stupid. If we agree upon that that this is stupid, what do we do instead? ‘How do I get the information to whoever needs it?’ If they have an electronic system in place, then that’s easy. Then you can send links simply by e-mail and then steer and spread it. If we have that, the question is now ‘Does everyone from the staff really have access to the internet?’ This is often not the case [...]. If they have access: to which web pages do they have access? [...] These are all quite basic but very important things that are missing and are deeply needed to be figured out.”

Respondents report further difficulties concerning receiving and sharing information during deployments. To get access to internal systems, authorisation is needed, which is for an external actor often a cumbersome procedure and not feasible in short time. Currently VOST-members’ access to deployment relevant internal data and communication networks often depends on pre-

existing access authorisations, e.g., access clearance due to the VOST-members' professional work. Ease of working is hence coincidental and depends on the background of the volunteers. Something that needs improvement.

“When I worked for [...] it was easy. Due to my work as [...]. It's the same network in [the federal state], hence I had access to all information I needed. Totally different story when I worked in [another federal state]. There I had to sit next to [somebody] who was so nice of getting for me or sending information from his account.”

Another obstacle stressed by the respondents is legal regulations in Germany, which restrict EMAs' official use of IT-applications provided by private companies, e.g. open-access web maps. Reasons are security concerns. At the same time, it is claimed that there is a lack of secure and legal alternative products with similar functions. It is left to the individual to deal with the dilemma. Consequently, individuals assume responsibility for not complying with regulations. Respondents emphasise that the issue goes beyond single organisations and the emergency sector; it concerns the whole public sector.

“For example, when I worked at the [...] it was officially instructed not to use Google Maps [to create a crisis map]. Then we said, well, with what else should we work? Well, then nobody had a solution. This problem is very severe. In the end, we used it anyway. Without consequence, but if somebody had checked it, it would have been my responsibility. [...] It's a legally crappy situation for everyone who somehow works with IT in civil protection organisations or any authority [...], and it's the same nationwide.”

VOSTs need adequate tools for visualising data and collaborative digital work. Respondents do not expect a rapid development of secure and governmental-approved IT-applications and tools. As long as no alternatives to the privately provided are made available, it is called for adapting regulations to enable the legitimate official use of certain IT-applications and tools by considering the greatest possible security. Without it, actors cannot deploy VOSTs, use VOSTs' work, and comply with regulations.

5.4 Recognition of VOSTs as valuable & trusted agents

The interview analysis expounded central challenges in achieving the recognition of VOSTs as a new actor in the CDM landscape.

Among formal CDM actors

A key obstacle raised by the respondents is the lack of familiarity with the existing VOSTs and the VOST-approach as such among staff in EMAs. Besides, people who have heard about VOSTs still often lack an understanding of “what VOSTs actually do and what VOSTs can do”. Respondents see the lack of understanding as a cause for scepticism and the querying of VOSTs benefits for CDM.

It is further reported that many actors only get to know VOSTs and become aware of their value during deployments.

“If you can create a live crisis map with the VOST during an operation that’s faster than what the operative forces on-site report, then they are convinced.”

Such contact to VOSTs presupposes that at least one central decision-maker was aware of the value of the VOST before the VOST employment. Fundamentally sceptical actors do not request a VOST and hence also cannot make a positive experience.

It is reported that the dissemination of knowledge on VOSTs and positive experience with deploying VOSTs takes place by “word-of-mouth-advertising”. Respondents stress, however, the need for additional, more strategic and steered measures. Especially the currently few available publications, both scientific but especially practice-orientated, are addressed in making it difficult for actors to inform themselves easily and comprehensively. Respondents consider therefore increasing the number of publications, particularly in German and in trade journals as central to increasing knowledge and awareness on VOSTs. Annex C presents an overview of all by the respondents named strategic measures.

The term ‘VOST’ itself is addressed as another challenging factor for recognising the new teams. The English label and the respective acronym are not self-explanatory. Most respondents nonetheless argue against renaming the teams but instead to improve the understanding of it. The pro-argument made is VOSTs forming a specific European and international community why the label ‘VOST’ offers advantages for collaboration and exchange not solely in Germany but also in cross-border contexts.

To operate in the formal CDM system, respondents emphasise the need for VOSTs to be trusted agents. On the one side, respondents address formalised proof of trustworthiness. It concerns the formal legitimacy of the teams to be deployed in the formal CDM structures. All CDM volunteers need to be trusted, but VOSTs’ specific tasks and anchoring into deployment settings demand, in particular, securing VOST-members’ trustworthiness.

“Our product is information; our work is processing information and large amounts of data. This of course means that we have a very different responsibility [than other volunteer units] - simply different. We work with information and possibly also with false information and possibly influencing actions and decisions of decision-makers with considerable consequences. So we simply have to live up to this responsibility.”

As volunteerism is common in Germany, structures and methods are in place to achieve formal legitimacy (refer to 6.1).

Respondents stress that the fulfilment of formal criteria is central. However, it is highlighted that the recognition of VOSTs and trustful collaboration with other CDM actors still dependent on further factors. Two central aspects are addressed as challenging in being accepted teams: The new working field of SM and the operating method, namely off-scene, physical absent.

“Of course, first they laugh at us because we are the nerds who sit in front of the computer - without trousers on, of course – and we are not on-site during an event.”

Respondents emphasise the significance of ensuring that VOSTs are recognised immediately as belonging to the emergency field.

“They [other actors in the CDM field] need to quickly realise, especially if they are perhaps sceptical at the beginning ‘Oh, he, or she, is one of us after all’.”

As a basal requirement, visual recognition is addressed. In this regard, respondents report on needed improvements concerning the provision of CDM or rather resepective organisation-specific (THW, fire brigade, etc.) typical clothing for VOST-members.

Respondents point further to the needed deployment-relevant expertise of VOST-members, which go beyond CDM-relevant SM skills but concern structures, protocols, terminology and processes. As these vary among actors and deployment contexts in CDM, the availability of specific expertise is highlighted. Respondents stress that a team composition related to the attempted deployment context improves VOSTs’ integration. It facilitates not only an easy collaboration but also leads to informal acceptance of VOSTs.

“If the VOST deploys in a police-led operation, it is highly beneficial to have VOST-members with police-background as a liaison.”

Among the public

Respondents emphasise the importance of not only gaining trust within the formal structures but also of the public as part of the integration of VOSTs into CDM structures.

“[VOSTs] are mediators - you take information from the public, give it back, and vice versa, you can also mirror information to the public. That is why reputation is just incredibly important for VOSTs. Both the authorities and the public must, of course, recognise VOST as a trustworthy instrument.”

Respondents point in that respect to different obstacles. Firstly, again the unfamiliarity of VOSTs is stressed as “VOSTs are still too unknown among the public”.

“It is very important to generate enough followers on SM, of course before an [crisis or disaster] event, who then can distribute the information of the VOST by retweeting, sharing of posts. It is central to have a well-known SM presence if not the information you share will not reach enough people.”

If VOSTs want to engage actively in crisis communication with the public, “trust in a VOST has to be there before an event happens”. Therefore, public relations work for VOSTs becomes necessary. Respondents also consider official Twitter account certification as supporting public trust in VOSTs.

A second challenge addressed by respondents concerns the positive image of VOSTs. Respondents point out that the task description of VOSTs as “monitoring” SM could favour a misperception of what VOSTs do as “‘monitoring’, can sound like surveillance, surveillance of the public, which is not what VOSTs do”. The lack of information on VOSTs is seen as negatively feeding speculations and creating potential mistrust. To avoid that, respondents highlight the need to increase publicly available official information provided by official sources on VOSTs.

“It can all be solved through communication if one approaches this offensively that there is a clear separation between police work and VOST work. [...] For that, you need to communicate it proactively and not wait for someone to take it the wrong way at some point. [...] VOSTs are clearly a volunteer unit [...] These are people with special skills who, instead of setting up emergency care stations, are searching for fake news [...]. Still, if you cannot find information about it - obviously - then doors are open for speculation. Proactive communication [...] is the key.”

5.5 Conditions for & adapting to needs of volunteer-based VOSTs

The interview analysis revealed central challenges and needs for improvement surrounding the volunteer-basis of VOSTs. Broadly, issues divide into one of general nature all volunteer-based teams face and those specific to digital volunteer teams.

Availability & motivation

As with all volunteer teams, to establish and maintain a VOST, sufficient and long-term committed people are needed. While the respondents do not see recruiting of volunteers as challenge (refer to 6.1), they address challenges concerning compatibility of volunteer and pay work. Regardless of the formal entitlement to being allowed to leave work for official deployments as a volunteer in CDM, to avoid conflicts at work selective use of official leave is made.

“It should work like this, but that is the theory. In practice, I am considering whether I apply for special leave for volunteer work from my employer or not. No matter how much entitlement I have to do so, at some point, your superior gets annoyed...This is the case with every employer. I think it is the same if you work for a private company, even if you work for a governmental agency. Your work has to be done, that is what is in the interest of your employer. So you evaluate carefully when to claim an official leave from work and not just insist on your right.”

Instead, it is common to put as much of the VOST-work as possible into leisure time. Respondents report that this practice becomes difficult if missions are intense and last over a longer period. Among others, they increase conflicts within private life.

“We have observed overall that the acceptance of longer assignments, which may be even more intense at the weekend because we are all working [...] that's why you have to do the follow-up work at the weekend, you sometimes meet incomprehension in the private context, from your family. [...] It leads to people dropping out, working less [...] leaves few people with even more work, less free weekends.”

To reduce conflicts with work and private life and prevent volunteers from dropping out, respondents claim the necessity to limit the burden of the individuals to a minimum by “spreading the work over many shoulders”. Respondents call therefore for the need of growing and increasing team strengths.

When asked whether digital volunteer work can increase or decrease the agreement between professional and volunteer work, digital volunteering is seen both as an advantage and as a disadvantage. On the negative side, respondents consider it more difficult to explain to the employer their work in a VOST, compared to traditional volunteer work.

“Leaving work for putting out a fire is simply easier to grasp than stopping work for reviewing social media posts.”

On the positive side, working as a digital volunteer could mean less downtime if a volunteering shift is taken over during working hours. Respondents stress, however, that preconditions for such volunteer work at the workplace are lacking (refer to *Organisational structures & legal regulations* below).

Another central aspect of the commitment of volunteers is their motivation for volunteering. Respondents emphasise that volunteer engagement in VOSTs is driven by altruism “to want to help people”. Nevertheless, it is pointed out that “recognition and appreciation” of the work is central to ensuring the long-term commitment of volunteers. The importance of feedback and appreciation by, e.g. heads of operations during and after deployments is emphasised, which is lacking too often. The physical absence is regarded a reason for that lack.

Besides verbal acknowledgement of VOSTs' contribution, respondents stress the importance of acts “where appreciation is manifested”. Respondents point to common German practices of awarding volunteers certificates and medals as a symbolic appreciation after especially work-intensive deployments. The question arises of whether such symbolic gestures should be translated into a digital form. Respondents emphasise lacking knowledge on the preferences of

digital volunteers. The importance of scientific research in this field is highlighted to support the development of relevant approaches.

Additionally, respondents stress the importance of joint team activities outside of the volunteering work for creating team spirit and upholding motivation. For the distributed-working VOSTs, the requirement for new approaches to compensate lack of easy opportunities to meet in person are therefore addressed.

“We can’t have a barbecue, we can - but not as spontaneously as other teams, nor can we have a couple of beers with our colleagues. We also can’t go easy on a joint day trip where also the volunteer partners or families can come [...] None of that works as easily as in other volunteer units.”

Regular training and exercise participation is also seen as crucial to keep volunteers engaged, hence motivated, as too long between deployments, can lead to losing motivation of volunteers.

Well-being

Even though psychological distress plays a role in many activities in CDM, respondents point to its particular significance for VOST-work.

“It is, of course, a different form of stress than putting out a fire or operating a pump. Sitting in front of the computer for hours is also exhausting and physically stressful, but primarily the danger to health is not physical, but a psychological one.”

Sifting through material for hours showing destruction, deaths, and suffering but also reading fake news creates significant distress. It is emphasised that the passivity of sitting at a screen and being incapacitated to act increases the distress. Processing is made further difficult because the VOST-volunteers are, in contrast to other volunteers due to remote work, often alone during and after their work.

“You work, and then you turn off the computer, and you are alone.”

Deployment structures are needed to compensate and reduce the stress impact by, e.g., virtual after-work meetings. Beyond this, the expansion of psychosocial emergency care in the CDM field, which has already begun, is in need to be pushed forward so “that every VOST-member has if necessary access – anonymously – to trained psychosocial emergency care personnel who help with coping”.

“Any disadvantage would be really the worst-case scenario. Imagining a VOST-member would suffer some lasting harm through their volunteer work. That needs to be prevented.”

Budget, equipment & training

Certified volunteers in Germany, for instance, at the volunteer fire brigades or the THW are equipped by their organisation. Certain budgets for units are further usually made available.

Respondents' report that many VOSTs do not receive yet similar support from their associated EMAs. It is further claimed that the EMAs have difficulties adapting to VOSTs' needs as they require equipment in soft- and hardware which are outside of accustomed equipment demands. As a consequence, VOSTs currently use private equipment; something which respondents claim strongly needs to change, as one respondent illustrates, for instance:

“If VOST-members use their own laptops and their own computer programs, it is figuratively speaking the same as if we were working in a rescue unit and would bring our own hammer, chisel, chain saw and even our own protective gear. Nobody would expect nor want that.”

Respondents report further that VOSTs mainly use free software for data mining and SM monitoring due to lacking budgets. In addition, respondents claim a lack of suitable tools for their work. Much work is therefore conducted manually. For improving their work situation, the development and research into adequate tools is called for. Respondents claim that EMAs should support and drive such research. It is pointed again to the value of cross-sector partnerships by cooperating with the private sector for automated tool development (refer to 5.1 *Exercise opportunities*).

Like all certified volunteers, VOST-members need basic training in the emergency field. Respondents discuss, however, which content the training needs to have. While VOSTs need an understanding of CDM and related principles, respondents claim that they do not require the same full training as other volunteers. Respondents call for evaluating training concepts regarding the needs of digital volunteers and making appropriate adjustments.

“Why do you as a VOST-member, need to know on which shoulder you should carry a trunk through flowing water when you are doing social media monitoring in front of the computer?”

Regarding SM competence, respondents report that organisations cannot currently provide VOST-members with official training in SM skills. Development of training material and training takes place within the VOSTs. Respondents report that some exchange of training material happens within the German VOST-community. Some respondents consider this sufficient and advocate for enforcing collaboration among the VOST-community by establishing more sophisticated exchange platforms. Other respondents argue that for achieving VOSTs comparable status to other resources within CDM, it is necessary to establish official SM courses at official training institutions. The core argument for establishing official training is that it allows issuing VOSTs with official certifications proofing their expert status. Some respondents recognise this formalisation of training as central also for improving the recognition of VOSTs within the CDM field (refer to 5.4).

“If I do a respiratory protection training or operational leader course, then I am issued with an official certificate, providing proof of my expertise. To give VOSTs equal status that’s what is needed too, in my opinion. [...] official certifications are central in our field.”

Organisational structures & legal regulations

Overall, respondents highlight that legal regulations in CDM are created for physical present volunteers. Many questions related to the digital volunteer work are unaddressed and in need of adaptation based on the new volunteer organisational form. Among others, regulations are needed for potential volunteer work at the workplace (refer to *Availability & motivation* above). For instance, if and under which conditions the employers’ infrastructure can be used for volunteering work. Additionally, insurance matters for such deployment cases require clarification, namely, who covers if something happens to the VOST-member at the workplace or the work equipment suffers damage while currently deploying as a volunteer.

The German volunteer system is based on physical membership in one local association. A legislative basis for integrating digital operating location-independent teams is therefore widely missing. Respondents claim the need to adapt to the new organisational form of digital teams, and hence the consequential updating of regulations.

“Take the THW law, the definition ‘the duty is carried out at the local association’ should be neutralised, equalised too simply: ‘the duty is carried out’. That would take off the connection between volunteer work and being tied to a location.”

5.6 Official support, anchoring & development of VOSTs

The interview analysis evinced challenges and required improvements regarding the strategic placement of VOSTs as well as concerning developments within the VOST-community.

Strategic placement of VOSTs

Although the respondents consider the current allocation of VOSTs as strategic, they stress that the current individuals’ driven process leads to a coincidental establishment of VOSTs.

“The current situation is like this. If someone somewhere wants to launch a VOST, it depends on where the person comes from. If they come from a fire brigade, they do a fire brigade VOST, and if they come from another aid organisation or from the THW, then it becomes a VOST at one of these organisations. That is how it works. It really depends on coincidence.”

Such a coincidental process poses the risk of an uneven distribution of VOSTs. It further risks a slow formation of new teams and an uneven excess of VOSTs as resources. To maximise VOSTs’ benefit within the CDM structures, respondents call for inducing a strategic and more steered placement of VOSTs. It is argued for anchoring VOSTs similar to other special units in

CDM, which are also not available in each local fire brigade or other local EMAs but are centrally placed. Due to the federal structure of CDM in Germany, the respondents consider the demand for a strategic establishment of “at least one VOST within each federal state”.

Besides formal criteria such as responsibilities and jurisdictions in CDM, respondents stress the need to consider informal customs and structures for the strategic placement of VOSTs. For instance, as resources are often preferably requested within the organisational structures, e.g. within the fire brigade structures, respondents argue for establishing further VOSTs among the diverse and different actors in CDM. The respondents point further to cooperation difficulties between the police and non-police actors. Therefore, most respondents argue in favour of placing VOSTs in central, cross-actor institutions, e.g. at the respective ministries of the interior, as the case in the federal state of Baden-Württemberg.

“At the ministry of interior, there a VOST would be centrally allocated, institutionally located between police and non-police emergency response at a central level.”

In addition to increasing the number of volunteer-based VOSTs, it is considered desirable to establish a professional team to ensure the definite availability of resources when needed. The volunteer-based teams’ function would then be to support the professional team. The resources of a professional team is also expected to support the development of the VOST-approach in Germany. Regarding the potential placement of such team, respondents highlight again the need of a strategic choice and point to the GMLZ⁸ or the BBK⁹ as potential placements.

Respondents see challenges for achieving strategic placements of VOSTs originating from the federal structure in CDM in Germany. There are different degrees of political will and commitment to the topic SM and VOSTs in the different states. Respondents report on initiatives from individuals to establish a VOST in federal states with currently have none. These actors, however, would face difficulties getting support and interest from central decision-makers on political level.

“In some states happens already quite a lot in the SM field, and there will be likely soon additional VOSTs. But others as for example [a specific federal state] here I am quite sure the topic will not get any priority soon. One federal state does it another not. It’s federalism.”

“Ok. Look at [specific federal state] for example. There is [...] trying [...] But there is no interest on political level on the topic [...] meets deaf ears. [...] tries and tries but without getting anywhere.”

⁸ The Joint Reporting and Situation Centre of the Federal Government and the Federal States (GMLZ) serves to support a joint picture of the situation regularly and especially during crises and disasters at the federal level, at the level of the federal states as well as among specialised authorities (BBK, 2021b).

⁹ The German Federal Office of Civil Protection and Disaster Assistance (BBK) is the superior federal government authority for civil protection in Germany (BMI, 2020).

For forwarding the establishment of VOSTs and achieving a strategic placement of teams, respondents call for decisions at national level to obligate the federal states to cover the topic SM within their CDM duties. With an official directive, each federal state would need to include SM in federal CDM. It is hoped that it would also trigger initiatives to bring diverse actors active in CDM together for discussing strategic placements of VOSTs.

“Helpful would be a directive [...] from the federation – hence from the BMI - to the federal states. If it becomes part of the duties the federal states need to cover like measures for fire protection [...], then each state needs to become active on the topic [social media].”

Another concern stressed by respondents hindering the support of the VOST-topic in EMAs is a lack of competence for establishing VOSTs. Among others, political issues would interfere in acquiring competence from external experts.

“There is no one in [the federal state] whom the Ministry of the Interior could request who could set this up within half a year. There is a lack of competence, a lack of people with experience. [...] As there is a lack of competence in [the federal state], you need to request a VOST-experienced expert from another federal state. That becomes immediately political. Then there are objections that the Interior Minister’s department should do it [...] And then it becomes complicated. Because one state secretary cannot work with another, because the one is from the wrong party and other obstacles.”

Some respondents assess the need for a central, political and actor-independent competence centre that can provide advisors for EMAs. When asked if the VOSG or VOST Europe serve as such competence support, respondents claim that many governmental actors will most likely not recognise them as legitimate sources. The need for a German-based competence source is assessed to gain recognition by officials.

Developments within the German VOST-community

There are different VOST-designs in Germany, and respondents do not consider the diversity problematic but needed. Team designs and work approaches need to fit the respective mandate and deployment context why “there is no single prototype VOST”. Respondents further point to the dynamic character of SM, which demands continuous learning and change of practice, why “the VOST-approach will likely always be in motion”.

Respondents acknowledge, however, that a too open approach and variety among the different VOSTs make their integration into the German CDM structures more difficult. Most respondents assess the need to introduce minimum standards among all teams to enable comparability of teams and ensure trust in teams operating under the label ‘VOST’ in Germany (refer to 5.4). Certain standards also allow better interoperability between teams.

Centrally, respondents address three main issues regarding currently missing but needed minimum standards. Firstly, respondents see a need for ensuring comparable basic qualification standards of VOST-members. Currently, SM training for VOSTs takes place individually in the VOSTs (refer to 5.5).

“It can be compared to other special units. For example, all divers need to know how to operate aqualungs, or height rescuers how to tie knots, all VOST-member must understand how to do monitoring and create a crisis map, and certain search tools must be available to anyone who wants to call themselves a VOST-member.”

Secondly, introducing a collective code of conduct among the German VOSTs is addressed. It is not only referred to self-commitment to the general humanitarian principles but to a required mutual understanding of which tasks VOSTs cover and which to exclude. For instance, when working in police-led operations, it is pointed to a need for an agreed demarcation between VOSTs’ working field and law enforcement tasks.

The third aspect also concerns the clear profile of VOSTs by establishing VOSTs as special resources supporting EMAs in crisis and disaster events. Currently, VOSTs are requested for a diverse number of emergencies, including small-scale events. Respondents see the need to define more clearly VOSTs purpose, namely not to provide regular resources in SM, but to be called upon when regular resources are no longer sufficient.

In achieving standards and sharpening the profile of VOSTs, the respondents address two central challenging factors. Firstly, the label ‘VOST’ is not protected, and anybody can use the term. Secondly, there are no governance structures in place among teams to regulate any standards. Therefore, some respondents call for establishing a German VOST umbrella organisation to define and assure standards, and better coordination of VOSTs.

6 Discussion

This chapter compares, conceptualises, reflects on the findings from chapters 4 and 5, and outlines broader implications of the research. The chapter ends with a brief summing up of the conducted analysis.

6.1 Comparing literature & primary data

When looking at the research results, the first observation is that the overarching topics of challenges for and requirements to improve VOSTs' integration identified in the literature were also found relevant in the primary data. Regardless of this general trend, some differences are notable. While the literature review revealed challenges surrounding fundamental conditions for SM use in CDM, the interviewed experts elaborated on it extensively and thematised aspects not addressed in the literature. Additionally, the primary data highlighted challenges not determined in the literature review. On the one hand, the interviewed experts pointed to challenges and questions for improvement relating to VOSTs being a significant innovation while the CDM field is characterised by rigid structures hampering innovation. On the other hand, challenges for VOSTs' integration into CDM deployments were discussed originating from the modus operandi of VOSTs, namely as digital-working teams. Contrariwise, the literature review revealed issues that were not addressed as challenges by the interviewed German VOST-members.

In Germany VOST-volunteers' membership in established organisations ensures that VOST-members receive formal training in the emergency field. A reason why challenges related to lacking trust in VOSTs due to the missing formal qualification of VOST-members pointed out in the reviewed literature are missing in the German context. The literature review further highlights that VOSTs' integration is challenged, and action taking is needed concerning clarifying responsibilities and liability questions regarding inadvertently caused damages by VOST-members due to their volunteer work. EMAs would need certainty in this regard as well as the VOST-members likewise. For Germany, non-liability and basic insurance are guaranteed again by the membership of VOST-volunteers in established organisations and by German legislation to deploy volunteers (DRK, 2019).

Challenges arising from lacking formal qualification and an insecure legal situation can hamper VOSTs' collaboration with EMAs. It indicates that while VOSTs are designed to serve EMAs needs explicitly, there are similar challenges in collaborating with VOSTs than with V&TCs, as long as formal training of VOST-members is not guaranteed, and liability questions are not clarified. The established structures for volunteers, including the institutionalisation of the

German VOSTs, can explain the absence of these challenges in the German context, which are not inevitably prevalent in other countries.

The anchoring of voluntarism in Germany can also explain why recruiting volunteers to staff VOSTs is in contrast to the literature review not seen as a challenge by the interviewed German experts. While Roth and Prior's (2019a) international study presents that VOST-members report recruitment challenges, on the contrary, the interviewed German VOST-members draw a positive picture regarding the prospect for the availability of motivated volunteers in Germany, for example, one respondent stated:

“Considering that, for example, the THW [refer to 2.1.2] alone has 80000 volunteers. Now there are 25 currently at the VOSTthw, so there is enormous potential.” (Respondent 5)

Additionally, the respondents point out that people who can no longer work on-site in the operational area can still work for VOSTs. They assess the further great potential for VOSTs to forward inclusion in the emergency field as VOSTs' work “can be conducted sitting in a wheelchair and without the need for physical strength” (Respondent 3). The new profile of digital volunteers could further motivate new people to volunteer who were previously not involved in CDM due to a lack of profile fitting to their skills and interests.

Notwithstanding the outlined differences, central issues highlighted by VOST-members from different country contexts in the literature could also be identified in the primary data generated by interviewing VOST-members from Germany. The research results are thus in line with Roth and Prior's (2019a) survey findings among VOST-members from seven countries. Their study could already identify patterns of challenges in integrating VOSTs in diverse countries in the Americas and Europe, including Germany. In addition to Roth and Priors' study, the identified similarities in literature and expert interview findings provide further indication that VOSTs' integration into CDM might face similar patterns in challenges independently of its many context specifications. Further research in this regard would be valuable to test such hypothesis.

The analysis of the conducted expert interviews could also provide more details on the origins of challenges and required measures for improvement and revealed central issues not identified in the literature review. The findings from the German context could serve as a starting point to examine them in other country contexts.

6.2 Conceptualising the primary data

In the centre of the research of this thesis was the investigation of VOSTs' integration into German CDM structures. The conducted expert interviews enhanced the understanding of

challenges hampering the integration of VOSTs and measures to improve it in the German context. In contrast to the detailed result presentation in chapter 5, this section aims to conceptualise the findings to achieve a higher level of abstraction.

Integration on different levels

Challenges arising and related measures to improve VOSTs' integration can be better understood by differentiating the integration as taking place on four different levels:

- **System level:** *The overall integration of VOSTs as a new actor type within the German CDM system; it includes recognising VOSTs among EMAs as trusted and valuable actors and similarly making VOSTs recognised among the public*
- **Organisational level:** *The integration as new innovative unit within an organisation*
- **Operational level:** *The integration into deployments including legal aspects, collaboration issues & technical infrastructure*
- **Individual level:** *Each VOST-member as new volunteer within the formal volunteer landscape with specific needs in skills and training, equipment, and care (among others)*

Types of challenges

In addition, the identified challenges can be grouped into two types of challenges, those:

- a) *directly related to the new VOSTs,*
- b) *which originate from fundamental underlying issues.*

Examples of the first are the unfamiliarity with the VOST-approach among EMAs and the public and obstacles in achieving trust in and accepting the new actor type VOST. It further concerns lacking official support for the strategic placement of VOSTs within the CDM system, difficulties in adapting to the new digital volunteer teams' needs, and a lack of commitment to the topic VOSTs in EMAs and on the political level. Examples for the second are generally lacking conditions and missing strategic decisions for SM use in CDM, lacking structures for digital-working teams and innovation-hampering structures in CDM. It can be concluded that for a better integration of VOSTs, it is not sufficient to direct measures only to the VOST-specific issues, but it demands fundamental improvements in underlying conditions.

Realms

The research findings point to required measures and changes for improving the integration of VOSTs in two different realms:

- a) *within the VOST-community,*
- b) *within the overall CDM field.*

Within the VOST-community measures appear required as a profile sharpening of the teams to support the recognition of VOSTs. Among others, it relates to agreeing on minimum standards among teams and an increase of organisational structure among the VOST-community, e.g., establishing a VOST umbrella organisation. Simultaneously change appears required in several different realms within the CDM field, as presented in Table 13.

Realm	Examples for change needs
<i>Technical change: Digitalisation, IT and equipment</i>	Development of SM simulation tools for integrating SM, hence VOSTs, into exercises
	Driving digitalisation and IT-infrastructure for CDM operations forward to allow a basis for VOST deployments
	Adequate equipment for digital-working VOSTs (provision of tools to monitor SM & for automated data processing, equipment for remote digital work, etc.)
<i>Change in laws and regulations</i>	Providing legal security regarding the use of SM in the public sector and especially in CDM; a basis for the deployment of VOSTs and use of products provided by VOSTs
	Regulations must enable the use of IT-applications and tools needed to process and visualise information gathered from SM
	Defining which actors are in which way responsible and need competences for SM in CDM. Basis for strategic allocation of VOSTs
	Outdated regulations relevant for CDM (as the FwDV100) need updating to meet demands of the SM era and define clearly responsibilities for SM in CDM operations
	Volunteer regulations/laws need updating to enable digital volunteer teams
<i>Changes in qualification/ training programmes</i>	Practice-orientated SM training courses for crisis unit staff
	Official SM skill trainings for VOST-members
	Adaptation of training in CDM regarding the needs of digital volunteers
<i>Change in resource provision</i>	Increasing the resource provision for SM use in CDM
	Resource allocation for a professional social media support team for CDM in addition to volunteer-based VOSTs, to ensure the availability of resources when needed
	Dedicated resource provision by the VOST-associated EMA for the volunteer-based VOSTs (equipment, fixed budget)
<i>Mind-set / Cultural change</i>	Recognition of sense of urgency to increase SM capacities
	Recognition of the importance of proactive crisis communication with the public
	Openness for cross-sector partnerships to engage with the private sector to fill capability lacks in the governmental sector
	Changes in working and leadership culture in EMAs to favour innovation processes
	Acceptance and recognition of digital volunteers as valuable and equally important actors as other volunteers /actors

Table 13: Realms in need for change to facilitate and improved integration of VOSTs.

6.3 Reflection & broader implications

The findings of the exploratory study into VOSTs' integration into CDM structures provided insights into challenges and related requirements, which not only concern the specific organisational form of VOSTs but also can become relevant in a broader context for CDM. To outline how the research findings can provide input beyond the specific VOST-concerns, the following sections discuss the research findings by focusing on different properties of the researched VOSTs.

Social media support teams for CDM

Several identified challenges and requirements for improvement relate to the essential purpose of VOSTs, namely to increase SM capacity of EMAs by specialised support teams. The reason why the VOST-approach has been developed and actors introduced them into CDM. The research findings indicate that the introduction of any support team (following a VOST-approach or any other approach as, e.g. professional inner-organisational teams) only becomes fruitful if SM capacities are fundamentally available in EMAs. Such availability requires integrating SM use into routine emergency work practices by establishing relevant staff positions, developing SM competence, and providing adequate technical infrastructure, among others. Without such a foundation, the effective use of SM in CDM and benefiting of the deployment of any specific SM competence team appears difficult.

A central reason why actors turn to establish volunteer-based teams for increasing SM capacities is the lack of resources for professional teams (Duffy, 2016; St.Denis, 2015). While volunteer-based VOSTs have been proven valuable support for EMAs (Reuter & Kaufhold, 2018; VOSG, 2017; Kaminska et al., 2015), claims are made in the reviewed literature and by the interviewed experts for investing in professional staff and making professional SM competence teams for CDM available for EMAs. It would ensure the availability of resources when needed and allow volunteers and volunteer-based teams to serve as supporting resources.

As with the Covid-19 pandemic, previous events revealed the high relevance of SM for effective CDM. Crises or disasters do not only take place in the physical realm anymore. SM create an additional virtual dimension of each event, and both spheres, the physical and the virtual, interact with each other (Fathi et al., 2019; Palen & Hughes, 2018; Alexander, 2014). The recognition of the significance of SM use in CDM is required in support of a better integration process of VOSTs and generally for establishing up-to-date practices. The consequences of such recognition are an adequate resource allocation for SM use. It can be expected that without further resource allocation to the topic, too many EMAs will lack basic

structures for effective integration of any specialised SM competence team during crisis and disaster events. Furthermore, while improvements are required to integrate volunteer-based SM support teams better, resources are required for establishing professional teams likewise not to build a system solely depending on volunteer-based force and resources provided by these volunteers.

Adaptability to changing conditions in CDM

VOSTs are a significant innovation in CDM, while the interviewed experts pointed to rigid and innovation-hampering structures in the CDM field, the reason there are challenges for VOSTs' integration. It raises general questions of EMAs and the public sectors' ability to being innovative and adaptive in response to changing conditions in CDM. The findings indicate that changes are required towards a more innovation-open environment in the public sector in Germany. Without such changes, adaption to new demands created by digitalisation and the lasting impact of SM on CDM will face difficulties.

Developments in digitalisation and new ICTs are dynamic and happen at high speed, constantly introducing innovations. They change today's communication and interaction patterns faster than at any time before. Without keeping up with new conditions, EMAs might risk losing connection to the public, which in contrast to the public sector, adapt fast to changes as the increased use of SM shows.

Digitalisation in CDM

A further perspective offers to focus on the organisational and working form of VOSTs, namely as digital teams. The primary data revealed several challenges and requirements for VOSTs' integration related to their modus operandi. The interview results indicate that Germany faces a significant lack of digitalisation in CDM and deployment structures lack in providing basic conditions for integrating digital-working teams. Working structures still follow pre-digital approaches why the integration of digital work products face difficulties. The findings further outline that working structures are still not conceptualised and thought out for flexible and location-independent work approaches in CDM.

The identified issues are not exclusively relevant for VOSTs' integration or volunteer-based teams but can become relevant for all kinds of digital teams in CDM. Digitalisation and new ICTs offer new tools, collaborative location-independent work, and hence benefiting from resources independent of location. Digitalisation offers new possibilities for interactions and resource pooling, which can significantly improve CDM outcomes (Reuter et al., 2018; Blum, et al., 2014). Structures which allow benefiting from digitalisation are desirable for better work

practices in CDM, why it calls for assessing current structures, and where needed their adaptation to enable the effective use of digital-working teams in CDM.

Certified digital volunteer teams in CDM

Several identified challenges for VOSTs' integration into CDM structures relate directly to VOSTs being digital volunteer-based teams.

In Germany, highly elaborated structures for certified volunteers are in place enabling a smooth integration of volunteers into the formal structures of CDM. Professional actors are accustomed to deploying and cooperating with certified volunteers in CDM operations. The research findings reveal that, on the one hand, such prerequisites and structures offer a basis for integrating volunteer-based digital teams. On the other hand, they hamper the integration.

Laws and regulations for volunteers teams have been developed in pre-digital times, for physical volunteers, without including prospects of digital volunteers. The same concerns equipment, training and security needs. The highly differentiated structures for volunteers become an obstacle when introducing a new drastic change: a new type of volunteer, the digital volunteer. Without making changes based on assessing the specific needs of digital volunteers, as in updating regulations, equipment and training, the effective integration of certified digital volunteer types of any kind in CDM structures can be expected to be highly difficult.

While the outlined findings draw from the German context with a specific formalised volunteer system, also the reviewed literature thematised the need for change in established CDM structures to provide better support for digital volunteers in formal structures. Topics addressed are, for instance, the updating of current work approaches of EMAs for integrating digital volunteer teams or the establishment of structures for training relevant for CDM, as well as credentialing and legal protection of the digital volunteers.

Individuals and groups have undertaken much effort to reap benefits from capacities offered by digital voluntarism for EMAs to improve CDM practices. Organisational structures, embedment, and work approaches of VOSTs have been aligned to country and organisation-specific conditions. The conducted research shows that measures within the VOST-community are required to still improve and forward the integration of VOSTs. The research findings nevertheless significantly reveal also that unidirectional attempts to accommodate new digital volunteer teams in traditional structures by individuals and teams reach their limits when the structures do not simultaneously adapt to the new form of volunteerism. Without changes within the respective structures, it appears unlikely that efforts of VOSTs or other similar digital

volunteer teams will be fruitful to become established actors in domestic CDM and their deployment a common practice. EMAs are asked to provide conditions enabling the use of capacities digital voluntarism can offer for tackling the demanding tasks of SM coverage in CDM.

Summing up

Building on a literature scoping study and using Germany as the country of investigation, the exploratory study revealed a diverse range of challenges and required improvements connected with VOSTs' integration into domestic CDM structures. While Chapters 4 and 5 presented in detail the findings of the literature review and primary data, this chapter synthesised the findings and attempted to elevate them to a higher level of abstraction. The reflection of findings allowed further identifying broader implications, which can benefit the knowledge body on structural conditions for integrating new digital volunteer teams into domestic CDM structures in general.

7 Conclusion & future research prospects

The exploratory study could meet the outset objective of improving the understanding of factors hampering the integration of VOSTs into CDM structures and identify entry points in support of a better integration process. The conducted literature scoping study revealed a diverse range of topics of challenges and related requirements. Building on these findings, primary data generated by interviewing German VOST-members could contextualise and deepen the understanding of challenges and required measures for improvement. The primary data revealed in addition central issues not identified in the literature.

It was found that VOSTs' integration is challenged by a lacking recognition of VOSTs as new, valuable actor in the field and lacking official support for VOSTs. However, many of the identified challenges are not directly related to the new organisational form of VOSTs but originate from fundamental underlying issues. It concerns lacking conditions for SM use, missing structures for digital-working teams generally, and for digital volunteer teams specifically, as well as innovation-hampering structures in the CDM field. The research exposed numerous necessary measures to be taken by multiple actors and in various areas to make VOSTs' integration into domestic CDM structures work better.

The findings indicate the need for further measure taking within the VOST-community to forward the integration of VOSTs. The research nevertheless significantly also reveals that unidirectional attempts of aligning organisational structures and work approaches of VOSTs to fit into established CDM structures reach their limits if the structures do not simultaneously adapt to the new form of volunteerism. Without changes within the structures, barriers will remain hindering VOSTs to become an established actor in domestic CDM and their deployment a common practice.

The conducted study contributes to increasing the knowledge body on structural conditions for VOSTs' integration. However, findings are based on a few literature sources, and a small number of expert interviews from one country context, Germany, and overall the research covers solely one perspective on the topic, namely the one of VOST-members. There is a need for continuous research in several further research directions.

The exploratory study revealed a wide range of perspectives, topics and realms relevant to integrating VOSTs into CDM. It would be valuable to take out single aspects and increase research into them to deepen their understanding. Within the German context, further consultations with VOST-members could test findings, deepen, and develop them further. It would also be valuable to consult people working on establishing VOSTs but struggling with

launching a VOST. Further research could focus on comparative approaches by investigating challenges and requirements for better integration of VOSTs in other country contexts and comparing findings to those made in the German context. Another valuable further research approach would be extending the conducted literature review by including sources from languages other than English and German, searching literature in other data bases as well as other types of information sources. Much information is available on SM platforms that traditional literature reviews cannot cover. Moreover, further studies are especially recommended, covering and gaining perspectives from other actors outside the VOST-community and contrasting the research findings.

The research into VOSTs allowed identifying broader implications offering a contribution to the knowledge body on conditions for harnessing benefits from capacities offered by digital voluntarism for EMAs in domestic CDM. Nevertheless, it is only one contribution in a widely under-researched area. Digital voluntarism offers valuable resources for increasing EMAs capacities in the SM sphere (van Gorp, 2014; Starbird & Palen, 2013). The possibilities are by no means exhausted, but rather various difficulties apparent in adapting to and benefiting from this new volunteering type (Bout, 2019; Harrison, 2016; McLennan et al., 2016). The scientific community can support overcoming obstacles by contributing with analysing and improving the understanding of concerns and supporting a transition within CDM practices. Therefore, it calls for increased attention to the topic among the scientific community contributing to the CDM field.

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Annex B: Interview material

Annex B.1: Interview guide handed to the interviewed experts (in German)

Thema: Integration von Virtual Operations Support Teams in Krisen- und Katastrophenmanagementstrukturen in Deutschland.

Vielen Dank, dass Sie sich Zeit nehmen für das Gespräch!

Einstieg

- **Seit wann und wie sind Sie im Bevölkerungsschutz tätig, sowohl hauptberuflich als auch als Freiwillige*r?**
- **Wann und wie haben Sie zum ersten Mal von Virtual Operations Support Teams (VOSTs) gehört?**
- **Wie sind Sie VOST-Mitglied geworden und seit wann sind Sie als VOST-Mitglied aktiv? In welcher Funktion?**
- **Inwiefern benötigt es Ihrer Meinung nach VOSTs im Krisen und Katastrophenmanagement in Deutschland?**

Part 1

- **Wissen Sie, wie es dazu kam, dass das VOST dem Sie angehören, eingerichtet wurde?**
- **Wie setzen sich die Mitglieder in dem VOST, indem sie tätig sind, zusammen?**
- **Können Sie mir einige Beispiele geben, in welchem Kontext das VOST bisher eingesetzt wurde?**
- **Wie würden Sie den aktuellen Status der Integration des VOST in die Organisation, in der es angegliedert ist, beschreiben?**

Part 2

- **Wie sollten Ihrer Meinung nach VOSTs idealerweise in Krisen und Katastrophenschutzstrukturen in Deutschland eingebettet sein?**
- **Welche Akteure sollten idealerweise ein VOST haben? Auf welcher Verwaltungsebene sollten sie angesiedelt sein? Warum?**
- **Wie sollten VOSTs idealerweise in Einsätzen eingebunden werden?**

Part 2a

- **Welche Faktoren erschweren bzw. hindern Ihrer Meinung nach die Einrichtung weiterer VOSTs?**
- **Was wäre Ihrer Meinung nach notwendig, damit mehr Akteure VOSTs einrichten?**

Part 2b

- **In einem Ihrer letzten Einsätze als VOST-Mitglied, gab es da irgendwelche Schwierigkeiten oder Herausforderungen während des Einsatzes? Inwiefern?**
- **Was sind allgemein Bedingungen damit VOST in Einsätze eingebunden werden können?**
- **Was sind zentrale Faktoren, die das Anfordern / Einbinden eines VOSTs in den Einsatz erschweren oder verhindern?**
- **Was könnte dazu führen, dass VOSTs häufiger anfordert und eingesetzt werden?**

Part 3

- **Wie sehen Sie die Zukunft des VOSTs, indem sie gerade arbeiten; sieht es so aus als würde es auch in Zukunft genug Freiwillige geben, die bereit sind sich in einem VOST zu engagieren?**
- **Was würden Sie sagen, sind Faktoren, die Einfluss darauf haben, ob es genügend Freiwillige gibt, die sich in einem VOST engagieren wollen? In Ihrem VOST und allgemein?**
- **Wenn Sie Ihre Arbeit als VOST-Freiwillige*r mit Ihrer vorherigen / anderen Arbeit im Bereich des Katastrophenschutzes vergleichen, was würden Sie sagen ist da anders?**

Part 4

- **Was ist erforderlich, um eine bessere und dauerhafte Integration von VOSTs in Krisen- und Katastrophenmanagementstrukturen in Deutschland zu ermöglichen?**
- **Was sind zentrale Hindernisse für die dauerhafte Integration von VOSTs in Krisen- und Katastrophenschutzstrukturen in Deutschland?**
- **Wenn Sie den Einfluss hätten etwas zu verändern, was würden Sie tun?**
- **Wenn Sie es beeinflussen könnten, welche Akteure sollten aktiv werden und die weitere Integration von VOSTs voranzutreiben? Wie?**

Annex B.2: English translation of the interview guide handed to the interviewed experts

Topic: Integrating Virtual Operations Support Teams into crisis and disaster management structures in Germany.

Thank you for taking the time for the interview!

Entry-questions

- **Since when and how have you been working in civil protection – professionally or as a volunteer?**
- **When and how have you first heard about Virtual Operations Support Teams (VOSTs)?**
- **How did you become a VOST-member and since when are you active as a VOST-member? In which function?**
- **In your opinion, in what way do German crisis and disaster management need VOSTs?**

Part 1

- **Do you know how it came that the VOST you are part of was established?**
- **Who are the members of the VOST you are part of?**
- **Could you give me some examples in which context your VOST has worked so far?**
- **How would you say is the status of the integration of the VOST into the organisation the VOST is established at?**

Part 2

- **In your opinion, how should VOSTs be ideally embedded within the crisis and disaster management structures in Germany?**
- **Which actors should ideally have a VOST? And on which administrative level should VOSTs be installed? Why?**
- **How should VOSTs be ideally anchored into response operations?**

Part 2a

- **What are the factors, which challenge the establishment of more VOSTs?**
- **What would be necessary so that more actors establish VOSTs?**

Part 2b

- **In one of your last deployments as VOST-member, did there any challenges emerge during the work? Which kind of?**
- **What are the basic conditions for the deployment of VOSTs?**
- **What are the major obstacles hindering actors to request / include a VOST into deployments?**
- **What could lead to more actors to request and to employ VOSTs?**

Part 3

- **How do you see the prospect of the VOST you are part of; do you find sufficient people willing to volunteer?**
- **How do you see the general prospect of availability of volunteers, which are willing to commit? In your VOST, and in general?**
- **If you compare your previous / other work in the civil protection field to your VOST-work, what would you say are differences?**

Part 4

- **What are in your opinion the most central requirements for a better and lasting integration of VOSTs into crisis and disaster management structures in Germany?**
- **What are the most central obstacles hindering the lasting integration of VOSTs into crisis and disaster management structures in Germany?**
- **If you had the power to change the current circumstances, what would you change?**
- **If you could influence it, which actors should get involved and push the further integration of VOSTs? How?**

Annex B.3: Follow-up questions design informed by the literature review

All questions were only asked if the respondents did not address the related topic by themselves (refer to 3.2.2). The addressed parts refer to the parts of the interview guide presented in Annex B.1 and B.2.

Follow-up questions for Part 2a – Issues surrounding the establishment / anchoring of VOSTs. Questions were informed by the literature review results presented in section 4.3.

Uptake on the VOST-approach in the CDM field in Germany:

- Is there an institutional interest in VOSTs? (In agencies? Ministries?)
- Have you heard of rejections of launching a VOST?

Diversity of / Differences between the VOSTs:

There are currently VOSTs at the THW, the Ministry at Interior and at two professional fire brigades. They all have different work foci, membership composition and designs. Hence, there is not one VOST approach but many.

- Would you say that the individual and diverse approaches affect the further uptake of VOSTs in Germany? How?

Organisation within the VOST-community:

- Is there a need for more governance among the VOST-community?
- Standards? Formalisation of work approaches? In what way?

Informal recognition of VOSTs:

- Where should further VOSTs be established? Why?
- Placement of VOSTs within structures of relevance for recognition of VOSTs? Why?

Support for launching VOSTs:

- VOST Europe e.g. can support the establishment of VOSTs. Do you think other organisations know about this possibility?
- Would you say that it supports the establishment on federal state level of VOSTs now that Baden-Wurtemberg has one?
- Do organisations need more support in the implementation of VOSTs?

Status of VOSTs as actors within CDM:

- Has your VOST or other VOSTs you know of participated in exercises? (Note: VOSTbw LÜKEX 2018)

Basic condition for VOSTs:

- How is the situation regarding basic conditions for social media use in CDM deployments?
- Is SM use in CDM supported? What are possible reasons why not?
- Are there SM use restrictions, if so how?

Follow-up questions for Part 2b – Issues surrounding the deployment of VOSTs.

Questions were informed by the literature review results presented in sections 4.1 and 4.3.

Embedment into deployments – Point of contact during deployments (4.3):

- How is the current situation?
- How should the embedment into operations preferably take place?

Acceptance of VOSTs as new actor by established actors (colleagues, deployment context) (4.1):

- Is there in your experience an understanding of what VOSTs can do in the CDM field?
Confidence in VOSTs' capabilities?
- Do people know what V O S T stands for or Virtual operations support team? Do you think the label of teams is a problem for getting VOSTs more deployed / more established?

Trustworthiness into VOSTs (4.1):

- How are VOST-members trained? Which background / training have VOST-members?
- What is the background of VOST-members? Where are VOST-members recruited? (Formal training or experience / background in the field?)
- Are there and which policies for verification and background checks, credentialing of VOST-members? (VOSTthw uses SÜ2)
- Virtual work as challenge? Physical meeting of VOST-members important?

Legal concerns (4.1):

- Legal uncertainty challenging VOST deployment?
- Liability questions?

VOSTs perception among the public (4.1):

- Does the public know what VOSTs are? Label of teams as problem?
- Is there an understanding of VOSTs role is in CDM?
 - o Trust in VOSTs as official source?
 - o VOST Twitter-account certification important?

***Follow-up questions for Part 1 & Part 3 – Situation and prospect of the running of VOSTs.
Questions were informed by the literature review results presented in section 4.2.***

Availability and commitment of volunteers:

- Is recruitment of members a problem to maintain VOSTs? Why (not)?
- What are factors influencing the motivation? (Remote work / isolation, physically and psychologically stressful work, high workload, few people)
- What is needed for keeping volunteers motivated, favour long-term commitment? (Motivational factors: altruism, awareness that work has a definitive impact, feedback from the VOST-deploying agency)

Resource provision for VOSTs:

- Current situation? (financial and material support of VOSTs from EMAs)
- Needs for improvements?
- Deployment of professional VOST-staff?

Safety & health of VOST-members:

- Working situation: work can be stressful and traumatising, spatially separated, alone, different to physical present volunteers: What are current structures for preventing harm (e.g. trauma because of what is seen during work) to volunteers? Deployment structure, psychological after-care?
- Legal protection: Are VOST-members protected, if so how? Is insurance available regarding potential mistakes, which can occur through their work?
- Need for improvements?

Training:

- How does SM training of VOST-members currently take place? (Structured training material for SM monitoring available? Shared among VOSTs?)
- Needs?

Equipment and working tools:

- How is the current situation? Need for improvement? How?

Overall, are EMAs / crisis units equipped for working with and equipping with digital volunteers?

Annex B.4: Interview information & consent form (in German)

Informationen zum Umgang mit Interviewmaterial

Interviewte*r: _____

Interview Datum: _____

Kontaktdaten der Interviewerin

Melina Semke



Interview Kontext und Verwendung der Daten

Die Interviews dienen zur Informationsgewinnung für die Masterarbeit der Interviewerin im Studiengang *Disaster Risk Management and Climate Change Adaptation* an der Lund University (Schweden). Die Masterarbeit hat zum Thema: *Integration von Virtual Operations Support Teams in Krisen- und Katastrophenmanagementstrukturen*. Deutschland dient als Untersuchungsgegenstand für die Masterarbeit. Die durch die Interviews gewonnenen Daten werden ausschließlich für die eben genannte Verwendung verarbeitet.

Zusicherung des Datenschutzes und der Anonymisierung der Daten

Hiermit versichere ich, dass ich alle Inhalte des Interviews streng vertraulich behandeln werde. Zur besseren Verarbeitung der Informationen werden die Interviews mit einem Aufnahmegerät aufgezeichnet. Die Interviewaufnahmen werden sicher und vor dem Zugang von Dritten geschützt aufbewahrt und nach dem Fertigstellen des Interview-Transkripts gelöscht.

Ich versichere, dass ich weder in der Masterarbeit noch in anderer Art und Weise Informationen aus den Interviews weitergeben werde, die Rückschlüsse auf die interviewte Person oder im Interview genannten Personen zulassen könnten. Die in den Interviews gewonnenen Informationen werden stattdessen in der Masterarbeit so anonymisiert wiedergegeben, dass sichergestellt ist, dass keine Identifizierung der interviewten Person oder genannten Personen möglich ist.

Die Teilnahme an den Interviews ist freiwillig. Sie haben zu jeder Zeit die Möglichkeit, ein Interview abubrechen und das Recht Ihr Einverständnis in eine Aufzeichnung zu widerrufen.

Sie haben außerdem nach Beendigung des Interviews das Recht die Niederschrift und Verwendung des Interviews zu widerrufen, ohne dass Ihnen dadurch irgendwelche Nachteile entstehen. Einen solchen Widerruf entrichten Sie bitte schriftlich an die oben genannten Kontaktdaten.

Frankfurt am Main, ____ 2020

M. Semke

Ich habe die Datenschutzbedingungen gelesen und bin damit einverstanden unter den oben genannten Bedingungen an einem Interview teilzunehmen.

ja nein

Unterschrift Interviewte*r, Datum, Ort

Annex B.5: English translation of the interview information & consent form

Interview Information

Respondent: _____

Interview date: _____

Contact details of the interviewer

Melina Semke

Assurance of data protection and anonymization of the data

The interview serves to collect information for the interviewer's master's thesis in the study programme *Disaster Risk Management and Climate Change Adaptation* at Lund University (Sweden). The topic of the master's thesis is: *Integrating Virtual Operations Support Teams into crisis and disaster management structures*. Germany serves as the country of investigation for the thesis. The data obtained through the interviews will be processed exclusively for the use as mentioned above.

Assurance of data protection and anonymization of data

I hereby assure you that I will treat all contents of the interview strictly confidential. For better processing of the information, the interviews will be recorded. The interview recordings will be stored securely, protected from access by third parties, and will be deleted after the transcription of the interview has been completed.

I assure you that I will not pass on any information from the interviews, either in the master's thesis or in any other way that could allow conclusions to be drawn about the person interviewed or persons mentioned in the interview. Instead, the information obtained in the interviews will be reproduced anonymously in the master's thesis to ensure that no identification of the interviewed person or persons mentioned is possible.

Participation in the interviews is voluntary. You can stop the interview at any time. You have also the right to withdraw your consent to a recording. You also have the right to revoke the recording and the use of the interview after the interview has ended, without suffering any disadvantages. Please send such revocation in writing to the contact details above.

Frankfurt am Main, _____2020

M. Semke

I have read the information above, and I agree to participate in the interview under the outlined conditions.

yes no

Signature of the respondent, date, place

Annex C: Primary data

The table below presents an overview of the named strategic measures to increase the awareness and knowledge of VOSTs (refer to 5.4).

Relevant actor/s	Measure	Explanation
<i>Scientists / journalists / practice-actors</i>	<i>Publications in German</i>	More publications, in particular, in German and in trade journals, are considered central to forward the recognition of VOSTs in Germany.
	<i>Research</i>	Further scientific research on VOSTs is assessed as crucial as it enforces evidence of capabilities of VOSTs and can make the benefits VOSTs offer visible to a large audience.
<i>Early-adopters</i>	<i>Word-of-mouth recommendation</i>	Reporting positive experiences among formal actors, especially from early-adopters who have already established and/or deployed VOSTs are central for spreading awareness of the benefit and need for VOSTs.
	<i>Strategic dissemination of VOST-approach at high decision- making levels</i>	The VOST-approach should be brought to attention at a high political level. As especially suitable platform serves the Permanent Conference of the Ministers of Interior working group V 'Firefighting, Rescue, Disaster Control and Civil Defence'. It is considered particularly valuable if representatives of Baden-Wurtemberg would bring the topic to attention, and report about their already established VOST on federal state level.
<i>VOSTs / established actors</i>	<i>Exercise participation</i>	VOSTs participation in exercises is stressed as important not only to improve collaboration between VOSTs and other actors in inter-organisational settings. Exercise participation is also highlighted as a central measure to make the VOST-approach more known and provide evidence of VOSTs' value for CDM. So far, only the VOSTbw has participated in a large-scale exercise (LÜKEX).
<i>VOST-community</i>	<i>Presence at central events</i>	Central conferences, fairs and other events within the CDM field by VOST-members offer platforms to hold official presentations to promote the VOST-approach to a large audience. Such events also offer crucial opportunities for informal conversations with central actors in the field.
	<i>Lectures</i>	Lectures in various training institutions allow the promotion of the approach; such as at the Academy for Crisis Management, Emergency Planning, and Civil Defence (AKNZ), the respective federal state fire brigade schools or central police training centres.
<i>Training programme directors</i>	<i>Integrate VOSTs as topic into training courses</i>	Training courses at, e.g., the federal fire brigade schools, police training centres, THW training centre, etc. should include in their educational programme a training section on VOSTs to make people understand that there are VOSTs and what they do and what they need.