Faculty of Arts and Sciences
FiF Thesis No. 127

Digital Transformation for Crisis Volunteerism

A Study in the Aftermath of the Swedish Forest Fires Crisis in 2018

Maria Murphy

li.u LINKÖPING
UNIVERSITY

Faculty of Arts and Sciences, FiF Thesis No. 127

Digital Transformation for Crisis Volunteerism

A study in the aftermath of the Swedish Forest Fires Crisis in 2018

Maria Murphy

Department of Management and Engineering
Linköping University, Sweden
Linköping 2021

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

<https://creativecommons.org/licenses/by-nc/4.0/>

©Maria Murphy, 2021

Linköping University, Faculty of Arts and Sciences, FiF Thesis no. 127

ISBN: 978-91-7929-612-4

ISSN 1401-4637

Printed in Sweden by LiU-tryck, 2021

Cover: Liz White Designs

Linköping University

Department of Management and Engineering,

Information Systems and Digitalisation

SE-581 83 Linköping, Sweden

Abstract

In the summer of 2018, Sweden was taken by surprise and engulfed by forest fires on an unprecedented scale. Various forms of crisis volunteerism (CV) proved essential in the large scale response that ensued. Previous information systems (IS) research gives insights, both theoretically and practically, on the potential of IS and digitalisation to enhance and support crisis response. However, the forest fires demonstrated that CV practices and practitioners in Sweden have practically no such support. CV is, in other words, an essential part of the crisis response system, but unsupported by dedicated digitalisation. The aim of this thesis is therefore to understand what is required to enable a digital transformation (DT) that will significantly improve CV practice and the overall crisis response system.

Sweden is not unique in this respect. From an international perspective, IS research devotes much attention to the area of crisis response. However, this is most commonly done using the perspective and needs of crisis management stakeholders as a departing point. Also, despite research on and the availability of IS solutions, the degree of practical implementation would appear to be low. This thesis is therefore also based on the perceived knowledge gap that the lack of IS and digitalisation supporting CV is, in part, a result of the lack of research focus on volunteer stakeholders and the CV practice itself. Another gap noted is the lack of knowledge regarding the real-world practice of CV which contributes to undermining the development and use of IS solutions for CV.

This thesis, therefore, provides a much needed holistic understanding of real-world CV. This understanding moves the perspective of volunteer stakeholders to the forefront without losing the perspective of crisis management. This has been done via an empirical study in the aftermath of the Swedish forest fires crisis as well as via studies of international IS literature on crisis response and CV. This has resulted in a unique holistic and comprehensive model that relates to the complexity, dynamics and emergence involved in CV practice. Via this model it is possible to relate specific parts or aspects of CV practice, to the whole practice area and continue modelling attributes in greater detail, as required, depending on DT or IS design needs.

Underlying the focus in this thesis lies a mild critique of previous IS research with more reductionist approaches, whereby the relevance of broader contextual understandings has been downplayed. The thesis

aligns with perspectives on digitalisation and IS design, proposing the relevance of developing broader holistic understandings of research topics. That is, understandings that have greater potential to reveal how phenomena come into being and are adapted in environmental contexts.

DT is understood in terms of a process whereby broader understandings of phenomena are used to identify needs (triggers), strategies and capabilities that will inform IS design initiatives. An analytical framework depicting this process and its main components and relationships has been designed in this thesis to contribute to an understanding of what is required to digitally transform CV practice.

In summary, the thesis provides a new holistic approach and understanding for the CV practice area and how it may be digitally transformed. The thesis also contributes to a new perspective on DT, applied to a complex and non-organisation based setting. This knowledge is of relevance to both practitioners and IS researchers in crisis response and CV. The CV practice meta-model and the analytical framework for digital transformation can be used to enable and inform future digital transformation strategies and policy in Sweden and internationally. They can also contribute to guiding the initiation of practical IS design initiatives, with greater potential to enhance and improve both CV and overall crisis response.

The research was performed within the information systems (IS) discipline.

Foreword

Information Systems (IS) is a research discipline within the Faculty of Arts and Sciences at Linköping University (LiU), Linköping Sweden. IS is a discipline studying human work with developing and changing different kinds of IT systems in organisational and societal settings. The research discipline includes theories, strategies and policies, models, methods, co-working principles and artefacts related to information systems development. Different development and change situations can be studied as planning, analysis, specification, design, implementation, maintenance, evaluation and redesign of information systems. Focus is also on the interplay with other forms of organizational development, processes of digitalization and innovation. The discipline also includes the study of prerequisites for and results from information systems development, as e.g. institutional settings, studies of usage and consequences of information systems on individual, group, organizational and societal levels.

The IS research at LiU is conducted in collaboration with private and public organizations. Collaboration also includes national and international research partners in the information systems research field. The research has a clear ambition to give distinct theoretical contributions within the information systems research field and relevant focus areas. Simultaneously, the research aims to contribute with practically needed and useful knowledge.

This work, *Digital Transformation: A Study in the Aftermath of the Swedish Forest Fires Crisis in 2018*, is written by Maria Murphy, Linköping University. She presents this work as her licentiate thesis in Information Systems, Division of Information Systems and Digitalization, Center for Advanced Research in Emergency Response (CARER), Department of Management and Engineering, Linköping University, Sweden.

Linköping, June 2021

Karin Axelsson
Professor

Ulf Melin
Professor

Sofie Pilemalm
Professor

Doctoral Dissertations in Information Systems¹

1. Karin Axelsson (1998) Metodisk systemstrukturering – att skapa samstämmighet mellan informationssystemarkitektur och verksamhet
2. Stefan Cronholm (1998) Metodverktyg och användbarhet – en studie av datorstödd metodbaserad systemutveckling
3. Anders Avdic (1999) Användare och utvecklare – om anveckling med kalkylprogram
4. Owen Eriksson (2000) Kommunikationskvalitet hos informationssystem och affärsprocesser
5. Mikael Lind (2001) Från system till process – kriterier för processbestämning vid verksamhetsanalys
6. Ulf Melin (2002) Koordination och informationssystem i företag och nätverk
7. Pär J. Ågerfalk (2003) Information Systems Actability: Understanding Information Technology as a Tool for Business Action and Communication
8. Ulf Seigerroth (2003) Att förstå och förändra systemutvecklingsverksamheter – en taxonomi för metautveckling
9. Karin Hedström (2004) Spår av datoriseringens värden – effekter av IT i äldreomsorg
10. Ewa Braf (2004) Knowledge Demanded for Action – Studies of Knowledge Mediation in Organisations
11. Fredrik Karlsson (2005) Method Configuration – method and computerized tool support
12. Malin Nordström (2005) Styrbar systemförvaltning – Att organisera systemförvaltningsverksamhet med hjälp av effektiva förvaltningsobjekt
13. Stefan Holgersson (2005) Yrke: Polis – yrkeskunskaper, motivation, IT-system och andra förutsättningar för polisarbete
14. Marie-Therese Christiansson & Benneth Christiansson (2006) Mötet mellan process och komponent – mot ett ramverk för en verksamhetsnära kravspecifikation vid anskaffning av komponentbaserade informationssystem
15. Britt-Marie Johansson (2007) Kundkommunikation vid distanshandel. En studie om kommunikationsmediers möjligheter och hinder

¹ The label was changed (to Information Systems) from Information Systems Development in May 2019.

16. Göran Hultgren (2007) eTjänster som social interaktion via användning av IT-system – en praktisk teori
17. Björn Johansson (2007) Deciding on Sourcing Option for Hosting of Software Applications in Organisations
18. Per Oscarson (2007) Actual and perceived information systems security
19. Hanna Broberg (2009) DEVIS: Design av verksamhetsstödande IT-system – En designteori och metod
20. Anders Hjalmarsson (2009) Behovet av struktur och frihet – en avhandling om situationsanpassad facilitering vid samarbetsinriktad modellering
21. Jenny Lagsten (2009) Utvärdera informationssystem – Pragmatiskt perspektiv och metod
22. Ida Lindgren (2013) Public e-Service Stakeholders – On who matters for public e-service development and implementation
23. Malin Granath (2016) The Smart City – how smart can ‘IT’ be? Discourses on digitalisation in policy and planning of urban development
24. Fredrik Söderström (2016) Introducing public sector eIDs – the power of actors’ translations and institutional barriers
25. Sten-Erik Öhlund (2017) Interoperability. Capability to interoperate in a shared work practice using information infrastructures – studies in ePrescribing
26. Yousefi Mojir, Kayvan (2018) Information Systems Development for Emerging Public Sector Cross-sector Collaborations: The Case of Swedish Emergency Response
27. Petersson, Johan (2019) Elektroniska marknadsplatser - IT-stöd för små- och medelstora leverantörer
28. Ramsell, Elina (2021) Toward ICT-enabled Co-production for Effective Crisis and Emergency Response

Licentiate Theses in Information Systems Development

1. Owen Eriksson (1994) Informationssystem med verksamhetskvalitet - utvärdering baserat på ett verksamhetsinriktat och samskapande synsätt
2. Karin Pettersson (1994) Informationssystemstrukturering, ansvarsfördelning och användarinflytande – en komparativ studie med utgångspunkt i två informationssystemstrategier
3. Stefan Cronholm (1994) Varför CASE-verktyg i systemutveckling? – En motiv- och konsekvensstudie avseende arbetssätt och arbetsformer
4. Anders Avdic (1995) Arbetsintegrerad systemutveckling med kalkylprogram
5. Dan Fristedt (1995) Metoder i användning – mot förbättring av systemutveckling genom situationell metodkunskap och metodanalys
6. Malin Bergvall (1995) Systemförvaltning i praktiken – en kvalitativ studie avseende centrala begrepp, aktiviteter och ansvarsroller
7. Mikael Lind (1996) Affärsprocessinriktad förändringsanalys – utveckling och tillämpning av synsätt och metod
8. Carita Åbom (1997) Videomötesteknik i olika affärssituationer – möjligheter och hinder
9. Tommy Wedlund (1997) Att skapa en företagsanpassad systemutvecklingsmodell – genom rekonstruktion, värdering och vidareutveckling i T50-bolag inom ABB
10. Boris Karlsson (1997) Metodanalys för förståelse och utveckling av systemutvecklingsverksamhet – analys och värdering av systemutvecklingsmodeller och dess användning
11. Ulf Melin (1998) Informationssystem vid ökad affärs- och processorientering – egenskaper, strategier och utveckling
12. Marie-Therese Christiansson (1998) Inter-organisatorisk verksamhetsutveckling – metoder som stöd vid utveckling av partnerskap och informationssystem
13. Fredrik Öberg (1998) Object-oriented frameworks – a new strategy for CASE tool development
14. Ulf Seigerroth (1998) Integration av förändringsmetoder – en modell för välgrundad metodintegration
15. Bengt EW Andersson (1999) Samverkande informationssystem mellan aktörer i offentliga åtaganden – en teori om aktörsarenor i samverkan om utbyte av information

16. Pär J. Ågerfalk (1999) Pragmatization of information systems – a theoretical and methodological outline
17. Karin Hedström (2000) Kunskapsanvändning och kunskapsutveckling hos verksamhetskonsulter – erfarenheter från ett FoU-samarbete
18. Göran Hultgren (2000) Nätverksinriktad förändringsanalys – perspektiv och metoder som stöd för förståelse och utveckling av affärsrelationer och informationssystem
19. Ewa Braf (2000) Organisationers kunskapsverksamheter – en kritisk studie av ”knowledge management”
20. Henrik Lindberg (2000) Webbaserade affärsprocesser – möjligheter och begränsningar
21. Benneth Christiansson (2000) Att komponentbasera informationssystem – Vad säger teori och praktik?
22. Per-Arne Segerkvist (2001) Webbaserade imaginära organisationers samverkansformer – Informationssystemarkitektur och aktörssamverkan som förutsättningar för affärsprocesser
23. Stefan Holgersson (2001) IT-system och filtrering av verksamhetskunskap – kvalitetsproblem vid analyser och beslutsfattande som bygger på uppgifter hämtade från polisens IT-system
24. Per Oscarson (2001) Informationssäkerhet i verksamheter – begrepp och modeller som stöd för förståelse av informationssäkerhet och dess hantering i verksamheter
25. Johan Petersson (2002) Lokala elektroniska marknadsplatser – informationssystem för platsbundna affärer
26. Fredrik Karlsson (2002) Meta-method for Method Configuration – A Rational Unified Process Case
27. Lennart Ljung (2003) Utveckling av en projektivitetsmodell – om organisationers förmåga att tillämpa projektarbetsformen
28. Britt-Marie Johansson (2003) Kundkommunikation på distans – en studie om kommunikationsmediets betydelse i affärstransaktioner
29. Fredrik Ericsson (2003) Information Technology for Learning and Acquiring Work Knowledge among Production Workers
30. Emma Eliason (2003) Effektanalys av IT-systems handlingsutrymme
31. Anders Hjalmarsson (2004) Att etablera och vidmakthålla förbättringsverksamhet. Behovet av koordination och interaktion vid förändring av systemutvecklingsverksamheter

32. Björn Johansson (2004) Deciding on Using Application Service Provision in SMEs
33. Ulf Larsson (2004) Designarbete i dialog – karaktärisering av interaktionen mellan användare och utvecklare i en systemutvecklingsprocess
34. Anders Forsman (2005) Standardisering som grund för informationssamverkan och IT-tjänster – En fallstudie baserad på trafikinformationstjänsten RDS-TMC
35. Jenny Lagsten (2005) Verksamhetsutvecklande utvärdering i informationssystemprojekt
36. Jan Olausson (2005) Att modellera uppdrag – grunder för förståelse av processinriktade informationssystem i transaktionsintensiva verksamheter
37. Amra Halilovic (2006) Ett praktikperspektiv på hantering av mjukvarukomponenter
38. Hanna Broberg (2006) Verksamhetsanpassade IT-stöd – designteori och metod
39. Sandra Haraldson (2008) Designprinciper för handlingskvalitet i samverkan – ett multiorganisatoriskt perspektiv på tredjepartslogistik
40. Jonas Sjöström (2008) Making Sense of the IT artefact – A socio-pragmatic inquiry into IS use qualities
41. Anders Persson (2009) Förutsättningar för sammanhållen kommunal eFörvaltning
42. Ann-Margreth Hammar (2011) Från projektorganisation till förvaltningsorganisation – en studie av överlämningsarenan
43. Eva Karlsson (2012) Systemutveckling för riskbaserad tillsyn – Hur verksamhetsanalys på praktikteoretisk grund kan användas för kravfångst
44. Hannes Göbel (2014) IT Service Management – Designprinciper för informationssystemsfartefakter
45. Kayvan Yousefi Mojir (2016) New Forms of Collaboration in Emergency Response Systems: A framework for participatory design of information systems
46. Siri Wassrin (2018) Why is it difficult to design innovative IT? An agential realist study of designing IT for healthcare innovation
47. Jonathan Crusoe (2019) Why is it so difficult to cultivate open government data? Understanding impediments from an ecosystem perspective
48. Maria Murphy (2021) Digital Transformation for Crisis Volunteerism: A Study in the Aftermath of the Swedish Forest Fires Crisis in 2018.

Abbreviations

IS	Information Systems
CV	Crisis Volunteerism
ISCV	Information Systems and Crisis Volunteerism
DT	Digital Transformation
VC	Volunteer Coordination
FRS	Fire and rescue services
MSB	Myndigheten för Samhällsskydd och Beredskap (The Swedish Civil Contingencies Agency)
FRG	Frivillig Resurs Grupp (Volunteer Resource Group)
RK	Röda Korset (The Red Cross)
SRK	Svenska Röda Korset (The Swedish Red Cross national organisation)
GT	Grounded theory
MGT	Multi-Grounded Theory

Acknowledgements

Life is full of surprises. Writing this thesis is one of them. One that I am very grateful for. Coming into contact with CARER and INDIG made this possible, thank you Sofie and Ulf!

When I started out on this project I didn't know what other surprises were waiting for me. There were challenges that I did and did not expect. Like all challenges, these experiences have made me grow. Today, I am grateful that I am the stronger for them. I couldn't have done this without my family, friends and colleagues.

Per. You are my rock. Loving me, feeding me, and making me laugh and feel good! Thank you for all your love and support.

Emma, Alva, Daniel and Janne. You guys are four impossible teenagers that I love to bits. You are all so busy now, finding your own foothold in life. Thank you for putting up with me during this time... and don't forget to clean the kitchen ☺!

My parents, Mary and Francis. You are the best in the world, always supporting me and making it possible for me to follow my dreams, no matter what they are. I love you!

Sofie, Tobias and Fredrik, thank you for your patience and helpfulness throughout my thesis work!

Friends and colleagues. I am so grateful for all of you, Carolina especially. I appreciate all the opportunities you (willingly or unwillingly ☺) have given me during these past years to stretch my mind, see things in a new light and find ways to survive and thrive.

To all who have patiently answered my questions and participated in interviews, observations and workshops. Thank you so much for sharing your valuable experiences with me and making this thesis possible!

Liz. Thank you so much for the beautiful cover you made for this book.

Contents

Chapter 1: Introduction.....	1
1.1 Central Thesis Concepts.....	3
1.2 Problem Description	4
1.2.1 <i>Lack of Relevant ICT solutions for CV</i>	4
1.2.2 <i>Lack of Alignment with Real-world Needs</i>	5
1.2.3 <i>Deficiencies in Understandings of CV</i>	5
1.2.4 <i>Integrating DT and IS Design</i>	6
1.2.5 <i>Incorrect Assumptions regarding CV</i>	7
1.2.6 <i>Narrow Understandings of Context</i>	7
1.2.7 <i>Summary of the Problems Motivating this Thesis</i>	8
1.3 Research Aim and Questions	8
1.4 Thesis Delimitations	9
1.5 Target Audience	11
1.6 Knowledge Contributions	11
1.7 Thesis Outline	12
Chapter 2: Study Context.....	13
2.1 Crisis Management and Crisis Response	13
2.2 Crisis Response in Sweden	14
2.2.1 <i>Crisis Response System Actors</i>	14
2.2.2 <i>Crisis Response System Structures</i>	16
2.3 The Forest Fires Crises in Sweden in 2018.....	17
2.3.1 <i>The Nature of the Forest Fires Crisis</i>	17
2.3.2 <i>Crisis Volunteerism in the Forest Fires Crisis</i>	18
2.4 Crisis Volunteerism as a Practice Area.....	18
Chapter 3: Research Approach	21
3.1 Research Design and Process.....	21
3.2 Philosophical Assumptions	22
3.2.1 <i>A Critical Realist Approach</i>	23
3.2.2 <i>A Pragmatic Approach</i>	24
3.3 Methodology	24
3.3.1 <i>Grounded and Multi-Grounded Theory</i>	25
3.3.2 <i>Grounding Procedures</i>	26

3.4	Methods for Data Generation and Data Analysis	28
3.4.1	<i>Empirical Studies</i>	28
3.4.2	<i>Literature Studies</i>	31
3.4.3	<i>Data Analysis and Conceptualisation</i>	32
3.5	Methodological Considerations	34
3.5.1	<i>Quality of the thesis as a whole</i>	35
3.5.2	<i>Quality of the results</i>	36
3.5.3	<i>Validity</i>	37
3.5.4	<i>Transferability</i>	39
3.6	Ethical Considerations	40
Chapter 4: Theory		43
4.1	Information Systems Theory	43
4.1.1	<i>IS Theory and Real-world Developments</i>	43
4.1.2	<i>Bounds of IS Theory</i>	44
4.1.3	<i>IS Design Theory</i>	46
4.2	Complexity Theory	49
4.2.1	<i>From Chaos to Order</i>	50
4.2.2	<i>From Linear to Nonlinear Perspectives</i>	50
4.2.3	<i>Dynamics and Emergence</i>	51
4.2.4	<i>Equilibrium and Adaption</i>	52
4.3	Digital Transformation	53
4.3.1	<i>Triggers for Digital Transformation</i>	55
4.3.2	<i>Digital Transformation Strategy</i>	55
4.3.3	<i>Digitally Enabled Capabilities</i>	56
4.4	An Analytical Framework for Digital Transformation	58
Chapter 5: Understanding Crisis Volunteerism		63
5.1	Crisis Volunteerism Stakeholders	65
5.1.1	<i>Types and levels of CV Stakeholders</i>	65
5.1.2	<i>Volunteer Affiliation</i>	67
5.1.3	<i>CV Integration in Crisis Management</i>	69
5.2	Crisis Volunteerism Processes	71
5.2.1	<i>ISCV Literature and CV Processes</i>	72
5.2.2	<i>Influences on CV Processes</i>	73
5.3	Local CV Coordination Processes	75
5.3.1	<i>Establish Local CV Coordination</i>	76
5.3.2	<i>Coordinate CV Requests and Offers</i>	81

5.3.3	<i>Coordinate Volunteer Work On-site</i>	84
5.3.4	<i>FRS Perspectives on Local CV Processes</i>	85
5.4	National CV Coordination Processes.....	87
5.4.1	<i>Establish Coordination Function</i>	90
5.4.2	<i>Coordinate CV Requests and Offers</i>	91
5.4.3	<i>Mediate Volunteers</i>	93
5.5	Crisis Volunteerism Tasks	94
5.5.1	<i>Crisis Volunteerism Taskers</i>	95
5.5.2	<i>Crisis Volunteerism Tasks</i>	96
5.5.3	<i>Crisis Volunteers Capabilities</i>	101
5.6	Crisis Volunteerism Environments	102
5.6.1	<i>Collaborative Structures</i>	103
5.6.2	<i>Institutional Arrangements</i>	106
5.6.3	<i>Resources and Preparedness</i>	108
5.6.4	<i>Other CV Environment Attributes</i>	111
5.7	Information and Communication Technology	113
5.7.1	<i>Uses of ICT in ISCV Research</i>	114
5.7.2	<i>ICT use in National Volunteer Coordination</i>	115
5.7.3	<i>ICT use in Local Volunteer Coordination</i>	117
5.8	Crisis Events	117
5.9	The Expanded CV Practice Meta-Model	118
Chapter 6: How to Digitally Transform CV		121
6.1	Triggers for Digital Transformation	122
6.1.1	<i>Future Crises and Large Scale Volunteerism</i>	123
6.1.2	<i>Societal and Community Resilience</i>	123
6.1.3	<i>Facilitating Collaboration</i>	124
6.1.4	<i>Community Engagement and Empowerment</i>	125
6.1.5	<i>Support for both Formal and Non-Formal CV</i>	125
6.1.6	<i>Relating to CV in Crisis Preparedness</i>	126
6.2	Digital Transformation Strategy	127
6.2.1	<i>Stakeholders or Processes?</i>	128
6.2.2	<i>Commonalities or Differences?</i>	129
6.3	Digitally Enabled Capabilities	130
6.3.1	<i>Establish Local and National CV Coordination</i>	131
6.3.2	<i>Coordinate CV Requests and Offers</i>	133
6.3.3	<i>Coordinate On-site Volunteer Work</i>	136

6.4	Challenges.....	138
6.4.1	<i>Aligning with Realities of Non-affiliated CV</i>	139
6.4.2	<i>Aligning Types of CV at the SRK</i>	141
6.4.3	<i>Structural Challenges</i>	142
Chapter 7:	Discussion.....	145
7.1	Delivering a Holistic Understanding of CV	145
7.2	Process and Practice Perspectives on CV	147
7.3	Regarding CV as a Complex Practice Area.....	149
7.4	Relating to DT for CV rather than ICT for CV	150
7.5	Translating Needs to Application Contexts	152
7.6	Research Approach	154
7.7	Methodology and methods.....	155
7.8	Limitations of the Thesis	157
Chapter 8:	Conclusions and Future Research.....	159
8.1	Key Contributions.....	160
8.1.1	<i>A Holistic Understanding of CV</i>	160
8.1.2	<i>How to Digitally Transform CV</i>	162
8.1.3	<i>The Analytical Framework for DT</i>	163
8.2	Suggestions for Future Research	164
References		166
Appendix A		185
Appendix B		189
Appendix C		193
Appendix D		197

Chapter 1: Introduction

This thesis is written within the information systems (IS) research discipline and makes inquiries into digital transformation (DT) for crisis volunteerism (CV).

Recurring crisis events, both in Sweden and internationally demonstrate time and time again that volunteers (often in large numbers) are required to assist in response to large scale crisis events (Waldman et al., 2016; Asp, 2017). Crisis volunteerism (CV) can be organised and invited by crisis management, authorities or established CV organisations (Auferbauer et al., 2016; Zettl et al., 2017; Eismann et al., 2018) or be more spontaneous initiatives by non-affiliated volunteers, often beyond the scope of crisis management and authorities (Aguirre et al., 2017; Twigg and Mosel, 2017). Regardless of how crisis volunteerism comes about or the type of affiliation with formal crisis management and authorities, support and coordination efforts are required to ensure the safety of crisis responders and overall efficiency of the crisis response (Quarantelli, 1988; Van de Walle and Turoff, 2008).

While this thesis will relate to all forms of formal and non-formal volunteerism. Careful attention is paid to the role of non-affiliated volunteerism, which has come to be more and more at the forefront as an essential contribution in the overall crisis response system (Asp et al., 2019; Strandh and Eklund, 2018). While previous authors use the term *spontaneous volunteerism* I prefer to relate to *non-affiliated volunteerism*. The reason for this is because it is inappropriate to use presuppositions regarding volunteer's spontaneity to define their engagement. Volunteers have in fact a broad range of motives, sometimes including spontaneity, but not always (Lindner et al., 2018; Lindner and Herrmann, 2020). The term non-affiliated relates to the fact that the volunteer is not affiliated (for example has membership) with a CV or non-CV organisation, which is deemed to be a more neutral and less value-laden approach to describing this category of volunteers.

In modern society, efforts to support any given practice area, not least involving citizen-government interaction, and enhance connectivity and distribution of information or resources on a large scale, to improve co-

ordination, performance and efficiency, are commonly addressed via digitalisation (Sørensen, 2016; Lindgren and van Veenstra, 2018; Mergel et al., 2018).

My preliminary inquiries in late 2018, among participants in the response to the Swedish forest fires crisis, revealed that the level of digitalisation for CV was low to non-existent. Studies of previous crises in Sweden also did not indicate the use of information and communication technology (ICT) for previous crisis events (Asp et al., 2015; Asp, 2017). In 2018, in response to the high level of non-affiliated volunteers will to help during the forest fires crisis, the SRK (Swedish Red Cross National Organisation) together with MSB (the Swedish Civil Contingencies Agency) quickly adapted existing systems to facilitate the recruitment and distribution of volunteer assistance. At the same time, locally, the smartphone and common applications such as MS Excel and MS Word were used to support the coordination efforts. These observations, made at the early stages of this thesis project, gave the impression that the practice area of CV in Sweden has been bypassed by the general stream of digitalisation, e-government and digital government that is otherwise strong and ongoing, both in Sweden and abroad.

From a practice perspective, the motivation for this thesis is therefore the lack of digitalisation observed in the Swedish context and the understanding that digitalisation is a prerequisite for improving and making CV practice more efficient in the future. This is not least against the backdrop of the ongoing Covid-19 pandemic. The potential of digitalisation for CV practice to improve crisis preparedness is a further motivator. Based on my early studies of ISCV research, several shortcomings were also observed and understood to contribute to this overall problem of a lack of digitalisation in CV practice (Rogstadius et al., 2013; Kaufhold and Reuter, 2016; Ramsell, 2021).

These practical realities and shortcomings in previous ISCV research are further discussed in the following section to provide a fuller problem description and motivate the research questions that are explored in the thesis. Thereafter delimitations, target audiences and knowledge contributions of the thesis are presented. Finally, a brief outline of all thesis chapters is provided. However, firstly important concepts related to in the thesis are introduced in the following section.

1.1 Central Thesis Concepts

Information Systems (IS)

Here, an information system is viewed from a pragmatic perspective. To ensure a system's usefulness it is not sufficient to consider the Information Technology (IT) facilitating the system (an information system can exist without IT-artefacts) or indeed the information managed by the system. We must also conceptualize what the system is to be used for.

Digital Transformation (DT)

The terms digitalisation and digital transformation are used largely interchangeably and are defined in this thesis in terms of a process with the power and potential to significantly restructure and transform organisations, institutions or even society.

Information Systems Design (IS Design)

Central to the concept of IS design is the process whereby IT artefacts are designed and built. In an IS Design process these activities are preceded by processes that provide understandings of both the immediate (application) and more distant (socio-technical) contexts.

Crisis

In this thesis, a crisis is understood to be a “*disruption within the state of a system, which reveals instability and discontinuity and which requires a specific treatment to deal with the unwanted consequences and to obtain a new acceptable state of the considered system*” (Bénaben et al., 2016: p. 126).

Crisis Management

The concept of crisis management relates to the previous definition of crisis and is viewed to consist of the practices of mitigation and prevention, preparedness, prediction and warning, response, recovery as well as hazard and vulnerability analysis, both before, during and after a crisis.

Crisis Response

Crisis response can be related to both as a practice (as above, together with other crisis management practices), as a purpose or something to be achieved (for example, saving lives and reducing damages) or in terms of

a system whereby actors are engaged in performing activities (for example, collaboration, coordination, cooperation or tasks).

Crisis Volunteerism (CV)

Crisis Volunteerism (CV) is viewed in this thesis as a collection of practices, demonstrating various levels of emergence, expansion, establishment or evolution. CV is performed by a broad range of actors, with varying degrees of integration in formal crisis response systems.

Crisis volunteerism Actors and Stakeholders

The categories of CV actors and stakeholders considered in this thesis are both volunteers and professional crisis management (e.g. authorities and emergency services) that must relate to CV practice in a crisis event.

1.2 Problem Description

Inspired by Alvesson and Sandberg (2011) I have chosen to relate to knowledge on practical needs in CV and identify and question assumptions in previous ISCV (Information Systems and Crisis Volunteerism) research that contribute to the lack of digitalisation in CV. Here, the underlying assumption on my part is that ISCV research should be useful and have the potential to help achieve relevant digitalisation for CV.

1.2.1 Lack of Relevant ICT solutions for CV

A lack of relevant ICT solutions and digitalisation for CV is the main problem driving this thesis. One reason for this situation is understood to be ambivalence on the part of government authorities concerning the relevance of involving volunteers, in particular non-affiliated volunteers, in crisis response (Barsky et al., 2007; Johansson et al., 2015; Strandh and Eklund, 2018). There would, in Sweden at least, appear to be a reluctance to recognise newer forms and constellations in crisis or emergency response that are enabled by the general level of digitalisation in society (Mojir, 2018; Ramsell, 2021). Central authorities emphasise the relevance of more traditional methods, established before the advent of large scale digitalisation. For example, pre-arrangements with established CV organisations (Hultén et al., 2016).

Digitalisation in CV is of course challenged by structural and institutional arrangements that also influence digitalisation efforts in society

in general. For example, the widely decentralised governmental structure in Sweden, which influences the investments that are made in digitalisation. This structure is of further relevance when we consider that the main practitioners (volunteers) in CV have no government organisation base, but are rather citizen-based.

Despite the absence of dedicated ICT in practice, the involvement of communities and citizens in the practice of CV is greatly influenced by the potential provided by everyday digital platforms (Facebook, Twitter, Google and a vast range of household apps) (Starbird and Palen, 2011; Hughes and Tapia, 2015; Kaufhold and Reuter, 2016).

A lack of digitalisation in CV can be seen as extra problematic when we consider that it is in a crisis that we most of all need efficiency, timeliness, accessibility and possibilities to communicate and collaborate. That is, all those valuable capabilities we expect digitalisation to support, enable and when required even transform. This motivates this thesis to focus on how to digitally transform the CV practice area.

1.2.2 Lack of Alignment with Real-world Needs

Rogstadius et al. (2013) discuss the fact that many technical solutions enabling new or improved forms of volunteering are never integrated into response efforts. They conclude that there is a mismatch between designs and real-world needs. It would appear that several years on, the situation is much the same. Despite solutions such as KUBAS (Zetl et al., 2017), RE-ACTA (Auferbauer and Tellioglu, 2017) and beAware (Baumgartner et al., 2010), that have the potential to contribute to integrating CV in crisis management practice, real-life implementations are few internationally and there are none in Sweden.

1.2.3 Deficiencies in Understandings of CV

While trying to understand why there is a lack of alignment with real-world needs it is relevant to consider what kind of understandings of CV are related to or delivered in ISCV research, and what understandings are lacking.

CV as an independent practice area is rarely investigated in ISCV research. It is rather related to as an add-on or area of secondary relevance to crisis management (Auferbauer et al., 2016; Benali and Ghomari, 2017b; Fuchs-Kittowski et al., 2017). This research has at best considered

the possibilities to formalise and integrate CV in crisis management. Little consideration is given to supporting non-formal CV in particular. This top-down approach is problematic, in that the needs of citizens (bottom-up perspective) and factors that influence CV practice risk being ignored (Grubmüller-Régent et al., 2014; Barbour and Manly, 2016).

This thesis recognises the need to relate to both top-down and bottom-up perspectives on CV to gain fuller and more relevant real-world understandings of CV. In practice, this is achieved by taking an interest in CV practice as a phenomenon in its own right. Thereby, some CV processes are viewed to be tightly interwoven with the professional crisis response system, while others are acknowledged to operate independently of crisis management.

It is relatively uncommon to have an explicit focus on understanding CV processes and practice in ISCV research. Observing CV processes provides the means to structure and analyse relevant aspects such as flow, practices, roles, routines, actors, interactions, information, organisation, communication, co-ordination and technology (Orloff, 2011; Linnell, 2014; Liu, 2014; Zettl et al., 2017; Auferbauer et al., 2019b). This thesis recognises therefore the potential in using a practice perspective to understand CV to achieve its DT (Goldkuhl, 2011; Saaroni, 2015; Andersson and Rosenqvist, 2018).

1.2.4 Integrating DT and IS Design

Digital transformation (DT) is becoming more attractive as a focal point in the IS research discipline. The attraction lies in that it recognises that digitalisation is a process whereby digital technology is used to achieve significant changes in organisations, institutions or even society. Also, in contrast to previous IT-centric IS research, it is considered relevant to go beyond the more immediate IT application context, and focus on the broader needs that IS and digitalisation must address.

Strategic objectives of DT and operative design of IT artefacts need to be aligned to achieve more significant improvements in any given practice area (Drechsler and Hevner, 2016; Hess et al., 2016; Vial, 2019). Due to the complex character of CV practice, which involves a heterogeneous set of actors and objectives in a complex and often dynamic environment, the development of DT strategies and the design of IS become infinitely

more challenging. I, therefore, suggest that the chances of achieving relevant digitalisation for CV are limited when the broader concerns of DT are not tied into and connected with operative IS design projects.

1.2.5 Incorrect Assumptions regarding CV

Incorrect assumptions regarding CV as a practice feeds into the directions and perspectives taken in previous IS research.

The notion of the volunteer, or more specifically the non-affiliated volunteer, as an unreliable, unpredictable and undesirable in crisis response is a strong assumption that gives legitimacy to the prevalence of and nature of top-down ISCV research (Schneider, 1992; Barsky et al., 2007; Johansson, 2009; Harris et al., 2017). This thesis is, in contrast, guided by the assumption that these volunteers have an essential and important contribution to make in crisis response (Albahari and Schultz, 2017; Carlton and Mills, 2017; Paciarotti et al., 2018; Rauchecker and Schryen, 2018; Strandh and Eklund, 2018).

1.2.6 Narrow Understandings of Context

I adhere to the understanding that the IS discipline has over emphasised focusing on the IT artefact, leading the entire discipline to prioritise research paying attention to factors more immediately associated with the IT artefact and the organisational context (Alter, 2003b; Lee et al., 2015; Sørensen, 2016). The ISCV research field has, by in large, also followed this general trend, giving greater priority to research investigating the immediate context of the IT artefact rather than considering broader environmental factors. This thesis deviates from this trend and seeks a broader and more holistic understandings of CV practice and its context.

CV is also a multi-dimensional, complex and fluid practice area, where actors not only exist but also emerge or evolve during a crisis event. This reality stands in contrast to the more determinant focus applied on the immediate application/IT-artefact context (commonly an organisation) in IS research (Orlikowski and Iacono, 2001; Benbasat and Zmud, 2003). In contrast to this, I choose to use the concept of DT that, to a greater degree, has the potential to observe the power associated with holistic understandings of factors beyond the immediate context of the IT

artefact. This enables a focus on capabilities such as connectedness, distribution, scaling and intelligence that can help digitally transform CV (Lindgren, 2013; Sørensen, 2016; Mergel et al., 2018).

1.2.7 Summary of the Problems Motivating this Thesis

The following figure (Figure 1) illustrates the problems motivating this thesis research and how they are related to one another. The problems are

1. Lack of relevant ICT solutions
2. Lack of alignment between real world needs and ICT solutions
3. Deficiencies in understandings of crisis volunteerism
4. Difficulties integrating DT and IS design processes
5. Incorrect assumptions regarding non-formal crisis volunteerism
6. Narrow understandings of context

Figure 1. Problem description for the thesis.

1.3 Research Aim and Questions

Based on the previous problem description, the overall aim of this thesis is to contribute to knowledge that has the potential to enable DT for CV

and thereby remedy problems associated with the lack of relevant ICT solutions for CV practice. A holistic perspective is taken to create an understanding of CV practice that reflects how CV can be digitally transformed. Following this ambition, the first research question is:

From a holistic perspective, what does the practice of crisis volunteerism entail?

This understanding is then used to answer the second research question, which is:

How can digital transformation be achieved for crisis volunteerism?

The first question leads to an inquiry regarding the main components of CV and their attributes and relationships. This inquiry is based on Swedish empirical findings and results from previous international ISCV research. The second question uses the understanding from the first research question and applies an analytical framework for DT (developed in Chapter 4) to identify specific triggers, strategies and capabilities required to digitally transform CV.

1.4 Thesis Delimitations

The main areas of delimitations used in this thesis are related to the nature of crisis events considered, the focus on fire and rescue services (FRS) practice area and finally the theoretical perspectives that are applied in the thesis.

Firstly, The Swedish Emergency Response System (ERS) is widely diversified in terms of actors and the levels of authority involved (Mojir, 2018). While Mojir (2018) observes actors involved in all manner of everyday emergencies as well as crisis or disaster events, this thesis has its focus on large scale crisis and disaster situations that are normally managed by Fire and rescue services (FRS). Although there is relevance in observing the overlap between everyday emergencies and crisis or disaster events, regarding preparation and the involvement of actors in responses, this issue is beyond the scope of this thesis work.

To distinguish the focus of this thesis, which is large scale crisis events, from work focusing on everyday emergencies, the term crisis will

be used throughout the thesis. This means speaking of crisis response and crisis management rather than emergency response and emergency management. It is however recognised that these terms are used interchangeably in much of the research within this area and that many may take emergency response to include response to large scale crises or disasters.

Secondly, the thesis focus is on contexts where FRS have a major role in the crisis response, such as the Swedish forest fires crisis. Therefore, other emergency services (e.g. medical or police) have received little or no attention in this work, although many of the aspects observed in the FRS context can be assumed to have relevance also for other emergency services. A key factor in deciding which emergency services actors to relate to is the nature of the crisis event. If this thesis, for instance, had studied crisis response in the context of the ongoing Covid-19 pandemic, medical emergency services would have replaced fire and rescue services as the focal point.

Thirdly, this thesis uses theoretical understandings of the concepts of DT, IS design and complexity to understand and analyse the data from both empirical and literature studies. Considering the nature of the research problem and questions, a broad range of IS theories may be understood to have relevance. For example, actor-network theory (Alexander and Silvis, 2014), theory on affordances in the IS context (Bloomfield et al., 2010), theory on socio-materiality (Leonardi, 2013) or institutional theory (Thornton and Ocasio, 2008). While these theories all have relevance, and may be related to briefly in the thesis, DT, complexity theory and IS design theory are viewed as most relevant in light of the thesis aim to develop a holistic understanding of CV and its complexity.

Two further delimitations are forthcoming and motivated in the problem described above. Firstly, that the interest of this thesis lies in understanding the capabilities that digitalisation needs to provide to support and enhance CV, rather than in specific requirements on IT applications. Secondly, that the thesis will observe the reliance of both top-down and bottom-up perspectives on CV rather than one or the other. In other words, the perspective of both volunteers and crisis management stakeholders are considered. The perspective of crisis victims is however outside the scope.

1.5 Target Audience

The research study underlying this thesis was carried out within the Centre for Advanced Research in Emergency Response (CARER) and the Department for Information Systems and Digitalization (INDIG) at Linköping University. The dual aim is to contribute to IS research as well as a growing body of research from CARER, with the knowledge required to influence and develop future emergency and crisis response work and practice in Sweden.

The thesis, therefore, addresses several audiences. Firstly, practitioners who are in one way or another engaged in managing and developing CV (both professionals and volunteers), and civil defence organisations capabilities. Secondly, IS researchers with an interest in DT, IS design and/or CV. For Swedish practitioners and researchers, the fact that the thesis relates to the case of the forest fires crisis in 2018 will increase the relevance of the thesis contribution for them. The relevance for international practitioners and researchers is however also secured via the study of previous research, which for the most part relates to international experiences.

1.6 Knowledge Contributions

The thesis provides three separate contributions. Firstly, the *CV practice meta-model*, where the six main components of CV practice, including details of their attributes and relationships, are conceptualised. Secondly, *the analytical framework for DT*. This contribution outlines the components and phases involved in the DT process for complex settings such as CV practice. This analytical framework is used in the thesis to analyse the first contribution (the holistic understanding of CV practice) to produce the second thesis contribution (an understanding of what is required to digitally transform CV). The third and final contribution is knowledge of what is required to achieve DT for CV. This contribution reveals the *triggers, strategies, and digitally enabled capabilities* that must be addressed to achieve DT for CV practice.

1.7 Thesis Outline

The remaining content of this thesis is outlined here.

Chapter 2: Study Context

This chapter presents a brief introduction to the context of the thesis and related research.

Chapter 3: Research Approach

Here, the research design, as well as ontological, epistemological and methodological approaches taken in the thesis project, are presented. This chapter also discloses ethical considerations and implications of the research approach for the quality, validity and generalisability of the thesis results.

Chapter 4: Theory

In this chapter, theoretical concepts are described and used to develop an analytical framework for DT to be applied to the thesis results.

Chapter 5: Understanding Crisis Volunteerism

This chapter contributes to answering the first research question and presents a holistic understanding of CV. These results are based on the empirical study of the Swedish forest fires case and a broad literature study of international ISCV research.

Chapter 6: How to Achieve Digital Transformation for CV

This chapter contributes to answering the second research question on how to digitally transform CV, by applying the conceptual analytical framework developed in Chapter 4 to the results and analysis in Chapter 5.

Chapter 7: Discussion

Here, the results and analysis presented in chapters 5 and 6 are discussed concerning their importance and relevance in a broader context of relevance to DT for CV practice.

Chapter 8: Conclusions

Finally, the key contributions of the thesis and suggestions for future research are summarised in this chapter

Chapter 2: Study Context

The purpose of this chapter is to provide the background information readers need to be able to relate to the setting of this thesis. This involves relating to how CV fits into the overall research and practice areas of crisis management and crisis response, both internationally and in Sweden. Also, the study context, i.e., the forest fires crisis that took place in Sweden during 2018 is described on a general level. A more comprehensive description of crisis volunteerism and the forest fires crisis in Sweden is presented in chapter 5. Also, while there are some linkages to DT here, this and other information systems concepts and theories are presented and discussed further in Chapter 4.

2.1 Crisis Management and Crisis Response

Crisis management can be understood as a comprehensive practice area, including the main activities of *preparedness*, *prediction and warning*, *response*, *recovery*, *hazard analysis*, *vulnerability analysis* and finally *mitigation* and *prevention* (Liu, 2014). CV is most commonly researched in the context of crisis response practices, as this is when volunteers are engaged (Rogstadius et al., 2013; Park and Johnston, 2017; Sobiegalla et al., 2017). Relevance is however also given to the role of CV in the adjacent practices of preparedness (Palen et al., 2007; Barbour and Manly, 2016; dos Santos Rocha et al., 2016), predictions and warnings (Díaz et al., 2017; Nespeca et al., 2018; Zhang et al., 2019a) and recovery (Quarantelli, 1984; Rogstadius et al., 2013; Kaminska et al., 2015).

According to Liu (2014), the main activities involved in crisis response are *evacuation*, *sheltering/protection*, *search and rescue*, *needs assessment*, *damage assessment*, *requirements analysis*, *resource analysis*, *procurement* and *logistics* (distribution, transport, warehousing). It is in relation to these activities that the role of crisis volunteers can be understood, whereby volunteers, for example, contribute to performing tasks (Auferbauer et al., 2016) or provide input to situation awareness (Foresti et al., 2015).

2.2 Crisis Response in Sweden

Crisis and emergency response in Sweden uses the crisis or emergency event as the main departure point, factoring in the type of event and its impact to understand needs. These understandings are used to dimension resources, secure the skillset required and develop an adequate operational response to the event (Fredholm and Göransson, 2010). Cedergårdh and Winnberg (2010) identify three levels of command within emergency management. *System command* that ensures that assistance needs are met. Needs are weighed up against the risk situation and ongoing operations are balanced against the production of preparedness. *Operational command* assigns tasks to organisational sections and assures that assistance needs are met during each operation. *Task command* executes assigned tasks by taking measures necessary to meet assistance needs. The Swedish law (The Swedish Civil Protection Act, 2003:778) on crisis and emergency response requires that response times be as short as possible, and specifies the order in which command should be taken by different levels of crisis command depending on both the geographic location and the severity of events.

I understand the descriptions of emergency/crisis response provided by Fredholm and Göransson (2010) and Cedergårdh and Winnberg (2010) to a large extent to be consistent with the international literature on crisis management. Here I note two main characteristics of IS research on crisis management that are of relevance to this thesis. Firstly, that the needs of formal crisis and disaster management functions are the primary concern in this research and, secondly that the role of volunteers, or the need for interaction with volunteers, is either not related to at all or only as a peripheral matter. I also note that while, in Sweden, formal crisis and disaster management is mainly the purview of authorities, in other countries volunteer stakeholders may also be included (McLennan et al., 2015; Malinen and Mankkinen, 2018).

In the following, I will explain in further detail the actors and structures involved in the crisis response system.

2.2.1 Crisis Response System Actors

Crisis response actors can be categorised from the perspective of their degree of formal integration in the crisis response system (Auferbauer et al., 2019b) or their level within the crisis response hierarchy (Mojir,

2016). CV actors in particular can be understood to fall into one of two main categories of formal and non-formal crisis response actors (Whittaker et al., 2015).

Formal crisis response actors are authorities or volunteer organisations with formal responsibilities in the crisis response system. Besides FRS, in Sweden, there are 18 voluntary civil defence organisations (SFS, 1994:524) who are considered to have formal or established responsibilities in the crisis response system. Both FRG and SRK are formal civil defence organisations. Pre-arrangements with corporate actors may also include them in this category of formal crisis response actors.

Non-formal crisis response actors, on the other hand, have no pre-arranged formal responsibilities in the established crisis response system. These are volunteer organisations that have expanded or extended their capacity to respond to the crisis. These may be churches, sports clubs, or groups that emerge and self-organise (often using social media platforms), individual citizens volunteering without affiliation to any organisation (non-affiliated volunteers) or even volunteers with a corporate affiliation (Whittaker et al., 2015; McLennan et al., 2016b). Also, individual citizens, with no previous affiliation to any volunteer organisation, but who engage in response activities, are a category of non-formal crisis response actors (Saaroni, 2015).

Crisis response in Sweden is dependent on the contributions of volunteers. This is underlined by MSB in their efforts to support municipalities and FRS in cooperating with volunteers (Johansson et al., 2015; Hultén et al., 2016). Several crisis events within the past five to six years have made it clear that crisis volunteer management or coordination is often not the direct responsibility of public authorities. In the Västmanland forest fires of 2014 (Asp et al., 2015), the refugee crisis of 2015 (Asp, 2017) as well as during the forest fires of 2018 (Kvarnlöf, 2019), it has become clear that formal Swedish crisis response authorities tend to view the more concrete practices of organising, co-ordinating and managing volunteers as being some else's responsibility. Most commonly the established civil defence volunteer organisations mobilise to perform such tasks. Also emergent groups have been recognised to fulfil important functions. When the issue of integrating crisis volunteerism and crisis volunteerism is broached (Hultén et al., 2016) the focus is on reaching agreements with these formally established CV organisations, rather than how to interact with non-formal types of volunteerism.

2.2.2 Crisis Response System Structures

Formal crisis response actors in Sweden are distributed in a decentralised structure with a presence on municipal (local), county (regional) and national levels. Fire and rescue services (FRS) in Sweden are a part of the municipal organisation and are responsible for crisis response activities on a local level. In parts of Sweden, municipal FRS organisations have joined together in FRS Federations and act both as local and regional resources.

Based on a proximity principle, responsibility for formal crisis response will normally fall on local or regional FRS. In certain circumstances, responsibilities may be escalated to county or national (MSB) administrative levels if it is deemed to be necessary to respond efficiently (Act, 2003: 778). All public authorities in Sweden (Local, County and National) are required to be prepared for crisis events and ensure capacity and capability to respond. This is achieved via crisis preparedness plans, which can be put into action in response to a specific crisis event in accordance with Swedish law and ordinance².

Formal or established CV organisations are expected to have preparedness to respond to crisis events in a coordinated fashion, together with authorities. They may be organised on local, regional and/or national levels. The Swedish Red Cross (SRK) and Volunteer Response Groups (FRG) are two of these organisations, together with the vehicle, Lotta, flying, engineering, motorcycle or radio corps and the home guard. The SRK and FRG differ in that the SRK is entirely independent of authorities and can therefore mobilise their crisis response resources as they please. The FRG on the other hand are established, instructed and engaged on the initiative of local municipalities. MSB expects that there should be formalised agreements between authorities and these CV organisations to facilitate their participation and contribution in crisis response (Hultén et al., 2016).

These broadly decentralised structural arrangements in Sweden (with 289 municipalities, two types of regional actors (county administrative

² The Civil Protection Act (2006:544) and the ordinance (2017:860) on county administrative boards' crisis preparedness and tasks in the event of heightened preparedness, ordinance (2006:637) on municipalities' and county councils' measures before and in the event of extraordinary events in peacetime and heightened preparedness and the ordinance (2015:1052) on crisis preparedness and measures by authorities responsible for surveillance in the event of heightened preparedness.

boards and county councils) and a national actor (MSB)) has been recognised in the Swedish government report (SOU, 2019:7) on the forest fires crisis as a problematic factor that impacted the success of the crisis response system both during this forest fires crisis of 2018 and previous crises. However, the fact that the same structures are also likely to have a negative impact on digitalisation and/or CV does not appear to have received any similar attention.

2.3 The Forest Fires Crises in Sweden in 2018

This thesis project was carried out in the aftermath of the Swedish forest fires crisis of 2018. The empirical studies focused on understanding the practice of crisis volunteerism on both local and national levels in the forest fires context. The full results of these studies are presented and analysed in chapter 5 why only a brief orientation is provided here.

2.3.1 The Nature of the Forest Fires Crisis

According to MSB, extreme fire risk was observed early in May 2018 in several areas in Sweden. In many regions, severe fires were dealt with during June (MSB, 2018). However, the situation escalated, and in the final weeks of July, several of the most critical forests fires ever witnessed in Sweden started. Drought during the spring and extreme heat during the summer were the precursors to these events. The evolution of the events was further influenced by sparks from trains and lightning storms. Citizen observations of fires and smoke were relayed via SOS Alarm (112) to local Fire and Rescue Services. During the summer months in 2018 SOS Alarm received 20 per cent more calls than normal due to the fires (SOS Alarm, 2018).

Estimates indicate that the fires covered approximately 14500 hectares between the two municipalities studied in this thesis, accounting for 70-80 per cent of the total burnt areal in Sweden during the crisis (MSB, 2018; SOU, 2019:7).

The firefighting efforts that ensued are described by MSB as the biggest ever to take place within the European Union. Besides regular firefighting resources, a large number of private, volunteer and international resources were mobilised to deal with the situation (MSB, 2018).

The unprecedented extent of the forest fires can be seen as the main reason behind the need for large scale volunteer response in this crisis.

2.3.2 Crisis Volunteerism in the Forest Fires Crisis

The Swedish forest fires crisis entailed large scale engagement by both formal and non-formal volunteer participants. During the response, formally established CV organisations were recruited and engaged via actions on local, regional and national levels. Also, groups and individuals responded in non-formalised, non-affiliated and more spontaneous manners.

Asp et al. (2019) evaluation of the crisis gives us an understanding of the nature of CV and how volunteers were coordinated during the Swedish forest fires crisis. This evaluation took place in Ljusdal municipality, which was one of the most severely inflicted municipalities. Asp et al. (2019) describe how an initial chaotic situation, concerning volunteer contributions, was turned around when an established crisis volunteer organisation became involved and assumed responsibilities from both the municipality and local FRS for coordination of all forms of volunteerism. This organisation was involved in the coordination of the activities of other formal crisis volunteer organisations such as the home guard and vehicle corps. The lists of volunteers managed by the local volunteer coordination organisation (Ljusdal Red Cross) included 813 non-affiliated volunteers. These lists were structured using knowledge of the capabilities and location of the volunteers.

In parallel to these developments an emergent group, Fjärilfolkan, used social media to establish their organisation, initially for sourcing and distributing provisions. Over time the volunteers in this group came to organise transport and logistics and manage donations, scheduling, administration, goods, activities and materials, as well as run a dining hall and a Facebook group. Roughly 300-350 volunteers were documented as associated with this non-formal emergent group (Asp et al., 2019).

2.4 Crisis Volunteerism as a Practice Area

As was explained in the problem description in chapter 1, this thesis aims at a more holistic and newer form of understanding of CV. This aim guided efforts to choose the *practice area of CV*, rather than *crisis volunteers* as the object of study. Choosing crisis volunteers could entail considering digitalisation for a particular type of crisis volunteers, such as non-affiliated (spontaneous) volunteers, as indeed is common and rele-

vant in ISCV research. However, such actor-centric approaches risk overlooking more dynamic aspects of CV whereby the entire practice of CV comes into being.

The object of study in this thesis is therefore the practice area of CV. Based on an understanding of CV in the context of the forest fires crisis in Sweden, the practice lens opens up for gaining a broader understanding of CV, which is deemed necessary to enable relevant IS design and digitalisation for CV.

Observing CV as a practice means that:

- This thesis relates to all types or forms of CV actors. That is both volunteer and professional, affiliated and non-affiliated volunteers, formal/established CV organisations as well as emergent or expanding CV organisations and other actors in the crisis response system.
- CV practice, as crisis management practice, is understood to be influenced both by the nature of crisis events and the environment within which these events take place. More specifically in this thesis, the evolution of the forest fires and the local and national levels where practices of crisis volunteerism were enacted.
- CV practice is understood to be guided by objectives that have overlap with those of other crisis response actors, but that may also differ. For example, when formal CV organisations in a crisis not only address needs expressed by professional crisis management but also by the general community.
- CV is viewed not only as an attachment or extended arm of professional crisis management or the crisis response system, but rather as a practice area in its own right with processes and work practices that are specific to this practice domain, and not only conditional on the overlap that exists with professional crisis management practices. It is necessary to understand these processes and their purposes to understand how CV can be digitally transformed. In relating to CV during the forest fires crisis it is relevant to consider these practices on both local and national levels.
- CV actors are understood to perform a range of tasks, and that there is a need to understand what these tasks are to understand

the role of these actors and the digital capabilities needed to support CV.

- CV practice is understood to take place on different levels in society, and in this study, it is recognised that efforts to digitalise CV need to take into consideration needs on both local and national levels.

The practice area of CV will be fully described in chapter 5.

Chapter 3: Research Approach

This chapter describes and motivates the work that was performed to research this thesis. The two main studies that underlie the results are described. These are an empirical study of crisis volunteerism (CV) during and after the Swedish forest fires crisis in 2018, and a literature study of previous research on information systems and crisis volunteerism (ISCV). A study of literature on IS theory, digital transformation (DT) and complexity was also performed to develop the analytical framework for DT that is presented in chapter 4.

The overall design of the research was guided by critical realist and pragmatic philosophies in combination with a grounded theory methodology.

The first section in this chapter conveys the overall research design and process, describing what was done to produce this thesis. Thereafter, the philosophical assumptions guiding this design and choices of methodology are explained. The following section describes the application of grounded theory methodology and methods for sampling, data generation and data analysis. The final section discusses ethical considerations. The quality and generalisability of the study's research approach and ethical considerations are discussed at the end of this chapter.

3.1 Research Design and Process

The research process involved five overall phases to 1) Define the purpose and aims of the research, 2) Explore previous ISCV research, 3) Perform empirical studies, 4) Develop the analytical framework for DT, and 5) Analyse and generate the thesis main contributions. These phases were carried out in a nonlinear, iterative manner and reflect the philosophical assumptions and methodology applied in the thesis. The thesis projects phases are summarised in the timeline in Figure 2.

The first phase involved developing the *purpose and aims* of the research and delivered the problem description and research questions that are presented in chapter 1 (Introduction).

The second phase developed an understanding of previous research on IS and CV and was based on a literature study that was ongoing for

the duration of the thesis project. The results from this phase are presented and analysed in chapter 5.

In the third phase, the focus was on relating to the real-life practice of CV during the forest fires crisis in Sweden in 2018. The results from this phase are presented together with the results from phase 2 in chapter 5.

The fourth phase was independent of the previous phases and was fuelled by studies of literature on IS theory, DT and complexity theory. These studies resulted in the analytical framework that is presented in chapter 4.

In the fifth phase, analysis and conceptualisation (a form of theory generation) was performed to produce the conceptual meta-model for CV practice (chapter 5) and develop the understanding of how DT can be achieved for CV (chapter 6).

Figure 2. Research Process Timeline

3.2 Philosophical Assumptions

CV is a broad practice area, involving many different, dynamic, emergent and uncertain practices, processes and stakeholders. These processes are by in large social, and various stakeholders have differentiated powers to

influence the processes of DT and IS design. This means that there is great complexity involved, which directed the research design towards the relevance of observing critical and pragmatic paradigms before realist or relativist paradigms (Mingers, 2004a; Mingers, 2004b; Goldkuhl, 2008).

3.2.1 A Critical Realist Approach

The critical realist perspective acknowledges both the intransitive dimension of reality, whereby reality is viewed to exist independently of humans and the transitive (epistemological) dimension represented by the production of knowledge which is the work of humans (Mingers et al., 2013). This distinction is made possible via the definition of three domains of reality (the real, the actual and the empirical) which are related to by Mingers (2004a) and Carlsson (2010) in the IS context. In the context of this thesis, via the first domain of *the real*, we can observe that CV practice comes into being via generative mechanisms (e.g. volunteering) and is upheld by structures (e.g. CV practice). In the second domain of *the actual* (a subset of the real), it is acknowledged that CV, even though real, may or perhaps may not be generated (be actual). In an actual crisis, such as the Swedish forest fires crisis, we are afforded an actual CV event. Finally, in the third domain, *the empirical* (a subset of the actual), we are afforded the opportunity to relate to actual events when we can observe them. So, via this study, empirical CV is observed and is then within the domain of the empirical. However since CV is within the domain of the real, it is viewed as real even if it is not actual or observed.

Digitalisation and DT, as well as CV, are concepts that most readily are defined and understood as processes, practices and events. They are in constant change over time and are influenced considerably by context (Orlikowski and Baroudi, 1991). They all may present with a high level of complexity in reality and be experienced as highly entangled and messy arrangements (Merali, 2016; Law, 2004).

A holistic approach to understanding CV and DT is made possible via the regard of *practice*, which emphasises the meaningfulness of the actions, mechanisms and contextual factors relevant to bringing CV or DT into being (Goldkuhl, 2011). As such I am not only interested in understanding who the stakeholders in CV and DT are and what their agendas are. I am also interested in understanding their relationships and fac-

tors that influence their actions. I am interested in the mechanisms, experiences and events that shape and form CV practices and the possibility to digitally transform these practices. Also, here critical realism, via its conceptualisation of the real in three domains clarifies the possibility in this thesis to relate to activity, interactions etc. on multiple levels.

3.2.2 A Pragmatic Approach

Pragmatism is pronounced by Goldkuhl (2012a) as being of particular relevance for IS research in that this research domain often seeks to generate prospective and predictive knowledge. Goldkuhl (2008) describes three types of pragmatism by focusing on the relationship between knowledge and action. The overall aim and purpose of this thesis is concerned with what knowledge (of CV, DT and IS design) is required to enable action (DT and IS design) to change and improve the complex practice of CV. This aim relates to the function of *knowledge to guide action and practice* (Functional pragmatism (Goldkuhl, 2008)). On the way to gaining this knowledge, the question is asked how to understand the practices of CV, DT and IS design? Here the aim is more so referential, in that I am seeking *knowledge about action* (Referential pragmatism (Goldkuhl, 2008)). In the second research question on how to achieve DT for CV the spotlight lands on the creation of *knowledge for action* (Methodological pragmatism (Goldkuhl, 2008)).

3.3 Methodology

The nature of the research topic and the research questions in this thesis mean it is suitable to use a qualitative research approach. (Gregor, 2006; Goldkuhl, 2019). Qualitative case study research methodology (Flyvbjerg, 2006) could have been considered relevant and useful, however, the choice fell on grounded theory (GT) and multi-grounded theory (MGT) methodologies which are deemed to be more specifically suitable and relevant to the critical realist and pragmatic philosophies that also influence the research approach.

While this research relates to the case of the Swedish forest fires crisis, it does not do so exclusively, and broad literature studies complement the case to ground the findings both in empirical findings and previous research findings. Furthermore, I relate to the concept of case study in the manner proposed by VanWynsberghe and Khan (2007), which views

case study research neither as a methodology or a method, but rather as a means of delineating a research phenomenon. As such the case of the forest fires crisis in Sweden in 2018 has contributed to the delineation of the concept of CV practice that is related to in this thesis, and has provided the empirical input to the thesis. The overall research approach is however not to be understood as case study research.

It is relevant to note that both GT and MGT methodologies have similar capabilities as case study research when it comes to offering the opportunity to study a phenomenon in a real-world context, and provide rich descriptions of that phenomenon (Glaser and Strauss, 1967; Flyvbjerg, 2006; Thornberg and Charmaz, 2014; Goldkuhl and Cronholm, 2019). My understanding is that this capability is more so down to the actual methods used to generate and analyse data, than the delineation of a case.

I would also suggest that the use of GT and MGT have the potential to contribute to greater rigour than case study research does in the overall research approach. This is due to their detailed conceptualisation of the grounding processes that take us from the empirical setting to the final theory and conceptualisations delivered by the thesis. GT thus provides clearer grounds to understand the possible transference of the results.

More recent adaptations of GT (Thornberg and Charmaz, 2014; Weed, 2017) and MGT methodology (Goldkuhl and Lind, 2010) have considerable overlap, why the methodology applied in this thesis draws on descriptions of both GT and MGT.

3.3.1 Grounded and Multi-Grounded Theory

Grounded theory (GT) methodology was developed by Glaser and Strauss (1967) to provide a methodology for qualitative research. Their original GT methodology is purely inductive in its approach, describing how to go from studies of empirical settings to theory that is *grounded* in these settings. Over time variations of GT such as MGT (Goldkuhl and Cronholm, 2010), informed grounded theory (Thornberg, 2012) or constructivist grounded theory (Charmaz, 2017) have sought to combine inductive and deductive approaches, thus grounding the theory in both empirical studies and previous knowledge.

A first motivation for relating to GT, and MGT, in particular, is due to its roots in the IS research discipline, where it is deemed most suitable (Goldkuhl and Lind, 2010; Goldkuhl, 2012b; Goldkuhl et al., 2020). A

second motivation is the critical approach taken in this thesis. In particular latter time versions of GT methodology are designed to be critical and use results of deduction to inform inductive practices (Goldkuhl and Cronholm, 2010; Charmaz, 2017; Weed, 2017). Thirdly, via GT the complexity and dynamics associated with studying social phenomena, in general, are more fully acknowledged than in strict realist or relativist ontologies and epistemologies (Weed, 2017).

The use of latter times versions of GT and MGT involves, besides the original empirical grounding procedures (Glaser and Strauss, 1967) also theoretical/informed grounding procedures (Goldkuhl and Cronholm, 2010; Thornberg, 2012) and internal grounding (Goldkuhl and Lind, 2010) which is of particular importance from the perspective of creating prospective and useful knowledge, as is the purpose of this thesis.

3.3.2 Grounding Procedures

The application of GT and MGT relates to the three main procedures of empirical, theoretical and internal grounding. These are the procedures whereby the results and conceptualisations delivered by a research endeavour are arrived at. The empirical grounding procedure is central to the original grounded theory as founded by Glaser and Strauss (1967). This is the procedure whereby empirical data is both generated and analysed to develop theory (Goldkuhl et al., 2020).

The process of theoretical (informed) grounding has been developed more recently (Goldkuhl and Cronholm, 2010; Thornberg, 2012; Thornberg and Charmaz, 2014). This is the procedure whereby theories and previous research findings are understood and brought into the analysis that delivers the thesis theoretical contribution (conceptualisations in the case of this thesis). This means that the evolving theory is confronted with other existing theories (Goldkuhl and Cronholm, 2010). In this thesis, external theories were appraised via literature studies of previous IS and ISCV research.

Internal grounding is a concept minted in MGT (Goldkuhl and Cronholm, 2010). While the previous empirical and theoretical grounding concepts are common to both GT and MGT methodology, internal grounding is more specific to MGT. Internal grounding is achieved by evaluating the conceptual structure of the evolving theory and checking the theories internal consistency and congruency (Goldkuhl and Cronholm, 2010).

Figure 3. GT and MGT Methodology and methods as applied in this thesis.

(Modified from Goldkuhl and Cronholm (2010, p. 193)).

The above figure illustrates these grounding procedures as well as the various methods used within the respective procedures for this thesis. These methods are discussed further in the following section.

3.4 Methods for Data Generation and Data Analysis

The methods used in the thesis are explained here. These include methods for data generation and methods used to analyse the data.

3.4.1 Empirical Studies

Since the purpose of the research was to gain a comprehensive and holistic understanding of CV, an effort was made to include a broad group of respondents in the empirical study. This involved choosing respondents on both *local* (Table 1) and *national* (Table 2) levels, as well as from different management domains. That is both *the professional crisis management domain* and *the CV management domain*.

The choice of which respondents to initially approach was based on an analysis of information available on the forest fires crisis, the localities most severely inflicted, and the role of actors on both local and national levels. This lead to two initial contacts after which, a snowballing sampling method (Bryman, 2009) was used to further identify other respondents relevant to include in the study.

National CV Management	National Crisis Management
<p>The National Swedish Red Cross</p> <ul style="list-style-type: none">- <i>Four in-depth semi-structured interviews</i>- <i>Participatory observations on 13 occasions (10 meetings, 2 workshops, 1 exercise).</i>- <i>Access to internal systems (intranet, volunteer management systems, workspaces) and documentation (policies, strategies, project, communication, work materials)</i>	<p>The Swedish Civil Contingencies Agency (MSB)</p> <ul style="list-style-type: none">- <i>Two in-depth, semi-structured interviews with those responsible for civil defence volunteer organisations and an assignment to the National Swedish Red Cross.</i> <p>Laws and regulations relevant to CRV practice</p>

Table 1. National data sources and methods.

Local CV Management	Local Crisis Management
Municipal Volunteer Resource Group - <i>1 in-depth, semi-structured interview with the leader.</i> Municipal Red Cross Group - <i>1 in-depth, semi-structured interview with the leader.</i>	Regional Fire and Rescue Services Organisation - <i>One in-depth, semi-structured interview with the chief</i> - <i>One full-day workshop with approximately 20 participants from the FRS organisation</i> Municipal Fire and Rescue Service - <i>1 in-depth, semi-structured interview with the FRS chief</i> CARER Knowledge cluster with members from municipal FRS organisations - <i>Participatory observations at four meetings</i>

Table 2. Local data sources and methods.

Empirical data was collected via interviews, observations, documentation studies and a workshop that were performed in the aftermath of the crisis event. The respondents and data sources chosen in the empirical study are summarised in Table 1 and Table 2 above.

3.4.1.1 Interviews

Two initial interviews were carried out with central CV stakeholders from the SRK (national CV management), and a regional FRS organisation (local crisis management). Both respondents had been highly involved in the response to the forest fires crisis. The information gathered via these interviews came, in line with the snowballing method, to direct further actions to select interview candidates. This resulted in contacts with other respondents within the national SRK organisation and a local representative, one more local FRS contact, as well as contact with one more local volunteer coordinator. The snowballing method also facilitated contact with national crisis management respondents at MSB.

The interviews were semi-structured, to ensure comprehensiveness in questions asked of the respondents, but also to allow flexibility and adaption in the interview situation (Myers, 2009; Stake, 2010). As such the data gathered delivers a retrospective perspective on the real-life

events that took place during the crisis, but also on activities undertaken to improve CV afterwards.

3.4.1.2 Participatory Observations

The active role taken in the participatory observations at the SRK was inspired by action research (Baskerville, 1999), and my pragmatic desire to influence CV practice while performing the research. This research does however not fulfil all requirements to be titled action research. There was, for example, no pre-arrangement with respondents regarding a specific change agenda. Participant observations are an active form of observation where the researcher joins in on the activity performed by the respondents (Stake, 2010). To facilitate data gathering via participatory observations, negotiations were performed with the SRK to find a mutually beneficial cooperation model. The agreement reached was that I would follow SRK activities to develop their capacity to manage CV, giving them continuous feedback on my observations as they progressed, and that would hopefully help them in their development work.

To a smaller extent (four times) I participated in meetings between the research centre CARER (Center for Advanced Research in Emergency Response Systems) and representatives from regional and municipal FRS organisations in what was called the *Knowledge Cluster*. These meetings were directed mainly towards the topic of the FRS organisation and their use of civilians as first responders in everyday emergencies.

3.4.1.3 Workshop

For the purposes of this thesis, one workshop was performed with the regional FRS organisation. A workshop is an activity where a group of people “*learn, acquire new knowledge, perform creative problem-solving, or innovate in relation to a domain-specific issue*”. (Ørngreen and Levinsen, 2017: p. 71). This workshop was initiated by me but planned together with the regional FRS chief. The purpose was to gather more comprehensive data on FRS experiences as well as perspectives on the role of CV in crisis response. The purpose was also to afford the FRS organisation the opportunity to reflect on how they can develop operations to improve their capabilities to integrate with CV. The 21 participants in the workshop represented both internal and external commanders, fire fighters, administrative staff and the chief.

3.4.1.4 Other Data Sources

Other data sources from which data were gathered are primarily documents that have helped shed light on policies, strategies, practices, regulations or activities. These documents were most commonly shared digitally or, in the case of the SRK, accessed directly via their intranet and internal workspaces. In the early stages, before choosing local respondents Media reports and municipal and MSB reports from the forest fires crisis were studied, to gain an orientation regarding the nature and locations of events.

3.4.2 Literature Studies

Two literature studies generated data for this thesis. The main study regarded previous ISCV research and generated data that is used in chapter 5 to provide a more comprehensive understanding of CV practice. The second literature study focused on IS theory, IS design theory, DT and complexity, and contributed to the development of the analytical framework for DT that is presented in chapter 4. An overview of these studies and their scope is provided in Table 3.

Literature Studies	Scope
ISCV Literature Study	<p>Included papers mainly from the information systems research domain, with bearing on the topic of crisis volunteerism and related concepts such as emergencies and disasters, the crisis response system etc.</p> <p>The study related to approximately 180 relevant research papers.</p>
Theory Literature Study	<p>Included papers on IS theory, IS design theory, digitalisation, digital transformation and complexity theory.</p> <p>The study related to approximately 90 relevant research papers.</p>

Table 3. Literature studies overview.

According to Levy and Ellis (2006), a literature study can provide a firm foundation for advancing knowledge, and be used to uncover areas where research is needed as well as facilitate theory development. The

literature studies performed in this thesis have taken a semi-systematic approach, as suggested by Snyder (2019) to be suitable when the goal is to study a broader topic and map theoretical approaches or themes or identify knowledge gaps. The semi-systematic review approach is deemed particularly relevant when a topic has been studied by researchers from diverse disciplines and where (as in the case of ISCV research) it is not feasible to review every single paper on the topic. Also, via the semi-systematic approach, it is possible to take note of how research has progressed or developed over time and to gain an overview and understanding of complex areas (Snyder, 2019).

3.4.3 Data Analysis and Conceptualisation

The ultimate goal of the data analysis in this thesis is to facilitate the conceptualisation of CV practice and an understanding of how to achieve DT for CV.

In GT, coding is a gradual and iterative process influenced by both the empirical and theoretical grounding processes, whereby the researcher moves from data to theory or conceptualisations. Coding is about *“naming segments of data with a label that simultaneously categorizes, summarizes, and accounts for each piece of data”* (Charmaz, 2006: p. 43). As is recommended in grounded theory methodology (Thornberg and Charmaz, 2014) data was gathered and analysed in parallel throughout the thesis work. This involved continual comparison (Urquhart et al., 2010; Thornberg, 2012; Weed, 2017) of results and the identification of patterns in the data. These helped develop new insights, perspectives and angles to be applied in the further gathering of data and coding.

Lengthy notes were taken during the interviews and participant observations. These notes are close to verbatim, and they are a recording of my direct interpretations of what was said, cutting to the core of the meaning that I interpreted was being communicated by the respondents. During the interviews, in particular, I tested these interpretations directly on the respondents to minimise misinterpretation of their answers. The recordings that were made of the majority of the interviews (it was not deemed appropriate to record at many participatory observations, and the recording device failed on a few occasions) were used to complement these notes in the analysis phase when an aspect of the notes was unclear.

These notes were re-read and complemented to form more complete transcriptions within a day or two from the data collection time. These are also the transcripts that were used to perform the initial coding of results.

The initial coding started as the first empirical data and literature study results became available and matured over time to a set of codes that identified different aspects deemed relevant to understanding CV to enable DT and ISD. Both empirical and literature study results were coded and contributed to the initial codes presented in Table 4.

When the initial coding process was not delivering new insights or questions, a process of focused coding (Thornberg and Charmaz, 2014) commenced whereby the initial codes were formed into more cohesive categories. At this stage, the results from the empirical study and literature study started to become more integrated into the specification of the categories. Focused codes “*capture and synthesize the main themes*” (Thornberg and Charmaz, 2014: p. 159). This coding and analysis were about seeing patterns and identifying conceptual themes of relevance to the data gathered. Once these focused themes had been identified both the empirical data and literature study data were revisited for recognition. An overview of initial and focused codes is provided in Table 4.

Parallel to, and following the focused coding, memo writing (Corbin and Strauss, 1990; Thornberg and Charmaz, 2014) was used to develop and test the concepts emerging. Overlapping the memo writing, theoretical coding was performed. This is used to analyse “*how categories and codes constructed from data might relate to each other as hypotheses to be integrated into a (grounded) theory*” (Thornberg and Charmaz, 2014: p. 159). Via this theoretical coding, the main components of the CV practice meta-model and their attributes were conceptualised. By modelling the data, the focus was placed on the internal grounding of the conceptualisation of CV and greater emphasis was placed on clarifying the conceptual categories and their relationships via the CV practice meta-model (Goldkuhl and Cronholm, 2010).

Initial Codes	Focused Codes
Nature of the crisis event Lack of capacity in professional emergency response systems Lack of clarity concerning roles and responsibilities for CV Co-ordination of volunteer efforts during an ongoing crisis Organising or controlling emergence and spontaneity during a crisis response The nature of CV	Needs or conditions that influence CV
Establishing CV organisation and co-ordination during a crisis response Registering volunteer requests and offers Matching needs for CV with volunteer offers Using volunteer resources in the field	The practice of CV
Situation awareness, sense-making, usability Speed, efficiency, decision making Access to accurate information Privacy, data protection, ethical and legal issues Information management, crisis communication Technology – Access to, usability, ICT, limitations, integration Societal change – volunteer behaviour Dealing with complexity Understanding roles and responsibilities	Aims of or needs in IS for CV
Via use of digital platforms, workspaces, databases (social media, crowd tasking, crowd sourcing etc.) By strengthening and enabling community empowerment and engagement in crisis response By engaging crisis volunteers in delivering information that will contribute to awareness of needs and conditions for the situation at hand	Main ways in which IS enables CV

Table 4. Initial and focused codes derived via grounding processes.

3.5 Methodological Considerations

In this section, the quality of the thesis is discussed using four main perspectives on 1) the quality of the thesis as a whole, 2) the quality of the

thesis results, 3) the validity of the thesis and finally 4) the transferability of the findings.

3.5.1 Quality of the thesis as a whole

Three actions have been taken to ensure the overall quality of this thesis. The first is the disclosure of my own previous experiences and how these have influenced the thesis. The second relates to the measures taken to ensure the internal consistency of the thesis and the third to measures taken to ensure an ethical approach in the thesis.

This thesis adheres to the approach and belief that a researcher, via their previous experiences and knowledge, will bring a specific set of *pre-conceptions* into the research endeavour from the beginning and that this is unavoidable (Charmaz and Belgrave, 2007). The thesis follows the line adhered to in several qualitative traditions such as hermeneutics (Myers, 2004) and ethnography (Howe and Eisenhart, 1990) and acknowledges both the existence of pre-conceptions and describes how they have influenced the research process.

This stance is furthermore related to the critical realist ontology adhered to in this thesis, whereby reality is viewed to be both pre-existing and generated (Mingers, 2004b). In other words, it is noted and accepted that this thesis is not only observing the pre-existing reality of CV but is simultaneously contributing to the mechanisms whereby CV is understood and related to. In particular, my will to *make a difference* has corresponded with the critical realist and pragmatic approaches taken in this thesis which has led to a questioning and critical approach throughout the entire project and not least to the overall structure of the thesis and analysis that are delivered.

Here I am not disposed to relate to my pre-disposition, in terms of previous knowledge and personality, as a positive or negative concerning the quality of this thesis. It is more so understood that revealing underlying assumptions clarifies the conditions under which the thesis results are valid and allows you the reader to reach your own conclusions concerning the credibility and the trustworthiness of the thesis contribution.

The *internal consistency* of the thesis is guaranteed via a tight relationship between the research problem and questions and the methodology and methods employed to arrive at the results, suitable methods of inference, and the quality of the ethical approach.

In chapter 3, I have argued for the suitability of GT methodology to relate to complexity and emergence as are relevant in the context of CV practice and DT (Merali, 2016). Also that qualitative GT methodology has the potential to deliver the holistic understandings that this thesis research questions specifically seek, not least relating to generative mechanisms and relationships in CV practice (Cecez-Kecmanovic, 2001).

Good research is, among other things, logical and the logical processes of both deduction and induction are of great value to making research meaningful (Kothari, 2004). In chapter 3, it was made clear that both inference practices of induction and deduction are used in an abductive fashion to relate to the research problem and questions in a suitable manner. This combination of logical approaches contributes to a more holistic description, and understanding of CV than either an inductive or deductive method of inference would have produced on their own.

The *ethical approach* applied in the thesis is described in full in section 3.6, where it is concluded that sufficient measures have been taken to protect the dignity, privacy and autonomy of the respondents in this study.

3.5.2 Quality of the results

In qualitative research, quality of results is to a large extent related to the richness in meanings that are provided, and that is lacking in other ways of doing research (Mishler, 1991). Another quality marker is how the results are structured and presented (Cronbach and Suppes, 1969). Finally, a significant mark of quality is the nature of the theoretical contribution made to collective theory (Thornberg and Charmaz, 2014).

Richness of meaning is achieved via *thick* descriptions (Geertz, 1973) that can capture both essentials and nuances and open up for deeper understandings of the phenomena under study. In this thesis, the data generation methods applied, such as in-depth interviews, a workshop and participatory observations, are particularly suitable for capturing rich meanings and understandings. The results section of this thesis has also been designed to relay thick descriptions. To these ends, when suitable citations have been provided, and descriptions of happenings and circumstances are conveyed.

Having *structure* is about making the main line of thought visible and possible to follow (Cronbach and Suppes, 1969). In structuring a thesis, there is a tension between richness of meanings and structure. Too

much richness of meaning may make the structure unclear while structuring to reduce complexity may be at the cost of the richness of meaning and lead to reductionism. This requires that the author be economical, in a manner that will provide the structure that enables the delivery of complex understandings while maintaining richness (Larsson, 1986).

Structure and the mainline of thought in this thesis is visualised and maintained via the conceptual meta-model of CV and the analytical model for DT. Quality in this thesis, in respect to rich descriptions and structure, is thus achieved via a focus on the fundamentals of the components and attributes associated with the practice areas of CV and DT. In particular, the meta-modelling approach adapted to present the thesis results contributes to the balance required between rich or detailed descriptions and structure. The model can be used to zoom in and out to observe both overall and detailed understandings as required. Introductory and summarising texts are also used throughout to position specific parts in relation to the overall structure of the thesis.

The nature of how the *theoretical contribution* of this thesis was arrived at is related to the grounded theory methodology applied in the thesis. Within grounded theory, the founders, Glaser and Strauss (1967), relate to how theory is generated directly from empirical data without regarding previous theory. Latter time proponents of grounded theory on the other hand open up for combining this approach with building on earlier theories and developing them (Goldkuhl and Cronholm, 2010; Thornberg and Charmaz, 2014). The use of the GT methodology strengthens the quality of this thesis concerning the thesis main theoretical contribution (the conceptualisation of CV practice), in that the theory-building is traceable between data, categories and theory (Goldkuhl and Cronholm, 2010).

3.5.3 Validity

On an overall level, validity is reflected in the persuasive power of the thesis results (Jackson, 1993), its empirical anchorage and the pragmatic usefulness of the results (for example related to the nature of the studies knowledge interests) (Howe and Eisenhart, 1990). Finally, it is also relevant to consider the theoretical anchorage of the theory or conceptualisations generated in the thesis (Goldkuhl and Cronholm, 2010).

The first criterion for the validity of the thesis results relates to *the persuasive power of the thesis*. Via this criterion, it is, for example, asked

to what extent the study can communicate a new conceptualisation of something (Jackson, 1993) and the presentation of the study displays rhetorical strength (Atkinson, 2014). The question in this respect is thus to what extent this thesis is convincing? Once again, you, the reader, are in the best position to answer this. Does this thesis make you view DT for CV in a new way? I believe that the arguments provided in the thesis discussion in chapter 7 point to several unique contributions of the thesis to understanding CV and how it can be digitally transformed.

A second criterion relates to the *empirical anchorage* of the results. Here the relationship between reality and interpretation comes into focus, and the credibility and validity of the results will be dependent on how this relationship is envisioned. Empirical anchorage can be equivocated with the concept of empirical grounding that was explained earlier. The results of this thesis are well-grounded via the analysis methods (internal, focused and theoretical coding) applied to the empirical data from the study of the forest fires crises case.

The final validity criterion discussed here is *the pragmatic criterion*. Here the focus is on the external value of the thesis, understood as the value the research may have to practice and how successful the researcher is in communicating the results to practitioners (Howe and Eisenhart, 1990). Habermas (1972) distinguishes between the uses of different kinds of studies depending on the nature of the studies knowledge interest. Three types are identified as technical, practical-hermeneutical respective emancipatory knowledge interests. The validity of a studies result must therefore be understood in relation to the knowledge interest and use aspired to.

This thesis asserts validity via the practical-hermeneutical and emancipatory knowledge interests. In the practical-hermeneutical vein, this thesis aims to present knowledge (interpretations, views and perspectives) on DT for CV that can be used as a platform for practitioners and researchers to share understandings and engage in dialogue required to achieve DT for CV practice. Both the conceptual models for CV and the analytical framework for DT can be viewed to have this potential, both for practitioners and researchers.

Concerning emancipatory knowledge interests, this thesis can also be assumed valid in that the thesis results relate to oppressive myths regarding both crisis volunteers and the nature of crisis volunteer practices. Contrary to authorities' beliefs and will, demonstrating that affiliated and

non-affiliated volunteers both have qualities and functions that must be considered to fully enable high quality volunteer contributions in large scale crises and disasters.

3.5.4 Transferability

The relevance of the thesis results is also connected to the similarities that exist between the researched context and other contexts (Corbin and Strauss, 1990). This is also related to as transferability by Lincoln and Guba (1985). The underlying line of thought here is that knowledge, concepts or principles gleaned in a study can be used to predict consequences or similarities in other contexts (Gioia et al., 2013). Other researchers or practitioners will be best positioned to judge the transferability of this thesis results in that they are in the best position to judge similarities between the thesis context and other contexts. To enable this, the researcher must therefore communicate the context of the studies interpretations to the reader (Larsson, 2009).

The possibility to relate to other complex contexts stretching over multiple stakeholders and domains, in similarity with CV, is possible based on the fact that the context surrounding CV is well explained via the holistic approach in the thesis and the thickness of these descriptions. The potential for transferability is also observed in terms of events. This study has focused on the case of the forest fires crisis, but, realistically, the CV practice meta-model developed in the thesis could be applied to the Covid-19 pandemic or other crisis events to, for example, gain understandings and perspectives that would facilitate DT initiatives also relevant to this context.

The possibility to transfer results in qualitative research is furthermore achieved by ensuring that the variation in the study exists in situations one wants to transfer to (Trigwell, 2006; Larsson, 2009). In this thesis, the possibility to transfer results was increased by maximising variation and ensuring that respondents representing a broad variety of perspectives (e.g. local, national, formal, non-formal) in the CV practice area, rather than, for example, a large number of respondents from one domain. The early literature studies were useful in this respect, as they allowed me to understand the relevance of including different respondents and contexts to maximise the variation.

3.6 Ethical Considerations

The ethical considerations taken in this thesis relate primarily to the respect of respondents' autonomy and dignity (Oliver, 2010). By protecting respondents privacy and relating to their dignity, autonomy is safeguarded (Roessler and Mokrosinska, 2013). Research ethical codes preserving dignity by showing respect for the respondents (Drenth, 2012; Mikkelsen et al., 2016). A further ethical criterion, that contributes to preserving dignity and autonomy, is honesty (Drenth, 2012; Mikkelsen et al., 2016). An expression of honesty is being open and honest about the purpose and foreseeable impact of the data collection process.

Measures were taken to safeguard respondent's privacy and dignity in this thesis empirical study. Initial contact was primarily made via e-mail allowing me to inform respondents. This also gave respondents time to evaluate and consider their participation. Honesty was important in the contact with all respondents, but in particular with *gatekeepers* for FRS and SRK. In these situations, I was careful, to be honest, and informative about the research and my participation. Objectives for my participation were agreed on jointly, and in one case also documented.

To respect respondents' dignity, all respondents have been anonymised in the thesis publication to as high a degree as possible. This involves relating to the role, rather than the name of respondents and also not disclosing their specific organisational or geographical belonging.

Informed consent is the research practice whereby respondents consent to participate is accompanied by information on what this participation means (Oliver, 2010). Informed consent is a practical construct whereby respect is given to the individual's rights to privacy, dignity and autonomy. The term *fully informed* opens up for interpretation, but the underlying meaning would appear to be that the respondents have received and understood enough about the research project, how the data they provide will be managed and their rights in participating, to make a decision to participate or not (Oliver, 2010). The principle of informed consent also implies that the researcher should inform of predictable difficulties or harm (Oliver, 2010).

Making respondents aware of their right to choose and change their participation throughout the research is therefore perhaps the strongest safeguard for the respondent's autonomy. Steps were taken throughout the research process to safeguard the respondent's autonomy. For example, by providing detailed information on the study before engagement

and by adapting my participatory role in meetings and during observations to ensure that participants were fully aware of who I was and what my purposes and role were. In these contexts, I was particularly receptive and responsive to any indications of unease from the participants about my presence, and measures were taken when required to remedy this.

Maria Murphy

Chapter 4: Theory

The purpose of this chapter is to present and motivate the analytical framework for digital transformation (DT) used in this thesis. I start by relating to limitations in more traditional information systems (IS) theory, from the perspective of the practice area of crisis volunteerism (CV). Thereafter, I relate to the fact that CV is a complex practice area and discuss how complexity influences how the practice area is researched in this thesis. Finally, in the third section on DT, I attempt to overcome the shortcomings identified in the first section on IS theory and meet the requirements observed in the second section on complexity. Here, it is demonstrated how the concept of digital transformation can be used to relate to a complex practice area such as CV to identify relevant avenues for digitalisation and IS design.

4.1 Information Systems Theory

The development of information systems theory is influenced by broader trends in society, the academic world and of course more specifically the IS research discipline. In the following, I will observe the nature of the relationship between real-world developments and IS theory as well as how an interest in bounding the IS discipline has spilt over into bounding IS theory. In doing this I seek to explore and understand the relevance of previous IS theory in the context of CV, which as a context deviates from the contexts traditionally researched in the IS discipline.

4.1.1 IS Theory and Real-world Developments

What is considered relevant to research within the IS discipline, and the production of IS theory, is related to technological advancements in the real world that are taking place regardless of the IS domains interests (Dahlbom, 1996). Dahlbom (1996) takes note of the fact that, through time, there has always been a discrepancy or lag between the focus of IS researchers and policymakers when it comes to what is going on in the real world. *“When personal computing and human-computer interaction was all the rage in the mid-1980s, we stuck to our methods for developing mainframe-based information systems”* Dahlbom (1996: p. 33).

Wide-scale digitalisation in society is blurring the lines between concepts such as the individual, the organisation and society, not least through the greater depth and level of entanglements that these developments are creating between the social and the material (Cecez-Kecmanovic et al., 2014). In the past decades, researchers have also related to the impact of digitalisation and DT, not only in organisations but in society as a whole and at all levels in society (Isaksson and Wennberg, 2016; Klievink et al., 2016; Sørensen, 2016; Lindgren and van Veenstra, 2018; Mergel et al., 2018).

I wonder if there is a similar discrepancy between what is going on in the real world today, and the IS theories that are related to the IS discipline today? My studies of ISCV literature would suggest so, where it is observed that focus is more readily applied to contexts and settings where there is a clear organisational attachment and IT-artefact. More holistic studies of aspects related to broader digitalisation and DT processes are not common. The historical developments observed by Dahlbom (1996) can help us consider how history is perhaps repeating itself. Now that the influence of information systems has gradually spread further and further beyond the organisational context, how can IS research keep up?

4.1.2 Bounds of IS Theory

In this section, I discuss factors that have set boundaries in place for the focus of IS theory. These boundaries represent a narrow focus on IS and more specifically the IT-artefact in the context of organisations as well as the reductionist approach whereby phenomena are researched in narrow contexts, resulting in oversight of real-world needs that are more complex.

The boundaries for IS theory that have been established are fuelled by the need to set the IS discipline apart from other academic disciplines, as a means to upholding its relevance, status and ultimately its right to existence (Davis, 1991; Iivari and Lyytinen, 1999; Avgerou, 2000; Orlikowski and Iacono, 2001; Alter, 2003b; Benbasat and Zmud, 2003; Klein and Hirschheim, 2008; Goldkuhl, 2016). Avgerou (2000) however, points to risks associated with a disciplinary focus that is too narrow and suggests that the IS discipline has a specific interest in broadening its focus and relating to complexity and change.

Indeed, in the case of a complex practice area such as CV, a narrow focus, based on disciplinary and other needs within the IS discipline, will risk producing research that lacks relevance and does not contribute to the significant improvements that are needed. This is because they do not address the real levels of complexity involved in CV.

There is a significant risk for reductionism when research has a close focus on the IT artefact and its immediate context. Orlikowski and Iacono (2001: p. 121) define the IT artefact as “*those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software*”. While there is a recognition here that the IT-artefact is part of a larger cultural and material context, by honing in on the IT-artefact, there is a risk that broader contextual factors are deemed irrelevant (Davis, 1991; Ehn, 1995; Alter, 2003b).

Although I applaud authors who defend the need to also consider broader contextual understandings in IS research, many of these researchers are still bounded by the concept of *the organisation*. Even Alter (2003b), despite his will to sidestep the IT-artefact, stays within the delineated organisational context. Goldkuhl (1996) relates to *informatics* basic categories as regulations, people, information, activity, technology, design and change. While this is interesting from the perspective of relating to broader contextual factors and their relevance, the context is given by the author is still very clearly stated as the business organisation. Iivari and Lyytinen (1999) discuss ten different approaches in Scandinavian IS development. While all of the approaches are well differentiated in terms of strengths, weaknesses and practical use, their relevance is only considered based on their use in an organisational context.

Since the year 2001, there have been pleas by IS researchers to once again broaden the concept of context in IS research. These pleas suggest the use of the term IS artefact rather than IT artefact (Lee et al., 2015), use concepts such as systems in organisations rather than IT artefact (Alter, 2003b), consider digitalisation and DT to a greater degree than information systems (Sørensen, 2016) or propose creating unity rather than separation between behavioural science research and design science (Goldkuhl, 2016).

In recent times, authors such as Sørensen (2016) invite us to consider aspects of connectedness, distribution and scaling associated with digitalisation in societal contexts. Also, Avgerou (2000) points to the need to relate to the societal impact of information systems, which opens up for

an interest in broader contextual factors associated with the transformation of areas such as CV practice that are complex and not organisationally bounded or necessarily even based.

In the above orientation, a movement or trend attempting to broaden the scope of IS research, beyond the immediate context of the IT artefact, is observed. In the context of this thesis and CV practice, this invites us to seek ways to broaden our perspective on what we need to know in IS research to facilitate the design of *relevant* IT artefacts that will address real-world needs in CV. In this thesis, the relevance of relating to and understanding the IT-artefact and its immediate context is therefore acknowledged. I am however suggesting that to do this and produce results that are relevant to real-world needs, it is also necessary to relate to broader contextual factors and to understand how understandings of both broader and more immediate (to the IT-artefact) contexts can be connected.

4.1.3 IS Design Theory

In alignment with the pragmatic approach taken in this thesis, it is deemed relevant to consider what is required to enable the *relevant* design of IT-artefacts. To do this I turned to IS literature on design and found the body of literature that goes under the titles of IS design theory or IS design science. As expected, this literature focuses mainly on the design of IT-artefacts and immediately related processes or context. Venable (2013), Walls et al. (1992), Baskerville and Pries-Heje (2014) and Gregor (2002) are all IS design researchers who present theories (or concepts and guiding principles) on what is considered to constitute or is needed to perform IS design research. They therefore deliver IS design theory that can be leveraged to design an IS design research project rather than a practical IS design project. Much of what is called IS design theory appears therefore to be theory of design theory rather than theory of IS design. This is criticised by Iivari (2019) who means that the desire to establish the discipline of design science research in IS has gone before the production of research contributing to theory that can inform the practice of IS design in real-life settings.

In the IS design science domain, the IT-artefact is most commonly the departing point, and clear delineations are continuously made towards what is termed behavioural science research where broader contextual in-

terests are observed. Such research uses an IT artefact centric design science approach (Hevner, 2004; Iivari, 2017). However, many IS researchers question the division between research focusing on understanding the immediate context of the IT artefact respective broader contexts and emphasise the problems associated with this division (Suchman, 2002; Puri et al., 2009; Goldkuhl, 2016; Herwix and Rosenkranz, 2018). Goldkuhl (2016) suggests seeking ways to unify rather than separate design science research and behavioural science research in IS.

Drechsler and Hevner (2016) take a pragmatic step in this direction, to relate to broader real-world needs driving the design of IT artefacts. They do this by broadening their previous (IT-centric) three-cycle design model (Hevner, 2007) with a *change and impact* cycle (Figure 4). The original three cycles are the relevance cycle, the design cycle and the rigour cycle. In the relevance cycle, the immediate application context is connected to the design science research endeavour. The design cycle uses input from the relevance cycle, connects the building of artefacts to their evaluation and provides the basis for the rigour cycle that contributes to the knowledge base for design science research.

The purpose of the fourth cycle, added by Drechsler and Hevner (2016), is to take second-order impacts of the design artefacts in a wider organisational and societal context into consideration, and not only those within the encompassing socio-technical system and more immediate application context. This includes paying attention to the triggers for the design science research project. The illustration in Figure 4 below is a modified version of Drechsler and Hevner (2016) four-cycle model. Their model has been simplified and complemented with a clarification of what can be understood as context respective scope in the model.

According to Drechsler and Hevner (2016), the expansion with the fourth change and impact cycle has several purposes. The first purpose is to relate to the problem of IS design projects in complex or *wicked* environments and open up for gaining the broader understanding required for relevant IS design. The second purpose is to relate to needs expressed via the agile metaphor in IS design and development, whereby a greater emphasis is placed on meeting challenges posed by complex and changing contexts, which also require broader contextual understanding. The third motivation is related to the need to evaluate IT artefacts and understand their utility and fit to actual requirements in real-world settings. A final driver for this perspective is the need to find ways to go beyond simplistic

and reductionist notions regarding the introduction of an artefact into a context and give more consideration to how this can trigger organisational or social change, and how utility should be evaluated.

Figure 4. Context and scope in IS design related to a simplified version of Drechsler and Hevner (2016, p. 5) model with four design cycles.

The topics of IS design theory, digitalisation and DT which lie at the heart of this thesis are rarely explicitly explored in the literature on IS and CV. A search among 1000 papers revealed only 100 papers with the word *design* in their title, abstract or keywords. Almost half of these papers relate to the design of a specific IS or ICT solution and do not make any explicit IS design theory contribution. The other half of the papers (approx. 50) relate to broader contextual factors of relevance for IS design. Only one paper, (Sobiegalla et al., 2016) lays claim to the term design science research. The topic of DT was not explored anywhere.

The convincing arguments that Drechsler and Hevner (2016) make above for broadening the focus of IS design research can thus be understood to correspond with the need in ISCV research. That is to broaden scope and awareness and to take in a greater span of complex real-world needs. That is aspects, not only in the immediate application context but also in the broader surrounding real-world context that must be understood to design *relevant* IT-artefacts for CV (Rogstadius et al., 2013; Grubmüller-Régent et al., 2014). These may be artefacts and applications

that meet the needs of a multitude of different stakeholders in CV practice, rather than only a few or a particular domain, as is common today. The analytical framework for DT (developed in this thesis and coming up in Figure 5) is therefore focused more specifically on the fourth change and impact cycle from this model, to facilitate paying attention to how understandings of a broader system context (external environment) impact and change the focus and direction taken in the immediate application context (internal environment).

4.2 Complexity Theory

In this section, complexity science and theory are discussed to understand their relevance for this thesis. CV is a domain that may be readily identified as wicked and complex according to Drechsler and Hevner (2016) account above. This thesis will demonstrate the complexity involved in CV, in terms of the challenges posed by crisis events, the broad range of environmental/contextual factors that will influence the practice, the special characteristics and interests of many CV stakeholders, the tasks performed in CV, the processes required to perform CV and the role of ICT in CV practice.

Complexity theory provides a platform from which real-world practices of CV can be understood. This section will explain the relevance of understanding central aspects of CV such as self-organisation and mechanisms of emergence and dynamics from the perspective of complexity theory. Also, why these aspects are central to understanding how CV contributes to society's capability to adapt to actual rather than preconceived events or courses of events and restore order in crises events.

Chapter 5 demonstrates the complexity involved in CV, by substantiating a meta-model for CV practice. The meta-modelling approach is particularly relevant to understanding complexity and is inspired by Bénaben et al. (2016). They observed shortcomings in conceptualisation and understanding of crisis management (also a complex practice area within the crisis response system) in IS research and presented a meta-model for knowledge management in crisis management. This approach was inspired by business modelling and demonstrates the usefulness of a meta-modelling approach in creating a holistic understanding of a phenomenon that enables one to relate to various aspects of complexity on different levels and from different perspectives within a practice area.

In the remainder of this section, four aspects of complexity (Chaos and order, nonlinear relationships, dynamics and emergence, and equilibrium and adaption) are explained and their relevance from the perspective of CV practice is discussed.

4.2.1 From Chaos to Order

Complexity science relates to the concepts of chaos, complexity, emergence and dynamics. According to Merali (2016), complexity is a term used to refer to contexts that are difficult to understand in detail. Contexts where phenomena are related in nonlinear manners and where emergence, innovation, learning and adaption are strategies used to deal with this complexity.

Consideration of complexity brings us close to the notion of chaos. However, while chaos theory is concerned with uncertainty and unpredictability, complexity science deals with order and what causes order (e.g. self-organisation and adaption) (Merali, 2016).

Crisis and disaster events are typically chaotic and complex. The levels of chaos and complexity are factors that contribute to the categorisation of the severity of an event, rendering it to be either an everyday emergency (dealt with within regular structures and resources) or to be a crisis or disaster (with needs beyond the capacity housed in regular structures and resources) (Fredholm and Göransson, 2010). Crisis response and CV are therefore both practices that must relate to this complexity and adapt strategies to restore order. This aspect is relevant further on in this thesis when mechanisms of self-organisation and adaption in CV are discussed.

4.2.2 From Linear to Nonlinear Perspectives

A systems perspective is crucial to the science of complexity where social and natural aspects of the world are understood in terms of *nonlinear* rather than linear systems. Being nonlinear implies that causal effects are nonlinear. So small changes in causal elements may cause changes in the system or its characteristics in ways that may invoke more than one outcome, and the outcome may therefore be difficult to predict (Byrne, 1998). Benbya and McKelvey (2006) also relate to the fact that complexity in IS design contexts can be multi-dimensional, demanding that attention be paid to multiple factors. A further consequence of the nonlinear

line of reasoning is a non-deterministic understanding of cause-effect relationships (Byrne, 1998). This can readily be understood in the crisis response and CV context where there are often multiple causes that interact in a non-additive manner, which means that the combined effect of these causes is not necessarily the sum of the separate effects, and patterns of effects and outcomes can be difficult to determine.

Understanding these complex arrangements of causes and effects is important in decision-making processes in the crisis response system. The fact that CV has the potential to contribute to the understandings of causes and effects required in crisis management is also acknowledged in ISCV research that is taking an interest in how CV can contribute to crisis managements situation awareness (Havlik et al., 2016; Benali and Ghomari, 2017b; Nespeca et al., 2018).

Benbya and McKelvey (2006) point specifically to complexity as inherent in IS design projects and regard the need to work with holistic understandings of contexts to ensure that the designed artefacts have sufficient regard for the complexity involved in any given context. The point is to avoid reductionism. This implies a need also in ISCV research to also observe CV practice as a whole, rather than singular aspects of CV.

4.2.3 Dynamics and Emergence

Merali (2016) uses the concept of networks to emphasise the dynamics of interaction between components in a complex system or context. The nonlinear interactions between components and attributes are regarded by Merali (2016) to be emergent and bottom-up and to bring network dynamics and evolving information content into focus.

Being able to separate being from coming into being and identifying relationships is according to Merali (2016) not sufficient when it comes to understanding complex systems. This is particularly relevant when it comes to understanding emergence that is central to complex systems. *“The emergent macroscopic “whole” displays a set of properties that is distinct from those displayed by any subset of its individual constituents (the microscopic) and their interactions”* (Merali, 2016: p. 422). To understand emergence in CV we, therefore, need understandings at different levels of analysis (macro and micro) simultaneously. These include understandings of local and national networks and dynamics in CV and understandings of CV components and their attributes and relationships.

Furthermore, we need to adopt a dynamic view of boundaries, observing how they are renegotiated via mechanisms of relativism and relationships and facilitate linkages between the system and environmental factors. The emergence and operation of CV coordination is an example of a context where boundaries and relationships between stakeholders are readily negotiated and adapted in crisis response (Zettl et al., 2017; Benali and Ghomari, 2017b). This is acknowledged in the CV practice meta-model presented in chapter 5, where the main components of CV are expanded with their attributes while the relationships between attributes and components are observed.

4.2.4 Equilibrium and Adaption

Via the concept of near to equilibrium systems (i.e. systems that are not static or isolated from their environment, but that return towards their general or grand state through negative feedback or damping of change when perturbed) and the concept of bifurcation points (points of division in systems of causal effects) Byrne (1998) explains that that complexity science is preoccupied with order rather than chaos. Complexity science takes interest in how order can be achieved by introducing small changes and that small changes or perturbations can achieve both stability and transformation of a system to a better state.

The capacity of complex systems to adapt and achieve equilibrium is dictated by their ability to self-organise according to Merali (2016), who goes on to define self-organisation as a generative process with the ability to generate new internal structures and forms of behaviour.

Self-organisation can be understood to be a major factor in CV whereby organisations and citizens adapt to crisis events and situations and strive to restore order. Self-organisation is also recognised to be a method used by citizens who, independently or together with crisis management or authorities, use social media or crowd sourcing platforms to work together in a crisis (Marsden, 2013; Kaufhold and Reuter, 2016; Simsa et al., 2019). In the context of CV, both this type of self-organisation and other forms of organisation can be understood as open systems, where energy and resources continually flowing through them. These forms of organisation are not designed but rather evolve from interaction between the system's components. This is not due to the properties of the components, but rather to the complex interactions taking place between components (Merali, 2016).

This may also be an explanation as to why ISCV research has difficulties meeting real-world needs and why there are little or no implementations of IS solutions for CV. This is because the complexity associated with crisis events and environments means that CV will continuously be re-organised in new constellations of open systems, even if there are prepared structures as a base. These systems are adapted to actual, rather than preconceived events or environmental influences. This suggests that CV self-organisation will be expressed differently depending on the nature of the crisis event and the crisis environment. Both of these aspects are also components of the CV practice meta-model presented in chapter 5.

4.3 Digital Transformation

In this section, the concept of digital transformation (DT) will be explained and explored to understand the key components of this process and their relevance for digitally transforming CV.

The terms digitalisation and DT are used largely interchangeably in the literature. Researchers relate to the concepts of digitalisation and DT as an ecosystem (Parviainen et al., 2017; Parida et al., 2019) which emphasises the need to observe multiple components and their relationships in any given context. Morakanyane et al. (2017) relates to DT as an evolutionary process that leverages digital capabilities and technologies to enable business models, operational processes and customer experiences to create value. As was discussed above, the DT literature is also prone to having a more singular organisational focus. There are however exceptions. Sørensen (2016) discusses the *wholesale digitalisation* and DT of society and observes that traditional IS research is challenged by these real-world developments. Randall and Berlina (2019) reflect on the transformational power of digitalisation and its impact on how people live, work, communicate, consume and do business and on broader concepts of society rather than a single business (Hess et al., 2016) which is most common. Others consider digitalisation and its potential to transform the relationship between citizens and government (Lindgren and van Veenstra, 2018; Mergel et al., 2019). Finally, today, advances in sensor technology, artificial intelligence and machine learning mean that we also need to consider intelligence as a power associated with DT (Greengard, 2015).

Although it is common to refer to DT as a process, it is less common to relate to the actual steps or phases involved in the DT process. Vial (2019) is an exception and has presented a process model of DT. Unfortunately, this model relates also to a business organisation, rather than a broader context such as CV. Vial (2019) describes the DT process as starting with a disruption (e.g. changes in consumer's expectations/behaviour) that trigger strategic responses that in turn rely on the use of digital technologies (which also fuel disruptions). These technologies enable changes in value creation paths which are also influenced by structural changes and organisational barriers. Changes in these value creation paths can furthermore lead to negative or positive impacts. Although this is adapted from literature on DT in organisational contexts, it can be assumed that these stages are relevant in other societal contexts.

This description is however lacking from the perspective of CV where we are more interested in citizen's expectations and behaviours than consumers and may often be dealing with a considerably more complicated and dynamic context in terms of scale, structure, organisation, events, risks etc. CV takes place to a large degree in another domain, i.e. the private sphere, involving inter-citizen relationships. In these contexts, citizens can also flex their digital muscles independent of government or business (Ramsell, 2021). IS research on DT has, however, to date, not embraced contexts similar to the CV context to the same extent as more traditional organisational contexts.

DT, while often considered in organisational contexts, is also used to understand broader processes of digitalisation, transgressing several organisations, practice areas, stakeholders and domains. I define DT as a process with the power and potential to restructure and transform practices, organisations, institutions or even society. Digital transformation is, therefore, more suitable than IT-artefact centric approaches to relate to the complex practice area of CV which demands the input of stakeholders in multiple domains, at multiple levels in society and in multiple places. CV places demands on the capabilities of connectedness, distribution, scaling and intelligence that digitalisation can provide.

The choice of a DT perspective in this thesis is motivated by the fact that, regardless of the dominance of the organisational focus, DT is still more orientated towards incorporating broader understandings of context.

In the following, I explain the main components of the DT process (Triggers, strategy and digitally enabled capabilities) and relate them to needs associated with complex contexts such as CV practice.

4.3.1 Triggers for Digital Transformation

Triggers for DT make digitalisation relevant as a means to achieve changes in any given setting (Zahra et al., 2006; Carcary et al., 2016). DT triggers can also be understood in terms of that they point to more overall aims, needs and purposes for DT. Vial (2019) considers what factors may trigger DT and calls these triggers disruptions. Changes in consumer or citizen behaviour, resource use and expectations, availability of technology and environmental factors can all be understood in terms of disruptive forces that influence needs and actions for DT (Zahra et al., 2006; Mergel et al., 2018; Klievink et al., 2016; Lindgren and van Veenstra, 2018).

In the context of CV practice, triggers for digital transformation can be related to the relevance of citizen's expectations that sufficient efficiency and capacity be achieved in crisis response (Saaroni, 2015; Albahari and Schultz, 2017; Mergel et al., 2018). Triggers for DT in CV may also emanate from other levels in society, such as local, national or international administrative functions or business's (Hagen et al., 2018), and their needs to meet the scale of demand on public services and increase responsiveness and openness (also in crisis contexts) (Klievink et al., 2016; Lindgren and van Veenstra, 2018).

4.3.2 Digital Transformation Strategy

Digital transformation (DT) strategy supports the transformations that come about when digital technologies are exploited to achieve certain values (Matt et al., 2015). According to Drnevich and Croson (2013), much of the extant research on the IT/strategy relationship relates to IT only on a functional level and neglects the strategic level. Sandberg (2014) suggests that the issues of IT strategy and business strategy become confused by the fact that the impact of IT on operational performance may be measured at different levels. Those responsible for a DT strategy need to be capable of appraising the significance of IT to achieving strategic goals, how value will be created in the future, who is in

charge of the DT endeavour, what type of structural changes will be required and how the DT endeavour will be financed (Hess et al., 2016).

This leads me to understand that DT Strategy for CV will be dependent both on environmental factors such as the institutional and structural arrangement in the crisis response system, and understandings of the values to be sought after in a digital transformation of CV. This perspective raises questions such as which institutions need to do what and why? How can consensus be achieved on goals for DT for CV when so many stakeholders are involved? What capabilities are required in which institutions to develop and implement a DT strategy for CV? Who can successfully develop and lead a DT strategy for CV?

Finally, DT strategy must relate to the complexity involved in CV. In particular to mechanisms such as self-organisation and emergence that are required for CV to function, but that may seem contra-intuitive when strategies are being designed.

4.3.3 Digitally Enabled Capabilities

Reference to the use of technology as a central element of digitalisation and DT processes are common in the DT literature (Vial, 2019). There are however nuances concerning the role technology plays. In the literature study on digitalisation and DT, it is observed that the role of digital technology is most commonly viewed as an enabler in various contexts and the focus is then on the capabilities afforded by uses of technology. *“A key area of focus in the digital transformation discourse is on developing the organizational digital capabilities to support the digitization journey, as opposed to focusing on specific organizational processes, systems etc.”* (Carcary et al., 2016: p. 2).

Related to strategy for DT, a set of foundational capabilities required for DT are suggested by Carcary et al. (2016). These are to promote and embed an agile digital culture, develop effective digital leadership skills, build digital talent and define and implement a transformative digital business strategy. According to Zahra et al. (2006), top management has a key role when it comes to enabling these and other digital capabilities.

The capability for businesses to harness technology and enable success is viewed to be contingent on their ability to deploy dynamic capabilities (Teece, 2007) whereof digital (IT or IS) capabilities relate to the dynamic capabilities enabled by uses of digital technology (Carcary et

al., 2016). These digital capabilities relate to leadership and governance or creating alignment between needs or values, and IT.

Implementation of digital capabilities support transformations, impact processes, resources and internal as well as external stakeholders and emphasise the role of collaboration and interactions in creating digital capabilities (Henriette et al., 2015). The specific digital capabilities identified by Henriette et al. (2015) in their review of previous research are digitalisation/dematerialization, internet technologies, analytics, mobility, social network, knowledge and skills.

This thesis study of literature on digitalisation and DT analysed digital capabilities, which resulted in the categorisation in Table 5. It should be observed that certain areas of digital capabilities identified in the table may overlap. The first two categories relating to value creation and structural change are also recognised in Vial (2019) model, but the remainder is not visualised. One reason for this may be that Vial (2019) appears to primarily consider the process of DT in the context of the single organisation and business context, whereas the summary here relates to the use of digital technologies to enable value creation in other societal, multi-organisational or multi-agential contexts such as CV represents.

Although this is a general overview of capabilities associated with digitalisation we can see that all of these categories can be understood to have relevance also in the CV context. The development of digitally enabled capabilities has thereby the potential to address several problems and needs for CV. Digitally enabled capabilities could be used to create value by enabling more flexible uses of CV resources (Saaroni, 2015). Also, the development of digital capabilities could ensure better alignment between different stakeholder's interests in CV and crisis response, by addressing institutional and structural problems (Helsloot, 2008; Dostál, 2015). Digital capabilities for collaboration, coordination, cooperation and co-production for CV are most needed (Pilemalm et al., 2016). In the CV context, the development of these digital capabilities also must relate to changes in citizen's digital behaviour and expectations, which has been significant over the past decades and which is also ongoing (Ramsell, 2021). CV practice can also be readily understood as a broad and complex ecosystem where digital capabilities can be key to managing the complexity that arises and facilitate the adaptive mechanisms that are needed in CV and crisis response (Díaz et al., 2017). Fi-

nally, digital capabilities can also be understood to enable citizen participation in a manner required to ensure community and societal resilience (Linnell, 2014).

Capabilities of digitalisation	Authors
Changes in value creation, delivery or capture	Parida et al. (2019), Hess et al. (2016), Senyo et al. (2019), Isaksson and Wennberg (2016)
Changes to structural and institutional arrangements affecting business models, products, services, processes, organisations etc.	Hüther (2016), Henriette et al. (2016), Klievink et al. (2016)
Collaboration, Cooperation, Coordination or Co-production	Bowersox et al. (2005), Nielsen (2011), Misra et al. (2018).
Societal change of, for example, the labour market, environment or peoples way of life	Cherry (2015), White (2012), Broadbent and Cara (2018)
The functioning of broader ecosystems involving relationships between, for example, multiple businesses, public authorities, organisations or citizens.	Parida et al. (2019), Parviainen et al. (2017), Sklyar et al. (2019)
E-government and public service	Rose et al. (2015), Mergel et al. (2019), Kokkinakos et al. (2016)
Community/Citizen engagement or participation	Schäfer (2016), Lakomaa (2018), Greve (2015)

Table 5. Capabilities provided by the use of digital technology.

4.4 An Analytical Framework for Digital Transformation

In this section, the concepts (IS theory, IS design theory, complexity theory and DT) discussed in the previous sections of this chapter are brought together to create an analytical framework, suitable to the purposes of understanding how DT can be achieved in a complex practice area such as CV (Figure 5). This proposed conceptualisation relates to the need to

go beyond traditional boundaries in IS research, to integrate IT artefact centric IS design practices with behavioural science approaches, to relate to complexity, and not least to what a DT process involves.

Going beyond traditional boundaries in IS research relates to the need to achieve a holistic understanding of the broader context of a practice area, whereby a comprehensive range of contextual factors are thoroughly explored. In particular, the observation of a multitude of stakeholders with different organisational bases or even no organisational base departs from the mainstream in IS research, where it is more common to consider needs using a singular organisational context (business, government or NGO) as a departing point. The four-cycle perspective on design science provided by Drechsler and Hevner (2016), and related to above in section 4.1.3, demonstrates a way forward in this respect by relating to broader contextual factors in the external environment. This understanding overlaps with the DT approach and is well aligned with the triggers and strategy components of the analytical framework in Figure 5. Understandings of complexity in any given context are central to this understanding of the external environment.

Once these broader holistic understandings of context are achieved, there is a challenge to translate them so they may be used in an IS design process to build, develop and evaluate IT artefacts. Key to this translation process is the formulation of digitally enabled capabilities that are required to achieve the transformation.

Relating to complexity is of relevance both in respect of the research topic, CV practice in this case, but also for the DT process which is also viewed as complex. In the CV context, this implies generating understanding that can reveal how CV practice contributes to creating order from chaos, how relationships between components and attributes of the overall CV practice are structured, of dynamics and emergence in the practice area, of how adaption occurs in the system and equilibrium is achieved, and how boundaries need to be related to as fluid and dynamic rather than static aspects of the practice area.

Relating to broader holistic understandings and complexity in the CV practice area also involves observing barriers or structures that the DT must take into consideration or change to allow for DT. Furthermore, this points at the relevance of considering DT itself in terms of a process with generative mechanisms.

Taking all of the above into account a final conceptualisation of DT must therefore add the activities involved in performing DT. These are identifying triggers for DT, formulating DT strategy, and developing both digital and non-digital capabilities required to realise the transformation. The final assemblage of relevant components and the relationships between them is illustrated in Figure 5.

Figure 5. An Analytical Framework for digital transformation in complex contexts.

This framework ties into the philosophical assumptions associated with critical realism and pragmatism that were presented in chapter 3 and resounds with the ontological conception of reality as constituted via generative and complex mechanisms. It also resounds with the pragmatic epistemological focus on the relationship between knowledge and action

which is viewed as multi-dimensional and utilitarian. For example, knowledge of DT triggers, strategies and choices are used to enable the development of digitally enabled capabilities.

The understanding of CV that is sought after in this thesis is a holistic understanding, suitable to the purpose of revealing complexities and relating to triggers, strategies and digitally enabled capabilities that are needed for CV. Such an understanding answers the first research question in this thesis and is presented in chapter 5 via a conceptual meta-model for CV practice.

Concerning the second research question, which inquires as to how CV practice can be digitally transformed, the analytical framework in Figure 5 is used in chapter 6 to analyse the results from chapter 5 and provide insight more specifically on the triggers, strategies and digitally enabled capabilities required to achieve the digital transformation of crisis volunteerism.

Maria Murphy

Chapter 5: Understanding Crisis Volunteerism

In this chapter, the findings from the empirical and ISCV literature studies are presented and analysed in answer to the first research question in this thesis, which seeks to compile a holistic understanding of the complex practice of crisis volunteerism (CV).³ The second research question, on how to achieve Digital Transformation (DT) for CV, is addressed in the next chapter.

Here, the main components of CV are identified and described, together with their attributes and relationships. This understanding of the practice of CV has been structured around six main components. These components are:

1. CV Stakeholders
2. CV Processes
3. CV Tasks
4. CV Environment
5. ICT (Information and Communication Technology)
6. Crisis Events.

These components and their relationships are conceptualised on a high level in the CV practice meta-model in Figure 6 on the next page. Thereafter, the components are explored one at a time in the following sections (CV processes take three sections). Finally, the CV practice meta-model is expanded with the attributes of each component at the end of this chapter, in Figure 18.

The modelling approach makes it possible to account for all of the main categories of data that were generated in both the empirical and literature studies.

The previous chapters have motivated the holistic approach in this chapter, and this has revealed a great deal of detail. However, to facilitate reasonable length in the thesis and ease readability, priorities have been made as follows:

³ This use of both empirical and literature study results is in line with the grounded theory methodology whereby inductive and deductive approaches are combined to assemble the results. The literature study results that are presented in this chapter are therefore first and foremost results, and not an analysis of the empirical results as otherwise is common in the results section of a thesis.

- CV processes, stakeholders and tasks, the three components that are most central to an understanding of CV, are presented in greater detail than the other components.
- Certain attributes of the CV environment component are more central to our understanding of CV and are therefore also presented in greater detail than other attributes.
- Results regarding the crisis event and ICT components are, although important, more peripheral than the other components to the understanding of CV practice itself and are therefore presented in a more summary manner.

Figure 6. A Conceptual Meta-Model for Crisis Volunteerism Practice.

The structure (or order), whereby literature results' respective empirical results are delivered in the sections below, will vary depending on the component being discussed. This is to facilitate a coherent structure, relevant to the presentation of results for the respective components.

Take note that CV processes are covered in three sections. These are 5.2 which relays commonalities between local and national processes as observed in the empirical study and summarises the literature findings on CV processes. Thereafter sections 5.3 and 5.4 use the results from the

empirical study to describe local respective national CV processes. Each of the main sections on CV stakeholders (5.1), CV processes (5.2 - 5.4), CV tasks (5.5) and CV environment (5.6)) are finalised with a text box describing relationships between components. This is not done for the ICT (5.7) and crisis event (5.8) components, as their relationships with other components have already been covered in the previous sections.

Dependent on your needs as a reader, you may use the table of contents to zoom in on specific components in the CV practice meta-model.

5.1 Crisis Volunteerism Stakeholders

It is difficult to relate to the concept of CV without first having a sense of which stakeholders or actors are involved in CV practice. CV practice stakeholders are therefore the first to be presented. Both the empirical study and the literature study reveal that there are many different potential types of CV stakeholders and

that there is a broad number of attributes that can be used to describe them. An overview of the types of CV stakeholders and their attributes is provided in 0. In the remainder of this section, these descriptors or attributes are explained in greater detail.

5.1.1 Types and levels of CV Stakeholders

Three broad types of CV stakeholders have been observed in both the empirical and literature studies. These are first and foremost volunteer stakeholders (civil sector) and thereafter stakeholders who are authorities (public sector) or who are corporate (private sector) (McLennan et al., 2016b; Mojir, 2016; Auferbauer et al., 2019b).

The level of CV stakeholders refers to their belonging on a local (e.g. municipal), regional (e.g. county) or national level (they could also potentially be on a global level). Both the volunteer stakeholders and authority stakeholders observed in the empirical study are noted to have affiliation on local, regional and national levels. The highly decentralised

nature of the Swedish government differs, however, from many international contexts and the degree of responsibility held at the local government level, in Sweden may not be on par with that of other countries.

Figure 7. CV stakeholder attributes observed in the study.

In the Swedish context, it is not always clear who is a volunteer. An example from the empirical study is used to illustrate this. Both FRS chiefs relate to the invaluable contribution of local farmers and entrepreneurs who provided much-needed capacity in response to the forest fires crisis. However, they have difficulties saying if these resources are voluntary or not. Underlying this confusion is the Swedish Act (2003: 778) on Protection Against Accidents, which incorporates a form of conscription (Tjänsteplikt) at the discretion of the FRS. This law gives the FRS powers to conscript volunteers, and it is stipulated that the first choice should be made among those who voluntarily offer their assistance. Such conscripted volunteers are entitled to compensation for their participation and liability issues are more straightforward. The status of being a conscripted volunteer provides insurance coverage, that is not necessarily provided for non-conscripted volunteers.

This aspect of conscription and compensation according to Swedish law goes against the common understanding that volunteering is free and un-compensated (Wilson, 2000), and gives rise to the question of if conscripted volunteers are truly volunteers? In practice, in the study of the

forest fires crisis, it appears that both conscripted and non-conscripted volunteers can both be subject to volunteer coordination by established CV organisations or the FRS.

The remainder of this section relates to the volunteer stakeholder category which is most central for CV practice. The concepts of organisational affiliation and degree of integration in authority's crisis management structures are used to do so.

5.1.2 Volunteer Affiliation

The studies in this thesis have revealed that there is great interest in if volunteers are affiliated with an organisation or not. The literature discusses categories of organised/spontaneous, organised/unorganised, affiliated/non-affiliated or formal/non-formal volunteerism (Wolensky, 1979; McLennan et al., 2015; Whittaker et al., 2015; McLennan et al., 2016a; Auferbauer and Tellioglu, 2019a). Affiliation to public, civil or corporate domains is also considered (McLennan et al., 2016a; Auferbauer et al., 2019b).

The types of volunteer organisation that the volunteer is affiliated with is also categorised as follows (Whittaker et al., 2015):

1. Established organisations, who perform their regular tasks through existing structures during the response. For example, the SRK (The Swedish Red Cross) in this study.
2. Expanding organisations, who perform their regular tasks through new structures in crisis response (e.g. churches)
3. Extending organisations, who perform new tasks in the crisis response through existing structures. For example, clubs or community organisations.
4. Emergent organisations, who perform new tasks through establishing new, not previously established, structures. For example, groups using social media platforms.

The relationships between the categories of non-affiliated and affiliated volunteers and these categories of volunteer organisations, in the Swedish context, are described in Figure 8. There, individual citizens and emergent groups are understood to be non-affiliated volunteers, while affiliated volunteers belong to expanding, expanding or extending volunteer organisations. However, in real life, these categories tend to lose their relevance. In the forest fires crisis, were non-affiliated volunteers still

non-affiliated when they joined an emergent group or allowed themselves to be organised by an established CV organisation?

During the Swedish forest fires crisis, at the local level, established volunteer organisations were used to coordinate all types of volunteer organisations, non-affiliated volunteers, and corporate contributions. At the national level, at the Swedish Red Cross (SRK), the primary form of volunteerism is SRK affiliated volunteerism. However, during the forest fires crisis in 2018 and previous crisis events, the SRK and local RK organisations also organised and coordinated non-affiliated volunteers (The SRK Crisis Manager). Both interviews and observations reveal that the SRK experience challenges in relating to both affiliated and non-affiliated volunteerism simultaneously. This is because the SRK coordinates affiliated volunteers, not only during crisis events but also in everyday operations. These difficulties were observed at an internal workshop⁴ at the SRK, where many participants had difficulties relating to and mixing the varied concepts of non-affiliated and affiliated volunteerism respective everyday and crisis volunteerism.

Figure 8. CV stakeholders during the Swedish forest fires Crisis.

* These actors have not been directly studied in this thesis.

⁴ This workshop was planned and conducted by the SRK in February 2019. I attended preparatory meetings for the workshop and the workshop itself as part of my participatory observations at the SRK.

The SRK Organisation Developer made it clear, in an interview, that both non-affiliated volunteerism and CV tend to take a back seat in relation to everyday affiliated SRK volunteerism.

“I think we always need to build on everyday experiences and use these in a crisis. We need, for example, to use the same communication tools. We shouldn’t need a new tool just for crisis situations” (The SRK Organisation Developer).

This perhaps closes doors for digital transformation more specific to CV as a whole. The issue of difficulties in operations, when it comes to relating to non-affiliated volunteerism, were also observed in an internal survey⁵ carried out by the SRK. One conclusion on the part of the SRK, after the survey, was that they need to clarify the use of the term *Spontaneous Volunteer*, which the leader of the study means should be reserved for crisis volunteer coordination and not used in the daily running of local RK operations. However, the survey revealed that local organisations were managing lists of non-affiliated volunteers in the aftermath of the forest fires crisis, reasoning that they would be good to have in case of renewed crisis events. As such, local RK organisations still needed to relate to the concept of spontaneous or non-affiliated volunteers in their everyday operations.

This SRK survey also indicated a gap between the national SRK organisation's view of non-affiliated volunteer coordination as an activity undertaken only within the scope of the MSB (The Swedish Civil Contingencies Agency) agreement on a national level, and local organisations understanding that they also need preparedness, tools, capacity and capabilities to coordinate non-affiliated volunteers locally in crisis events, regardless of what has been agreed with MSB.

5.1.3 CV Integration in Crisis Management

In this section, I will relate to understandings of the integration of volunteer stakeholders in professional crisis management structures.

Both local VC (Volunteer Coordination) respondents, who lead established CV organisations during the forest fires crisis, attested to the importance of being invited to participate in crisis management meetings with FRS (Fire and Rescue Services) as well as municipalities and county

⁵ As part of my participatory observations, I partook in a meeting where the results of the survey, carried out by the SRK in 2019, were presented.

administrations during the forest fires crisis. In both cases, there was tight integration of the organisations whereby local VC representatives participated in crisis management meetings and had channels for contact and information in between meetings. Thereby, their respective activities could be coordinated. Also, on the national level, the SRK organisation for volunteer coordination was tightly coordinated with MSB (The Swedish Civil Contingencies Agency), to facilitate the mediation of non-affiliated volunteers, mainly to local authority stakeholders.

Auferbauer and Tellioğlu (2019a) note that the degree of socialisation (interpreted here as knowledge of one another's goals and integration of activities) of different types of volunteer stakeholders (based on affiliation) in crisis and disaster management (CDM) can vary. They identify four different degrees of socialisation:

1. Non-affiliated volunteers are viewed as having no socialisation in CDM.
2. Pre-registered volunteers, affiliated supporters and affiliated decision-makers have membership status in a formal CDM organisation and are afforded decision making possibilities.
3. Emergent groups are self-organised with no socialisation in CDM, and supporting organisations.
4. Formal CDM organisations are viewed as established CDM volunteer organisations performing crisis management activities and therefore socialised/integrated.

Many papers relate to the nature of the relationship between authority stakeholders (mostly crisis and disaster management authorities) and volunteer stakeholders. For example, observing authority's primary desire to engage established organisations with trained and skilled volunteers, or the fears associated with the integration of non-affiliated volunteers in response work (Schneider, 1992; Barsky et al., 2007; Johansson, 2009; Harris et al., 2017). Twigg and Mosel (2017) furthermore relate to the lack of integration of non-formal volunteer actors in formal crisis planning. The empirical study reveals that different stakeholders have different preferences when it comes to engaging or collaborating with volunteers. Established CV organisations in Sweden are considered by MSB respondents to be the preferred partner in crisis response work. This is the case also for the FRS respondents. Local volunteer coordinators on the other hand express no form of preference.

Relationships: CV Stakeholders and other components

Different types of CV stakeholders have varying potential to perform tasks in CV and that this will also influence the roles they are given in CV processes. Views on which CV stakeholders are suitable for which CV tasks are more so understood to differ depending on the stakeholder's position (local/national, CV/crisis management) and capabilities. The volume of CV stakeholders, and the complexity that arises when they need to collaborate, speaks clearly to a need to utilise the capabilities that ICT that can provide for collaboration, information management, communication etc. within CV processes.

5.2 Crisis Volunteerism Processes

In this and the following two sections, the CV processes component is understood, first from a general perspective (this section), and thereafter from local (section 5.3) respective national level (section 5.4) perspectives. Although the focus here is on volunteer coordination processes, other CV coordination processes can also be discerned in the study's findings.

For example, processes whereby citizens self-organise in emergent groups, or whereby citizens task themselves and one another.

The processes common to both local and national CV, and their relationships, are summarised in Figure 9. In the remainder of this section, the literature study findings on CV processes are presented. Thereafter, aspects and objectives that influence CV processes are understood.

Relationships between the CV process component and other CV components are summarised at the end of this section in a text box.

Figure 9. Local and national crisis volunteerism processes from the forest fires crisis event and that are described in this study.

5.2.1 ISCV Literature and CV Processes

On an overall level, the literature study has revealed that CV processes are seldom explicitly related to or explored in their own right. In ISCV research the processes of crisis management, involving the stages of preparedness, response and recovery are most commonly used to relate to crisis volunteerism (CV). For example, by modelling the potential activities of volunteers based on these phases (Liu, 2014). This is observed most readily in the crowd sourcing and crowd tasking literature where the use of digital platforms with broad and adaptable capabilities are in focus (ENSURE (Jendreck et al., 2016), RE-ACTA (Auferbauer and Tellioğlu, 2017), DRIVER (Havlik et al., 2016) and KUBAS (Zettl et al., 2017; Rauchecker and Schryen, 2018) or Ushahidi (Marsden, 2013)). Processes of registering and matching volunteer requests and offers are also explored (Troy et al., 2008; Sobiegalla et al., 2017).

The ISO Standard (ISO 22319), “*Security and resilience — Community resilience — Guidelines for planning the involvement of spontaneous volunteers*”, outlines the process steps involved in planning for the involvement of spontaneous volunteers (SVs) in crisis response, also from a crisis management perspective. These are:

- defining the relationship with SVs
- understanding the concerns of stakeholders

- identifying risks associated with tasks that are suitable for SVs
- reducing risks associated with tasks that are suitable for SVs
- coordinating SVs
- setting expectations of SVs
- monitoring the tasks performed by SVs
- identifying needs for training and instruction
- recognizing and rewarding SVs.

Orloff (2011) is unique in relating to the processes required in the planning and management of spontaneous volunteer's task performance, from the perspective of CV stakeholders. The processes related to are:

- the establishment of a volunteer reception centre (VRK) with the tasks and roles required in a VRK
- methods and workflows for spot screening, assessment and selection of volunteers
- proactive management protocols to reduce unwanted volunteer behaviour
- attending to the needs of volunteers in task performance which involves managing with self-care in mind and self-care training for volunteers.

Task description and distribution methods are researched by some (Kerle and Hoffman, 2013; Auferbauer et al., 2016; Fuchs-Kittowski et al., 2017). Methods of planning, directing, optimising and monitoring volunteer task performance are also explored (Mazumdar et al., 2015; Ramchurn et al., 2016; Ludwig et al., 2017; Pielorz et al., 2018). Furthermore, Barsky et al. (2007) consider the evaluation of volunteer's performance.

5.2.2 Influences on CV Processes

CV processes do not evolve and are not performed in a vacuum. As processes generally, they are designed to capitalise on strengths and opportunities, mitigate weaknesses or challenges and achieve specific objectives. The impact of crisis events and crisis environments on CV processes that are indicated in Figure 6 (the overall CV practice meta-model) is understood by relating to concepts of strengths/opportunities, weaknesses/challenges and objectives. I will therefore briefly summarise the study's findings in these areas in the following.

The local and national VC respondents relayed a large number of aspects that can be understood as challenges respective opportunities for

CV coordination during the forest fires crisis. The main challenges relate to collaboration while the engagement from the general public, and the strong will to participate in CV were viewed as the main strengths. These strengths respective challenges are summarised in Appendix A.

The objectives for CV during the forest fires crisis, as relayed by respondents, were to:

- enable volunteer participation in the overall crisis response
- enable efficiency in the crisis response
- fill perceived shortcomings and gaps in the crisis response
- mitigate risks during the ongoing crisis
- increase societal and community resilience
- improve capabilities to recover after a crisis.

In the literature, the following aspects are more generally understood as contributors or influences to objectives that will guide the development and implementation of CV processes:

- Lack of capacity and capabilities in professional crisis response system (Quarantelli, 1988; Stenberg et al., 2014; Ramsell et al., 2016).
- Lack of clarity concerning roles and responsibilities for CV in crisis response. (Van de Walle and Turoff, 2008; Jakes and Langer, 2012; Schimak et al., 2015).
- The nature of CV coordination established in response to the crisis (Grubmüller-Régent et al., 2014; Munkvold et al., 2015; Auferbauer and Tellioğlu, 2019a).
- Methods used to organise and control emergence and spontaneity among volunteers (Orloff, 2011; Falasca and Zobel, 2012; Asp, 2017).
- The nature of volunteerism in the affected context (Aguirre et al., 2017; Carlton and Mills, 2017; Lindner, 2017).
- The data protection and crisis laws (Havlik et al., 2013; Grubmüller-Régent et al., 2014; Sobiegalla et al., 2017).
- Accessibility and usability of ICT (infrastructure, technology, digital platforms, workspaces, databases etc.) (Bram and Vestergren, 2012; Qadir et al., 2016; Auferbauer and Tellioğlu, 2017).

Relationships: CV Processes and other CV components

The most striking aspect of complexity in CV practice is how *CV processes* can be influenced in an infinite number of ways by various attributes of the *CV environment*. The broad range of environmental attributes presented in section 5.6 contributes to revealing the nature of this complexity. This also leads us to recognise the relevance of dynamic properties of CV processes that allow adaption and re-organisation to suit actual, rather than pre-conceived, conditions of the crisis.

The results of the literature study indicate that *ICT* has great potential to support and enable *CV processes* by facilitating collaboration, information management and communication. However, the results of this study show that this potential was not realised during the forest fires crisis.

Relationship between *CV Processes* and *CV stakeholders* was described in the previous section while the relationship between *CV processes* and *CV tasks* is described in section 5.5 (*CV Tasks*).

5.3 Local CV Coordination Processes

In this section, the empirical findings on local processes for coordination of CV during the forest fires crisis are presented.

The interviews in the empirical study with the local VC leaders and FRS chiefs, for two of the municipalities most severely affected by the forest fires crisis, are used in this section to create an understanding of the activities and flows required for local coordination of volunteers during the crisis.

Figure 10. Local CV coordination processes during the forest fires crisis and that were described in this study.

Figure 10 illustrates the three main local CV processes and their sub-processes as follows:

1. Establish local CV coordination.
2. Coordinate CV requests and offers.
3. Coordinate on-site volunteer work.

The remainder of this section expands and describes these processes and their respective sub-processes in greater detail.

5.3.1 Establish Local CV Coordination

Before the forest fires crisis, there was no pre-arranged or established CV coordination function in the two studied municipalities. The fact that numerous organisations were on-site, with various capabilities and capacities to help, lead to the need to establish such a coordination function to channel and utilise these resources.

The respondents reveal that the establishment of coordination by the local CV organisations during the crisis answered the need to let all of these organisations know what to do, when, where and why, and to minimise overlap or waste in the processes. The VC leaders reflect this in the following citations:

“FRG is like an umbrella under which several organisations can help out, so the municipality can have a single contact point to gain access to capabilities, instead of several.” (The FRG VC Leader).

“All other organisations were controlled by the Red Cross here too. Not only temporary volunteers” (The RK VC Leader)

Four main activities have been identified in the actions taken to establish local CV coordination as follows:

1. Initiate local CV coordination.
2. Define scope and objectives.
3. Establish collaboration structures.
4. Resource operations.

5.3.1.1 Initiate Local CV Coordination

As a first step, the VC leaders took the initiative to start coordinating non-affiliated volunteers, who were offering their services on a scale that FRS were unable to deal with. Both VC leaders confirm how they acted to fill the gaps in FRS CV coordination.

“When we started (at the beginning of the fires) FRS didn’t know who we were. They turned to the municipality who in turn asked us if we could assist with logistics”. (The FRG VC Leader)

The FRG leader relates to how they took initiative to take over local CV coordination in municipality 1.

“There, they didn’t know who we were or what we could do. We had to sit and wait a long time with nothing to do... We had time to observe the chaos with volunteers who were stopping the FRS from doing their job... Someone at the federation level of FRS heard tell that we were waiting and got in touch to ask who and what FRG is. I told him what we are trained for and what we can help out with and he said we could coordinate the volunteers... So we took over that task.” (The FRG VC Leader)

Both VC leaders relate how their employment in the respective municipalities provided network benefits, which enabled them to initiate and establish local CV coordination.

5.3.1.2 Define Scope and Objectives for CV Coordination

As the established CV coordination in both municipalities functioned as an intersection between the needs and offerings of multiple stakeholders, the relationships established between these stakeholders contributed to defining the scope of the CV coordination. In municipality 2, in the early stages of the crisis, the RK VC leader says *“many different actors were pulling at crisis management, and many were doing their own thing too much”* (The RK VC Leader). In this situation, the RK VC leader identified that no one was managing volunteerism. Here, we can note that the scope and objectives of the CV coordination organisation started being articulated as efforts to relieve pressure on formal crisis management.

In the first municipality, the FRG VC leader relates how the objectives and scope for their CV coordination were negotiated together with municipal and FRS representatives. The initial objective was to coordinate the contributions of both affiliated and non-affiliated volunteers with FRS and municipalities needs. However, this scope quickly expanded to embrace coordination between all CV stakeholders.

There was a proactive approach on the part of CV coordination, to identify and integrate emergent and non-affiliated volunteer initiatives. The FRG VC relates, regarding their Facebook use, that when they made requests for help, they were greatly shared and followed by various help groups.

“There was also a lot going on in these groups that we needed to keep an eye on... There were initiatives gathering people to come up (to Municipality 1). We wanted to know in advance... There were volunteers that just showed up out in the woods”. (The FRG VC Leader)

Another aspect of the scope of CV coordination is the tasks they perform. Both VC leaders relate how the tasks continued to grow over time. In the first municipality, the tasks grew, from the initial registration of non-affiliated volunteers to matching large volumes of requests and offers for volunteers and volunteered resources, to large scale logistics involving transportation and delivery of food, water and other goods, to providing accommodation etc. CV tasks are discussed at greater length in section 5.5.

As the crisis evolved new needs and resources ebbed in and out from local CV coordination. The scope and objectives of the coordination were thereby not static, but rather in a state of continuous re-negotiation as events evolved and different stakeholders and needs came and went. In

particular with the entrance of new stakeholders giving rise to adjustments, as is illustrated in the following situation when county administration assumed responsibility for crisis management in municipality 2.

“It was difficult in the beginning, in part the county was eager to put their own touch on things. They tried to tear down structures we had that were working. After some time we began, for example, to get signals that people out in the woods weren’t getting food.” (The RK VC Leader)

5.3.1.3 Establish Collaboration Structures

Local VC organisations established different types of collaboration with different stakeholders depending on the needs that were to be met. Here the RK VC leader describes the nature of their collaboration with other CV organisations.

“It became a sort of “us”... For example, when it came to manning the night rounds. It was natural to pair someone from the vehicle corps with a Red Cross volunteer with first aid knowledge and a volunteer from the Lotta corps⁶ with knowledge of how to provide companionship and support in a crisis. It was needs that determined who did what. We also had home guard volunteers... it was easy to put teams together to meet needs”. (The RK VC Leader).

The RK organisation in municipality 2 had contact on a needs basis as well as at regular pre-appointed meeting times, with the municipalities and FRS crisis management. In these collaborations, the public authorities could channel and communicate their assessment of the situation as well as their needs for volunteer assistance. The volunteer organisation could also share and discuss their own assessments, resources and needs.

Due to the large geographic area in the second municipality, and the fact that there were multiple fire locations, the RK VC leader set up in a location central to all fires and appointed local CV managers at the respective sites. These were people that the RK VC leader knew and trusted to be *stress-resistant*. These local CV managers were able to assess needs and task volunteers. They were also responsible for scheduling volunteers for on-site tasks. The RK VC leader managed coordination between these local sites and the municipalities and FRS crisis management.

⁶ A Swedish civil defence volunteer organisation that recruits and trains women to volunteer in crisis situations.

The collaborative practice whereby one CV organisation coordinated other formal and non-formal volunteer constellations was similar in the first municipality. Here, FRG had some preparations (forms) in place for taking orders for volunteer assistance from FRS or the Home Guard and for registering volunteer offers. These forms and the management of the information they contained was throughout events developed and rudimentarily digitalised by FRG to suit the extensive needs in the crisis. Furthermore, a form for providing information to volunteers for a specific assignment or task was developed. Two FRG members also attended the FRS crisis management meetings.

5.3.1.4 Resource Operations

Both of the local CV management organisations have the appearance of being self-resourcing, due to the use of volunteers to perform all manner of tasks and duties. However, the municipalities were also important sources of resources for CV. They provided facilities, transportation or food required for volunteers to be able to perform various tasks. The operations of the RK organisation was facilitated by the municipality making their resources (e.g. school kitchens, vehicles and fuel cards) available to the organisation.

In the first municipality, this was more difficult. Municipal transportation such as minibuses and cars were eventually made available, but it took time and the FRG VC points out that the municipality had no preparedness for this. Both VC leaders leveraged their experience and contacts in the municipalities, to secure the resources required to enable and continue their operations.

In the first municipality, the core competence in the FRG group was utilised to man the CV coordination organisation, but other volunteers were also sourced. It would appear that the same pragmatic approach to sourcing volunteers and resources, in general, was also taken when it came to manning the CV coordination function.

“It was impossible to quickly see what people could offer... We needed an excel file where we could quickly search... We got a hold of someone who was good at computers and who created a file so we could search for location, drivers-licence, specific equipment, everything!”
(The FRG VC Leader)

5.3.2 Coordinate CV Requests and Offers

The second main step in the overall process of local CV coordination is the coordination of CV requests and offers. This involves:

1. Gathering and prioritising CV needs and requests.
2. Gathering and assessing CV offers.
3. Matching CV requests and offers.
4. Recruiting volunteers, goods, services or equipment.

5.3.2.1 Gathering and Prioritising CV Needs and Requests

A main task of the local CV coordination organisations was to assess the need for various types of volunteer assistance and resources. According to the VC leaders, they not only received requests from local FRS or the municipalities. They received direct requests from local and county authorities during the crisis, and from other actors such as forestry owners, private persons or other volunteer organisations. They furthermore acted proactively to observe and gather needs and meet needs in the community.

Requests for CV assistance were created and administrated in a joint process between different stakeholders, via discussion and negotiation. The participation of CV organisation representatives and open channels of communication with local crisis management facilitated the discussion and translation of needs into relevant requests for volunteer assistance. In answer to a question on who can best define tasks for volunteers in a crisis the RK VC leader answered as follows:

“It should be a discussion. It can be different. It is important to look at people, I think the best results are achieved if FRS in cooperation with a volunteer organisation defines”. (The RK VC Leader).

In the interviews it is less clear what information was forthcoming in volunteer requests, or if all requests were registered, and if the requests were shared with other stakeholders, and if so how. The FRG VC leader gives the fullest description and explains that they had access to FRG forms for receiving orders of services or goods from FRS or the Home Guard, and used these to take note of what was required and by whom. These forms were also adapted to suit their needs in the forest fires crisis. The forms were filled out on paper, and there is no mention of their content being transferred to any digital format. The FRG VC leader says

“FRS screened tasks and categorised them as ones that firefighters have to perform and tasks that could be performed by others.” (FRG VC Leader).

The FRG VC leader in municipality 1 explains further that they also received requests for specific equipment and resources from the FRS.

5.3.2.2 Gathering and Analysing CV Offers

In parallel with managing needs and requests, offers from volunteers were also gathered and analysed by the CV coordination organisations. In municipality 1, many volunteer offers could be registered in person due to the convergence there. Many offers were also received by telephone and e-mail since both the municipality and regional FRS had published FRG’s telephone number, or were channelled via the municipality or FRS.

“Initially the greatest task was to have people who could receive people via all the channels they used, e-mail, text, telephone, physical appearance, the municipality’s home page....” (The FRG VC Leader)

Both VC leaders relayed that they operated lists to greater or lesser extents where offers of volunteer assistance and resources were registered or documented. Concerning non-affiliated volunteers, the FRG says that volunteer offers came from the locality and as far away as Denmark and Norway, that they may or may not include offers of equipment in the crisis response, and that they at times wanted FRG to make travel arrangements for them. Some were FRS, police or military personnel who happened to be holidaying in the area. Some couldn’t help out physically and chose to make collections instead. Some just wanted to leave a name but not do anything (The FRG VC Leader).

The FRG VC leader also gave an account of two tasks involved in managing volunteer offers. Firstly, sifting through and registering offers that had been made to FRS before FRG starting their CV coordination activities. Secondly, receiving and registering new offers. The objective of registering the offers in Excel was to be able to quickly search for resources to match specific requests. A recruitment form for volunteers was developed and the completed forms were later transferred to the Excel file. A data protection (GDPR) check-box was included on the form whereby the volunteer approved the continued management of their personal information for the crisis response.

“By day 3-4 we were able to make full use of the file. We had two people inputting everything new and one inputting the old offers.”
(FRG Leader, 21 May 2019).

It should be noted that the coordination functions also coordinated volunteered services and donated goods. The store in municipality 1 housed mainly crisps, water and medical supplies. Volunteers were tasked with keeping track of the goods and ensuring that they were delivered or could be collected for use in the crisis response. Incoming goods were registered and matched with needs and requests. The FRG VC leader relates that it was very difficult to direct people's will to help, and makes an example of a request on Facebook for bottled water which resulted in them receiving in total eighteen pallets of bottled water.

5.3.2.3 Match Requests and Offers and Recruit Volunteers

The interviews reveal numerous approaches for searching for volunteer resources to match a specific request. Among the first methods are:

- Searching pre-registered volunteer offers.
- Managing stored goods.
- Making direct inquiries with sources known to have the resources required.
- Utilising personal contacts.
- Putting requests out on social media.

If these approaches failed to come up with the requested resources, further efforts were made such as:

- Searching via a broader network of contacts (i.e. contacts contacts).
- Placing recruitment advertisements for specific skills or equipment via, for example, the municipalities home page
- Making requests to the SRK national register of volunteer offerings.

The approach that was used was related to the type of resources required and the urgency with which they were required.

Associated with the allocation of volunteers to specific tasks, MSB official 2 points to the need to be capable of verifying the competency and skills of volunteers who are not affiliated with established CV organisations. The RK VC leader also spoke of choosing members from established CV organisations to perform transport tasks close to the fire loca-

tions and for fuel transportation. These volunteers' affiliation with established CV organisations was taken as a verification of their training, skills and capabilities.

The FRG VC leader, in particular, emphasises the time-criticality, sometimes in terms of hours, involved in sourcing resources to match the requests. This leader also suggests the relevance of pre-registration of potential volunteer resources before the crisis event. This would better facilitate time criticality as well as the uncertainty involved in what resources will be required depending on the nature of the crisis event. Furthermore, the FRG VC leader reflects that there was no system for sharing information on the resources and capabilities of other FRG organisations in Sweden during the forest fires crisis.

Once the appropriate volunteer resources were identified via the above search practices, the next steps were to verify their availability and make the preparations required to receive them on-site. Routines for communicating this information were established by both CV organisations. The RK VC leader relates that this work was largely performed by telephone. Within FRG in municipality 1, e-mail and social media were also commonly used. There is no mention of using systems, shared information spaces or digital platforms by either of the local respondents.

5.3.3 Coordinate Volunteer Work On-site

Once the availability of CV resources (goods or volunteers) was known it became possible to prioritise and schedule how and when and where they were to be used, as well as to prepare volunteers for their tasks. Both VC leaders refer to these practices as a central part of CV coordination and management. Once again there were no prepared tools available to the CV organisations for these purposes. The RK VC leader mentions that they used Excel for scheduling.

The FRG VC leader found it necessary to develop a form, to help relay important information about the task to those volunteering. In this information, they could see who they were to contact on-site, what different assignments require (equipment, clothing etc.), safety information, information on shifts and informing activities, and current crisis status information. Volunteers were gathered at shift breaks for handovers, to receive both verbal and written information.

The FRG and RK VC leaders describe the following activities they performed to support volunteers in their tasks on-site:

- Transportation arrangements to and from the task location.
- Ensuring arrangements for possible quick evacuation of volunteers to avoid being caught in the fires.
- Supplies (food, water, plasters etc.) for volunteers.
- Equipment for performing assigned tasks.
- Medical attention.
- Routines for check-in and check-out of volunteers on-site.
- Supervision of volunteer work.
- Supporting hand-overs between volunteers
- Relaying information from volunteers to other crisis response stakeholders.
- Follow-up of volunteer performance

It should also be noted that other stakeholders, such as FRS or established CV organisations also performed similar coordination of on-site volunteer task performance. It is safe to assume that also these organisations would have needed to perform similar activities to those described above.

5.3.4 FRS Perspectives on Local CV Processes

Via a workshop (see a fuller description of the workshop in section 3.4.1.3), with a regional FRS organisation that was involved in the forest fires crisis response, FRS perspectives on volunteer coordination were gathered. This group's perspectives were internal, considering how their processes could be developed to better relate to needs associated with CV. It is however noteworthy that the suggestions are similar to the needs described by the VC leaders above. In the following, the suggestions most highly prioritised by the participants for the following four areas are presented.

1. Volunteer recruitment.
2. Volunteer start-up.
3. Volunteer work performance.
4. Volunteer work conclusion.

The full results, with all suggestions, can be viewed in Appendix B.

Concerning *volunteer recruitment*, the three suggestions most highly prioritised were to:

1. Develop FRS capabilities for CV coordination by preparing forms suitable for registering CV.

2. Carry out a *clarification assignment* within the FRS to further specify potential for improving the activities and capabilities to coordinate and deal with CV
3. Create a common register (digital) for volunteer registration that can be used both internally and externally (in the field) by FRS.

At *volunteer start-up* the FRS participants relayed the following priorities:

1. Clear and distinct instructions for volunteers.
2. Routines for checking in volunteers when they start their assignment.
3. Routines for marking of volunteers with vests with the text *Volunteer*.

During *volunteer work performance* the following suggestions for priorities were made:

1. Ensure that volunteers have a clear description of the assignment to be carried out and that they have leadership for task performance.
2. Make plans for when and where volunteers are to work, to maintain sustainability in the volunteer response over time.

When it is time for the volunteers to conclude their assignment (*volunteer work conclusion*) and leave the site the most important needs are to:

1. Be able to check out volunteers.
2. Ensure that there is a handover from volunteers leaving the site to those who will resume the same tasks.
3. A follow-up of volunteers, thanking them for their help and asking them to help evaluate the volunteer response and crisis management.

Viewing the responses, over all areas of volunteer coordination (recruitment, start-up, performance, conclusion) the suggestions could be divided into six categories.

1. Actions, routines or policies required to facilitate volunteer participation and coordination.
2. The resources required to perform these activities.
3. The organisational roles required to perform these activities.
4. Education for volunteers
5. Information needs related to CV.

5.4 National CV Coordination Processes

In this section, the empirical results regarding national processes for coordination of non-affiliated CV are presented. This is the second part of the CV process component, alongside the local processes for CV coordination described in the previous section (5.3)

Responsibilities for the coordination of non-affiliated (spontaneous) volunteers was assigned to the SRK by MSB during the forest fires crisis in 2018. The SRK crisis manager conveys, in interviews, that while the SRK has been adjusting their internal strategy over some years to enable them to fulfil needs for crisis volunteerism in Sweden, the request to assume the role of the national coordinator for non-affiliated volunteerism came abruptly. As a result, structures, organisation, digitalisation, processes, routines etc. to perform the coordination of non-affiliated volunteers, were not fully prepared. Although no new forest fires happened, requiring national coordination of non-affiliated volunteers, during the summer of 2019, the SRK has continued to tweak and refine their workflows, for example, in a practice run (CV coordination exercise) in November 2019.

The SRK crisis manager, as many respondents in this study, reflects on the learning experience afforded by the forest fires crisis saying *“This exercise (the forest fires crisis) was good. No one died but we gained a lot of insight and learnt a lot.”* (The SRK Crisis Manager). Even before the forest fires crisis, the SRK had been working at improving their crisis preparedness and CV capabilities over some years. Several investigations and reports discussing needs to be met had already been produced. However, since the forest fires in the summer of 2018 initiatives in this area have been reinforced at the SRK.

Upon accepting the assignment from MSB, the first step was to mobilise for national coordination of non-affiliated CV. The second step, which in practice was started in parallel with the first step, was to perform the coordination task to match volunteer requests and offers and supply local actors with volunteers. In similarity with the descriptions provided by VC leaders of how local CV coordination was set up, how the SRK coordination function came into being also displayed considerable emergent and adaptive traits. An overview of these process steps and their subprocesses are illustrated in Figure 11.

Figure 11. National (SRK) processes for coordination of non-affiliated CV during the forest fires crisis and described in this study.

Mobilising and setting up the national coordination of non-affiliated CV involved:

1. Establishing a coordination function at the SRK.
2. Agreeing on the scope and objectives for this function.

These are described in the following two sub-sections.

The SRK crisis manager described how, in parallel with setting up the coordination function and agreeing on the function's scope and objectives, the processes required to perform the coordination work were also started up. The assignment was outwardly relatively simple and involved the SRK receiving requests for volunteers from Fire and Rescue Services (FRS), municipalities and county administrations. Requests were mainly channelled via MSB and offers to volunteer were gathered from the general public. The SRK proceeded to then match requests and offers of volunteerism and sent thereafter the details of volunteers to those requesting volunteer services. However, there were no previous routines or processes in place to do this on the large scale involved. These processes

therefore emerged and were developed and refined throughout the entire forest fires crisis event.

It was difficult to keep the coordination function running when the volume of offers and requests increased, and the SRK crisis manager says that the SRK, although having crisis preparedness, was not well enough prepared for the scale of events that evolved in the forest fires crisis. A significant problem was that so many SRK staff were simultaneously on holidays (many abroad). The solution was to recruit volunteers from the register of volunteer offers.

Processes for the following were developed to enable the coordination function and used the following tools:

- volunteer registration online – A form on the SRK website
- registry maintenance – Database and Excel spreadsheet
- receiving volunteer requests – E-mail and telephone
- matching and securing volunteer resources for specific requests – Excel spreadsheet
- communicating volunteer details to volunteer requesters – E-mail.

According to the SRK crisis manager, the SRK communications department had been foresighted enough to make preparations for gathering volunteer offers of help online during the days before receiving the MSB assignment. The SRK crisis manager reflects that they, at the time of the assignment, were inexperienced in how to manage non-affiliated volunteers at the national level and that the project was an experience in learning by doing.

“We did not know how a system like this was to be managed... What is required? How should it work digitally? What should we search for? What things do we require from a volunteer?” (The SRK Crisis Manager).

In summary, the main sub-processes involved in performing national coordination of non-affiliated CV are:

1. Receive volunteer requests.
2. Receive volunteer offers.
3. Match volunteer requests and offers.
4. Mediate volunteers to requesters.

These are described in greater detail in the following sub-sections.

5.4.1 Establish Coordination Function

MSB official 1 explains the background to the assignment the SRK received as follows.

“We don’t use spontaneous volunteers for our work, but try to help actors receive the required resources. A spontaneous volunteer is a fine resource, but can also be a burden. Fire and Rescue Services asked for help to deal with spontaneous volunteers and this is the background to the assignment given to the SRK.” (MSB Official 1).

The SRK manager describes the initial stages of the establishment when the request from MSB was first received, as being very rushed and uncertain. According to the SRK manager, the SRK couldn't say no to the request, and the decision to accept was made within an hour of the formal request from MSB.

Aligned with the set-up of the coordination, was the process whereby the scope and objectives of the coordination function were agreed upon. The overall aim of the assignment was to relieve MSB, FRS, municipalities and county administrations of the pressures involved in coordinating non-affiliated volunteers.

“Our assignment was to gather and mediate resources to those requesting them in the smartest way possible.” (The SRK crisis manager).

The objectives for the MSB assignment at the SRK was to be capable of doing the following:

- Gather contact details from non-affiliated volunteers via their online web.
- Communicate in a directed manner with these volunteers and follow up on their activities and interests
- Build up coordination process and follow up of volunteers based on the following scenarios:
 - Mediating volunteers to external actors such as FRS.
 - Volunteers are not offered any tasks.
- Establish directives and workflows for how volunteers would be channelled within the SRK after completed assignment, to:
 - local RK organisations and tasks
 - other forms of engagement, such as a donation.
- Take inventory of preconditions for follow-up of those who have:
 - offered to help

- been mediated
- participated in crisis response activities
- been channelled within the SRK after completed assignment.

This was to be achieved using the SRK actual digital capabilities and resources at the time. There was no financing for digitalisation in the agreement.

The scope of the assignment etched out during the forest fires crisis came to be that the SRK would receive requests from authorities for volunteer assistance and match them with offers from non-affiliated volunteers. The scope of the SRK engagement ended once the names and contact details for the volunteers were handed over to the requestor.

The SRK crisis manager relayed that the arrangement between MSB and the SRK initially caused other established CV organisations some discomfort. To appease concerns, it was, after a while, clarified that the SRK would only assist with coordination of non-affiliated volunteers in localities where there was not already local CV coordination in place, or to assist local CV coordination at their request.

5.4.2 Coordinate CV Requests and Offers

5.4.2.1 Receive Requests

Once contact between the SRK and the requester was established, the SRK documented the request including specific requirements regarding the volunteer's skills, attributes and equipment. A checklist for these interviews was developed.

The SRK crisis manager lamented the quality of these requests and says

“What I like the least is the term “hands and feet” and you hear it really often. What is it you need the hands and feet for?!” (The SRK Crisis Manager).

The SRK crisis manager, with almost 30 years of experience of CV, expressed deep concern over the Swedish authority's nativity and/or inexperience in dealing with volunteers. This respondent also voiced concern over the situations that could ensue locally, when non-qualified or ill-equipped volunteers appear and are perhaps not capable of performing the tasks required.

“The problem is that they (the requestors) view requesting volunteers as requesting hands and feet. They don’t view it as a specific skill set, and you get what you ask for (som man ropar får man svar – original Swedish proverb)... This creates enormous problems for coordination. Sending out volunteers who think they have an important task to perform, who then cannot perform these tasks... This is wrong... In large scale operations, such as in Municipality 2, there is often something for everyone to do, but this is not the case normally.” (The SRK Crisis Manager)

5.4.2.2 Receive Offers

In the SRK coordination of non-affiliated volunteers, the general public was allowed to report their interest to volunteer via a simple online form at the SRK website. The details collected via the form were basic, including the volunteer's name, age, location (municipality), contact details and attributes. The attributes included on the form were developed over time and came to include questions on the volunteer's abilities/qualifications. For example, driver's licence, ability to perform physical work, ability and experience dealing with people in vulnerable situations, first aid and medical qualifications, and language skills. Once a person submitted the form these details were recorded in a database. Thereafter, at regular intervals, these details were exported to update an Excel document with the new volunteers. This spreadsheet was used to search for volunteers meeting the criteria required by the requestors.

The SRK had, previous to the forest fires crisis, a recruitment database for managing everyday SRK volunteerism, but they were unable to adapt it for use in the crisis at such short notice. Instead, website functionality was used to create the form and gather CV offers. One problem with the register of volunteers was duplicates, which occurred when those offering to help did not feel they received feedback or a task quick enough and therefore submitted a new offer via the online form. This was in part since the SRK received no feedback from the requestors as to which volunteers were engaged and tasked and which were not.

In general, the SRK discovered over time that they needed better selection criteria and had to adjust the online form. Furthermore, they realised that managing a register is resource-intensive. For example, because of the required communication with volunteers who had registered, informing them of the status.

“You have to take care of those who have registered. In the beginning, we sent out information every second day. First a confirmation that the registration had been received... we haven’t forgotten you... developments are this and that... We ended up in a situation where they could check a box to say they did not want any more information. It became like an information letter”. (The SRK Crisis Manager)

Another problem was that those volunteers already supplied to a requestor were removed from the register. However, since there was no feedback from the requestors regarding their use of the mediated volunteers, the RK could not know if the volunteers were used or not.

5.4.2.3 Match Requests and Offers

Once a request was received by the SRK, the Excel document was searched manually by sorting columns, to find appropriate candidates. This involved trying to fit multiple parameters such as location and attributes. Once suitable candidates were identified, the SRK used their digital resources to create a case for contact with the individuals whose assistance would be required for a specific request. Via this system, messages were sent to the volunteers to confirm their willingness to engage in the specific task. These messages were short, without details of the exact location to avoid unwanted convergence. These inquiries were commonly sent to more volunteers than were requested to ensure enough would accept.

One problem experienced by the SRK was that they received far more offers of volunteerism than they had positions to fill.

“We took in lots of people (in the registry – note) but we didn’t have anyone who needed them. This was because MSB had not been successful in their communication to FRS, county administrations and municipalities that they could request resources from the register.” (The SRK Crisis Manager)

5.4.3 Mediate Volunteers

Once the volunteers confirmed their willingness to partake, their contact details were gathered on a list that was conveyed to the requestor for that particular task. After that, it was the local requestor’s responsibility to contact, engage and support the volunteers. In the description of this part of the process, the SRK crisis manager is careful to emphasise that the

assignment was to *mediate* volunteers and views this as a very different (much reduced) practice compared to when the SRK themselves engage volunteers.

A problem incurred in the mediation of volunteers was that local requestors were not prepared or equipped to manage communication with the mediated volunteers.

“It was beyond the scope of our assignment to contact the volunteers and send them to different places. So we sent lists of people who could help out (to the requestors), after that, it was up to the requestor to get in touch with them and agree on how to continue. Requestors were not prepared for this, to sit out in the forest and need to make contact in this manner.” (The SRK Crisis Manager)

In the aftermath of the forest fires crisis, this part of the assignment from MSB has been modified, and in case of renewed national CV coordination, the SRK will assume responsibility for the volunteers until they arrive on-site and are handed over to the local leadership. The SRK crisis manager explains that the SRK requires that volunteers wishing to engage in tasks for the SRK undergo a process of introduction and education, reading the SRK code of conduct and signing a secrecy agreement. There are also routines in place to verify and assess the volunteer’s capabilities. The mediation task, therefore, lacked the quality assurance routines normally performed by the SRK.

5.5 Crisis Volunteerism Tasks

CV tasks relate to the services, tasks, response operations, contributions etc. provided by volunteers in a crisis. An overview of CV tasks is provided in Figure 12.

Although there are exceptions (Waldman et al., 2016; Albahari and Schultz, 2017; Silk et al., 2018), in general, the literature study revealed that it is common to discuss uses of technology to support CV practice without ever mentioning the more precise nature or character of the tasks to be performed by volunteers or the capabilities volunteers need to perform these tasks.

Tasks and capabilities of volunteers are interrelated. So, when we consider CV tasks, we must also consider the capabilities of actors involved in crisis volunteerism. Volunteer capabilities can be understood

in terms of skills, knowledge, resources or training (Waldman et al., 2016).

The nature of the response work will dictate the relevance of these capabilities.

Figure 12. Crisis Volunteerism Tasks

In the remainder of this section CV tasks will be described from three perspectives:

1. CV taskers (those tasking volunteers).
2. CV tasks (the tasks taken on by volunteers).
3. CV capabilities or resources (that volunteers must have to perform tasks).

Finally, relationships between the CV task component and other CV components are summarised at the end of this section.

5.5.1 Crisis Volunteerism Taskers

Many stakeholders in the crisis response have the potential to be taskers and can display various forms of affiliation and/or integration in crisis management. It is most common to assume that taskers are affiliated with formal CV stakeholders (either crisis management or an established CV organisations) (Liu, 2014; Benali and Ghomari, 2017a; Zettl et al., 2017).

However, observing the role of social media in CV and crisis management, it is noted that non-affiliated volunteers and emergent groups also have the capacity to self-organise and perform a wide range of tasks independently of formal CV coordination (Starbird et al., 2011; Linders, 2012; Hughes and Tapia, 2015). Concepts such as collective action (Theocharis et al., 2017) and digital volunteerism (Kaminska et al., 2015)

are also explored in IS research and demonstrate decentralised tasking where the role of the tasker is less prominent and tasks may be identified and designed by the volunteer (the tasked) rather than by a tasker function.

As was related earlier in this chapter, on the local level CV coordination organisations played a major role as direct taskers of volunteers and as mediators of tasks to volunteers. Local VC and FRS respondents in the study of the Swedish forest fires crisis also relate to how emergent groups self-organised and engaged in response initiatives independently of formal CV coordination. Local VC leaders acted to incorporate such initiatives but the SRK crisis manager pointed out that not all crisis volunteers want to be affiliated or organised to/by any type of organisation.

5.5.2 Crisis Volunteerism Tasks

In the literature study, there is a clear dominance of focus concerning CV tasks on volunteer's provision of situational awareness for crisis management (Kaminska et al., 2015; Benali and Ghomari, 2017a; Nespeca et al., 2018). However, in the empirical study of the forest fires crisis, very little relevance is given to this aspect, despite specific questions being posed to all respondents. Authorities demonstrated less interest while VC leaders saw some potential. The RK VC leader was the only one with an example where they had mediated information on local conditions to FRS, and how this had helped avoid an accident in water bombing activities.

The role of digital volunteers and the tasks they perform are also given much relevance in previous research. Related to volunteered geographical information (VGI) (De Albuquerque et al., 2016a; Netek and Panek, 2016) we have the use of automation and remote sensors (human or machine) to collect and disseminate situational information (Kerle and Hoffman, 2013; Ramchurn et al., 2016; Frank et al., 2017), lost and found tasks (Barrenechea et al., 2015) or translation, categorisation and geotagging (Hester et al., 2010). Liu (2014) observes crowd sensing, tagging, mapping and curating as task areas related to crowd sourcing digital volunteers. Once again, however, this type of volunteerism was not noted in the empirical study.

Some researchers recognise that volunteers have the potential to perform certain types of on-site tasks in the event of a crisis or disaster. These are food provision, delivery of basic health care, environmental sanitation campaigns, efforts to raise awareness, construction (Albahari and

Schultz, 2017), donations and aid collection (Agrawal et al., 2015). Waldman and Kaminska (2015) relate to the capabilities that volunteers can provide in a flooding crisis.

These are:

- preparedness
- public information
- warning
- communication
- search operations
- resource centre
- logistics
- health care
- emergency water
- food/nutrition
- clothing & sundries
- shelter/lodging
- family services
- transportation
- damage assessment
- self-assessment
- clean-up
- refurbishment.

Here, there is a much clearer overlap with the experiences of the VC leaders in the forest fires crisis, where many of these tasks were also relevant. Further attributes of tasks that are deemed relevant to consider are the complexity of tasks (Agrawal et al., 2015) or the location of tasks (Ernst et al., 2016). Aman et al. (2012) furthermore consider ICT supported tasks and mention communication, event detection and assessment, warning, GIS supported collaboration, decision support, training, navigation and evacuation as CV tasks. Based on the responses from local respondents in the study, it was possible to identify four main categories of tasks performed by volunteers during the forest fires crisis (Figure 13).

Figure 13. Categories of tasks during the forest fires crisis.

These are tasks where volunteers:

1. perform FRS tasks
2. assist FRS in their operations
3. support FRS operations
4. support community during the crisis.

Different types of CV were noted to be more or less suited to these different categories of tasks during the forest fires crisis. For example, established CV organisations were the preferred source of volunteers for tasks assisting and supporting FRS operations and that are within the scope of the FRS own responsibilities. The contribution of non-formal CV stakeholders is considered more relevant for supporting FRS operations and providing general support in the community.

These four categories of CV tasks are described in greater detail below. Thereafter FRS perspectives on CV tasks are conveyed.

5.5.2.1 Professional Tasks

The first task area is the core operative tasks of FRS, which are professional firefighting and crisis management, where there are very specific needs and requirements for training and experience or certification to allow participation.

The FRS chiefs channelled their requests for assistance with professional firefighting duties to neighbouring FRS organisations and regional authorities and thereafter MSB. This is following established routines in Sweden for collaboration between public authorities in large-scale crisis events. This resulted in a large volume of external professional resources being sourced to respond to the forest fires, not least in municipality 2 where the FRS chief mentions 140 fully equipped and staffed fire trucks that arrived from Poland to assist in fighting the fires. The sourcing of these resources was conducted by local, regional and national authorities, in parallel with CV coordination.

Water bombing resources are also mentioned by both FRS chiefs as well as the depots with fire hoses etc. that MSB provided. Tasks at the core of the FRS profession were thereby almost always performed by professional FRS workers.

The FRG VC leader confirms that volunteers, by in large, were not required for operative firefighting activities. However, local VC organisations also came to receive offers from firefighters, police and military personnel visiting the area at the time of the crisis.

5.5.2.2 Tasks Assisting Professionals

The Regional FRS chief spoke of both affiliated and non-affiliated volunteers being assistants to professional firefighters, for example, carrying heavy equipment and putting out fires together with professional firefighters in controlled situations. In the local interviews in both municipalities, it can be observed that volunteers from the Home Guard worked in an assisting or controlled capacity with professional firefighters. However, also non-affiliated volunteers were recruited to assist firefighters.

The FRS chiefs sourced specific resources and services to assist them from local volunteer coordination functions, local businesses and, for example, farmers with the required equipment.

5.5.2.3 Tasks Supporting Professional Operations

The next task area observed is that where volunteers were requested to provide support to enable endurance and efficiency over time in the professional firefighting response. When the CV organisations leaders are asked what tasks volunteers performed, the greater volume of tasks is within this area. These tasks were:

- Resource management (Sourcing, receiving and storing, scheduling, instructing, guiding, transporting and distributing volunteers, professionals, goods, donations, equipment etc.)
- Preparing and serving meals.
- Accommodation and housekeeping services for professional and volunteer responders.
- Basic medical assistance (treating blisters and minor burns) and crisis support.
- Guard services (guarding closed roads or extinguished fires).
- Supporting crisis command.

The FRG VC leader relates examples as follows:

“A boat was needed for one assignment... The airport needed a tank for jet fuel... The tank needed to be transported. Vehicles from the military etc. We sourced all sorts” (The FRG VC Leader).

Formal established CV organisations volunteers were as a rule requested to perform tasks involving risks or that required a greater degree of organisation, as they had relevant training or leadership capacity. An amateur radio organisation assisted with communications in the field. Drivers were recruited from the vehicle corps. Also, the Lotta corps or

Home Guard assisted in command functions, with documentation and co-ordination. However, many other expanding or extending organisations, as well as emergent groups and non-affiliated individuals, came to be involved in performing tasks within this area.

5.5.2.4 Tasks Supporting Community

A final task area is called general community support and refers to the volunteer activities and resources that were requested or required but that are outside the previous three areas. Overall the interviews reveal little in this respect and it is clear that the establishment and running of local CV coordination had its primary focus on responding to requests emanating more or less directly from the professional operative crisis response, and to support it.

One task mentioned briefly in the interviews by local VC respondents is the management of crisis information. Another need stemming out of the crisis, but not directly related to the immediate crisis response, is the care for volunteer and professional responders after the event. Also support provided for evacuees or victims can be understood as tasks supporting community.

5.5.2.5 FRS Perspectives on Crisis Volunteerism Tasks

In the workshop performed with participants from the regional FRS organisation, by relating to experiences from the forest fires crisis, potential CV tasks were identified. The main categories of tasks, where volunteers can help or support the FRS were identified by participants as:

- Logistics and supply.
- Administration.
- Physically demanding tasks.
- Evacuation/warning.
- Managing equipment.
- Other

The full list of tasks within each of these categories can be found in Appendix C.

The single most highly prioritised FRS task was logistics followed by logging events, with food and endurance over time in physically demanding tasks as a joint second priority. It is noted that the tasks identified do not include the core FRS task of firefighting, but rather the layer of tasks required to facilitate the functioning of the FRS. There is as such

an overlap with the previous section on tasks assisting or supporting professionals.

5.5.3 Crisis Volunteers Capabilities

This is the third and final aspect of CV tasks. In the interviews with local respondents, volunteer capabilities were understood to be of relevance in both local and national processes where volunteer needs and requests were matched with volunteer offers. The workshop study with the regional FRS organisation identified several capabilities. These capabilities have been analysed after the workshop, which resulted in the identification of eight categories:

- Computer skills
- Technical skills
- Film/photography skill
- Driving skills
- Cooking skills
- Language skills
- Personal attributes
- Other capabilities

The full list of capabilities within each of these categories is available in Appendix D. Note that these categories have overlap with the tasks identified by local VC leaders as well as the personal information that volunteers registered at the SRK.

The FRS group also related to the resources expected to be volunteered during a crisis. The categories of resources identified were stationary, fuel, vehicles, supplies, IT equipment and other equipment.

Relationships: CV Tasks and other CV components

The results above clarify that the concept of *CV tasks* must be understood in terms of tasks, taskers and capabilities. The type of tasks to be performed will be conditional on the nature of the *Crisis Event* and the resources and structures that exist in the *Crisis Environment*. The *CV processes* will also contribute to identifying, defining, prioritising and coordinating *CV tasks*. In this, the role of taskers is central and an understanding of volunteer capabilities is essential to make it possible to match an appropriate category of *CV stakeholder* with respective tasks. Finally, the possibility to perform tasks will be conditional on attributes of the *CV environment*.

5.6 Crisis Volunteerism Environments

The CV environment is the broader context within which the crisis event and CV practice take place. Three aspects of the CV environment are understood to have the most significance or impact on CV processes. These are:

1. Collaborative structures.
2. Institutional arrangements.
3. Resources and crisis preparedness.

Other attributes identified in the study, and that are relayed in a more summary manner at the end of this section, are legal aspects, cultural arrangements, and social, physical or natural environmental aspects. An overview of all attributes identified and their relationships are illustrated in Figure 14.

Figure 14. Crisis volunteerism environment attributes.

There is considerable complexity, in terms of interrelationships between the CV environment attributes. Differences between environments in terms of resources or demographics, population density, or the degree

of social cohesion or unrest may be readily observed also under everyday conditions. However, such environmental factors can gain specific relevance depending on the nature or location of the crisis event. Lightning strikes in a concrete suburban area would not have induced wildfires as was the case when they struck in densely forested areas of Sweden and could instead have resulted in other types of crises (e.g. severe power outages).

5.6.1 Collaborative Structures

The relevance of collaborative structures is strongest in relation to the CV process, CV stakeholder and CV task components in the CV practice meta-model. In the literature, collaboration is also the contextual factor that receives the most attention. A large portion of the literature studied concerns the potential of improved collaboration (which is understood to include cooperation and coordination) using information and communication technology (ICT). Approaches to collaboration are highly dependent on the perspective of different stakeholders, which to a large degree may be coloured by their preference for centralised or decentralised management structures (Helsloot, 2008).

Collaborative interactions for coordination or cooperative purposes can potentially occur between and among all CV stakeholders in a crisis. Collaboration is often considered in terms of being intra-organisational (within an organisation) or inter-organisational (between organisations) (Papadonikolaki et al., 2019). However, in research on emergency and crisis response, cross-sector (Pilemalm et al., 2016) or multi-organisational (Kapucu, 2005) forms of collaboration can be given greater relevance.

The main forms of interaction that enable CV collaboration to take place happen between authorities (e.g. FRS or municipalities), formal established CV organisations (e.g. FRG and SRK) and non-formal CV actors (e.g. non-affiliated volunteers or emergent groups) (See Table 6).

For collaboration to bear fruit, the practices of coordination and co-operation need to be mobilised (Turoff et al., 2008). Shen and Shaw (2004) observe coordination mechanisms in terms of structure or processes. Liu (2014) focuses on the articulation of cooperative work such as communication or negotiation activities, while Jaeger et al. (2007) research networks such as community response grids and how they facilitate interaction between a wide range of actors. A coordination structure

of particular relevance for CV and the case of the forest fires crisis in Sweden is related to the concept of intermediary organisations that bridge the coordination gap between authorities and a broad range of volunteer responses (Zettl et al., 2017).

Types of CV Interaction	Examples of Publications
<i>Authority – Formal CV organisation</i> Interactions between crisis management authorities and formal CV organisations	Quarantelli (1988); Shen and Shaw (2004); Ramsell et al. (2016)
<i>Authority/Formal CV Organisation – Non-formal CV actors</i> Interactions between crisis management authorities or formal CV organisations and non-formal CV actors such as non-affiliated volunteers or emergent groups	Poblet et al. (2014); Rauchecker and Schryen (2018); Strandh and Eklund (2018)
<i>Non-formal CV actors – Non-formal CV actors</i> Interactions between citizens, non-affiliated volunteers or emergent groups	Nan and Lu (2014); Hughes and Tapia (2015); Simsa et al. (2019)

Table 6. Types of interaction between CV Stakeholders.

Among the structural challenges observed in the literature are those related to the need to develop collaboration structures that can facilitate the integration of non-formal volunteers in the crisis management process (Ramsell et al., 2017). Another question is how structural arrangements influence the cultivation of autonomy for volunteer organisations (Harris et al., 2017). To enable this, crisis management and crisis response system structures in particular need to anticipate volunteer responses and develop preparedness for volunteer participation, as well as an adaptive capacity in their organisations for dealing with non-formal volunteer responses (Jakes and Langer, 2012).

In the empirical study, confusion and deficiencies related to coordination and collaboration structures for CV were noted by both the SRK leader and regional FRS chief. The regional FRS chief says that his organisation made very little formal effort to recruit or coordinate volunteers and that they were not prepared for being inundated by people wishing to help. This FRS chief speaks of the need for structure and functions for coordinating volunteers, e.g. handing out equipment and tasks, “*You can’t just let volunteers loose in emergencies*”, and admits they were

lacking in capabilities to manage this coordination. The SRK crisis manager also points to the relevance of structure and maintains that volunteers need direction concerning what they can or should do, and to be given an understanding of how the response system works.

In Sweden, during the forest fires crisis, collaborative arrangements and interactions that were established and applied had varying degrees of formality and were emergent during the crisis event. On the local level, both VC and FRS respondents reveal that established CV organisations became the intermediaries and central coordinators of multiple forms of formal and non-formal volunteerism. This included established CV organisations, extending, and expanding organisations, emergent groups and non-affiliated citizens. Channels were, alongside these initiatives, also open between authorities and non-formal CV stakeholders.

As was described in section 5.4, the SRK assumed responsibility for matching requests for volunteer assistance with offers of assistance from non-affiliated volunteers (The SRK Crisis Manager). Figure 15 demonstrates the complexity of all of these collaborative interaction structures. While the coordination of the established volunteer organisations was shared between the local CV organisations and FRS or municipalities in a common structure, non-affiliated volunteers were coordinated mainly by the local and national CV organisations.

Both VC leaders point out several initiatives they took to embrace emergent volunteer groups and spontaneous initiatives and to deal with problematic issues related to non-affiliated volunteerism in their work.

“I discovered that there was a lot of misinformation among volunteers out there. I solved the problem by delegating people I have confidence in, people with respect for facts... There was an overrepresentation of Red Cross workers.” (The RK VC Leader).

The FRG VC leader gives more perspective on the need for CV coordination structures and says:

“There were volunteers who, on their own initiative, just turned up out in the woods. It was difficult to sort this out in the beginning. They had eaten the food that FRS had ordered, there wasn’t enough to go around. When we discovered this we got them to report to us so we could know who was out there and could check them off when they returned. We knew who was out in the forest”. (The FRG VC Leader)

Figure 15. CV stakeholder interactions during the forest fires crisis

Paths to improving collaboration in crisis response are identified in the studied literature as going via enhanced communication, information management, task management and the use of collaboration tools (Shen and Shaw, 2004; Jaeger et al., 2007; Romano et al., 2014). I will return to this in section 5.7 on the uses of ICT in CV. Parallels are at times also drawn to developments within e-government whereby digitalisation is used to engage citizens as partners in the coproduction of services (Linders, 2012; Ramsell, 2021), or to improve the interaction between citizens and authorities (Pilemalm et al., 2016).

5.6.2 Institutional Arrangements

In the study of literature, the impact of institutional arrangements for CV is noted. Abedin and Babar (2018) address the issue of how social media can redistribute institutional power to non-institutional stakeholders in

crisis events. Barbour and Manly (2016) take interest in volunteer organisations interpretations and ways of relating to institutional logics for both crisis preparedness and crisis response. Dostál (2015) take note of how NGO's attempt to institutionalise their cooperation in crisis response. Mees et al. (2016) study the rationales that influence the degree of institutionalisation of coproduction in a crisis response setting. There are as such several potential perspectives on institutional logics and various means whereby institutional power may be redistributed or renegotiated between government and non-government actors in crisis events.

In the empirical study, the impact of institutional arrangements in the CV environment is understood to be relevant in creating and maintaining barriers for efficient and effective CV in Sweden. These barriers or dilemmas are:

- An involvement exclusion paradox (Harris et al., 2017) about non-affiliated volunteerism, whereby non-affiliated volunteer contributions, while required, are often not recognised or not welcomed or prepared for by authorities in particular.
- Unrealistic expectations regarding the capacity of established CV organisations and capabilities of authorities.
- Lack of alignment of institutional arrangements with regard to the current reality of CV including the contribution of non-affiliated volunteers, emergence, and self-organisation.

These problems are interconnected. The MSB official 2 points out the failings of public authorities concerning preparedness to use established CV organisations. MSB official 1 also expresses wariness and reluctance to consider non-affiliated volunteerism as worthy of development using digitalisation. While the considerable decline of capacity in established CV organisations in Sweden, ongoing for decades, is acknowledged by the MSB, there would appear to be a reluctance to acknowledge a CV reality where citizens, thanks to digitalisation, have considerable powers to remain non-affiliated, self-organise and respond independently of authorities. This reluctance can be understood to be related to the MSB focus on supporting formal and established CV organisations and their integration in the crisis response system.

Representing CV reality during the forest fires crisis, both FRG VC and RK VC leaders relate how they, in an emergent manner, stepped in

to fill the gaps that occurred in the local FRS and municipality's coordination of volunteer initiatives. One leader says "*Nobody was managing volunteers, so I grabbed ahold (of the task)*". (The FRG VC Leader)

In interviews with representatives from MSB and the SRK, mention was made of the need to *handle* civilians will to help out to prevent them from getting in the way of or disrupting crisis response activities. Opening up channels for registering volunteer offerings, and making the existence of such channels broadly known to the public, would therefore seem to have had dual purposes, dependent on different stakeholder's perspectives. In part as a calming measure (conveyed by MSB and FRS respondents), ensuring the general public that volunteer resources will be taken on to the extent they are needed and thereby prevent unwanted convergence or spontaneity, or to fill real needs in the crisis response and channel much needed non-affiliated volunteer contributions (as conveyed by local VC and SRK respondents, and local FRS chiefs).

The setup and running of the local CV organisations are described by the local VC leaders as being primarily pragmatic, observing the need to deal with volunteerism based on practical realities in the specific local community and the actual crisis conditions, while the authority respondents (FRS and MSB) are more concerned with professional and established CV organisations contributions, organisation and collaborations. The SRK crisis manager says

"it cannot be so that we channel volunteerism as a show-off... it has to build on real needs" (The SRK Crisis Manager)

5.6.3 Resources and Preparedness

The FRS chief at municipality 2 explains that they were faced with a challenge far beyond their own capabilities. Their preparedness to enrol the capacity of neighbouring municipalities and regional administrations was considerably hampered because those resources were not available, due to the neighbours having their own fires to respond to. Furthermore, the spread of fires throughout the country meant that national MSB resources were stretched thin.

The municipal FRS chief, while uncertain, is inclined to place the responsibility for CV with the municipality rather than their own FRS organisation, or with established CV organisations. However, in the workshop with the regional FRS organisation, problems experienced in dealing with volunteers during the forest fires crisis were also viewed as

internal shortcomings at the FRS, and many suggestions were forthcoming about how the FRS could increase their preparedness to contribute to better CV coordination in the future (see section 5.3.4 and Appendix B).

One of the MSB respondents points out the failings of public authorities in general, during the response to the forest fires crisis, and says *“Public authorities have not done what one could have expected them to. They should, for example, have been able to formulate needs and requirements for volunteerism”*. (MSB official 2). In the Swedish crisis response system, FRS and municipalities are expected to have preparedness via contractual agreements with established local and national CV organisations, such as FRG or the SRK (Hultén et al., 2016). However, no such contractual agreements were in place at the onset of the forest fires crisis in the two municipalities that were studied.

The regional FRS chief also notes that they are a federation of FRS organisations from seven municipalities and how this can contribute to difficulties in managing CV. He says *“When functions are lacking for coordinating resources within the (FRS) organisation, it’s far to create (such functions) for volunteers”*. (The Regional FRS Chief)

Both local VC leaders explained that their local organisations had very few members capable of volunteering in the crisis at that time (less than 10 each). They were reliant on both non-affiliated and affiliated volunteers to man and operate their coordination organisations and functions as well as to perform crisis response tasks. Based on numbers provided by the local VC leaders, these volunteer coordinators dealt with on average 160 active volunteers per day. Similar needs to recruit non-affiliated volunteers to perform CV coordination were experienced at the SRK.

The local VC leaders express that their capacity was too limited to enable them to carry out volunteer tasks themselves. Their main function became the leadership and coordination of other established, expanding or extending organisations as well as emergent groups and non-affiliated volunteers, with the needs of crisis management authorities. This is not entirely in line with how MSB visualise the functioning of CV in Sweden, where the skills and training of volunteers affiliated with established CV organisations are given priority over the availability of volunteers. Both MSB respondents relate rather to an ambition that established CV organisations will provide the volunteer capacity required and that those non-affiliated volunteers should more so be managed than utilised in crisis events. In practice, during the forest fires crisis, the role played by the

local CV organisations more so resounded with the intermediary coordination role explored by Zettl et al. (2017), whereby CV organisations coordinated other non-formal, emergent or non-affiliated forms of volunteerism.

MSB are responsible for appointing and supporting civil defence volunteer organisations, which are the established CV organisations in Sweden. Local respondents (Municipal FRS Chief and RK VC leader) both commented on the fact that these established CV organisations in their areas have few members and that a majority of the members are elderly and not capable of performing many of the tasks required in response to the forest fires crisis. When questioned on the age structure in these organisations in general, the MSB official respondents replied that they did not have access to information on the age distribution in these organisations. They maintained that it is worthwhile investing in these organisations to rejuvenate them and make them attractive again.

“I think it is better to make them (civil defence volunteer organisations) more attractive. When we rebuild our civil defence, they will be attractive again ... They have been obsolete because we haven’t had a civil defence, but their identity is relevant. Our system has failed to make the organisations feel relevant and support them in being relevant.” (MSB official 2).

This ambition is coupled with the fact that Sweden is currently rebuilding its defence systems, and the idea is that these developments will also lead to a strengthening of the civil defence volunteer capacity in crisis events.

Observations at the SRK revealed that, contrary to the intentions of the SRK Strategy for 2020-2023, the local organisations found it difficult to integrate crisis planning and preparedness in everyday operations. In particular, local RK organisations in more rural areas, but also others related to difficulties recruiting new volunteers. Probable causes of this are that the SRK until recently did not engage in CV in Sweden, that many in the organisation have difficulties relating to the many different types of volunteerism that the SRK are expected to contribute to and finally because of the many unknowns concerning the actual capabilities of SRK affiliated volunteers. Participatory observations revealed that these uncertainties are because knowledge of affiliated volunteers age and capabilities is not registered or documented systematically in the organisation. Also, demographics have an influence, whereby many SRK affiliated

volunteers are elderly and therefore are not suitable for all types of volunteer tasks in crisis events such as forest fires or the current pandemic.

5.6.4 Other CV Environment Attributes

The remaining attributes, observed to have relevance when attempting to understand the full complexity of the CV environment, are legal aspects, culture, resources, crisis preparedness and the social, natural and physical environment attributes. These are described briefly in the following.

5.6.4.1 Cultural Arrangements

Cultural references are not widespread in the literature. Coletti et al. (2018) is an exception when they discuss the necessity of understanding humanitarian organisations values and culture when designing IS. Cultural arrangements are also only discussed to a small extent in this studies empirical data. Here there is an understanding of *local* culture and a fear that a lack of understanding of local culture could hamper CV coordination. The SRK crisis manager says

“How can we talk about the problems with non-Swedish speaking individuals... It’s about safety. You have to be sure the person understands” (The SRK Crisis Manager).

This manager also says that there are different cultural attitudes to how actively volunteers should engage in crisis response activities that need to be taken into account in volunteer coordination.

5.6.4.2 Legal Aspects

Havlik et al. (2013) reflect on the need to address the legal and ethical challenges associated with engaging citizens in crowd sourcing or crowd tasking activities during ongoing crisis events. A Swedish report has also studied a range of more specific legal questions and issues associated with CV, not least how liability should be managed if a volunteer is injured or killed while volunteering in crisis response (Holm, 2016). Pilemalm et al. (2013) also observed in one study that legal issues were not discussed at all when establishing local volunteer responder groups. In Swedish practice, questions of liability, insurance etc. are contingent of how the volunteerism is categorised by the FRS. On a general level, volunteers that have been conscripted by the FRS have coverage while those who have

not been conscripted or do not have affiliation to a volunteer organisation do not.

The SRK crisis manager also spoke of the importance of their volunteers being insured. Proper procedures for recruiting and also visualising (using vests) who is a volunteer working under the RK umbrella is, therefore, an important aspect to ensure that both volunteers and the SRK have the proper protection.

5.6.4.3 The Social, Natural and Physical Environment

Bénaben et al. (2016) relate to the relevance of social (demographics, population density, stakeholder representation etc.), natural (climate, weather, the time of day etc.) and physical aspects (lakes, property, infrastructure etc.) of the CV environment in the context of crisis management. These factors can however also be considered relevant as influences in CV practice.

Relationships: CV Tasks and other CV components

The boundaries and content of the *CV environment* component are largely dependent on the nature and location of the crisis event. Furthermore, attributes of the *CV environment* (collaborative, institutional, cultural or legal arrangements and resources, crisis preparedness and social, physical or natural aspects of the CV environment) exert various forms of influence on *CV processes*, *CV stakeholders* and *CV tasks*.

The results point to the relevance of the scale of *crisis events* for the collaboration aspect of the *CV environment*. As was observed in the case of the Swedish forest fires crisis, the extensive scale of the event contributed to a need for higher levels of collaboration between *multiple CV stakeholders* than would be the case in a less extensive event.

CV Stakeholders are recognised to be both a separate component and part of the *CV environment* component. As such there are relations to the other attributes of the *CV environment* component, in particular collaborative structures where interactions between different types of stakeholders are observed.

5.7 Information and Communication Technology

In this section, I will briefly convey results on the uses of information and communication technology (ICT) as observed in the studies. As was made clear in the introduction to this thesis, at the onset of the forest fires crisis there were no dedicated information systems addressing needs in CV.

This does of course not mean that those involved did not use ICT. In the following, I will first relate to findings from the literature study and thereafter local respective national empirical findings. Based on the findings of the literature study, it is noted that there is a potentially very broad range of ICT to support and enable CV stakeholders, processes and task performance. Almost none of these uses was however observed in the empirical study.

Based mainly on the literature study results, Figure 16 illustrates key attributes of ICT that are relevant to enable CV.

Figure 16. Attributes of ICT for crisis volunteerism described in this study.

5.7.1 Uses of ICT in ISCV Research

Previous IS research on CV includes a large number of studies relating to the uses of ICT. Inspired by Liu (2014), a perspective was applied to the literature study findings to reveal the why, what, where, when and who concerning digitalisation for CV practice. The results of this analysis are presented in Table 7 on page 116. Many papers in the literature study somehow bear witness to the capabilities created by uses of ICT in the context of crisis response and CV. The three areas receiving the most attention are:

1. Management, collaboration and organisation
2. Information management and processing.
3. Communication.

More specific uses of ICT within each of these areas are listed below.

ICT capabilities for CV management, organisation or coordination

- Collaborative crisis management and coordination work between crisis professionals and volunteers or crowds (e.g Cobb et al., 2014).
- Establishing CV coordination (e.g. Batard et al., 2018)
- Managing volunteers on-site (e.g. Falasca and Zobel, 2012)
- Self-coordination/organisation of volunteers (e.g. Kaufhold and Reuter, 2016)
- Citizen roles in the crisis response context, e.g. as agents or sensors (e.g. Romano et al., 2014).
- Digital participation and digital or virtual volunteerism (e.g. Middelhoff et al., 2016).
- Networks, volunteer networks and social networks for collaborating and co-ordinating (e.g. Jaeger et al., 2007).
- Collective intelligence/knowledge (e.g. Waldman and Kamin-ska, 2015) and collective behaviour (e.g. Eismann et al., 2016).
- Supporting the overall process of volunteering (e.g. Shen and Shaw, 2004) (Shen and Shaw, 2004)
- Co-production (e.g. Linders, 2012).

ICT capabilities for information management and processing

- Registering and matching volunteer requests and offers, crowd sourcing and crowd tasking (e.g. Schimak et al., 2015).
- Situation awareness (e.g. Bram and Vestergren, 2012).
- Perspectives on informing, warning or alerting citizens and citizens seeking out crisis information (e.g. Jendreck et al., 2016).
- Information processing (e.g. Krüger et al., 2017).
- Volunteered Geographic Information (VGI) (dos Santos Rocha et al., 2016).
- Enabling decision making (e.g. Cobb et al., 2014) and sense-making (e.g. Jennex, 2011).

ICT capabilities for communication

- To achieve objectives (e.g. Eismann et al., 2016) and/or information management (e.g. Liu, 2014).
- Communication classification (e.g. Eismann et al., 2016).

5.7.2 ICT use in National Volunteer Coordination

At both the MSB and the SRK, national volunteer coordination, phone calls and e-mails were used to communicate both between one another and towards other stakeholders (CV organisations and authorities). The information-sharing platform VIS was also used at the MSB for sharing information with local and county authorities.

The SRK demonstrated the highest level of ICT sophistication during the forest fires crisis by using a database, online web functionality, e-mail as well as MS SharePoint, Excel and Word. Since 2018, the SRK has adapted a new recruitment system (ReachMee), firstly for everyday affiliated volunteer recruitment, and later, at the beginning of 2020, for non-affiliated CV. The SRK now has one system, instead of several, capable of managing non-affiliated CV recruitment and mediation. The functionality in ReachMee greatly surpasses the previous digital/manual solution for coordinating both non-affiliated and affiliated volunteers. However, further adaptations of processes and strategies are required to utilise this system's functionality to its full extent.

Why Digitalise	What to Digitalise	Where to Digitalise	When to Digitalise	Who to involve in digitalisation
Efficiency and effectiveness	Variations of volunteer organisation and spontaneity	On-site	Crisis Response	Volunteer organisations
Collaboration, co-operation and co-ordination	Volunteer attributes	Off-site	Crisis Preparedness	Non-affiliated volunteers
Community resilience and empowerment	Volunteer capabilities	Online	Everyday emergencies	Professional crisis response organisations
Utilising volunteer potential	Volunteer coordination	Single or multiple locations	Large scale crisis & disaster events	Other stakeholders with input or influence concerning the digitalising of CV
	Volunteer processes and activities			
	Crisis/Emergency Management processes and activities			
	Crisis information management and processing			
	Crisis communication			

Table 7. Summary of ISCV literature study findings on digitalisation of crisis volunteerism

5.7.3 ICT use in Local Volunteer Coordination

For communication, the local VC respondents relate only to the use of phone calls, mobile text messages and e-mails. For coordinating volunteers and resources and logging events the Microsoft applications, Excel and Word were mentioned. However, in particular, during the initial stages, pen and paper were used. The purposes here were to register requests and offers of help, to plan and schedule volunteer tasks or to log events. Facebook was used to communicate needs and receive offers to help. Due to the distribution of volunteers, in particular on-site, the role of mobile infrastructure was important. Difficulties associated with insufficient coverage were however noted.

5.8 Crisis Events

Finally, in this section, the nature of crisis events (Figure 17) is understood to impact the key components of CV practice, i.e. processes, stakeholders and tasks. Several mentions of this have also been made in the previous sections.

The type of crisis (Jakes and Langer, 2012), the events leading up to the crisis (precursors) (for example, drought the months before the Swedish forest fires crisis) and the evolution (development) of crisis events will influence if the crisis can be defined in terms of sub-events. Crisis events or sub-events (Bénaben et al., 2016) are described in terms of their location, damages incurred, their scale, scope and complexity (Waugh and Streib, 2006; Van de Walle and Turoff, 2008) or impact and risks involved (Pipek et al., 2014). The empirical study from the forest fires crisis relates to the influence and relevance of all of the above factors which are illustrated in Figure 17.

Figure 17. Crisis event attributes observed in the study.

5.9 The Expanded CV Practice Meta-Model

This chapter (Chapter 5) has used the results from the literature study and empirical study to provide a holistic understanding of CV practice. The four main components (stakeholders, processes, tasks and environments) have been presented in greater detail while the remaining two are only overviewed. The entire expanded model, displaying both CV practice components and their attributes, is presented below in Figure 18. This facilitates that readers can overview the entire practice area, but also view the attributes of components they find most interesting or relevant, depending on their needs.

Figure 18. The expanded CV practice meta-model.

Maria Murphy

Chapter 6: How to Digitally Transform CV

This chapter aims to answer the second research of how crisis volunteerism can be digitally transformed? To do this, the analytical framework for digital transformation (DT) that was presented in chapter 4 (Figure 5) is used to relate to and analyse the empirical results presented in chapter 5.

Figure 19. An Analytical Framework for digital transformation in complex contexts (Developed in chapter 4 and first presented in Figure 5).

This chapter, therefore, contributes to an understanding of what is required to digitally transform CV in Sweden. However, given the broad overlap between Swedish and international experiences conveyed in chapter 5, where both Swedish empirical and ISCV literature results are presented, it is safe to assume that there is relevance also in international contexts.

The first section in this chapter presents understandings of the main *triggers* that are pushing and creating a need to digitally transform crisis volunteerism (CV). The second part focuses on the *DT strategies* that are required to enable DT for CV. Thirdly, results on *digitally enabled capabilities* (also referred to as digital capabilities), that need to be developed to achieve DT for CV, are presented. Finally, observations of barriers/challenges and structures that need to be removed or changed are described.

6.1 Triggers for Digital Transformation

Triggers for DT for CV are best understood as disruptions, changes, challenges or opportunities that give rise to needs for transformation. For example, availability of new technology, changes in society or the expectations of citizens can lead to different sets of needs that can be addressed via DT (Zahra et al., 2006; Carcary et al., 2016; Lindgren and van Veenstra, 2018; Mergel et al., 2018). Often these may either be needs to do the same thing, but in a different way; or needs to do something entirely new, that is something that has not been done before (Matt et al., 2015; Hess et al., 2016).

Objectives for and influences on CV (section 5.2.2), help identify the following triggers for DT that will be discussed in the remainder of this section. These are:

- Future crises requiring large scale volunteerism.
- Increasing societal and community resilience.
- Support for collaboration and coordination in crisis events.
- Facilitating community engagement and empowerment in crisis response.
- Extending support to both formal and non-formal volunteerism.
- Applying holistic understandings of CV in crisis preparedness.

6.1.1 Future Crises and Large Scale Volunteerism

The scale of the Swedish Forest Fires event and the level of CV required in response to the crisis goes far beyond previous experiences in Sweden, although the refugee crisis in 2015 has similarities in that it also required large scale volunteerism in several parts of the country at the same time. This thesis results reveal that the majority of respondents, regardless of affiliation, acknowledged that the full register of types of formal and non-formal CV was required to ensure an adequate response to the events of the forest fires crisis. Different forms of CV can in this respect be understood to be a filler, applied to gaps in society's crisis response system.

MSB deems it possible that forest fires are credible threats also in the future and have continued to work to improve preparation for such events. However, other threats that could lead to crisis events requiring large scale volunteer engagement, similar to that required during the forest fires crisis, are also credible. Indeed, as I write, we are in a pandemic where large scale volunteer engagement is once again an issue.

The results in chapter 5 (Understandings of CV) reveal how volunteers relate to the forest fires crisis event in a creative and emergent manner on all levels in society. As individual citizens and as members of organisations on local, regional or national levels. The results also indicate that non-affiliated volunteers contributions are essential in large scale crisis events because the resources of authorities and formal or established CV organisations is insufficient.

I believe that future crisis events can be assumed to also demand large scale volunteer engagement of multiple levels and within multiple domains (civil, public and corporate). The lack of digital support for all forms of CV today and the results presented in the previous chapter all point to a huge potential to improve CV practice by developing digital capabilities. This is perhaps the primary *trigger* or reason pointing at the need to digitally transform CV to be more inclusive of both formal and non-formal CV.

6.1.2 Societal and Community Resilience

Local communities struggle with an array of challenges in everyday life that have to do with the nature of the social, natural and physical environment. It is to be expected that these challenges may often prove to be vulnerabilities in times of crisis. This was the case in municipality 2,

where the forest industry and the livelihood of many in this community were affected by the fires.

Local inhabitant's understandings of the fundamentals of their communities functioning, economically, socially and institutionally was an opportunity concerning the crisis event and contributed to them providing the capacity and capabilities required in the CV response.

From the perspective of creating community resilience, meaning the capabilities of a community to respond to and recover from crisis events, this type of local engagement can be viewed to play an important role. Also, efforts to prepare and enable structures and mechanisms to organise and coordinate local citizens in voluntary roles in crisis response are positive from the perspective of strengthening community resilience.

These results suggest that there is a need to create conditions favourable to enabling community engagement and resilience and that CV is the practice whereby this can be realised. The powers of digitalisation to connect and distribute information over a broad range of stakeholders is conducive to these purposes why the need to increase societal and community resilience can also be viewed as a *trigger* for DT for CV.

6.1.3 Facilitating Collaboration

The case of CV during the Forest Fires Crisis illustrates the broad range of interactions partaken in, for collaborative purposes, by a range of both formal and non-formal stakeholders (Figure 15, page 106). Each of these interactions represents a need to manage information, communication, and knowledge. In the literature study, it is also noted that many of the uses of technology observed in ISCV research relate to collaboration and the associated functions of information management and communication management.

The results of this study reveal the centrality of local CV coordination practices for enabling both formal and non-formal on-site and on-task volunteer contributions. Understandings of local aspects of the social, natural and physical environment or institutional and cultural arrangements are pointed to by local respondents as an important requirement on crisis volunteers. This points to the need to develop digital capabilities that serve the purposes of both local and national coordination functions.

The acknowledgement of the extensive needs for collaboration and interaction between CV stakeholders during large scale crisis events is a major *trigger* for DT initiatives for CV.

6.1.4 Community Engagement and Empowerment

Advances in technology and digitalisation have through all times influenced changes in citizen's behaviour in general. For example, physical, social and communicative behaviours and habits. The ISCV literature study also observes such changes, not least in observing phenomena such as digital volunteerism and the use of social media by volunteers to self-organise.

In this study, it is also observed that the smartphone was an essential digital resource and foundation for the strategies developed and applied by both local and national volunteer coordination. The positive use of powerful digital platforms for collaboration and information sharing, allows people to manage their work, economy, family arrangements, social engagements or tasks in more time-efficient, convenient and autonomous ways. It is therefore natural to assume that citizens in general, and crisis volunteers in particular, will expect to reap similar benefits from digitalisation even in a crisis.

Experiences from the Swedish forest fires crisis demonstrates that citizens are empowered by the level of digitalisation in society to act independently of authorities for self-organising and performing volunteer acts. In these instances, the institutional power associated with crisis management can be re-distributed from formal CV stakeholders to non-formal CV stakeholders.

The *trigger* here for improving CV via DT lies in the need to relate to the fact that individuals can act in a volunteer capacity in a crisis to a large extent completely independent of authorities and formal CV organisations. There is a need to support these forms of non-affiliated or independent non-formal volunteer actions, and not just those pre-planned and integrated into formal CV.

6.1.5 Support for both Formal and Non-Formal CV

The results in chapter 5 demonstrate that the Swedish crisis response system relies on both formal and non-formal forms of volunteerism. The re-

sults also indicate that neither of these CV forms has the support of dedicated ICT to perform volunteer coordination or participate in performing volunteer tasks. The results further demonstrate that, on a local level, these forms of volunteerism are highly integrated, and that local and national volunteer coordination processes also overlap to a high extent. This points at the relevance of considering the needs of all forms of CV when striving to digitally transform CV practice in Sweden.

Also, from an international perspective, based on the literature study, most ISCV research is focused on silos differentiating between different types of CV rather than observing the relevance of how different types of volunteerism are integrated on-site to function as a whole.

The realities of non-affiliated volunteer's participation in crisis response can be seen to challenge crisis management practitioners and researchers more single-minded focus on the role of formal CV organisations in crisis response. This beckons the focus in ISCV research to be more inclusive of both formal and non-formal stakeholders and practices.

6.1.6 Relating to CV in Crisis Preparedness

The results of this study indicate that crisis preparedness, before the forest fires crisis, had not considered the realities of CV to a sufficient extent. This is in part dependent on the top-down crisis management perspective that has been predominant in defining the where, why, when and what of CV. However, the results of this study clarify that CV is a practice area where holistic rather than top-down or bottom-up perspectives are required.

The full effect of a dominant top-down perspective hits the non-formal CV stakeholders and reduces the possibility for the formal crisis response to integrate these stakeholders in appropriate ways. To disregard the top-down perspective and only apply a bottom-up perspective would not create the level of integration required for successful collaborations during a crisis.

New directions are required in crisis preparedness on the part of formal CV stakeholders in particular, where the full array of CV stakeholders and bottom-up perspectives are taken into account.

One way to achieve this is to place greater emphasis on a holistic understanding of CV and the processes that need to be supported to improve the practice. For example, the matchmaking process, whereby an individual's capabilities and specific CV tasks are matched. The focus

here lies on individual capabilities and tasks, rather than membership or organisation. The focus is also on the need for digital capabilities to support these processes and enable higher levels of integration between different stakeholder's interests.

The need to improve preparedness for large scale CV in case of future events is a *trigger* for digitally transforming CV.

6.2 Digital Transformation Strategy

Making strategic choices for DT for CV is about prioritising what needs to be transformed. This includes relating to needs and triggers and making decisions regarding what areas to prioritise the development of digital capabilities for (Matt et al., 2015; Carcary et al., 2016; Hess et al., 2016; Jansson and Andervin, 2016).

Making such strategic choices is dependent on a holistic understanding of the practice of CV. In the following, I relate both to the triggers identified above and to the conceptual meta-model for CV practice (Figure 18, page 119) to take note of some of the choices that must be made to push a transformation process forward and enable the development of relevant digital capabilities for CV practice

Based on the previous discussion of triggers for DT in CV we can observe several reasons to digitally transform CV. However, in the case of CV, transformation in practice requires the participation of a broad range of stakeholders and it is reasonable to state that having different histories and contexts, these stakeholders will also have different motives and purposes guiding their actions to digitally transform CV.

It is suggested here that high-level strategic choices are required to ensure that the strategies formulated on tactical and operative levels can be viewed by all stakeholders to be aligned, even if these lower-level choices have different purposes.

Using this perspective and based on the results of this study two main strategies that would serve the purpose of enabling DT to improve CV practice are to:

- support collaboration and interaction between the entire range of CV stakeholders
- allow for support of semi-formalisation in CV practices.

The remainder of this section relates to strategy concerning what to digitalise. For example, what types of collaboration or interactions to digitally transform and what stakeholders to include in these transformations.

6.2.1 Stakeholders or Processes?

This thesis points to a range of formal and non-formal CV stakeholders involved in CV practices. These stakeholders may be understood in terms of the proximity to or integration in authority's crisis management. Closest are civil defence volunteer organisations such as SRK or FRG. After these established CV organisations, we have a range of expanding, extending or emergent organisations that step up in various ways during a crisis event. Peculiar for this group is that it is difficult to foresee who these organisations will be, depending on the location and nature of the crisis event. Finally, we have citizens that are not affiliated to the above categories but who have relevant capabilities and are willing to help out in the crisis response work.

Authorities such as the FRS, municipalities and regional or national administrations, are also stakeholders with interests in CV. They have the power to enable or disable CV initiatives, and in the forest fires crisis, they were requestors of the services of CV.

Today, support of collaboration between established CV organisations and crisis management are most highly prioritised by authorities in particular. Also, one stakeholder, the Swedish Red Cross, has been singled out, on the national level, as the main coordinator of non-affiliated volunteerism. Based on the results of the empirical study, future strategic choices, that function to improve and align digitalisation initiatives for CV with the realities of CV practice, will benefit from strengthening the capacity of formal CV organisations to take on an intermediary role and coordinate multiple forms of CV engagement and stakeholders, including non-formal stakeholders.

Here, I suggest that the required alignment between CV practice and relevant digitalisation initiatives can be achieved via a stronger pragmatic focus on commonalities in the goals and aims of CV in practice, regardless of form or administrative level. Both the local and national processes for CV during the forest fires crisis display many similarities in this respect. Both were guided by the ambition to deliver the right type of volunteer assistance, in the right place, at the right time and with the required

capabilities and equipment. Both had an initial phase when the coordination function and collaborative interfaces were established. Both had the same central function to gather requests for and offers of volunteer help and create suitable matches, based on capability assessments.

The local processes are however extended in that they also cover scheduling, support and logistics required to manage volunteers on-site. It is also observed that the primary relevance in Swedish volunteering is still on-site, so local coordination is always a necessity, whereas needs for national coordination can only be motivated to the extent that they directly support local coordination.

From a *strategic* perspective, tactical and operative initiatives to digitalise CV would therefore benefit from choosing to focus on how these central CV processes, common to multiple stakeholders, can be supported by digital capabilities that can be used by multiple stakeholders, rather than choosing to focus on the needs or perspectives of specific CV stakeholders.

6.2.2 Commonalities or Differences?

The pathways of collaboration and interaction between CV stakeholders during the forest fires are outlined in the section on collaboration structures in the previous chapter ((Figure 15, page 106). The intermediary functioning of both local and national established CV organisations is striking in this illustration. These organisations had in practice, during the forest fires crisis, the most unique position to influence how CV was enacted. The essence of this enactment is also represented by the processes outlined in this study of how they established coordination and collaborative interfaces, matched volunteer requests and offers, and locally managed volunteers on-site.

These processes can be seen as being at the heart of CV practice in Sweden (and abroad). In particular, local volunteer coordination worked highly integrated with local crisis management, with FRS and municipalities and even regions, as well as with the full spectrum of CV stakeholders. The national coordination of non-affiliated volunteerism carried out by the SRK is more peripheral from the perspective of the volunteer tasks carried out. For the national coordination to be meaningful in the future, the ties between national and local coordination need to be considerably strengthened, with ICT solutions enabling multiple stakeholder's access to the same data and information on volunteer requests and offers.

Providing common access to essential information and knowledge is how collaboration and interactions between stakeholders with different backgrounds and interests are forged. It is therefore relevant for several reasons to focus on *commonalities* in interests associated with the overall goal of CV practice, rather than on the different perspectives of individual stakeholders. I conclude that a strategic choice needs to be made concerning how collaboration may be improved. The suggestion here is that a *strategic* focus on creating digitally enabled capabilities that support commonalities in *the central processes of CV coordination* has greater potential while too strong a focus on the capabilities or interests of individual stakeholders risks hampering rather than helping the cause of DT for CV.

6.3 Digitally Enabled Capabilities

Developing digitally enabled capabilities is about harnessing the potential of technology to support the transformation of endeavours to achieve goals and values in line with the triggers and strategies discussed in the previous sections (Zahra et al., 2006; Teece, 2007; Henriette et al., 2015; Carcary et al., 2016; Vial, 2019).

The empirical data in this study revealed a large number of strengths and weaknesses in both local and national CV coordination during the forest fires crisis (Appendix A). These are associated with different parts of the CV coordination processes. Here, it is understood that many of these weaknesses may be addressed via and strengths developed by utilising digitally enabled capabilities. During the forest fires crisis in Sweden, both on the local and national level, there was no dedicated ICT available for use by volunteer coordination leaders. Also, the overall level of digitalisation is most correctly described as rudimentary.

In the aftermath of the crisis, the SRK has adapted a recruitment tool that provides the digital capabilities to more seamlessly support the gathering and flow of information on volunteer offerings and requests and the matchmaking process. So far, not all of this functionality will be utilised, which means that the inflow of information on volunteer requests and outflow of recruited volunteers will continue via telephone and e-mail, as during the forest fires crisis. In particular, the overall process of requesting volunteers remains arduous where local requesters must turn to county administrations, who turn to MSB, who first try to match needs with established CV organisations and thereafter turn to SRK who turn to

the general public. This is precisely the type of cumbersome management of information that digitalisation has the potential to eliminate, by creating more direct means of communicating needs and capabilities between volunteer requestors and volunteers.

In the following, the processes for coordinating CV are discussed to understand more specific needs that digitally enabled capabilities can address.

6.3.1 Establish Local and National CV Coordination

In the results of this study (chapter 5), on both local and national levels, the establishment of CV coordination functions are described as a series of emergent activities, taken in adaption to the nature of the crisis event, crisis environment and stakeholders involved, most importantly with the endorsement of crisis management authorities and municipalities. The spectrum of crisis events that could potentially inflict a community or nation is broad, as is the range of competencies and capabilities required to respond. The local and national volunteer stakeholders that had the capabilities required to coordinate volunteerism during the forest fires crisis will therefore not necessarily be the stakeholders best equipped for this in another crisis event. Events of the recent pandemic have also demonstrated this.

So, when we consider developing digital capabilities supporting the set-up of volunteer coordination, we need to maintain an awareness of the important function of the emergent approach that was observed in the case of the forest fires crisis. A *lagom* (a Swedish term meaning just enough) level of formalisation via the use of established CV organisations enables those establishing CV coordination functions the possibility to be flexible, and adapt to actual circumstances rather than planned for circumstances, which are not necessarily at all in line with the reality of the situation. While these emergent qualities need to be maintained, the role of preparedness is in no way diminished. The training and skillsets of the established CV organisations and individuals who set up local and national coordination functions during the forest fires crisis did not emerge overnight but are directly related to the preparedness afforded the Swedish society via the financing and support of civil defence volunteer organisations.

In other words, digital capabilities to support the set-up of local and national CV coordination functions must support both the formal structures and procedures that create preparedness to perform volunteer coordination, as well as the emergent processes that create the flexibility required to adapt to the conditions created in any specific crisis event.

Digitally enabled capabilities need to be developed to support activities in these stages when collaborative structures between stakeholders are established and coordination functions are manned and resourced. These capabilities need more specifically to take the intermediary role of volunteer coordination functions into consideration and support not just the channels and infrastructure between CV coordination and crisis management and authorities, but also between CV coordination stakeholders and other forms of both formal and non-formal CV stakeholders.

Digitally Enabled Capabilities	Primary Stakeholders	Secondary Stakeholders
Preparedness to establish CV coordination.	Authorities Established CV Organisations	Community
Preparedness to engage in CV coordination and define scope and objectives.	Established CV organisations	Authorities Community
Preparedness to share information on capacity and capabilities between collaboration parts	All formal and non-formal CV stakeholders	Community
Preparedness for resourcing of CV coordination functions	Authorities Established CV Organisations	Community

Table 8. Digitally enabled capabilities for establishing volunteer coordination.

Based on the results of this thesis (chapter 5) a list with suggestions for digitally enabled capabilities, relevant for the phase when CV coordination is established, has been compiled in Table 8. These capabilities are also related to the primary and secondary CV stakeholders that will benefit from the development of these capabilities.

6.3.2 Coordinate CV Requests and Offers

The processes whereby requests for assistance and offers of volunteer help are coordinated involves different stages. Firstly, the gathering and assessment of requests and offers. Secondly, the processing of this information. Thirdly, the engagement of the volunteers in specific tasks. Each of these is discussed from the perspective of required digital capabilities and a list of suggested digital capabilities is presented in Table 9, at the end of this section.

6.3.2.1 Gathering and Assessing Information

The capabilities of volunteer coordination functions, required to gather and assess volunteer requests and offers, is dependent on the collaborative structures that were put in place when the volunteer coordination function was established and refined.

In general, digitally enabled capabilities for volunteer coordination, need to support activities for gathering, disseminating, sharing and storing information of volunteer needs and offerings. Once again, the intermediary nature of volunteer coordination and the multilevel (national, regional, local) performance of these activities must be taken into account. These point to the need for ICT solutions to be capable of spreading and sharing information among a very broad range of both formal and non-formal CV stakeholders. The nature of crisis events and the crisis environment also play a role here, taking into consideration the possibility to utilise networks and online facilities and when and where off-line functionality may be required.

In the process of gathering volunteer needs and offerings, assessment and validation of information (e.g. volunteer capabilities or qualifications) are important features. When it comes to developing digital capabilities to share and store the gathered information in these processes, consideration must also be taken to data protection laws. For example,

informing both volunteers and volunteer requestors of their rights and obligations.

6.3.2.2 Processing Information

The second stage of coordinating CV requests and offers involves a process whereby volunteer needs and offers are matched. As was observed in the study of the forest fires crisis in Sweden, this process was performed manually, by sorting and optically scanning excel lists with volunteer details to find a match for a specific task or assignment, or by communicating with other organisations to source the required capabilities. This process of matching specific requests with suitable volunteers, regardless of affiliation, involves taking into consideration multiple characteristics of the volunteer such as their location, their physical traits and their qualifications. These are tasks that typically are well suited to be digitalised.

The local volunteer coordinators had, however, also shortcuts that could be taken. By using members of established CV organisations, they were able to assume that the volunteers would have certain characteristics without having to specify what was required. This worked however only to a point, and in the study of both local and national volunteer coordination, it was observed that knowledge of CV organisations member's characteristics, and the possibility to quickly match with needs, are often limited even within established formal CV organisations.

The nature of digitally enabled capabilities, required to support the processing of information to match volunteer needs and offers can be understood to be conditional on the perspective applied in CV. Using an organisation-centric perspective where each CV organisation views the capabilities of their members as an internal issue only, little or no support for gathering, processing and sharing information on characteristics and capabilities of CV organisations members has been developed. The result is that there, at best, is knowledge of member's capabilities within a single CV organisation. However, the possibilities to quickly and efficiently share this information between CV organisations and authorities, as crises require, are limited. The alternative to such an organisation-centric approach is a more inclusive CV practice approach, whereby the need to share information on individual CV organisations members characteristics, between formal CV stakeholders, is observed and understood to be

highly similar to the need to gather, process and share information on the characteristics of non-affiliated volunteers.

6.3.2.3 Volunteer Engagement

Once volunteer needs and offers have been matched, the next step is to formally engage and verify the participation of the volunteer. Even if organisations and individuals have volunteered their services at a certain point in time, before or during the crisis, there are no certainties concerning their availability when they are needed. Both local and national CV coordination related to this via strategies whereby availability was confirmed and scheduled.

During the forest fires crisis, non-affiliated volunteer offers were, by in large, made without any knowledge of volunteer tasks and assignments to be performed. In other words, the vast majority of civilians offering to help had very little knowledge of specific tasks and assignments where volunteer help was required. This has two main consequences. Firstly, the pool of volunteers that have offered their services may not have enough, or the best, volunteers with the capabilities required for the tasks involved. Secondly, the lack of information on what tasks volunteers are interested in performing leads to the recruitment process getting slowed down. This is because more effort is required in both the matchmaking process and the recruitment processes when the nature of the tasks to be performed is unknown. As a result, expectations regarding speed and efficiency in the crisis response are not met.

One way to mitigate these negative consequences is to develop digitally enabled capabilities that provide information on volunteer tasks, and that volunteers are allowed to choose tasks that they are interested in and have the required capabilities to perform. Such an arrangement would, however, also increase the importance of assessment and validation of volunteer characteristics and capabilities. This is also a task that readily can be digitalised.

The results in this thesis (chapter 5) point to the relevance of developing a set of *digitally enabled capabilities* to support and improve the coordination of CV requests and offers in the event of a crisis on local or national levels. Several required capabilities are presented in Table 9, where they are also related to the primary and secondary stakeholders that will benefit from these capabilities.

Digitally Enabled Capabilities	Primary Stakeholders	Secondary Stakeholders
Preparedness to manage volunteer requests	Authorities Established CV Organisations	Crisis Volunteers Community
Preparedness to manage volunteer offers	Established CV Organisations Crisis Volunteers	Authorities Community
Preparedness to match volunteer offers and requests	Established CV Organisations Authorities Crisis Volunteers	Community
Preparedness to deploy volunteers to on-site coordination	Established CV Organisations Authorities Crisis Volunteers	Community
Preparedness to recruit different capabilities for different crisis events	Authorities Established CV Organisations	Crisis Volunteers

Table 9. Digitally enabled capabilities for coordinating volunteer requests and offers.

6.3.3 Coordinate On-site Volunteer Work

Once volunteers have been engaged, and their availability has been confirmed, a new set of procedures are set in motion to prepare volunteers for their assignment and get them on-site before they start their tasks, to support them on-site in their task performance, and finally to help them finish their assignment and leave the worksite.

Before an assignment, volunteers need information about what equipment and clothing they need to bring with them and what will be

provided on-site or on-task. The next challenge is getting the volunteers on-site and/or to where they need to perform their assignments (task-site). For some assignments, volunteers may be able to make their way, but for others transportation must be arranged, as was the case during the Swedish forest fires crisis. Volunteers need information on the tasks they will be expected to perform and they need information about when and where their services will be required.

During ongoing volunteer work, volunteers need to be supplied with food and water. Time for rest and if required, social/psychological support, will also be needed. This all presupposes support structures around the working volunteers to ensure their health and safety. A further need is to know where volunteers are at all times. This is particularly important when volunteers are working in risky environments. For example, when volunteers engaged in post-extinguishing tasks (to ensure that fires that have been put out do not flare up again).

There is also a need to know that volunteers have completed assignments and that they are leaving the site. Before leaving it may also be necessary to facilitate a handover to other volunteers who are going to continue the same task. In the interests of improving their operation's volunteer coordination may commonly have an interest in evaluating the volunteer's experiences after the event, and therefore perform follow-ups.

The results in this thesis point to the relevance of developing *digitally enabled capabilities* for information management and communication to support and improve the coordination of on-site crisis volunteer task performance. These are presented in Table 10 and are related to the primary and secondary stakeholders that will benefit from the development of these capabilities.

Digitally Enabled Capabilities	Primary Stakeholders	Secondary Stakeholders
Create, spread and share pre-assignment information to volunteers	Local CV Coordinators Crisis Volunteers	Authorities Community
Schedule on-site volunteer work	Local CV Coordinators Crisis Volunteers	Authorities Community
Plan logistic arrangements for on-site volunteer support	Crisis Volunteers	Authorities Community
Support counselling and crisis support for volunteers	Crisis Volunteers	Community
Locate and track volunteers and their comings and goings	Local CV Coordinators Crisis Volunteers	Authorities Community
Support handovers and evaluations when volunteers have finished their tasks	Local CV Coordinators	Crisis Volunteers Authorities Community

Table 10. Digitally enabled capabilities for coordination of on-site volunteer task performance.

6.4 Challenges

In the sections above, volunteer behaviour has been discussed from various perspectives. Overall, digitalisation in society has influenced citizen's expectations concerning the availability and use of digital capabilities in crisis events, not least to facilitate volunteer responses (Auferbauer et al., 2015; Saaroni, 2015; Díaz et al., 2017; Zettl et al., 2017). When there is no dedicated ICT, citizens turn to the everyday tools they are used to, to self-organise and perform volunteer work. Societal

digitalisation is therefore expected to be influential in changing both formal and non-formal forms of volunteerism (Sørensen, 2016; Ramsell, 2021).

In this study, it is observed that formal CV stakeholders in Sweden are either reluctant to initiate or unaware of what the development of digital capabilities potentially can do to support more emergent and autonomous volunteer behaviour in crisis events. This is a barrier for DT for CV in Sweden. I suggest that the barrier is partially a result of the institutional logics that prevail within FRS, MSB and the SRK. These are logics that are contingent on these organisations main goals and assignments. In the case of all three organisations, the fundamental and common goal is to save lives and property and alleviate suffering in crisis events. Digitalisation is, by many that were approached in this study, more so viewed to supply tools for performing certain activities than the capability to change how work is carried out and make significant improvements.

Besides, and even because of, these institutional logics there are structural arrangements in the Swedish crisis response system that marginalise more emergent and autonomous forms of volunteer behaviour. Non-affiliated and emergent forms of volunteerism are those most marginalised in the Swedish crisis response system. However, established forms of CV also lack the digitally enabled capabilities they need. Therefore, in the following the influence of institutional logics and structural arrangements on digitalisation of both formal and non-formal types of CV are discussed.

6.4.1 Aligning with Realities of Non-affiliated CV

Institutional logics are suggested to influence initiatives taken to digitally transform CV, in a manner that undermines support to non-formal and autonomous forms of crisis volunteer contribution. While the MSB respondents demonstrate an awareness that there is a need to relate to non-affiliated volunteers, they are more evasive about what this means in practice. It is clear however that the contribution of non-affiliated volunteers and emergent groups is not considered as important as that of established CV organisations. The institutional logic expressed by these respondents is that society should first and foremost rely on what we know, the traditional forms of established CV organisations.

The FRS respondent's logics also relate first and foremost to the potential difficulties associated with more autonomous forms of volunteer

behaviour. However, the actual events and realities of volunteer contributions during the forest fires crisis seem to contribute to changing these logics. Nevertheless, FRS still place responsibilities for organising and coordinating these efforts outside their organisations, with CV organisations or municipalities.

At the SRK, the contribution of non-affiliated volunteers is readily validated and acknowledged. However, the institutional logics at the SRK leave non-affiliated volunteers at the bottom of the volunteering hierarchy. This results in several avenues for the development of digitally enabled capabilities for non-affiliated and emergent forms of volunteerism not being explored.

Following changes in the Swedish national defence strategy, support and rejuvenation in these organisations have suffered for many decades now. A new direction in this strategy has however led to the MSB wishing to rebuild these organisations so that they can provide the volunteer capacity required in crisis events. This logic is understandable, but it risks ignoring the gap that exists right now whereby many of these organisations have few members and lack the capacity or the capabilities required in an event such as the forest fires crisis, or indeed the ongoing pandemic. It also ignores the question of how feasible it is to build up CV response capacity within these organisations to the level required in large scale crises.

Both this study and previous studies of CV (Barbour and Manly, 2016; Mees et al., 2016; Abedin and Babar, 2018) relate to problems associated with institutional logics and arrangements among authorities. In particular, the concept of non-affiliated volunteerism is infected, whereby these volunteers are often assumed to be unqualified, unpredictable and unreliable (FRS and MSB respondents in this study and Barsky et al., 2007; Johansson, 2009). This attitude will influence the steps taken to integrate non-affiliated volunteers in the crisis response.

The result of these institutional logics and assumptions means that there is little preparedness or initiative to build digitally enabled capabilities for processes that can source, check and verify the qualifications of non-affiliated volunteers and match them with the needs emanating from the particular crisis events, and facilitate their integration in formal CV. There would also appear to be a particular lack of initiative to support the local level with digitally enabled capabilities, where volunteers are tasked on-site.

In summary, logics among stakeholders in the formal crisis response system in Sweden need to be realigned with both the necessity and potential provided by formal/established CV organisations and non-formal forms of CV, and with local CV practices in particular.

6.4.2 Aligning Types of CV at the SRK

During the participation in projects and groups at the SRK, it was noted that the SRK has a low level of maturity concerning process management which would normally bridge the gap between strategic priorities and operations. Furthermore, the organisation has been turbulent, being restructured organisationally several times over the past years, most recently in 2019. In the projects to develop both everyday volunteerism and CV at the SRK, there was uncertainty regarding to what extent existing priorities provided for the development of both affiliated and non-affiliated CV. It was observed that these uncertainties prevailed despite the prioritising of CV at a strategic level.

This discrepancy is understood to be related to the lack of clearly defined processes at the SRK and to hamper efforts to digitally transform CV. While strategic objectives and goals are required to support and enable digitalisation, they are not sufficient to develop the tools and systems required to support operations. Information systems and digitally enabled capabilities are only in part technology, the other part is processes and structures.

In the system adopted by the SRK in the aftermath of the forest fires crisis, the functionality allows for the coordination of both affiliated and non-affiliated volunteers. The stakeholders given access to the system are however only SRK stakeholders. Other stakeholders (authorities or other volunteer organisations) requiring volunteers are not granted access to view the volunteer offers in the system directly, but rather must communicate their needs via e-mail or telephone to the SRK. This is in contrast to the open system employed by another NGO called *Volontärbyrån* (www.volontarbyran.org) where external organisations and authorities can create and publish assignments.

This is an example where the full capabilities of digitalisation are underutilised due to structural challenges. The reasons for this can be understood to be related to the terms and dynamics involved in the relationships between the SRK, MSB and other CV organisations. By not providing the possibility for external actors to create their own assignments or

to search for volunteers in the SRK system, existing digital enabled capabilities to source and recruit relevant volunteer capabilities are not being utilised to their full extent and potential. This would also appear to be contradictory to the SRK's ultimate goal, to be the first volunteer organisation to be contacted in a crisis.

Efforts by the SRK to relate to the needs of other external stakeholders such as municipalities, county administrations, other CV organisations or society and communities have not been observed in this study. When questioned on this, the SRK crisis manager explained that the involvement of external actors is restricted to receiving requests for volunteers within the scope of the MSB assignment, and there is reluctance at the moment (2020) to go beyond this scope.

The possibility for the national SRK organisation to align their work with both SRK volunteers and non-affiliated volunteers for CV appears to be hampered by a lack of availability of information on the characteristics and capabilities of their members. An ICT system (volunteer tool) was introduced at the SRK during 2018 and could have had the potential to fill this gap. However, the implementation has been unsuccessful due to cuts in the project and the subsequent reluctance of local RK organisations to use the system. Also, while a majority of SRK members are over 65 years of age⁷, less than 3 per cent of those offering to help via the SRK online form during the forest fires crisis of 2018 were over 60 years of age. 40 per cent were 18-30 respective 31-45 years old.

6.4.3 Structural Challenges

Typically in a business, structural change requires the support of top management (Matt et al., 2015). However, structural realities for CV in the Swedish crisis response context reveal that it is not transparent who should take the lead for developing a DT strategy for CV. Due to the multitude of stakeholders involved, leadership issues for CV become blurred. As a background, we should also consider that Sweden is a very small country, with a population of only 10 million. Although there are pockets of smaller initiatives in Sweden, no one is taking any obvious lead to significantly transforming CV via digitalisation. Swedish FRS

⁷ The SRK has not been able to provide specific data on the age distribution of their members. Also, MSB was unable to provide any information on the age distribution of members in any of the civil defence volunteer organisations.

chiefs also express frustration over the lack of coordinated national efforts to develop digital solutions suitable to their needs concerning engaging volunteers and also in regard to using volunteers for everyday emergencies (CARER knowledge cluster, 2018).

All respondents in the study were invited to explain their views on digitalisation in the context of experiences from the forest fires crisis, and also where responsibilities for digitalisation of CV lie in the Swedish crisis response system. Here a dilemma can be observed. Both local and national volunteer respondents point to the need for digital capabilities supporting operative work with both formal and non-formal volunteer activities. At the same time, in particular, local respondents, recognise that their needs at the local level are far from unique and mean that it, therefore, would be more sensible for the national stakeholders to take responsibility for developing digital capabilities suited to local uses. However, in the interviews with the MSB respondents, they do not know of any initiatives to support the digitalisation of CV in this or any other manner. The initiatives at the SRK have not either had a focus on local needs, other than those within their own organisation.

Multi-dimensional structures, in terms of levels and domains, in the context of CV contribute to blurring lines concerning what stakeholders can contribute to DT. The question of digitalisation and DT to enable local operative functions, such as CV coordination, lack a structural platform in the Swedish crisis response systems current arrangement. To enable DT for CV and improve the capacity and functioning of the Swedish crisis response system such a platform needs to be established, either within current structures or via changes to these structures.

Via the results of this thesis (chapter 5), the concept of CV coordination has come to be understood as significantly more dynamic and transitional, whereby volunteers' degree of affiliation to an organisation can evolve and change both over time and during an event. Also, crisis events themselves evolve and emerge, influencing needs for volunteer capacity. Cases and empirical findings of many studies indicate that organisation in the crisis response context is a more fluid matter, whereby volunteers self-organise or groups emerge and non-affiliated volunteers are temporarily mediated or managed by intermediary CV organisations. Also, the nature of crisis events and the crisis environment can readily require volunteers to have the capabilities or capacity of established CV organisations.

In summary of this chapter, there is potential to develop knowledge of and arrangements regarding DT triggers, DT strategies and digitally enabled capabilities to improve CV practice. There are, however, several challenges that must be addressed to do this.

The results and analysis from both this and the previous chapter will be discussed and related to a broader context and theory in the following discussion (Chapter 7).

Chapter 7: Discussion

In this chapter the relevance and contribution of this thesis is discussed from the broader contextual perspectives on the crisis response system, digital transformation (DT), IS design, complexity and ISCV research that was delivered primarily in chapters 1,2 and 4, but also to a certain extent chapter 5.

The main topics of discussion are the relevance of:

- delivering a holistic understanding of CV practice
- relating to CV using practice and process perspectives
- regarding CV as a complex practice area
- relating to DT for CV rather than ICT⁸ for CV
- translating broader contextual needs to application contexts.

Also, the research approach, methodology and limitations of the thesis are discussed toward the end of this chapter.

7.1 Delivering a Holistic Understanding of CV

Problems associated with reductionist approaches in IS research in general and ISCV research, in particular, whereby narrow perspectives and aspects of CV practice are delivered in research products, were discussed in chapters (1 and 4). The conclusion there was that there is a need to pay attention to the relevance of broader contextual factors and the complexity associated with the CV practice area.

How previous ISCV research is performed and presented can be likened with serving a whole cake in miniature portions, and distributing these portions in different rooms in the house, or even in houses down the street, rather than at the dining table. One explanation for this is the intense focus on the relevance of the IT-artefact, and its immediate application context, that has been dominant in IS research (Alter, 2003a; Herwix and Rosenkranz, 2018; Lee et al., 2015; Sørensen, 2016). Such research is zooming in on slivers of, or crumbs of the cake. However, another reason for reductionism is the format for publication of research

⁸ Information and Communication Technology

findings via journals and conferences where space is limited and the possibilities to contribute to more holistic understandings of complex phenomena are restricted. The plates are simply too small.

Via *the monograph format* of this thesis, I have had a bigger plate, affording me the possibility to attempt to piece the cake together and read the writing on the top. This is achieved via the holistic conceptualisation of CV practice delivered in the CV practice meta-model as well as via a combination of inductive and deductive research approaches and the use of grounded theory methodology.

The components of the CV practice meta-model represent slices of cake, while the attributes represent slivers or crumbs, and the high-level representation (the meta-model) demonstrates the relationships between the components, which represents the whole cake. This holistic presentation of CV practice represents a unique contribution to ISCV research. In the literature study for this thesis, I have only found a few publications with a similar holistic approach. One is (Liu, 2014) crisis crowd sourcing framework, where the who, what, why, where, when and how of crowd sourcing is explored in a holistic manner, similar to that applied in this thesis. The relevance of this approach is perhaps also confirmed by the high degree of citations associated with this publication.

The conceptual meta-model for CV practice (Figure 18 in chapter 5) incorporates and combines several perspectives relevant to understanding the domain of CV practice, with a view to its digital transformation. Besides the perspectives afforded via the models six individual components, the model also allows us to *combine top-down and bottom-up perspectives*. This was also observed to be unusual in the study of previous ISCV literature where a top-down perspective is most dominant. This possibility is afforded this thesis via the broad understanding rendered to the CV stakeholder component, whereby both volunteers and crisis management/authorities are recognised to be stakeholders in CV. This opens up for relating to the complexities involved in CV to a greater degree. Authors, such as Zettl et al. (2017), relate to the intermediary role of established CV organisations between crisis management and non-affiliated volunteers. Hughes and Tapia (2015) also have a similar approach to CV stakeholders when they research meetings between crisis management and crisis volunteers via social media platforms. This thesis clarifies, however, to a greater extent the relevance of taking a more holistic view of CV stakeholders and their relationships to one another as well as to

other components of the CV practice meta-model. This approach brings us, therefore, closer to understanding the realities of CV, as is required to achieve DT for CV, and addresses gaps in previous ISCV research.

The CV practice meta-model also affords us the possibility to apply *strategic respective operative perspectives* on CV practice, which is a further prerequisite for DT and IS design. The strategic perspective can be applied primarily (although not solely) around understandings of the crisis event and CV environment components, and their relationships to the CV process component, while an operative perspective (relevant to developing digitally enabled capabilities) more so will relate to the CV process, CV stakeholder, CV task and ICT components. This adds to current ISCV research, where the dominant perspective today is operative, mainly focusing on ICT, task and stakeholder components, and where strategic aspects are more peripheral to the research endeavours. This can, for example, be noted in the growing body of crowd sourcing, or crowd tasking research (Auferbauer et al., 2016; de Albuquerque et al., 2016b; Kaufhold et al., 2019; Ludwig et al., 2017; Middelhoff et al., 2017).

The holistic approach applied in the CV practice meta-model allows us to relate to and *explore new types of arrangements in CV practice*. We can, for example, relate to the implications for processes, ICT and tasks when new types of CV stakeholders are introduced or concerning different types of crisis events, or crises in different environments. Ramsell (2021) describes an approach to emergency volunteerism, whereby authorities support volunteer participation outside the formal crisis response system. The volunteers have a loose affiliation to a group of community volunteers. These volunteers decide momentarily, in the case of an emergency, if they will participate in the response or not. The CV practice meta-model can be used, in this case, to perform a holistic exploration of all aspects of this new type of volunteer practice, and thereby enable understandings of how this practice can be related to CV practice and benefit from DT for CV practice.

7.2 Process and Practice Perspectives on CV

The comprehensiveness of the practice and process descriptions delivered in the results (chapter 5) is, in the context of previous ISCV research, one of the most unique and valuable contributions of this thesis. The observation of the case of CV practice, in the forest fires crisis in Sweden in

2018, facilitated achieving the objective of this thesis to gain a holistic understanding of CV. While the CV practice meta-model provides a holistic description of the CV practice area, the three main processes for volunteer coordination (Establishing volunteer coordination, Managing volunteer requests and offers and Managing volunteers on-site) are part of the CV process component.

Many ISCV papers related to various activities or steps involved in CV practice or CV processes. I have, however, found none that assemble the overall processes involved or provide a more holistic perspective on *CV practice as a whole*. Orloff (2011), while not expressing any direct awareness of presenting a practice or process perspective and not having an expressed IS interest, gives the most comprehensive description of the activities involved in coordinating non-affiliated volunteers, including all of the three main processes mentioned above.

Spotting this gap in previous research is, of course, one of the most important motivators for the practice and process perspectives that have guided the thesis approach. However, even more, important is the recognition of the usefulness and relevance associated with using practice and process perspectives in the CV context (see more about this in section 2.4).

A practice perspective implies an emphasis on *meaningfulness* whereby stakeholders, actions, linguistic objects and material objects are assembled and interrelated in meaningful ways that make sense to those involved in the practice (Goldkuhl, 2011). Practice is, however, seldom self-contained, and these meanings are, according to Goldkuhl and Röstlinger (2006), always *conditional on factors beyond the specific actions involved in the practice*. In the CV practice meta-model, these meanings are driven via the crisis event and crisis environment components.

Stakeholders are central to the concept of practice in that they *perform actions*. Actions in practice are viewed to be performed by individual actors, collectively by several actors (a group), by humans and artefacts together or by artefacts in prearranged ways (Goldkuhl, 2011). In the CV practice meta-model, stakeholders are noted to be actors in this respect. Also, of importance for the concept of practice is the holistic notion whereby elements of the practice are interrelated via their relationship to the practice as a whole, and that practice is a *dynamic* concept continually evolving (Goldkuhl, 2011).

Practice and process are strongly related concepts with many similarities, such as their transformative and coordination purposes. Practice is, however, considered to be broader than the process concept whereby *practice can involve several processes* (Goldkuhl and Röstlinger, 2006). The overall comprehension of CV practice and the CV process component corresponds with this understanding. It is also via the stakeholder and process components that we come closer to the elements of emergence and dynamics that are a natural part of CV practice.

7.3 Regarding CV as a Complex Practice Area

The meta-model construct, used to conceptualise a holistic understanding of CV, answers in several respects to needs in characterising complexity as were discussed in chapter 4. On a high level (relationships between components) or on a reduced level (relationships between attributes), the relationships between the main CV practice components have the outward appearance of linearity. However, on the whole, the CV practice meta-model is asking us to observe multiple factors simultaneously and to consider the *multi-dimensionality of CV and the nonlinearity* involved when attempting to understand the causal effects of these relationships. Using the CV practice meta-model, it can be readily understood that the outcome of singular actions in CV is a complex process, where *outcomes may often not be determined*. The components and attributes are highly entangled in the network-like structures, where *bottom-up mechanisms and emergence* contribute to *adaptive and dynamic mechanisms*. These are traits of complexity according to Merali (2016) and Benbya and McKelvey (2006), who relate to how multiple factors often interact in non-additive manners and state that factors can reinforce or cancel out each other in a complex system. The CV process component is of particular interest in this context because it is via these processes that the adaptive mechanisms required to go from a situation characterised by chaos to order are enacted.

From a complexity perspective, the CV practice meta-model reveals *how macroscopic properties (the whole) arises out of microscopic properties* (components, attributes, interactions, relationships, structures or behaviours). This is in line with Merali (2016) theory that identifying relationships is not a sufficient ground for understanding complexity and that it is also necessary to understand the nature of emergence in terms of linkages between the system as a whole and environmental factors.

A central interest of complexity theory in information systems is *the capacity of complex systems to adapt and achieve equilibrium*. This is a process whereby order is created from chaos (Byrne, 1998). According to Merali (2016), self-organisation is the generative mechanism enabling systems to maintain an existence far from equilibrium, as is a typical need in crisis or disaster contexts. The adaption mechanisms involved in *self-organisation* are possible based on the complex interactions between components. This thesis demonstrates, that in the case of CV, self-organisation can also be understood to arise from interactions with their roots in the CV process component, where there is an ability to relate to other components and adapt new structures and forms of behaviour appropriate to the crisis response. For example, when local volunteer coordination more so emerged and evolved, and groups of volunteers self-organised in parallel with the formal crisis response system.

7.4 Relating to DT for CV rather than ICT for CV

Besides a holistic understanding of CV practice, this thesis also develops an analytical framework to understand how to achieve digital transformation for CV. In the context of ISCV research, this can be seen as a unique contribution. Section 4.1.3 refers to a search among the keywords and abstracts of 1000 ISCV publications for the term “digital transformation” which resulted in no matches.

In section 4.3 it is noted that although some research on DT considers e-government and public sector contexts, most research pertains to the business domain. DT research is therefore limited when it comes to relating to aspects of greater relevance to more diverse domains, such as CV practice. Also, as is discussed in chapter 4, and to a certain extent demonstrated in section 5.7.1, the common focus of ISCV research is ICT for CV rather than DT for CV.

The analysis of the thesis results in chapter 6 used the analytical framework for DT developed in chapter 4 and contributes therefore to a new understanding of how to achieve DT for CV. *Triggers* for DT are described as well as *DT strategies* and the *digitally enabled capabilities* that are required to digitally transform CV.

The *triggers* that have been identified relate to the broader relevance of DT for CV. Why do we need DT for CV? The main reasons identified relate to community engagement and resilience, the large scale collabo-

ration required in CV practice, the need to relate to all types of CV stakeholders and types of practice rather than just a few. While these aspects are often researched in their own right, it is less common (or even non-existent) to make the connection that is made in this thesis to the process of digital transformation.

In chapter 6, DT strategies are suggested to be needed to relate to these triggers by considering the importance of the intermediary role of established CV organisations, emergent aspects of CV coordination and needs to enable non-formal CV to a greater extent. This thesis suggests that to achieve DT and design relevant ICT, a *DT strategy* is required at a national level. Once again, the previous ISCV research area does not relate to the concept of digital transformation, and therefore not either to this strategic aspect. I have only taken note of one article that considers strategy (although not specifically digital or DT strategy). This was a resilience strategy, for integrating volunteers in emergency response (Hälterlein et al., 2018).

Meyerhoff Nielsen (2019) relate to DT as a national government issue and maintain that DT strategy must be linked across all levels (national, regional and local) of government to minimise stop-starts and zig-zags in the implementation of the digital strategy. While collaboration and consensus between stakeholders are central to achieving this, it is not enough. Strong and recognised mandates when collaboration breaks down or consensus is not reached must also be enabled. They observed the role of a cross-governmental steering committee that helped maintain a holistic perspective on DT strategy for the whole of government as opposed to silos or levels of government. Finally, Meyerhoff Nielsen (2019) observed a distinction that was made between governance or e-governance and e-government. The former is considered to cover all processes of governing and decisions made concerning IT and technology use, while the latter, e-government, is restricted to the use of ICT and its application by the government for the provision of information and public services to the people. From this perspective DT is viewed to be an e-governance rather than an e-government issue.

This thesis demonstrates that Sweden lacks the type of strategy and structure that Meyerhoff Nielsen (2019) maintains is required *to enable digital transformation across multiple levels of government*. The findings reveal that there is no DT strategy addressing the needs associated with CV practice, and initiatives appear more so as scattered dots on a map or

in silos rather than as a clear path or road leading somewhere and enabling capabilities for connectivity, distribution, scaling and intelligence in this context. This thesis points, therefore, to the necessity of working on a policy level to create the conditions required to enable DT for CV.

Digitally enabled capabilities are required to support the main CV processes, at the core of CV practice, and that is common to both local and national CV stakeholders. These are processes for establishing volunteer coordination (a highly emergent and dynamic process), for coordinating volunteer requests and offers and for coordination of on-site CV. The need to develop these capabilities is a product of both the thesis results on holistic understandings of CV practice and the understandings of DT triggers and strategies arrived at in the analysis.

In Drechsler and Hevner (2016) four-cycle model for IS design research (see section 4.1.3), there is a change and impact cycle within which *a broader, environmental, context is translated to inform the more immediate application context*. While Drechsler and Hevner (2016) point to the relevance of performing this translation, they do not advise how this can be done. However, this thesis demonstrates that the analytical framework for DT developed in chapter 4 can be used for this purpose. The translation process is demonstrated in chapter 6, where the holistic understanding of CV practice is used to identify DT triggers and strategies and define the digitally enabled capabilities that ICT needs to address.

7.5 Translating Needs to Application Contexts

This thesis results demonstrate that the practice area of CV represents a complex, multi-organisational and multi-dimensional context, unlike those traditionally studied in IS research. In chapter 4, problems associated with the IS discipline and IS research were also discussed. These included problems with too narrow a focus on the IT-artefact and bounding of IS research to the immediate organisational context of the IT-artefact. These approaches are understood to be reductionist and detrimental to the purposes of relating to real-world needs in a non-organisation based and complex context such as CV practice (Benbya and McKelvey, 2006).

Majchrzak et al. (2016) suggest an expanded definition of IS theory, to round this discussion and the problem of reductionism. First, *theory of the problem*, that contributes to understanding how and why an organisational or societal problem (related to ICT) occurs. Here, approaches akin

to those applied in behavioural science research have greater representation, and broader contextual factors, beyond the immediate context of the IT-artefact, and closer to what can be described as real-world needs, are used. Secondly, *theory of the solution*, that contributes to understandings of how and why ICT is expected to contribute to solving a particular organisational or societal problem, along with the additional (non-ICT) conditions necessary for the success of the ICT solution.

ISCV research has so far demonstrated greater representation from the perspective of focusing on the *theory of the solution*, with a narrower focus on IT-artefacts and their immediate context. This is particularly obvious via the strong interest in IT artefact design relating to crowd sourcing solutions (Havlik et al., 2013; Chu et al., 2015; Zhang et al., 2019b), crowd tasking (Auferbauer et al., 2015; Barrenechea et al., 2015), uses of social media (Chroust, 2013; Reuter et al., 2015), crisis mapping (VGI) (Kerle and Hoffman, 2013; De Albuquerque et al., 2016a) and collaboration solutions (Cobb et al., 2014; Ernst et al., 2017). Design or development of IT artefacts is also considered for needs such as emergency description (Erskine and Pepper, 2015), networked community resilience (Comes, 2016), position tracking (Hanssen, 2015), distributing emergency information (Hidayanti and Supangkat, 2018), alerting systems (Kaufhold et al., 2019), decision support (Neville et al., 2018) or volunteer recruitment (Thomas et al., 2019).

IS research that contributes more so to a *theory of the problem* relates to understandings of real-world problems, beyond the narrower scope of an IT-artefact. In ISCV research, areas that are explored from the perspective of a theory of the problem are, for example, volunteer performance (Alam et al., 2012), volunteer motivation (Gómez-Barrón et al., 2019), volunteer behaviour (Kvarnlöf, 2018), volunteer coordination (Meissen et al., 2017), participation (Aitamurto and Saldivar, 2017), resilience (Kaminska, 2016), social media use (Reuter and Kaufhold, 2018), emergence (Lai, 2017), community engagement (Pilemalm et al., 2013), digital volunteerism (Radianti and Gjørseter, 2019), collective action (Tim et al., 2013) or semi-professional involvement (Yousefi Mojir et al., 2019).

The holistic conceptualisation of CV practice in the CV practice meta-model represents this thesis main contribution to the theory of the problem while the analytical framework for DT and its application in this thesis can be viewed as closer to contributing to a theory of the solution,

or perhaps more correctly as a way of bonding between a theory of the problem and a theory of the solution. This is in line with the middle ground approach suggested by authors such as Drechsler and Hevner (2016), Goldkuhl (2016) or Herwix and Rosenkranz (2018) whereby it is considered more relevant to relate to *both* rather than *either-or* when it comes to choosing between a theory of the problem and a theory of the solution.

In answer to observations that IS design initiatives *fail to meet real-world needs* (Dahlbom, 1996; Alter, 2003b; Rogstadius et al., 2013; Sørensen, 2016), I maintain that these thesis contributions, that conceptualise the problem (the CV practice meta-model) and suggests ways forward to achieve relevant solutions (via application of the DT analytical framework), bring us closer to *meeting real-world needs of CV practice*. This thesis approach demonstrates how the gap between a theory of the problem (broader contextual focus beyond the IT-artefact) and a theory of the solution (context more immediate to the IT-artefact) can be bridged over by using the DT analytical framework, and this facilitates the translation process that Drechsler and Hevner (2016) (section 4.1.3) suggest is needed between external and internal environments.

7.6 Research Approach

The applied approach to researching CV practice was to a high degree influenced by my own previous experiences in the roles of IT business consultant and analyst for a government agency. In these roles, I became accustomed to going behind the veil, not taking observations at face value and most importantly, to premiering facts over assumptions. These experiences contributed to my combination of critical realist and pragmatic approaches to ontology and epistemology in this thesis.

These philosophical approaches can be surmised in two understandings. An understanding of practice as a collection of activities (processes), stakeholders, inputs, outputs and contextual factors that may be considered real when they are thought about, when they are exercised, or when they are observed. In other words, I do not need to directly (physically) observe these practices to understand or influence them.

The second understanding is about how to relate to knowledge of the practice (action). What is this knowledge, what is it about, what is its relevance? Understandings of the multi-dimensional relationship be-

tween knowledge and action (knowledge for action, knowledge about action and knowledge through action) have helped to maintain interest in multiple perspectives and compose the more holistic understanding of CV practice presented in the thesis. For example, recognising that actions to digitally transform CV require knowledge of (about) CV practice (action) and that this knowledge can be used to understand how to digitally transform CV, that is DT (action) through understandings (knowledge) of CV practice. The CV meta-model can also be used to generate new knowledge to promote action in or for CV practice.

Gaining an understanding of previous research at the early stages of the research project, in particular regarding dominant assumptions and gaps (see chapter 1), was influential in guiding the focus of the empirical studies. This enabled me to compensate for gaps in previous research regarding CV processes and tasks and relate to dichotomous assumptions related to top-down and bottom-up approaches and types of volunteerism and hone in on the relevance of a more holistic approach.

A final reflection relates to the format for this thesis publication. At the onset of this research, the intention was to follow the custom of my institution and publish a compilation thesis. Plans were, however, changed, resulting in the production of this monography. This change took place after the publication of the first article (Murphy, 2020), and was due to the holistic nature of the knowledge contribution. The monography format was simply more suitable to the purposes of this thesis and presenting its findings.

7.7 Methodology and methods

Issues of quality, transferability and ethics have already been discussed at length in chapter 3, why I will be brief in this section.

Threats to the quality of this thesis as a whole could have been a lack of rigour in dealing with my preconceptions regarding the practice of CV and the stakeholders involved. I have therefore been careful to ransack myself in this area and be aware of the influence exerted. On the whole, previous experiences are considered to be an asset in facilitating a research approach capable of relating to the complexity associated with the research topic.

The holistic approach and quality in the thesis are dependent on the ability to convey rich descriptions. Here the risk is that readers will drown in the detail. So while it was important to convey descriptive detail, it was

equally important to ensure that readers also could keep track of the bigger picture. To help achieve this efforts were made to ensure clarity in the use of language and the structure in the presentation of results and analysis. Most importantly, however, the results were also modelled and presented as an overall CV meta-model, as models of individual components and finally in the expanded CV meta-model. These models facilitate keeping track of where one is in the greater CV practice area while relating to more specific details and give the reader the possibility to zoom in and out on specific areas of interest.

Another methodological risk, when relating to a broader research topic, is that the validity of the results may be questioned and that the results or conclusions have less persuasive power than desirable. In this thesis, the sampling procedure ensured sufficient variation in the empirical data generation process to facilitate understanding. Also, the addition of insights from previous research further facilitated the broad grounding required in the thesis. This means that interpretations of results are conveyed with a greater sense of conviction, which is positive for the persuasive power of the thesis.

The final and perhaps most important methodological aspect or risk with the findings of this thesis is their transferability. Although this study relates to a single empirical case, the combined inductive-deductive (abductive) approach has broadened the data generation process considerably, taking in experiences from many other relevant cases. This means that the results can be considered to have broad transferability in terms of usefulness in CV practice contexts beyond Sweden or beyond forest fires crisis events. However, I would also suggest that the approach to relating to a research topic as a practice area broadens the transferability of some of these thesis findings to other non-CV practice areas. For example, demonstrating how a holistic understanding of a practice area can be achieved and presented. Also, demonstrating how a practice area can be analysed to understand how it may be digitally transformed. It is however you, the reader, who will have the best possibility to assess when, where and how the results of this thesis may be transferred for use in other research or practice settings.

7.8 Limitations of the Thesis

This thesis has focused on CV practice in the context of large-scale crises and disaster events. This means that the thesis contributions are not designed specifically to contribute to knowledge on volunteer contributions in everyday emergencies. This could be considered a limitation. However, I argue, that the high-level CV meta-model may also be readily applied to understand volunteerism in other contexts. This could be achieved by researching understandings of emergency events, the relevance of the environment in which the emergency takes place, the roles and relevance of volunteer stakeholders in emergencies, emergency volunteering processes and tasks, as well as the role of ICT in supporting emergency volunteerism. On the second, more detailed modelling level, I would suggest that there also is considerable overlap of relevant attributes, but that it would most likely be relevant to evaluate the relevance of certain attributes, the nature of relationships and perhaps add other attributes if necessary.

A limitation or deficiency in this thesis conceptualisation of CV is concerning the role of municipal and regional actors as stakeholders in CV. The thesis has focused on the operative roles of stakeholders at the local level (Fire and Rescue Services and Volunteer Coordination). In Sweden, these operative stakeholders are, however, aligned in a greater structure with municipal and regional actors that have not been included in the focus of this study. On the whole, this is not considered to impede the relevance or validity of the thesis findings. It would, however, be beneficial in future studies to relate also to these categories of stakeholders, to enhance the CV meta-model.

Another limitation is the scope of the empirical studies, which only took in the Swedish context and a forest fires context. It would therefore be highly relevant to test the model in other countries and other crisis events. A final limitation of this thesis, as well as most ISCV research, is that it has not considered the perspective of crisis victims. As in the case of municipal and regional stakeholders, I believe that including victims perspectives would contribute to improving the overall understanding of CV practice and the CV meta-model.

Concerning the analytical framework for DT in complex contexts and its application to understanding how CV can be digitally transformed, there is a limitation in that the thesis scope stops at the identification of

digitally enabled capabilities. Ideally, I would have liked to have followed on from this stage to an application design context to design relevant ICT for CV.

Finally, although considered a strength in this thesis, the holistic approach taken has a limitation concerning the depth at which the components of CV practice were researched. If one or a few of these components had been focused on it would have been possible to gain a more in-depth understanding with regard to those specific components attributes and relationships. However, efforts have been made to consider the most important components of the CV practice meta-model, in particular, in sufficient detail, also in this thesis.

Chapter 8: Conclusions and Future Research

In this chapter, conclusions are drawn concerning the contributions of the thesis and suggestions are made concerning future research.

As I am writing in the middle of the largest pandemic the world has experienced in almost 100 years, studying how crisis response can be improved is easily understood to be a highly relevant and interesting research topic. Also, against the backdrop of major digitalisation, in all work and social aspects of life, that has changed the nature of relationships between people and between citizens and government or business, it is relevant to consider citizens and their roles in the crisis response system, as well as needs to digitally support them.

The event of the forest fires in Sweden in 2018 demonstrated that citizen's affiliated and non-affiliated participation in crisis response provides a much-needed contribution to societies' overall capacity to respond to crisis events and to be resilient in the face of future crises and disasters. This thesis, as well as previous international ISCV research, points to the fact that these practices need and can be improved via relevant development and implementations of ICT. Problems identified in chapter 1 have however also pointed to the need to also consider digital transformation in a broader sense to ensure that ICT is developed in a manner that will meet actual, real-world, needs. The perspectives concerning pragmatism, DT, IS design and complexity have contributed to a focus on how knowledge about CV practice can facilitate DT, on understanding what CV practice needs to achieve, on how this practice is enacted, and what conditions influence this practice.

There is a direct potential for practitioners such as crisis management and CV organisations to use the CV meta-model to develop policy and strategies that will improve CV. For researchers, this thesis' key relevance lies in the methodology and theory applied to achieve a description of a research phenomenon that is both holistic and specific, and that demonstrates how to achieve real-world understandings and translate them to achieve DT and enable informed IS design.

From the perspective of the IS discipline, this research aligns with those proposing unity, rather than separation, between behavioural sci-

ence research and design science research. The design of relevant IT artefacts for CV practice is understood to be dependent on understandings of broad contextual factors that facilitate understandings of real-world needs. This thesis demonstrates how a DT process can contribute to translating these real-world needs in a manner that will inform relevant IS design.

8.1 Key Contributions

The main aim and purpose of this thesis are to understand how the practice of CV can be digitally transformed. However, to understand how this may be achieved, it is first necessary to have a holistic understanding of the practice of CV. This is reflected in the main research questions which are

1. How can CV practice be holistically understood?
2. Based on this understanding, how can CV be digitally transformed?

In answering these questions the thesis provides several novel contributions both to research on ISCV and knowledge regarding CV practice and digital transformation. The answers to each of the research questions create two separate contributions. There is however also a third contribution, which is the analytical framework for DT in complex settings which has been designed to facilitate answering the second question. These three main contributions are therefore described in the following three sections.

8.1.1 A Holistic Understanding of CV

The holistic understanding of CV is described in the results section (chapter 5) of this thesis and discussed in section 7.1. These understandings are supported by the conceptualisation in the CV practice meta-model (Figure 18). This model demonstrates how the practice can be holistically understood via six main components and their attributes. The main components are CV Stakeholders, CV Processes, CV Tasks, CV Environment, CV ICT and Crisis Events. As was explained in the discussion in Chapter 7, this model is unique in the context of ISCV research.

In this model, the CV process component is related to being influenced by the nature of the crisis event and the crisis environment. CV stakeholders perform or participate in CV processes and are also part of

the CV environment. CV processes will, in turn, influence the nature of CV tasks performed in the crisis response. The final component of the model is ICT that is used by stakeholders, supports CV processes and enables the performance of CV tasks.

In the results section, each of these components is analysed to reveal their attributes and relationships. The main processes involved in CV are unfolded and explained as attributes of the CV process component. Likewise, the range of stakeholders involved in CV practice is structured and revealed via the attributes of the stakeholder component and their relationships.

Via this approach to all components in the model, the complexity involved in CV is revealed. This complexity is in part due to the number (volume) of components and attributes. However, it is more so the complicated nonlinear nature of relationships that arise among the multitude of attributes of components that most significantly indicate the complexity involved in CV. This means that it is not always possible to foresee what will happen if changes are made in one part of the practice and how the dynamics and emergence involved in CV processes will evolve for any specific crisis event.

In summary, the CV meta-model contribution provides a means to relate to all aspects of CV practice. It can, for example, be used to zoom in or out on specific perspectives using the components or to focus on relationships between components. It is particularly useful in the context of DT and IS design processes, in that it provides a means to hone in on both broader contexts and more application near contexts (via a breakdown of attributes of the components and understandings of their relationships), to gain a fuller understanding of them and provide input to both processes. The model has the potential to be adapted to evaluate implemented solutions for CV practice, to understand to what degree the solutions meet real-world needs. Different stakeholders such as crisis management or CV organisations can use the model to evaluate and help develop their practices in a manner that will contribute to improving CV. Another possible application is to use the holistic understanding of CV practice to test the implications of policy or policy changes in the CV practice area.

8.1.2 How to Digitally Transform CV

The second question on how to digitally transform CV is addressed in chapter 6, where the analytical framework for DT in complex settings (developed in chapter 4) is used to extract triggers, DT strategy, digitally enabled capabilities and understandings of barriers and structural change required for DT from the empirical and literature study results. The application of the concept of DT to a practice area such as CV is also a new approach in IS research where a business is most commonly the object of study.

The triggers for DT are the evolvment of crisis events, needs to fill gaps in the crisis response system, needs to improve societal and community resilience, needs to facilitate collaboration (including coordination, cooperation and co-production), needs to provide better support for both affiliated and non-affiliated volunteerism and finally to improve crisis preparedness concerning CV involvement in crisis response efforts.

Successful DT is dependent on strategies and strategic choices that, in the case of CV, relate to a multitude of triggers or needs for DT. The strategic choices required to enable DT for CV are found to gravitate around two main factors. Firstly, the respective status associated with affiliated and non-affiliated CV stakeholders. The experiences from the Swedish forest fires crisis and other international studies point to the need to consider both categories of stakeholders when developing digital capabilities. Secondly, the results point to the need to emphasise supporting a wide range of CV processes by focusing on their commonalities rather than differences in terms of level (local or national) or stakeholder focus (affiliated or non-affiliated).

Three high level digitally enabled capabilities, required to digitally transform CV, are as follows:

1. The capability to establish local and national volunteer coordination functions in the event of a crisis.
2. The capability to coordinate CV requests and offers to be able to deliver capable and equipped volunteers in the response effort.
3. The capability to coordinate volunteer work on-site.

Further capabilities within each of these areas are listed in tables 8-10 in chapter 6.

Barriers and challenges for developing DT strategy for CV, and the required digitally enabled capabilities have been identified based on the holistic understandings of CV presented in the thesis. One main challenge

is based on the lack of alignment observed between the real-world involvement of non-affiliated volunteers in the Swedish forest fires crisis, and the institutional norms and logics guiding the overall Swedish crisis response system whereby established CV organisations are prioritised. To move forward with a successful DT of CV as a whole, it is necessary to forge better alignment between these realities and logics.

Another challenge relates to results from the study of the Swedish Red Cross (SRK) internal work to develop CV. These results show that the SRK, in the face of the new assignment to coordinate non-affiliated volunteers during and after the forest fires crisis, struggle with aligning their traditional coordination of SRK affiliated volunteers (both every day and in crisis situations) with the coordination of non-affiliated crisis volunteerism. A strong focus on internal needs to promote and develop arrangements for SRK affiliated volunteerism restricts a broader understanding of societies' overall needs concerning non-affiliated CV and CV practice as a whole.

8.1.3 The Analytical Framework for DT

The analytical framework for DT developed in chapter 4, although mostly a means to achieving the contributions described above, should also be considered a relevant contribution of this thesis. The novelty lies in it being one of the first conceptualisations of DT stemming from needs to observe DT in more diverse and complex settings. There is also novelty and relevance in the fact that the framework observes the full range of potential associated with DT as well as the need to relate to complexity in the context to be digitally transformed. The framework is thereby suitable for application not only in diverse settings such as CV practice, but also in more traditional business or organisational settings.

This framework addresses the shortcomings associated with reductionist approaches in previous IS research that have a limited focus and understandings of organisational settings and the immediate application context. In chapter 4, the analytical framework for DT is developed in a manner that makes it suitable to use in broader, multi-dimensional, complex and non-organisation based settings. Three aspects are central to this contribution. Firstly the use of the concept of digital transformation, which is well suited to honing in on real-world needs via the observance of triggers/values, DT strategy and digitally enabled capabilities. Secondly, the DT concept aligns well with the need to make more significant

changes within a broad practice area and provides a means of understanding what digitally enabled capabilities need to be developed. So the question addressed via the DT approach is what do we need to know and prioritise to enable the design of *relevant* ICT rather than what are the more specific functional requirements on an ICT. Finally, via the integration of complexity theory, the analytical framework for DT allows us to relate to practice areas such as CV that are more diverse and multi-dimensional and where adaptive, emergent and dynamic mechanisms come into play.

8.2 Suggestions for Future Research

Here, a few relevant avenues for future research endeavours are mentioned.

The first avenue departs from the thesis main contribution of the CV meta-model. In future research, it would be interesting to apply this conceptualisation of CV practice in other CV practice settings. For example, in other countries, by different CV stakeholders, relating to other types of crisis events, focusing on different administrative levels for IS design rather than DT, and evaluating CV practice and DT strategies or ICT design initiatives. Also to apply the CV meta-model to everyday emergency volunteerism practice.

Furthermore, it would be interesting to apply the meta-modelling approach and analytical framework for DT to entirely other practice areas. How readily can the main components of the CV practice area can be translated to other practice areas? What would such a translation process entail, and would this make it quicker and more efficient to relate to other practice areas to achieve their digital transformation?

Other avenues for future research relate to the contribution this thesis makes regarding knowledge on how CV can be digitally transformed via the use of the analytical framework for DT in complex settings. Further inquiry into the process of DT in other (primarily non-business and organisation based) practice areas could help develop the analytical framework and improve our knowledge of the translation process required to ensure that ICT designs meet real-world needs. It would therefore be of interest to apply the central concepts of DT (triggers, strategy, capabilities) to other complex practice areas, where there is financing and other conditions required to design and develop IT artefacts, observing in greater detail how this translation process may successfully be achieved.

References

- Abedin, B. & Babar, A. (2018) Institutional vs. Non-institutional use of Social Media during Emergency Response: A Case of Twitter in 2014 Australian Bush Fire. *Information Systems Frontiers* 20: 729-740.
- Act, S. C. P. (2003: 778) Lag (2003: 778) om skydd mot olyckor.
- Agrawal, R., Springer, A. & Lovell, E. (2015) QuickResponseHost: Enabling crowdsourced disaster response stations. 233-239
- Aguirre, B. E., Macias-Medrano, J., Batista-Silva, J. L., et al. (2017) Spontaneous volunteering in emergencies. The Palgrave Handbook of Volunteering, Civic Participation, and Nonprofit Associations. Palgrave Macmillan, 311-329.
- Aitamurto, T. & Saldivar, J. (2017) Motivating participation in crowdsourced policymaking: The interplay of epistemic and interactive aspects. *Proceedings of the ACM on Human-Computer Interaction* 1.
- Alam, K., Tasneem, S. & Oliveras, E. (2012) Performance of female volunteer community health workers in Dhaka urban slums. *Social Science and Medicine* 75: 511-515.
- Albahari, A. & Schultz, C. H. (2017) A qualitative analysis of the spontaneous volunteer response to the 2013 Sudan floods: changing the paradigm. *Prehospital and disaster medicine* 32: 240-248.
- Alexander, P. M. & Silvis, E. S. (2014) Actor-network theory in information systems research.
- Alter, S. (2003a) 18 Reasons Why IT-Reliant Work Systems Should Replace "The IT Artifact" as the Core Subject Matter of the IS Field. *Communications of the association for information systems* 12: 23.
- Alter, S. (2003b) Sidestepping the IT Artifact, Scrapping the IS Silo, and Laying Claim to "Systems in Organizations". *Communications of the association for information systems* 12: 30.
- Alvesson, M. & Sandberg, J. (2011) Generating research questions through problematization. *Academy of management review* 36: 247-271.
- Aman, H., Irani, P. & Liang, H.-N. (2012) A review of Information Communication Technology Applied on Common Tasks during Times of Emergency. *Proceedings of the 9th International ISCRAM Conference*: 1-10
- Andersson, P. & Rosenqvist, C. (2018) Strategic Challenges of Digital Innovation and Transformation. In: Per Andersson SM, Magnus Mähring, Robin Teigland, and Karl Wennberg (eds.) (ed) Managing Digital Transformation. Stockholm, Stockholm School of Economics Institute for Research, 17.

- Asp, V. (2017) Frivilligresurser under flyktingsituationen: Frivilliga försvarsorganisationer och trossamfunds förmåga att möta samhällets behov hösten 2015. Försvarshögskolan (FHS).
- Asp, V., Blomstrand, R., Deschamps-Berger, J., et al. (2019) Besten besegrad: utvärdering av krishantering under skogsbränderna i Ljusdal 2018. Försvarshögskolan (FHS).
- Asp, V., Bynander, F., Daléus, P., et al. (2015) Bara skog som brinner?: Utvärdering av krishantering under skogsbranden i Västmanland 2014. CRISMART, Försvarshögskolan.
- Atkinson, P. (2014) The ethnographic imagination: Textual constructions of reality. Routledge.
- Auferbauer, D., Ganhör, R. & Tellioglu, H. (2015) Moving Towards Crowd Tasking for Disaster Mitigation. *Proceedings of the ISCRAM 2015 Conference*
- Auferbauer, D., Ganhör, R., Tellioglu, H., et al. (2016) Crowdtasking: Field Study on a Crowdsourcing Solution for Practitioners in Crisis Management. *Proceedings of the ISCRAM 2016 Conference*
- Auferbauer, D., Ruggenthaler, C., Czac, G., et al. (2019b) Taxonomy of Community Interaction in Crises and Disasters. *Proceedings of the ISCRAM 2019 Conference*
- Auferbauer, D. & Tellioglu, H. (2017) Centralized Crowdsourcing in Disaster Management: Findings and Implications: Full paper. *Proceedings of the 8th International Conference on Communities and Technologies 2017*: 173-182
- Auferbauer, D. & Tellioglu, H. (2019a) Socio-technical Dynamics: Cooperation of Emergent and Established Organisations in Crises and Disasters. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*: 218
- Avgerou, C. (2000) Information systems: what sort of science is it? *Omega* 28: 567-579.
- Barbour, J. B. & Manly, J. N. (2016) Redefining disaster preparedness: Institutional contradictions and praxis in volunteer responder organizing. *Management Communication Quarterly* 30: 333-361.
- Barrenechea, M., Anderson, K. M., Palen, L., et al. (2015) Engineering crowdwork for disaster events: The human-centered development of a lost-and-found tasking environment. *IEEE Computer Society* 2015-March: 182-191.
- Barsky, L. E., Trainor, J. E., Torres, M. R., et al. (2007) Managing volunteers: FEMA's Urban Search and Rescue programme and interactions with unaffiliated responders in disaster response. *Disasters* 31: 495-507.
- Baskerville, R. & Pries-Heje, J. (2014) Design theory projectability. In: Doolin B, McLeod L, Lamprou E, et al. (eds). Springer New York LLC, 219-232.

- Baskerville, R. L. (1999) Investigating information systems with action research. *Communications of the association for information systems* 2: 19.
- Batard, R., Rizza, C., Montarnal, A., et al. (2018) Ethical, legal and social considerations surrounding the use of facebook groups during hurricane irma in Cuba. *Proceedings of the ISCRAM 2018 Conference*: 268-275
- Baumgartner, N., Gottesheim, W., Mitsch, S., et al. (2010) BeAware!—situation awareness, the ontology-driven way. *Data & Knowledge Engineering* 69: 1181-1193.
- Bénaben, F., Lauras, M., Truptil, S., et al. (2016) A metamodel for knowledge management in crisis management. *2016 49th Hawaii International Conference on System Sciences (HICSS)*: 126-135
- Benali, M. & Ghomari, A. R. (2017a) Information and knowledge driven collaborative crisis management: A literature review C3 - Proceedings of the 2016 3rd International Conference on Information and Communication Technologies for Disaster Management, ICT-DM 2016. *3rd International Conference on Information and Communication Technologies for Disaster Management, ICT-DM 2016*.
- Benali, M. & Ghomari, A. R. (2017b) Towards a Crowdsourcing-based Approach to enhance Decision Making in Collaborative Crisis Management. *Proceedings of the 14th ISCRAM Conference – Albi, France, May 2017*.
- Benbasat, I. & Zmud, R. W. (2003) The identity crisis within the IS discipline: Defining and communicating the discipline's core properties. *MIS quarterly*: 183-194.
- Benbya, H. & McKelvey, B. (2006) Toward a complexity theory of information systems development. *Information Technology & People* 19: 12-34.
- Bloomfield, B. P., Latham, Y. & Vurdubakis, T. (2010) Bodies, technologies and action possibilities: When is an affordance? *Sociology* 44: 415-433.
- Bowersox, D. J., Closs, D. J. & Drayer, R. W. (2005) The digital transformation: technology and beyond. *Supply Chain Management Review* 9: 22-29.
- Bram, S. & Vestergren, S. (2012) Emergency Response Systems: Concepts, features, evaluation and design. Linköping University Electronic Press.
- Broadbent, S. & Cara, F. (2018) Seeking control in a precarious environment: Sustainable practices as an adaptive strategy to living under uncertainty. *Sustainability (Switzerland)* 10.
- Bryman, A. (2009) Methods in social science (Samhällsvetenskapliga metoder). LiberMalmö.
- Byrne, D. S. (1998) Complexity theory and the social sciences: An introduction. Psychology Press.
- Carcary, M., Doherty, E. & Conway, G. (2016) A dynamic capability approach to Digital transformation: A focus on key foundational themes. *The European Conference on Information Systems Management*.: 20-28

- Carlsson, S. A. (2010) Design science research in information systems: A critical realist approach. *Design Research in Information Systems*: 209-233.
- Carlton, S. & Mills, C. E. (2017) The Student Volunteer Army: a 'repeat emergent' emergency response organisation. *Disasters* 41: 764-787.
- Cecez-Kecmanovic, D. (2001) Doing critical IS research: The question of methodology. *Qualitative research in IS: Issues and trends*. IGI Global, 141-162.
- Cecez-Kecmanovic, D., Galliers, R. D., Henfridsson, O., et al. (2014) The sociomateriality of information systems: current status, future directions. *MIS quarterly* 38: 809-830.
- Cedergårdh, E. & Winnberg, T. (2010) 8. Structuring a command organisation. *Emergency Response Management in Today's Complex Society*: 197.
- Charmaz, K. (2006) Constructing grounded theory: A practical guide through qualitative analysis. sage.
- Charmaz, K. (2017) The power of constructivist grounded theory for critical inquiry. *Qualitative inquiry* 23: 34-45.
- Charmaz, K. & Belgrave, L. L. (2007) Grounded theory. *The Blackwell encyclopedia of sociology*.
- Cherry, M. A. (2015) Beyond misclassification: The digital transformation of work. *Comp. Lab. L. & Pol'y J.* 37: 577.
- Chroust, G. (2013) Social media in crisis situations. *IDIMT-2013 Information Technology, Human Values, Innovation and Economy*: 13-22
- Chu, E. T. H., Lin, C. Y., Tsai, P. H., et al. (2015) Design and implementation of participant selection for crowdsourcing disaster information. *International Journal of Safety and Security Engineering* 5: 48-62.
- Cobb, C., McCarthy, T., Perkins, A., et al. (2014) Designing for the Deluge: Understanding & Supporting the Distributed, Collaborative Work of Crisis Volunteers. *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing 2014*
- Coletti, P. G. S., Mays, R. E. & Widera, A. (2018) Bringing technology and humanitarian values together: A framework to design and assess humanitarian information systems. 1-9
- Comes, T. (2016) Designing for networked community resilience. 6-11
- Corbin, J. M. & Strauss, A. (1990) Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative sociology* 13: 3-21.
- Cronbach, L. J. & Suppes, P. (1969) Research for tomorrow's schools: Disciplined inquiry for education.
- Dahlbom, B. (1996) The new informatics. *Scandinavian Journal of Information Systems* 8: 3.
- Davis, G. B. (1991) The emergence of Information Systems as a business function and academic discipline. Management Information Systems Research Center, Curtis L. Carlson School of Management University of Minnesota.

- De Albuquerque, J. P., Fonte, C. C., De Almeida, J. P., et al. (2016a) How volunteered geographic information can be integrated into emergency management practice? First lessons learned from an urban fire simulation in the city of Coimbra. *Proceedings of the ISCRAM 2016 Conference*
- de Albuquerque, J. P., Herfort, B. & Eckle, M. (2016b) The tasks of the crowd: A typology of tasks in geographic information crowdsourcing and a case study in humanitarian mapping. *Remote Sensing* 8.
- Díaz, P., Onorati, T. & Aedo, I. (2017) A digital knowledge ecosystem to increase participation in emergency warnings and alerts management. In: Au MHA, Choo KKR, Li KC, et al. (eds). Springer Verlag, 700-711.
- dos Santos Rocha, R., Widera, A., van den Berg, R. P., et al. (2016) Improving the Involvement of Digital Volunteers in Disaster Management. *International Conference on Information Technology in Disaster Risk Reduction*: 214-224
- Dostál, J. (2015) Lessons of cooperation between government and non-governmental organizations in emergency management in the Czech Republic. *International Journal of Safety and Security Engineering* 5: 203-221.
- Drechsler, A. & Hevner, A. (2016) A four-cycle model of IS design science research: capturing the dynamic nature of IS artifact design. Breakthroughs and Emerging Insights from Ongoing Design Science Projects. *Research-in-progress papers and poster presentations from the 11th International Conference on Design Science Research in Information Systems and Technology (DESRIST) 2016. St. John, Canada, 23-25 May*
- Drenth, P. J. (2012) A European code of conduct for research integrity. *Promoting research integrity in a global environment* 161.
- Drnevich, P. L. & Croson, D. C. (2013) Information technology and business-level strategy: Toward an integrated theoretical perspective. *MIS quarterly*: 483-509.
- Ehn, P. (1995) Informatics-design for usability.
- Eismann, K., Posegga, O. & Fischbach, K. (2016) Collective behaviour, Social Media, and disasters: a Systematic literature Review. *ECIS: ResearchPaper104*
- Eismann, K., Posegga, O. & Fischbach, K. (2018) Decision making in emergency management: The role of social media.
- Ernst, C., Mladenow, A. & Strauss, C. (2016) Location-based crowdsourcing in disaster response. 28-34
- Ernst, C., Mladenow, A. & Strauss, C. (2017) Collaboration and crowdsourcing in emergency management. *International Journal of Pervasive Computing and Communications* 13: 176-193.
- Erskine, M. A. & Pepper, W. (2015) Enhancing emergency response management using Emergency Description Information Technology

- (EDIT): A design science approach. *International Journal of Electronic Government Research* 11: 51-65.
- Falasca, M. & Zobel, C. (2012) An optimization model for volunteer assignments in humanitarian organizations. *Socio-Economic Planning Sciences* 46: 250-260.
- Flyvbjerg, B. (2006) Five misunderstandings about case-study research. *Qualitative inquiry* 12: 219-245.
- Foresti, G. L., Farinosi, M. & Vernier, M. (2015) Situational awareness in smart environments: socio-mobile and sensor data fusion for emergency response to disasters. *Journal of Ambient Intelligence and Humanized Computing* 6: 239-257.
- Frank, J., Rebbapragada, U., Bialas, J., et al. (2017) Effect of label noise on the machine-learned classification of earthquake damage. *Remote Sensing* 9.
- Fredholm, L. & Göransson, A.-L. (2010) Emergency Response Management in Today's Complex Society. Swedish Civil Contingencies Agency.
- Fuchs-Kittowski, F., Jendreck, M., Meissen, U., et al. (2017) ENSURE - Integration of volunteers in disaster management. In: Hrebicek J, Pitner T, Denzer R, et al. (eds). Springer New York LLC, 247-262.
- Geertz, C. (1973) Thick description: Toward an interpretive theory of culture. *Turning points in qualitative research: Tying knots in a handkerchief* 3: 143-168.
- Gioia, D. A., Corley, K. G. & Hamilton, A. L. (2013) Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods* 16: 15-31.
- Glaser, B. G. & Strauss, A. L. (1967) The discovery of grounded theory. Aldine New York.
- Goldkuhl, G. (1996) Informatik-Ett ämne i, om och för förändring. *Installationsföreläsning, Internationella*.
- Goldkuhl, G. (2008) What kind of pragmatism in information systems research. *AIS SIG Prag inaugural meeting*
- Goldkuhl, G. (2011) The research practice of practice research: theorizing and situational inquiry. *Systems, Signs & Actions* 5: 7-29.
- Goldkuhl, G. (2012a) Design research in search for a paradigm: Pragmatism is the answer. European Design Science Symposium: Springer, Berlin, Heidelberg., 84-95.
- Goldkuhl, G. (2012b) Pragmatism vs interpretivism in qualitative information systems research. *European Journal of information systems* 21: 135-146.
- Goldkuhl, G. (2016) Separation or unity? Behavioral science vs. design science. *AIS SIGPRAG Pre-ICIS Workshop Practice-based Design and Innovation of Digital Artifacts*
- Goldkuhl, G. (2019) The generation of qualitative data in information systems research: the diversity of empirical research methods. *Communications of the AIS* 44.

- Goldkuhl, G. & Cronholm, S. (2010) Adding theoretical grounding to grounded theory: Toward multi-grounded theory. *International Journal of Qualitative Methods* 9: 187-205.
- Goldkuhl, G. & Cronholm, S. (2019) Grounded Theory in Information Systems Research—from Themes in IS Discourse to Possible Developments. *ICIS 2019 Proceedings*
- Goldkuhl, G., Cronholm, S. & Lind, M. (2020) Multi-grounded action research. *Information Systems and E-Business Management*.
- Goldkuhl, G. & Lind, M. (2010) A multi-grounded design research process. *International Conference on Design Science Research in Information Systems*: 45-60
- Goldkuhl, G. & Röstlinger, A. (2006) Context in focus: Transaction and infrastructure in workpractices. *Information Systems (ALOIS)* 1: 2.
- Gómez-Barrón, J. P., Manso-Callejo, M. Á. & Alcarria, R. (2019) Needs, drivers, participants and engagement actions: a framework for motivating contributions to volunteered geographic information systems. *Journal of Geographical Systems* 21: 5-41.
- Greengard, S. (2015) The internet of things. MIT press.
- Gregor, S. (2002) Design theory in information systems. *Australasian Journal of Information Systems* 10.
- Gregor, S. (2006) The nature of theory in information systems. *MIS quarterly*: 611-642.
- Greve, C. (2015) Ideas in public management reform for the 2010s. Digitalization, value creation and involvement. *Public Organization Review* 15: 49-65.
- Grubmüller-Régent, V., Wetzstein, I., Rainer, K., et al. (2014) From the Academic Debate to Real-World Use and Back. *CeDEM Asia 2014*: 127.
- Habermas, J. (1972) Knowledge and Human Interests. Beacon Paperback Boston.
- Hagen, L., Keller, T., Neely, S., et al. (2018) Crisis Communications in the Age of Social Media: A Network Analysis of Zika-Related Tweets. *Social Science Computer Review* 36: 523-541.
- Hanssen, Ø. (2015) Position tracking in voluntary search and rescue operations. *Proceedings of the ISCRAM 2015 Conference*: 76-86
- Harris, M., Shaw, D., Scully, J., et al. (2017) The involvement/exclusion paradox of spontaneous volunteering: New lessons and theory from winter flood episodes in England. *Nonprofit and Voluntary Sector Quarterly* 46: 352-371.
- Havlik, D., Egly, M., Huber, H., et al. (2013) Robust and Trusted Crowd-Sourcing and Crowd-Tasking in the Future Internet. Springer New York LLC, 164-176.
- Havlik, D., Pielorz, J. & Widera, A. (2016) Interaction with citizens experiments: from context-aware alerting to crowdtasking. *Proceedings of the 2016 ISCRAM Conference*

- Helsloot, I. (2008) Coordination is a prerequisite for good collaboration, isn't it? *Journal of Contingencies and Crisis Management* 16: 173-176.
- Henriette, E., Feki, M. & Boughzala, I. (2015) The shape of digital transformation: A systematic literature review. *MCIS 2015 Proceedings*: 431-443.
- Henriette, E., Feki, M. & Boughzala, I. (2016) Digital Transformation Challenges. *MCIS*: 33
- Herwix, A. & Rosenkranz, C. (2018) Making Sense of Design Science in Information Systems Research: Insights from a Systematic Literature Review. *International Conference on Design Science Research in Information Systems and Technology*: 51-66
- Hess, T., Matt, C., Benlian, A., et al. (2016) Options for Formulating a Digital Transformation Strategy. *MIS Quarterly Executive* 15.
- Hester, V., Shaw, A. & Biewald, L. (2010) Scalable crisis relief: Crowdsourced SMS translation and categorization with Mission 4636. *Proceedings of the first ACM symposium on computing for development*: 1-7
- Hevner, A. R. (2004) Design Science in Information Systems Research. *MIS quarterly* 28: 75-105.
- Hevner, A. R. (2007) A three cycle view of design science research. *Scandinavian Journal of Information Systems* 19: 4.
- Hidayanti & Supangkat, S. H. (2018) Designing A Distribution Emergency Information Service in Earthquake Post-Disaster Based on Service Computing System Engineering C3 - Proceeding - 2018 International Conference on ICT for Smart Society: Innovation Toward Smart Society and Society 5.0, ICISS 2018. *2018 International Conference on ICT for Smart Society, ICISS 2018*.
- Holm, A. (2016) Några ansvarsfrågor avseende aktörer, i synnerhet frivilliga, som deltar i räddningsinsatser. CARER Linköping University Electronic Press.
- Howe, K. & Eisenhart, M. (1990) Standards for qualitative (and quantitative) research: A prolegomenon. *Educational researcher* 19: 2-9.
- Hughes, A. L. & Tapia, A. H. (2015) Social media in crisis: When professional responders meet digital volunteers. *Journal of Homeland Security and Emergency Management* 12: 679-706.
- Hultén, P., Rådman, J. & Dobson, V. (2016) Fältguide för myndigheters samverkan med frivilliga och frivilligorganisationer under en kris. En vägledning från MSB. MSB956.
- Hüther, M. (2016) Digitalisation: An engine for structural change-A challenge for economic policy. IW Policy Paper.
- Hälterlein, J., Madsen, L., Schuchardt, A., et al. (2018) Integrating Volunteers in Emergency Response: A Strategy for Increased Resilience Within German Civil Security Research. *Urban Disaster Resilience and Security*. Springer, 113-128.

- Iivari, J. (2017) Information system artefact or information system application: that is the question. *Information Systems Journal* 27: 753-774.
- Iivari, J. (2019) A Critical Look at Theories in Design Science Research. *Journal of the Association for Information Systems*: 21(23), 10.
- Iivari, J. & Lyytinen, K. (1999) Research on information systems development in Scandinavia. *Rethinking management information systems*: 57-102.
- Isaksson, D. & Wennberg, K. (2016) Digitalization and collective value creation. Bergström, A., & Wennberg, K. *Machines, Jobs and equality. Technological Change and Labor Markets in Europe. European Liberal Forum, Brussels, Belgium*
- Jackson, P. W. (1993) Qualitative research and its public. *International Journal of Qualitative Studies in Education* 6: 227-231.
- Jaeger, P. T., Shneiderman, B., Fleischmann, K. R., et al. (2007) Community response grids: E-government, social networks, and effective emergency management. *Telecommunications Policy* 31: 592-604.
- Jakes, P. J. & Langer, E. L. (2012) The adaptive capacity of New Zealand communities to wildfire. *International Journal of Wildland Fire* 21: 764-772.
- Jansson, J. & Andervin, M. (2016) Att Leda Digital Transformation. Stockholm, HOI Förlag.
- Jendreck, M., Meissen, U., Rösler, M., et al. (2016) ENSURE-Increasing resilience by integration of volunteers in disaster management. *Environmental Informatics-Stability, Continuity, Innovation: Current trends and future perspectives based on* 30: 131-140.
- Jennex, M. E. (2011) Crisis Response & Management and Emerging Information Systems: Critical Applications. Information Science Reference USA.
- Johansson, R. (2009) Gränsöverbryggarna och de oorganiserade frivilliga: Olycksplatsen som mötesplats. Från klass till organisation - en resa genom det sociala landskapet. Malmö: Liber förlag, 190-208.
- Johansson, R., Karlsson, R., Oscarsson, O., et al. (2015) Att använda, leda och samverka med frivilliga: Om kommuners och länsstyrelser relationer med aktörer utanför den offentliga sektorn inom ramen för det geografiska områdesansvaret. Myndigheten för samhällsskydd och beredskap.
- Kaminska, K. (2016) Leveraging social media and digital volunteers for building cross-border disaster resilience: Lessons from the Canada-US enhanced resilience experiments. 310-314
- Kaminska, K., Dawe, P., Forbes, K., et al. (2015) Digital volunteer supported recovery operations experiment. Defence Research and Development Canada, Centre for Security Science.
- Kapucu, N. (2005) Interorganizational coordination in dynamic context: Networks in emergency response management. *Connections* 26: 33-48.
- Kaufhold, M. A. & Reuter, C. (2016) The Self-Organization of Digital Volunteers across Social Media: The Case of the 2013 European Floods

- in Germany. *Journal of Homeland Security and Emergency Management* 13: 137-166.
- Kaufhold, M. A., Rupp, N., Reuter, C., et al. (2019) Mitigating information overload in social media during conflicts and crises: design and evaluation of a cross-platform alerting system. *Behaviour and Information Technology*.
- Kerle, N. & Hoffman, R. R. (2013) Collaborative damage mapping for emergency response: The role of Cognitive Systems Engineering. *Natural Hazards and Earth System Science* 13: 97-113.
- Klein, H. K. & Hirschheim, R. (2008) The structure of the IS discipline reconsidered: Implications and reflections from a community of practice perspective. *Information and Organization* 18: 280-302.
- Klievink, B., Bharosa, N. & Tan, Y.-H. (2016) The collaborative realization of public values and business goals: Governance and infrastructure of public-private information platforms. *Government Information Quarterly* 33: 67-79.
- Kokkinakos, P., Markaki, O., Koussouris, S., et al. (2016) Digital transformation: Is public sector following the enterprise 2.0 paradigm? In: Kabanov Y, Kampis G, Wimmer M, et al. (eds). Springer Verlag, 96-105.
- Kothari, C. R. (2004) Research methodology: Methods and techniques. New Age International.
- Krüger, M., Ahmad, S. S.-O. & Shahid, S. (2017) Investigating the requirements of an online emergency response platform. *Proceedings of the Ninth International Conference on Information and Communication Technologies and Development*: 40
- Kvarnlöf, L. (2018) A need to help: stories of emergent behaviour from the scene of accident. *International Journal of Emergency Services* 7: 203-213.
- Kvarnlöf, L. (2019) När det brinner runt knuten–Risk, roller och resurser i samband med skogsbrandsevakuering. *Utvecklingen av en forskningsmiljö*: 17.
- Lai, C. H. (2017) A study of emergent organizing and technological affordances after a natural disaster. *Online Information Review* 41: 507-523.
- Lakomaa, E. (2018) Digitalization, Collective Intelligence, and Entrepreneurship in the Care Sector. In: P. Andersson SM, M. Mähring, R. Teigland and K. Wennberg (eds.) (ed) Managing Digital Transformation. Stockholm, Stockholm School of Economics Institute for Research.
- Larsson, S. (1986) Kvalitativ analys-exemplet fenomenografi. Studentlitteratur.
- Larsson, S. (2009) A pluralist view of generalization in qualitative research. *International journal of research & method in education* 32: 25-38.
- Law, J. (2004) After method: Mess in social science research. Routledge.

- Lee, A. S., Thomas, M. & Baskerville, R. L. (2015) Going back to basics in design science: from the information technology artifact to the information systems artifact. *Information Systems Journal* 25: 5-21.
- Leonardi, P. M. (2013) Theoretical foundations for the study of sociomateriality. *Information and Organization* 23: 59-76.
- Levy, Y. & Ellis, T. J. (2006) A systems approach to conduct an effective literature review in support of information systems research. *Informing Science* 9.
- Lincoln, Y. S. & Guba, E. G. (1985) Establishing trustworthiness. *Naturalistic inquiry* 289: 289-327.
- Linders, D. (2012) From e-government to we-government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly* 29: 446-454.
- Lindgren, I. (2013) Public e-Service Stakeholders: A study on who matters for public e-service development and implementation. Linköping University Electronic Press.
- Lindgren, I. & van Veenstra, A. F. (2018) Digital government transformation: a case illustrating public e-service development as part of public sector transformation. *Proceedings of the 19th Annual International Conference on Digital Government Research: Governance in the Data Age*: 38
- Lindner, S., Betke, Hans, Sackman, Stefan. (2017) Attributes for Simulating Spontaneous On-Site volunteers. *Proceedings of the ISCRAM 2017 Conference*
- Lindner, S. & Herrmann, C. (2020) The Behavior of Spontaneous Volunteers: A Discrete Choice Experiment on the Decision to Help. *Proceedings of the 53rd Hawaii International Conference on System Sciences*
- Lindner, S., Kuehnel, S., Betke, H., et al. (2018) Simulating Spontaneous Volunteers—A Conceptual Model.
- Linnell, M. (2014) Citizen response in crisis: Individual and collective efforts to enhance community resilience. *Human Technology*.
- Liu, S. B. (2014) Crisis crowdsourcing framework: designing strategic configurations of crowdsourcing for the emergency management domain. *Computer Supported Cooperative Work (CSCW)* 23: 389-443.
- Ludwig, T., Kotthaus, C., Reuter, C., et al. (2017) Situated crowdsourcing during disasters: Managing the tasks of spontaneous volunteers through public displays. *International Journal of Human Computer Studies* 102: 103-121.
- Majchrzak, A., Markus, M. L. & Wareham, J. (2016) Designing for digital transformation: Lessons for information systems research from the study of ICT and societal challenges. *MIS quarterly* 40: 267-277.
- Malinen, S. & Mankkinen, T. (2018) Finnish Firefighters' Barriers to Volunteering. *Nonprofit and Voluntary Sector Quarterly* 47: 604-622.
- Marsden, J. (2013) Stigmergic self-organization and the improvisation of Ushahidi. *Cognitive Systems Research* 21: 52-64.

- Matt, C., Hess, T. & Benlian, A. (2015) Digital transformation strategies. *Business & Information Systems Engineering* 57: 339-343.
- Mazumdar, S., Wrigley, S. N., Ireson, N., et al. (2015) Geo-fence driven crowd-sourcing for Emergencies. *Proceedings of the ISCRAM 2015 Conference*
- McLennan, B., Molloy, J., Whittaker, J., et al. (2016a) Centralised coordination of spontaneous emergency volunteers: The EV CREW model. *Australian Journal of Emergency Management* 31: 24-30.
- McLennan, B., Whittaker, J. & Handmer, J. (2015) Emergency volunteering in Australia: transforming not declining. *Australia: Bushfire and Natural Hazards CRC*.
- McLennan, B., Whittaker, J. & Handmer, J. (2016b) The changing landscape of disaster volunteering: opportunities, responses and gaps in Australia. *Natural Hazards* 84: 2031-2048.
- Mees, H., Crabbé, A., Alexander, M., et al. (2016) Coproducing flood risk management through citizen involvement: Insights from cross-country comparison in Europe. *Ecology and Society* 21.
- Meissen, U., Fuchs-Kittowski, F., Jendreck, M., et al. (2017) A general system architecture and design for the coordination of volunteers for agile disaster response. *Proceedings of ISCRAM 2017 Conference*: 890-900
- Merali, Y. (2016) Complexity and Information Systems: The Emergent Domain. *Enacting Research Methods in Information Systems*. Springer, 251-281.
- Mergel, I., Edelmann, N. & Haug, N. (2019) Defining digital transformation: Results from expert interviews. *Government Information Quarterly*.
- Mergel, I., Kattel, R., Lember, V., et al. (2018) Citizen-oriented digital transformation in the public sector. *Proceedings of the 19th Annual International Conference on Digital Government Research: Governance in the Data Age*: 122
- Meyerhoff Nielsen, M. (2019) Governance lessons from Denmark's digital transformation. *20th Annual International Conference on Digital Government Research*: 456-461
- Middelhoff, M., Widera, A., Van Den Berg, R. P., et al. (2017) Crowdsourcing and Crowdtasking in Crisis Management Lessons Learned From a Field Experiment Simulating a Flooding in the City of the Hague. *Proceedings of ISCRAM 2017 Conference*
- Middelhoff, M., Widera, A., van den Berg, R. P., et al. (2016) Crowdsourcing and crowdtasking in crisis management: Lessons learned from a field experiment simulating a flooding in the city of the Hague. *Information and Communication Technologies for Disaster Management (ICT-DM), 2016 3rd International Conference on*: 1-8
- Mikkelsen, Ø., Hartvigsen, S. H., Hauge, K. H., et al. (2016) Guidelines for Research Ethics in Science and Technology.
- Mingers, J. (2004a) Re-establishing the real: critical realism and information systems. *Social theory and philosophy for information systems* 372.

- Mingers, J. (2004b) Real-izing information systems: critical realism as an underpinning philosophy for information systems. *Information and Organization* 14: 87-103.
- Mingers, J., Mutch, A. & Willcocks, L. (2013) Critical realism in information systems research. *MIS quarterly* 37: 795-802.
- Mishler, E. G. (1991) Research interviewing: Context and narrative. Harvard university press.
- Misra, A., Misra, D. P., Mahapatra, S. S., et al. (2018) Digital transformation model: analytic approach on participatory governance & community engagement in India. *Proceedings of the 19th Annual International Conference on Digital Government Research: Governance in the Data Age*: 61
- Mojir, K. Y. (2016) New Forms of Collaboration in Emergency Response Systems: A framework for participatory design of information systems PDF. Diss. Linköping University Electronic Press.
- Mojir, K. Y. (2018) Information Systems Development for Emerging Public Sector Cross-sector Collaborations: The Case of Swedish Emergency Response. Linköping University Electronic Press.
- Morakanyane, R., Grace, A. A. & O'Reilly, P. (2017) Conceptualizing Digital Transformation in Business Organizations: A Systematic Review of Literature. *Bled eConference*: 21
- MSB. (2018) MSB:s arbete med skogsbränderna 2018 : Tillsammans kunde vi hantera en extrem skogsbrandssäsong. In: Beredskap MfSo (ed).
- Munkvold, B. E., Flaten, M. & Nguyen, R. P. (2015) Volunteers' Perceptions of the use of social media in emergency management. *Proceedings of ISCRAM 2015 Conference*
- Murphy, M. (2020) Crisis Volunteerism and Digital Transformation. *EGOV-CeDEM-ePart 2020*: 89.
- Myers, M. D. (2004) Hermeneutics in information systems research. *Social theory and philosophy for information systems*: 103-128.
- Myers, M. D. (2009) Qualitative research in business & management. Sage.
- Nan, N. & Lu, Y. (2014) Harnessing the power of self-organization in an online community during organizational crisis. *MIS Quarterly: Management Information Systems* 38: 1135-1157.
- Nespeca, V., Comes, T. & Alfonso, L. (2018) Information Sharing and Coordination in Collaborative Flood Warning and Response Systems. *Proceedings of 27th international conference on information systems development (ISD2018)*
- Netek, R. & Panek, J. (2016) Framework See-Think-Do as a tool for crowdsourcing support - Case study on crisis management. In: Tsai F, Gruen A, Safar V, et al. (eds). International Society for Photogrammetry and Remote Sensing, 13-16.
- Neville, K., Pope, A., O'Riordan, S., et al. (2018) Evaluating an emergency management decision support system with practitioner-driven scenarios: Action design research C3 - International Conference on Information

- Systems 2018, ICIS 2018. *39th International Conference on Information Systems, ICIS 2018*.
- Nielsen, M. M. (2011) Danish eGovernment success factors: strategies and good practice examples. *Global Strategy and Practice of E-Governance: Examples from Around the World*. IGI Global, 231-254.
- Oliver, P. (2010) *The student's guide to research ethics*. McGraw-Hill Education (UK).
- Orlikowski, W. J. & Baroudi, J. J. (1991) Studying information technology in organizations: Research approaches and assumptions. *Information systems research* 2: 1-28.
- Orlikowski, W. J. & Iacono, C. S. (2001) Research commentary: Desperately seeking the "IT" in IT research—A call to theorizing the IT artifact. *Information systems research* 12: 121-134.
- Orloff, L. (2011) *Managing spontaneous community volunteers in disasters: a field manual*. CRC Press.
- Paciarotti, C., Cesaroni, A. & Bevilacqua, M. (2018) The Management of Spontaneous Volunteers: a successful model from a flood emergency in Italy. *International journal of disaster risk reduction*.
- Palen, L., Hiltz, S. R. & Liu, S. B. (2007) Online forums supporting grassroots participation in emergency preparedness and response. *Communications of the ACM* 50: 54-58.
- Papadonikolaki, E., van Oel, C. & Kagioglou, M. (2019) Organising and Managing boundaries: A structurational view of collaboration with Building Information Modelling (BIM). *International Journal of Project Management* 37: 378-394.
- Parida, V., Sjödin, D. & Reim, W. (2019) Reviewing Literature on Digitalization, Business Model Innovation, and Sustainable Industry: Past Achievements and Future Promises. Multidisciplinary Digital Publishing Institute.
- Park, C. H. & Johnston, E. W. (2017) A framework for analyzing digital volunteer contributions in emergent crisis response efforts. *New Media & Society* 19: 1308-1327.
- Parviainen, P., Tihinen, M., Kääriäinen, J., et al. (2017) Tackling the digitalization challenge: How to benefit from digitalization in practice. *International Journal of Information Systems and Project Management* 5: 63-77.
- Pielorz, J., Prandtstetter, M., Straub, M., et al. (2018) Optimal geospatial volunteer allocation needs realistic distances. Institute of Electrical and Electronics Engineers Inc.
- Pilemalm, S., Lindgren, I. & Ramsell, E. (2016) Emerging forms of inter-organizational and cross-sector collaborations in e-government initiatives Implications for participative development of information systems. *Transforming Government- People Process and Policy* 10: 605-636.

- Pilemalm, S., Stenberg, R. & Granberg, T. A. (2013) Emergency response in rural areas. *International Journal of Information Systems for Crisis Response and Management (IJISCRAM)* 5: 19-31.
- Pipek, V., Liu, S. B. & Kerne, A. (2014) Crisis informatics and collaboration: a brief introduction. *Computer Supported Cooperative Work (CSCW)* 23: 339-345.
- Poblet, M., García-Cuesta, E. & Casanovas, P. (2014) Crowdsourcing tools for disaster management: A review of platforms and methods. *AI Approaches to the Complexity of Legal Systems*. Springer, 261-274.
- Puri, S. K., Sahay, S. & Lewis, J. (2009) Building participatory HIS networks: A case study from Kerala, India. *Information and Organization* 19: 63-83.
- Qadir, J., Ali, A., ur Rasool, R., et al. (2016) Crisis analytics: big data-driven crisis response. *Journal of International Humanitarian Action* 1: 12.
- Quarantelli, E. L. (1984) Emergent citizen groups in disaster preparedness and recovery activities. University of Delaware Disaster Research Center.
- Quarantelli, E. L. (1988) Disaster crisis management: A summary of research findings. *Journal of management studies* 25: 373-385.
- Radianti, J. & Gjørseter, T. (2019) Digital Volunteers in Disaster Response: Accessibility Challenges. In: Antona M and Stephanidis C (eds). Springer Verlag, 523-537.
- Ramchurn, S. D., Huynh, T. D., Wu, F., et al. (2016) A disaster response system based on human-agent collectives. *Journal of Artificial Intelligence Research* 57: 661-708.
- Ramsell, E. (2021) Toward ICT-enabled Co-production for Effective Crisis and Emergency Response. Linköping University Electronic Press.
- Ramsell, E., Pilemalm, S. & Andersson Granberg, T. (2016) Integration av frivilliga aktörer i dynamisk resurshandling vid räddningsinsatser. CARER Rapport Nr 17 2016: Linköping University Electronic Press.
- Ramsell, E., Pilemalm, S. & Andersson Granberg, T. (2017) Using Volunteers for Emergency Response in Rural Areas: Network Collaboration Factors and IT support in the Case of Enhanced Neighbors. *The 14th International Conference on Information Systems for Crisis Response And Management, May 21-24, Albi, Occitanie Pyrénées-Méditerranée, France*: 985-995
- Randall, L. & Berlina, A. (2019) Governing the digital transition in Nordic Regions: The human element. Nordregio.
- Rauchecker, G. & Schryen, G. (2018) Decision Support for the Optimal Coordination of Spontaneous Volunteers in Disaster Relief. *Proceedings of ISCRAM 2018 Conference*
- Reuter, C. & Kaufhold, M. A. (2018) Fifteen years of social media in emergencies: a retrospective review and future directions for crisis informatics. *Journal of Contingencies and Crisis Management* 26: 41-57.

- Reuter, C., Ludwig, T., Kaufhold, M. A., et al. (2015) XHELP: Design of a cross-platform social-media application to support volunteermoderators in disasters. 4093-4102
- Roessler, B. & Mokrosinska, D. (2013) Privacy and social interaction. *Philosophy & Social Criticism* 39: 771-791.
- Rogstadius, J., Teixeira, C., Karapanos, E., et al. (2013) An introduction for system developers to volunteer roles in crisis response and recovery. *Proceedings of ISCRAM 2013 Conference*
- Romano, M., Onorati, T., Díaz, P., et al. (2014) Improving emergency response: Citizens performing actions. *Proceedings of ISCRAM 2014 Conference*
- Rose, J., Persson, J. S., Heeager, L. T., et al. (2015) Managing e-Government: value positions and relationships. *Information Systems Journal* 25: 531-571.
- Saaroni, L. (2015) Managing spontaneous volunteers in emergencies: a local government perspective. *Australian Journal of Emergency Management, The* 30: 56.
- Sandberg, J. (2014) Digital capability: investigating coevolution of IT and business strategies. Umeå universitet.
- Schimak, G., Havlik, D. & Pielorz, J. (2015) Crowdsourcing in crisis and disaster management—challenges and considerations. *International Symposium on Environmental Software Systems*: 56-70
- Schneider, S. K. (1992) Governmental response to disasters: The conflict between bureaucratic procedures and emergent norms. *Public Administration Review*: 135-145.
- Schäfer, M. T. (2016) Challenging Citizenship: Social Media and Big Data. *Computer Supported Cooperative Work (CSCW)* 25: 111-113.
- Senyo, P. K., Liu, K. & Effah, J. (2019) Digital business ecosystem: Literature review and a framework for future research. *International Journal of Information Management* 47: 52-64.
- SFS. (1994:524) Förordning (1994:524) om frivillig försvarsverksamhet. In: Försvarsdepartementet (ed). Regeringskansliet.
- Shen, S. & Shaw, M. (2004) Managing coordination in emergency response systems with information technologies. *AMCIS 2004 Proceedings*: 252.
- Silk, A., Lenton, G., Savage, R., et al. (2018) Job task characteristics of Australian emergency services volunteers during search and rescue operations. *Ergonomics* 61: 265-272.
- Simsa, R., Rameder, P., Aghamanoukjan, A., et al. (2019) Spontaneous Volunteering in Social Crises: Self-Organization and Coordination. *Nonprofit and Voluntary Sector Quarterly* 48: 103S-122S.
- Sklyar, A., Kowalkowski, C., Tronvoll, B., et al. (2019) Organizing for digital servitization: A service ecosystem perspective. *Journal of Business Research*.
- Snyder, H. (2019) Literature review as a research methodology: An overview and guidelines. *Journal of Business Research* 104: 333-339.

- Sobieggalla, F., Posegga, O. & Fischbach, K. (2016) Connecting disaster volunteers and relief organizations: A design science approach. *Thirty Seventh International Conference on Information Systems, Dublin 2016*
- Sobieggalla, F., Posegga, O. & Fischbach, K. (2017) Evaluating a mobile crisis response system for the management of disaster volunteers. *Proceedings of the 12th International Conference on Design Science Research in Information Systems and Technology*
- SOS Alarm. (2018) SOS Alarm Årsberättelse. Stockholm: SOS Alarm.
- SOU. (2019:7) Skogsbränderna sommarn 2018. Betänkande av 2018 års skogsbrandsutredning. Stockholm: Statens Offentliga Utredningar.
- Stake, R. E. (2010) Qualitative research: Studying how things work. The Guilford Press New York London.
- Starbird, K. & Palen, L. (2011) Voluntweeters: Self-organizing by digital volunteers in times of crisis. *Proceedings of the SIGCHI conference on human factors in computing systems*: 1071-1080
- Starbird, K., Palen, L., Liu, S. B., et al. (2011) Promoting structured data in citizen communications during disaster response: An account of strategies for diffusion of the 'Tweak the Tweet' syntax. *Crisis Information Management: Communication and Technologies*. Elsevier Ltd., 43-63.
- Stenberg, R., Pilemalm, S. & Yousefi Mojir, K. (2014) Samverkansformer för räddning och respons: Exempel och förslag. Linköping University Electronic Press. CARER Arbetsrapport Nr 12.
- Strandh, V. & Eklund, N. (2018) Emergent groups in disaster research: Varieties of scientific observation over time and across studies of nine natural disasters. *Journal of Contingencies and Crisis Management* 26: 329-337.
- Suchman, L. A. (2002) Practice-based design of information systems: Notes from the hyperdeveloped world. *Information Society* 18: 139-144.
- Sørensen, C. (2016) The Curse of the Smart Machine? Digitalisation and the children of the mainframe. *Scandinavian Journal of Information Systems* 28: 57-68.
- Teece, D. J. (2007) Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic management journal* 28: 1319-1350.
- Theocharis, Y., Vitoratou, S. & Sajuria, J. (2017) Civil Society in Times of Crisis: Understanding Collective Action Dynamics in Digitally-Enabled Volunteer Networks. *Journal of Computer-Mediated Communication* 22: 248-265.
- Thomas, L., Pritchard, G. & Briggs, P. (2019) Digital design considerations for volunteer recruitment: Making the implicit promises of volunteering more explicit. *9th International Conference on Communities and Technologies, C and T 2019*: 29-40
- Thornberg, R. (2012) Informed grounded theory. *Scandinavian journal of educational research* 56: 243-259.

- Thornberg, R. & Charmaz, K. (2014) Grounded theory and theoretical coding. *The SAGE handbook of qualitative data analysis* 5: 153-169.
- Thornton, P. H. & Ocasio, W. (2008) Institutional logics. *The Sage handbook of organizational institutionalism* 840: 99-128.
- Tim, Y., Yang, L., Pan, S. L., et al. (2013) The emergence of social media as boundary objects in crisis response: A collective action perspective C3 - International Conference on Information Systems (ICIS 2013): Reshaping Society Through Information Systems Design. *International Conference on Information Systems, ICIS 2013* 5: 3882-3893.
- Trigwell, K. (2006) Phenomenography: An approach to research into geography education. *Journal of geography in higher education* 30: 367-372.
- Troy, D. A., Carson, A., Vanderbeek, J., et al. (2008) Enhancing community-based disaster preparedness with information technology. *Disasters* 32: 149-165.
- Turoff, M., White, C., Plotnick, L., et al. (2008) Dynamic emergency response management for large scale decision making in extreme events. *Proceedings of the 5th International ISCRAM Conference*: 462-470
- Twigg, J. & Mosel, I. (2017) Emergent groups and spontaneous volunteers in urban disaster response. *Environment and Urbanization* 29: 443-458.
- Urquhart, C., Lehmann, H. & Myers, M. D. (2010) Putting the 'theory' back into grounded theory: guidelines for grounded theory studies in information systems. *Information Systems Journal* 20: 357-381.
- Van de Walle, B. & Turoff, M. (2008) Decision support for emergency situations. *Information Systems and E-Business Management* 6: 295-316.
- VanWynsberghe, R. & Khan, S. (2007) Redefining case study. *International Journal of Qualitative Methods* 6: 80-94.
- Venable, J. R. (2013) Rethinking design theory in information systems. *International Conference on Design Science Research in Information Systems* 136-149
- Vial, G. (2019) Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*.
- Waldman, S. & Kaminska, K. (2015) Connecting emergency management organizations with digitally enabled emergent volunteering. Ottawa, ON: Defence Research and Development Canada.
- Waldman, S., Verga, S. & Godsoe, M. (2016) Building a framework for Calgary's emergency volunteers. Ottawa, ON: Defence Research and Development Canada.
- Walls, J. G., Widmeyer, G. R. & El Sawy, O. A. (1992) Building an information system design theory for vigilant EIS. *Information systems research* 3: 36-59.
- Waugh, W. L. & Streib, G. (2006) Collaboration and leadership for effective emergency management. *Public Administration Review* 66: 131-140.

- Weed, M. (2017) Capturing the essence of grounded theory: The importance of understanding commonalities and variants. *Qualitative Research in Sport, Exercise and Health* 9: 149-156.
- White, M. (2012) Digital workplaces: Vision and reality. *Business Information Review* 29: 205-214.
- Whittaker, J., McLennan, B. & Handmer, J. (2015) A review of informal volunteerism in emergencies and disasters: Definition, opportunities and challenges. *International journal of disaster risk reduction* 13: 358-368.
- Wilson, J. (2000) Volunteering. *Annual review of sociology* 26: 215-240.
- Wolensky, R. P. (1979) Toward a broader conceptualization of volunteerism in disaster. *Journal of Voluntary Action Research* 8: 33-42.
- Yousefi Mojir, K., Pilemalm, S. & Andersson Granberg, T. (2019) Semi-professionals: emergency response as an additional task in current occupations. *International Journal of Emergency Services* 8: 86-107.
- Zahra, S. A., Sapienza, H. J. & Davidsson, P. (2006) Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda. *Journal of management studies* 43: 917-955.
- Zettl, V., Ludwig, T., Kotthaus, C., et al. (2017) Embedding Unaffiliated Volunteers in Crisis Management Systems: Deploying and Supporting the Concept of Intermediary Organizations. *Resilience Engineering and Management, 14th ISCRAM Conference Paper*
- Zhang, C., Fan, C., Yao, W., et al. (2019a) Social media for intelligent public information and warning in disasters: An interdisciplinary review. *International Journal of Information Management* 49: 190-207.
- Zhang, H., Jiang, J., Huang, W., et al. (2019b) Design and implementation of crowdsourcing based China's national public geospatial information collection system C3 - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives. *4th ISPRS Geospatial Week 2019* 42: 1621-1624.
- Ørngreen, R. & Levinsen, K. (2017) Workshops as a Research Methodology. *Electronic Journal of E-learning* 15: 70-81.

Appendix A

Strengths/Challenges in CV Coordination

The following tables (0 - 0) present strengths/opportunities respective weaknesses/challenges as relayed in the empirical study by local respective national volunteer coordinators during the forest fires crisis in Sweden in 2018.

Strengths and Opportunities in Local Volunteer Coordination
The publics overwhelming will to volunteer
The capacity and range of services and goods provided volunteers
Affiliation with a formal CV organisation
Access to volunteers with CV training, skills and experience
FRS and Municipalities integration of CV organisations
Regular contact between local coordination and crisis management
Access to volunteers via national register of non-affiliated volunteers
Access to municipalities knowledge, networks and resources
Quick adaption to needs for volunteer coordination
Selection of CV coordinators to combat false crisis information
Documentation of volunteer activities
Incorporation of non-affiliated volunteers and emergent groups
The ability to source resources and volunteers via Social Media
The possibility to relate to volunteer skills based on affiliation.

Strengths and opportunities in local CV coordination during the forest fires crisis.

Weaknesses and Challenges to Local Volunteer Coordination

The lack of capacity in formal CV organisations
Large distances between multiple fires in the municipalities
The volume of CV stakeholders requiring support.
The prolonged crisis event with new sub-crisis threatening all the time
FRS, municipalities and regional authorities lack of preparedness, training, capacity and knowledge of CV coordination
Lack of coordination between local and national VC processes.
Lack of direct access to the national non-affiliated volunteer register
Use of external coordinators for local volunteer coordination
Uncertainty and constraints due to GDPR regulations
A total lack of digital preparedness and infrastructure
The spread of rumours and false crisis information among citizens
Volunteers with unrealistic expectations
The presence of un-registered non-affiliated volunteers on-site
Exhaustion among volunteer coordinators
Difficulties stopping and calling off initiatives started on social media
Difficulties with mobile and radio coverage in certain areas
Too many channels for non-affiliated volunteer offerings
Difficulties managing volunteer offerings from outside the local area
Difficulties assessing and verifying the skills of non-formal volunteers
A lack of pre-registered volunteers, and pre-registered information on the availability of resources within formal CV organisations.
Incorrect crisis information provided by media
Extreme levels of time criticality for provision of resources
Lack of a single point of contact at authorities for volunteer issues
Unclear distribution of responsibilities between VC and municipalities

Weakness, threats and challenges in local CV coordination during the forest fires crisis.

Strengths and Opportunities in National Volunteer Coordination

Sufficient resources at the SRK to quickly establish large scale coordination of non-affiliated volunteers on a national level

One clearly defined channel for non-affiliated volunteer offers

The public's overwhelming will to volunteer

The capacity and range of services and goods provided by volunteers

The SRK's previous experience as a formal CV organisation

The SRK's established contacts with corporate stakeholders

Strengths and opportunities in national CV coordination during the forest fires crisis.

Weaknesses and Challenges to National Volunteer Coordination

Lack of preparedness at the SRK and MSB for large scale VC

Little or no digital preparedness

Lack of preparedness at local and regional authorities for VC

Lack of capacity at MSB to administrate volumes of volunteerism

Lack of rejuvenation and capacity in formal CV organisations

Lack of knowledge and legitimacy for the national SRK coordination

Lack of ability among volunteer requesters to clearly define needs

There was no feedback to the SRK on mediated volunteers

Confusion due to GDPR regulations

Unrealistic expectations from non-affiliated volunteers

Difficulties updating volunteers on their status

Uncertainty to the purpose of the assignment - to appease public opinion or to meet real needs

Difficulties aligning affiliated and non-affiliated CV at the SRK

No verification or quality assurance for non-affiliated volunteers

Difficult for MSB to have an overview of non-formal CV activities

Weakness, threats and challenges in national CV coordination during the forest fires crisis.

Maria Murphy

Appendix B

FRS on how to improve CV coordination

Category	Recruitment	Start-up	Performance	Termination
Actions/ Routines	<p>Verifying volunteers identity</p> <p>Written confirmation of assignment</p> <p>Informing volunteers that we will call you if we need you</p> <p>Gather information about volunteers</p> <p>Establish conditions and agreements for CV</p> <p>Carry out a clarification assignment to clarify how FRS should deal with CV</p> <p>What to do when shifts change</p>	<p>Check-in and check-out routines</p> <p>Supervision</p> <p>Use of “volunteer” vests</p> <p>Creating situation awareness</p> <p>Checking out/in equipment</p> <p>Scheduling</p> <p>What to do when shifts change</p> <p>Remuneration policy</p>	<p>For breaks</p> <p>For shift changes</p> <p>Checks and follow up from both safety and efficiency perspectives</p> <p>Time registration</p> <p>Checking who is where and when</p> <p>Documenting activities</p> <p>Securing environment</p> <p>Safety arrangements</p> <p>Access to equipment</p> <p>Accommodation</p> <p>Planning supply of meals and drink</p> <p>Coordination planning</p> <p>On-site organisation</p>	<p>Check-out</p> <p>Checks that everyone has returned</p> <p>Check on task progression</p> <p>Hand-over</p> <p>Feedback of experiences</p> <p>Evaluation</p> <p>Information and follow-up to volunteers, thanking them</p> <p>Requesting remuneration before departure from crisis site</p> <p>Transport home (tired drivers)</p>

Category	Recruitment	Start-up	Performance	Termination
Resources	Prepared forms Remuneration Working hours Information channels GDPR	Safety instructions Protective equipment and their use Clear work environment guidelines	Vests for volunteers Toilets etc. The volunteers need to have a high capacity for self-maintenance	Return of borrowed equipment Remuneration for destroyed belongings Administration of remuneration
Roles	Personnel prepared to register volunteers Accountability between roles involved in crisis response	Clear role descriptions Clarifying leadership	Supervision	
Education	Before a crisis - for pre-registered vol. Quick courses for non-affiliated volunteers (e.g. via YouTube or laminated sheets)	Quick courses (e.g. via YouTube or laminated sheets)		

Category	Recruitment	Start-up	Performance	Termination
Digitalisation	<p>Web based volunteer registration</p> <p>QR-code to be used for check-in/out</p> <p>Common internal and external system for volunteer registration</p> <p>A digital search index for finding suitable volunteers</p>	<p>Communication channels</p>	<p>Digital real time logging of resources and needs</p> <p>Communication channels</p> <p>Mapping support</p>	
Information	<p>Access to resources</p> <p>Attributes</p> <p>Education</p> <p>Type of drivers licence</p> <p>Physical condition</p> <p>Contact details</p> <p>Competence</p> <p>Knowledge, Availability, Next of kin</p> <p>Bank/Account details</p>	<p>General information on what the volunteers are doing, need to do, conditions, challenges etc.</p>	<p>General information on what the volunteers are doing, need to do, conditions, challenges etc.</p>	<p>Recruitment opportunities to become a firefighter.</p>

Appendix C

FRS on CV Tasks

Registration of Volunteers	Administrative Support	Communication
Registration of newly arrived volunteers Registration of volunteers competence/capabilities Check-in and check-out volunteers Information on tasks for volunteers Registration location Creating lists compiling the availability of volunteer resources and their capabilities	Documentation and logging events Secretary tasks Gather information from crisis leadership before logging Compile information Create documentation for the future (photographs, film etc.) Document volunteers Document events for the FRs events report Contribute local awareness (for example an inventory of local organisations) Man reception desks	Create FAQ for the public Create information to be shared (what to do in a crisis, what volunteer competence is required) Translate to different languages Proofread press statements Scan social media for information Search media for false information that needs to be denied Be out on social media directing people to where they can find correct information Gather intelligence to contribute to situation awareness Spread information (flyers, information boards etc.)

FRS perspective on CV tasks in information management.

Logistics and supply	Administration	Physically demanding tasks
Moving resources Carrying materials Material supply Inventory Transportation of people and goods (e.g. water) Driving trucks and for example manure spreaders Cook food Deliver food Manage rations	Registration of people Registration of time reports for response personnel Managing check-in and check-out Spreading information to those working Documentation Logging events Communication	Digging Raking Hacking Take care of small fires on the ground Fill sand sacs Load and unload Build hose systems Carry and layout hoses Endurance over time
Evacuation/Warning	Manage Equipment	Other
Warn citizens Door to door Evacuation	Maintenance Distribution of personal equipment Manage Engine Syringes	Crisis support Gather intelligence to contribute to situation awareness Efforts to save the environment Managing guard posts (e.g. guarding access to fire locations or fires that have been put out). Search for missing people Save animals

FRS perspective on CV tasks within their own jurisdiction.

Evacuation	Support for FRS	Machine operation/ Transportation
Evacuating citizens Evacuation volunteers Help to evacuated (Police) Animal evacuation (County Administration) Information to evacuees (Municipality)	Support efforts (Municipality, County Administration, MSB) Coordination in general (County Administration, MSB) Coordinating Resources (County Administration) Coordinating Volunteers (CV Organisation)	Driving vehicles (CV Organisation) Driving Machines (CV Organisation) Fuel (CV Organisation)
Support for society/community	Logistics	
Care for children (Municipality) Care of the elderly (Municipality) Upkeep on roads (Swedish Transport Administration, Municipality) Route guidance (Municipality) Route information (SVEVIA) Directing traffic (SVEVIA) Closing off roads (Police)	Transporting Volunteers (CV Organisation) Supplies (CV Organisation) Food and rations (Municipality and CV Organisation)	

FRS perspective on non-FRS CV tasks

Maria Murphy

Appendix D

FRS on CV Capabilities

Personal attributes

Full health
Strong and enduring
Administration skills
Sense of responsibility
Authoritative
Capable of taking orders
Responsiveness
Meticulous
Orderly
Organisational skills
Collaborative skills
Social and nice
Stress-resistant
Structured
Systematic

Computers/systems skills

Daedalos
Computer skills
Social Media
Google
GIS
MS Office

Technical skills

Mechanical skills
Reparation skills
Technical education or experience
Hydraulics skills
Hose management education

Film/photography skills

Filming skills
Photography skills
Knowledge of file management

Driving skills

Driving licence
Transportation knowledge
Delivery knowledge

Cooking skills

Chef's qualifications
Food handling qualifications
Commercial kitchen skills

Language skills

Multi-lingual skills
"Plain language" skills
SFI (Swedish for immigrants)
skills at level D

Other skills

GDPR skills
Graphic production
Hands and feet
Hunting team experience
Local knowledge
Environmental skills
Media skills
Drone skills
Animal care skills

FACULTY OF ARTS AND SCIENCES

Faculty of Arts and Sciences, FIF Thesis No. 127, 2021

Department of Management and Engineering, Information Systems and Digitalization

Linköping University
SE-581 83 Linköping, Sweden

www.liu.se

In large scale crisis events, volunteerism is a necessary complement in the established crisis response system. This has proven to be the case, both internationally and in Sweden, most recently during the forest fires crisis of 2018. For crisis volunteerism to function well, it is necessary to have information systems that are capable of capitalising on citizens will to engage and help, and that will ensure that crisis volunteerism contributes to efficiency in the overall crisis response system. It is therefore relevant to consider how digitalisation can contribute to improving crisis volunteerism.

This thesis provides new perspectives and understandings of crisis volunteerism, and what is required to digitally transform this practice. This is achieved by relating to crisis volunteerism as a practice area in its own right, rather than an add-on to the practice area of crisis management, which is otherwise common in previous research. Using the concept of digital transformation to understand how this practice area can be improved is also a novel approach.

The thesis has developed an analytical framework for digital transformation in complex settings such as crisis volunteerism and applied it to a holistic understanding of crisis volunteerism practice. This has uncovered the triggers, strategies and capabilities that are in play and must be taken into consideration, to facilitate the *relevant and useful* design and development of information systems for crisis volunteerism and the crisis response system.