

Conceptions of crisis management capabilities

– Municipal officials' perspectives

Jerry Nilsson

Department of Fire Safety Engineering
and Systems Safety

Lund University, Sweden

Doctoral thesis, Lund 2010

Conceptions of crisis
management capabilities
– Municipal officials' perspectives

Jerry Nilsson

Department of Fire Safety Engineering
and Systems Safety

Lund University

Doctoral thesis

Lund 2010

Conceptions of crisis management capabilities
– Municipal officials' perspectives

Jerry Nilsson

Report 1044
ISSN 1402-3504
ISRN LUTVDG/TVBB--1044--SE
ISBN 978-91-628-8038-5

Number of pages: 95
Illustrations: Jerry Nilsson

Keywords

Vulnerability analysis, municipality, crisis management, dependencies, valuable and worth protecting, responsive, learning, individual learning, learning organisation, officials, conceptions.

© Copyright: Jerry Nilsson and the Department of Fire Safety Engineering and Systems Safety, Faculty of Engineering, Lund University, Lund, 2010.

Brandteknik och riskhantering
Lunds Tekniska Högskola
Lunds Universitet
Box 118
22100 Lund

brand@brand.lth.se
<http://www.brand.lth.se>
Telefon: 046-222 73 60
Fax: 046-222 46 12

Department of Fire Safety Engineering
and Systems Safety
Lund University
P.O. Box 118
SE-22100 Lund
Sweden

brand@brand.lth.se
<http://www.brand.lth.se/english>
Telephone: +46-46-222 73 60
Fax: +46-46-222 46 12

Abstract

In the Swedish crisis management system, the municipalities have a great responsibility. One part of this responsibility concerns preparing for crises by making risk and vulnerability analyses as well as plans for how to handle extraordinary events. Such preparedness planning involves municipal officials and consequently their conceptions of their organisations' crisis management capabilities. This makes it vital to look into these conceptions more closely and establish whether specific characteristics can be identified. This thesis aims at gaining understanding of how officials involved in preparedness planning in general and vulnerability analysis in particular explicitly conceive of their organisations' crisis management capabilities. The thesis poses six specific research questions, pertaining to three themes: vulnerability, dependencies and learning. The results show specific characteristics in how officials conceive of their organisations' crisis management capabilities. These characteristics appear as similarities, variations, and even disagreements. It is argued that the characteristics as well as what explains them must be considered in the development of society's crisis management systems.

Summary

In the Swedish crisis management system, the municipalities have a great responsibility. One part of this responsibility concerns preparing for crises. The legislation demands that municipalities should perform risk and vulnerability analyses and make plans for handling extraordinary events. These preparedness activities largely involve municipal officials (here used to include civil servants as well political appointees). Their conceptions about their organisations' crisis management capabilities will influence the analyses as well as the decisions made in preparedness planning. This makes it vital to study these conceptions more specifically. This thesis aims at gaining understanding of how officials involved in preparedness planning in general and vulnerability analysis in particular explicitly conceive of their organisations' crisis management capabilities. Focus is mainly on municipal civil servants. The overarching research question that is stated in the thesis is:

What characteristics can be found in the officials' expressed conceptions of their organisations' crisis management capabilities?

Three themes are considered: *Vulnerability*, *Dependencies* and *Learning*. Two specific research questions are posed for each theme.

The vulnerability theme first considers the question what officials in different organisations consider to be valuable and worth protecting from deterioration. In the thesis, this is seen as a basic step of a vulnerability analysis. Thereafter, the officials' conceptions of weaknesses in their organisations' crisis management capabilities are considered.

The dependency theme first raises the question of the possibility to identify the degree to which actors participating in a vulnerability analysis are dependent on actors that have not been represented during the analysis. Connected with this question is whether it is possible to identify, among all actors identified in the vulnerability analysis, those particularly important in the managing of a specific scenario. The second question raised is to what degree officials representing different actors in the preparedness planning agree on the dependency relations between the actors.

The learning theme first raises the question of what different officials who participate in a tabletop exercise learn about their organisation's crisis management capability and how it may be improved. Thereafter cases are studied where obvious problems in knowledge transfer may be identified from the local emergency preparedness planning committee to the rest of the municipality. The question being raised here is what characterizes the role-

taking of the individuals in these committees. Do they act in accordance with the theories of the learning organisation?

In order to answer the research questions, conceptions expressed by officials in vulnerability analyses or in connection with preparedness planning were studied. Methods used to collect information were questionnaires, interviews, seminars and tabletop exercises. The information was analysed through systematizing it and categorizing it, trying to look for patterns in what the officials expressed regarding their organizations' crisis management capabilities.

The results show that: 1) Officials in different organizations have different ideas about what is valuable and worth protecting. At the same time they focus on and develop some categories of items more than others, e.g. Infrastructures and real estate as well Processes and functions; 2) The problems that the officials identify in their organizations' crisis management capabilities can usually be related to some part of their organizations and some types of processes, such as Structure of the organization and Operational processes; 3) The officials' quantitative assessments of what actors the organizations represented at a tabletop exercise depend on in a crisis situation can be used for identifying the degrees to which participating organizations are dependent on actors not represented at the exercise. The assessments can also be used to identify actors who can be seen as particularly important in the managing of the scenario. The actors can be shown in a classification diagram where individual actors as well as categories of actors (such as Information and Municipal management) can be identified as specific types such as Key actors, Specialists, Supporting actors and Background actors; 4) There are marked degrees of disagreement between the officials about how dependent the actors they represent are on each other. Only in every third situation, where two agents (officials) individually assess one actor's dependency on the other they are in perfect agreement. Moreover, in every sixth such situation, a big or very big discrepancy between their assessments can be identified; 5) Officials participating in tabletop exercises learn different aspects of crisis management that relate to themselves as individuals and to the organization at large. The degree of understanding that the participants gain about it also appears to vary considerably; 6) In the cases where problems exist in transferring knowledge from the local emergency planning committee to other parts of the municipalities, it is found that the officials who are chosen as members in the local emergency planning committees do not shoulder the role that the learning organisation prescribes.

Sammanfattning

I det svenska krishanteringssystemet har kommunerna ett stort ansvar. En del av ansvaret handlar om att förbereda sig för kriser. Lagstiftningen kräver bland annat att kommunerna genomför risk- och sårbarhetsanalyser och upprättar planer för hur de skall hantera extraordinära händelser. I detta krisberedskapsarbete involveras främst tjänstemän och politiker. Deras föreställningar om sina organisationer och deras krishanteringsförmåga påverkar såväl analyser som de ställningstaganden som görs inom beredskapsplaneringen. Därför är det viktigt att studera dessa föreställningar mer specifikt. Avhandlingens syfte är att öka förståelsen för de föreställningar som tjänstemän och politiker, som involveras i beredskapsplaneringen, uttrycker om sina organisationers krishanteringsförmåga. Framför allt fokuseras kommunala tjänstemän och deras uppfattningar i sårbarhetsanalyser.

Den övergripande frågan som ställs i avhandlingen är: *vad karakteriserar tjänstemäns och politikernas uttryckta föreställningar om sina organisationers krishanteringsförmågor?* Tre teman behandlas: Sårbarhet, beroenden och lärande. För varje tema ställs två specifika forskningsfrågor.

Temat sårbarhet behandlar först frågan vad tjänstemän i olika organisationer anser vara skyddsvärt. I avhandlingen anses det vara grunden i en sårbarhetsanalys att ha klarlagt vad som är skyddsvärt. Därefter analyseras vilka svagheter tjänstemän och i en del fall politiker anser att deras organisationers krishanteringsförmåga har. Temat beroenden studerar möjligheten, utifrån information som ges vid sårbarhetsanalyser av framför allt tjänstemän, att identifiera i vilken grad deltagande aktörer är beroende av aktörer som inte representerats vid analysen. I samband härmed studeras i vad mån det är möjligt att identifiera aktörer som är särskilt viktiga i hanterandet av det scenario som analyseras. Slutligen behandlas frågan om tjänstemän som representerar olika aktörer i beredskapsarbetet är överens om de beroendeförhållanden som råder mellan de aktörer de representerar.

Temat lärande tar upp frågan vad olika tjänstemän som deltar i en sårbarhetsanalys lär sig om sin organisations krishanteringsförmåga och hur den kan utvecklas. Därefter studeras fall där en uppenbar tröghet kan skönjas vad gäller spridandet av kunskap och förståelse till övriga delar av den kommunala organisationen. Frågan som ställs är, i de fall där problem med kunskapsspridning från den kommunala beredskapsgruppen kan skönjas, vad som karakteriserar de tjänstemän som valts ut för att ingå i dessa beredskapsgrupper. Agerar de på ett sätt som ligger i linje med de teorier som finns kring lärandeprocesser i organisationer?

För att besvara forskningsfrågorna studerades framför allt föreställningar som uttrycktes av tjänstemän, och i några fall politiker, i eller i samband med, sårbarhetsanalyser. Metoder som användes för att samla in information var enkäter, intervjuer, seminarier och ”tabletop-övningar”. Informationen analyserades genom att systematisera och kategorisera den, samt att försöka se mönster i vad de tillfrågade uttryckte gällande sina organisationers krishanteringsförmågor och deras utvecklingsmöjligheter.

Resultatet visar att: 1) Tjänstemän i olika organisationer tar upp olika saker när de identifierar vad som är skyddsvärt. Samtidigt fokuserar de och utvecklar vissa aspekter mer än andra såsom infrastrukturer och fastigheter liksom processer och funktioner; 2) De problem som tjänstemän och politiker identifierar i sina organisationers krishanteringsförmågor kan oftare relateras till vissa delar av organisationen och vissa processer än andra, t ex organisationens strukturer och operativa processer; 3) Tjänstemäns (och i något enstaka fall politikerns) kvantitativa bedömningar gjorda vid en tabletop övning gällande vilka aktörer den egna organisationen är beroende av vid en kris kan användas för att identifiera i vilken grad deltagande aktörer är beroende av aktörer som inte representerats vid övningen. Bedömningarna kan också användas för att identifiera aktörer som bedöms vara särskilt viktiga i hanterandet av scenariot. En klassificering kan göras av aktörer och kategorier av aktörer (som t ex informationsaktör, kommunal ledningsaktör) i olika typer såsom Nyckelaktörer, Specialister, Stödjande aktörer och Bakgrundsaktörer; 4) Det finns stora mått av oenighet mellan tjänstemän i deras syn på hur beroende de aktörer de representerar är av varandra. Bara i vart tredje fall där två tjänstemän bedömer sina aktörers respektive beroenden är de helt överensstämmande och i vart sjätte fall kan en stor eller mycket stor diskrepans identifieras; 5) Tjänstemän som deltar i tabletop-övningar lär sig aspekter av krishantering som relaterar såväl till dem själva som individer som till organisationen i stort. Varje individ lär sig emellertid olika brett och olika djupt; 6) I de fall där det finns en uppenbar tröghet i kunskapsöverföringen i en kommun, är det tydligt att individerna som valts ut för att ingå i den kommunala beredskapsgruppen inte tar på sig rollen att sprida kunskaperna vidare i sina egna organisationer.

Acknowledgements

I would like to express my sincerest appreciation to a number of people and organizations that have given me support during the time of accomplishing this thesis.

First of all I want to thank my two supervisors Kurt Petersen and Per-Olof Hallin who have given me excellent guidance. Kurt represents exceptional expertise and resourcefulness. His decisive support has been central in finally completing this thesis. PO personifies not only extraordinary competence but also warmth and wisdom. Throughout the process, and even before, he has truly delivered endless support and encouragement in every possible way. His help has been invaluable to me. I would also like to thank my former supervisor, Sven Erik Magnusson, who with his never-ending creativity inspired the research.

Thanks to *everyone* at the Department of Fire Safety Engineering and Systems Safety as well as FRIVA and to all who contributed during the drafting process of the thesis. I would especially like to recognize Kerstin Eriksson, Henrik Tehler, Marcus Abrahamsson, Nicklas Guldåker, Henrik Hassel and Jonas Borell, as well as Stefan Svensson and Lars Fredholm at the Swedish Civil Contingencies Agency. Special thanks to Susanne Hildingsson at LU Service who with her positive attitude and strong coffee made every morning a good morning!

I'd like to express my appreciation to the Swedish Civil Contingencies Agency (MSB) and the former Swedish Emergency Management Agency for funding the research on which this thesis is based. Moreover, I am grateful to the officials, in the municipalities and other organizations, who most generously shared their thoughts, experience and wisdom.

I also want to express warmhearted gratefulness to my parents Riitta and Stig-Arne, as well as my sister Sandy, for life-long support and love. You have always been there, encouraging me. I am also grateful to Anker Pedersen and Christer Bech, and other friends and relatives for their support.

Finally, but most importantly, I would like to express my thankfulness to my dearly loved life companion Anne-Marie and to my sons Joel and Anton. Anne-Marie, your infinite love, patience and encouragement have been an enormous source of strength. Words cannot express how much I appreciate and adore you. Joel & Anton, you are the two brightest shining stars on my sky, always putting life in perspective. I love you and I am most grateful that you exist in my life.

Table of contents

1 INTRODUCTION	11
1.1 Outline of the report.....	12
1.1.1 <i>Papers</i>	13
1.1.2 <i>Related publications</i>	14
2 BACKGROUND	15
2.1 The municipality context.....	15
2.2 Vulnerability, crises, crisis management and vulnerability analyses	17
2.3 Officials' conceptions – a brief introduction to the research questions.....	22
3 AIM AND RESEARCH QUESTIONS	23
3.1 Vulnerability theme.....	25
3.1.1 <i>Officials' views on what is valuable and worth protecting</i>	25
3.1.2 <i>Officials' views on weaknesses in their organisations' responsive crisis management capabilities</i>	26
3.2 Dependencies theme.....	27
3.2.1 <i>Agents' assessments of their actors' dependencies on other actors</i>	27
3.2.2 <i>Are agents in agreement concerning their actors' interdependencies?</i>	28
3.3 Learning theme	30
3.3.1 <i>The learning outcomes of tabletop exercises</i>	30
3.3.2 <i>Individual officials' roles for learning throughout the organisation</i>	31
3.4 Summary of the thematic research questions	31
4 ANALYSING CONCEPTIONS EXPRESSED BY OFFICIALS IN PREPAREDNESS PLANNING	33
4.1 Dimensions of vulnerability.....	33
4.1.1 <i>Dimensions of what is valuable and worth protecting</i>	33
4.1.2 <i>Dimensions of the organisations' responsive crisis management capabilities</i>	34
4.2 Dimensions of dependencies.....	35
4.3 Dimensions of learning	36
5 RESEARCH PROCESS AND METHODS	39
5.1 Understanding the research process.....	39
5.2 Techniques and approaches for collecting data.....	43
5.3 Techniques and approaches for analysing data	47
5.4 Research settings for empirical data collection and the selection of participants.....	48

6 RESEARCH CONTRIBUTIONS	51
6.1 Summary of papers	51
6.2 Results	58
6.2.1 <i>Addressing the vulnerability theme</i>	58
6.2.2 <i>Addressing the dependencies theme</i>	64
6.2.3 <i>Addressing the learning theme</i>	67
6.2.4 <i>Addressing the overarching research question</i>	71
7 DISCUSSION	73
7.1 Perspectives	73
7.2 Methods, validity and reliability	77
7.3 Further research.....	80
8 CONCLUSIONS	83
REFERENCES	87
APPENDIX – PAPERS I-VI	

1 Introduction

Crises and crisis management has been given an increased attention worldwide the last decade. In Sweden a legal framework has been established that requires that public authorities should prepare for crises (e.g. SFS, 2006 a; b; c¹). The basic idea is to prevent crises from happening and make sure that society will be better prepared for managing those that may nevertheless occur. The crisis management system is based on a bottom-up perspective where the municipalities can be seen as having a central role. The legislation requires that the municipalities prepare for crises by making risk and vulnerability analyses, and by establishing plans for dealing with extraordinary events. This work often involves municipal civil servants and political appointees. These two categories will be termed “officials” in this thesis. Officials will provide information into risk and vulnerability analyses and to the design of plans based on their conceptions in the form of understandings, opinions and beliefs of the conditions of the municipality with regard to its exposure to different threats and its capability to manage different crises. Hence there is an important link between their conceptions and the municipalities’ crisis management capabilities. In order to gain understanding of this link there is a need to clarify and make explicit the officials’ conceptions of their organizations’ crisis management capabilities.

The importance of making local officials’ conceptions explicit has already been recognized in practice. It is, for example, often suggested that the risk and vulnerability analyses required of municipalities should involve the officials so that a broad outcome is obtained and relevant actors² are being heard. However, fewer attempts have been made to systematically study the conceptions local officials express when analyzing their organization’s crisis management capability. Research has been more focused on risk perception in general (e.g. Slovic, et al., 1980; Slovic, 1987; 1998, Wildavsky & Dake, 1998), people’s conceptions of future threats and sustainable developments (Bjerstedt, 1992) and misconceptions or myths regarding people’s behaviour in crises (e.g. Kreps, 1991; and Fischer III, 1998; Alexander, 2007; Constable, 2008). There is also a substantial amount of literature that has looked into common weaknesses in preparedness planning (e.g. Dynes, 1983; Dynes, 1994; Perry & Lindell, 2003) as well as providing principles for effective crisis management (e.g. Quarantelli, 1997; Boin & Lagadec, 2000; Boin, 2005a). This

¹ These laws and regulations can be seen as being related to earlier versions, e.g. SFS, 2002 a, b, which are now annulled

² *Actor* will be used in this thesis to denote individuals, organizations or other entities that may act.

thesis highlights and tries to systematize conceptions officials have of their organisations' crisis management capabilities. It particularly focuses on what is expressed in connection with their participation in municipal vulnerability analyses. However, it also studies the effects of preparedness planning in general. Increasing our understanding on this matter may be useful for improving the crisis management capability of municipalities as well as society in general.

1.1 Outline of the report

Background

The background aims at setting the scene and explaining why it is relevant to study officials' conceptions on their organizations' crisis management capabilities. It explains briefly the municipality and its responsibility in preparedness planning. It defines central concepts used such as Vulnerability, Crisis management and Vulnerability analysis.

Aim and research questions

This chapter introduces the aim and an overarching research question. Moreover, three themes, Vulnerability, Dependencies and Learning, each one involving a thematic research question, as well as two specific research questions are established.

Analysing conceptions expressed by officials in preparedness planning

The chapter presents the central dimensions of the three themes Vulnerability, Dependencies and Learning, taking into consideration the different research questions.

Research process and methods

Research process and methods tries to explain the research process and its link to the research questions. Moreover it presents the techniques used for collecting and analysing data. It also explains the research settings for empirical data collection and the selection of participants in the study.

Research contributions

Research contributions summarises the appended papers briefly, and then gives a more lengthy review where the different research questions are addressed.

Discussion

The implications of the results are discussed in this chapter, as well as the use of methods and the validity and reliability of the result.

Conclusions

Conclusions summarise the main points of the thesis.

1.1.1 Papers

The papers included in this thesis are listed below. The six papers have been submitted to international scientific journals and subjected to peer review. Four papers have so far been accepted and two are under review.

- Paper I Nilsson, J. & Becker, P. (2009), What's important? Making what is valuable and worth protecting explicit when performing risk and vulnerability analyses. *International Journal of Risk Assessment and Management*. Vol. 13, No. 3/4, pp. 345 -363.
- Paper II Nilsson, J. (2009), What's the problem? Local officials' conceptions of weaknesses in their municipalities' crisis management capabilities. Accepted for publication in *Journal of Contingencies and Crisis Management*.
- Paper III Tehler, H. & Nilsson, J. (2009), Using Network Analysis to Evaluate Interdependencies Identified in Tabletop Exercises. Submitted to an international journal.
- Paper IV Nilsson, J. & Tehler, H. (2010), Discrepancies in agents' conceptions of interdependencies. Submitted to an international journal.
- Paper V Nilsson, J. (2009), Using tabletop exercises to learn about crisis management: Empirical evidence. *International Journal of Emergency Management*. Vol. 6, No.2, pp. 136 – 151.

Paper VI Nilsson, J. & Eriksson, K. (2008), The Role of the Individual – A Key to Learning in Preparedness Organisations. *Journal of Contingencies and Crisis Management*. Vol. 16, No. 3, pp. 135-142.

1.1.2 Related publications

Hallin, P.O., Nilsson, J., Olofsson, N. (2004), *Kommunal sårbarhetsanalys*. [Municipal vulnerability analysis] KBM:s forskningsserie, No 3. (In Swedish)

Nilsson, J. (2003), *Introduktion till riskanalysmetoder*. [Introduction to methods for risk analysis] Report 3124. Brandteknik, Lunds tekniska högskola, Lunds universitet. (In Swedish)

Hallin, P.O., Nilsson, J. & Olofsson, N. (2003), *Kommunerna i det nya sårbarhetslandskapet*. In Clark E, Hallin PO & Widgren M. (Eds.) Tidsrumsfragment [Time space fragment] (pp. 165-184), Rapporter och notiser 165, Institutionen för kulturgeografi och ekonomisk geografi, Lunds universitet. (In Swedish)

Lundin, J., Abrahamsson, M. & Nilsson, J. (2003), *Översiktlig genomgång av "Länsprojekt Riskhantering i Dalarnas län"*. [Review of the risk management in Dalarna County project] Report 7017, LTH Brandteknik, Lund, Sweden. (In Swedish)

Nilsson J., Magnusson, S. E., Hallin, P.O. & Lenntorp, B. (2001), *Sårbarhetsanalys och kommunal sårbarhetsrevision*. [Vulnerability analysis and auditing of municipal vulnerability] LUCRAM, Lunds universitet. (In Swedish)

Nilsson J., Magnusson, S. E. & Hallin, P.O. (2000), *Integrerad regional riskbedömning och riskhantering*. [Integrated regional risk assessment and risk management] LUCRAM, Report 1002, Lunds universitet. (In Swedish)

Nilsson, J. (2000), *Vulnerability Analysis – Öresund*. LUCRAM, Lund University.

Nilsson, J. & N. Törneman, (2000), *Vulnerability and Hot Spot Assessment of Öresund for Oil Spills - a mapping approach*. ISSN 1404-2983 Report 2001. LUCRAM. Lund University.

2 Background

2.1 The municipality context

In Sweden as in many other countries, the concern about managing crises, risks, and vulnerabilities has increased during recent decade. At the end of the 1990's and the beginning of the 2000's, governmental public investigations and propositions in Sweden started to raise the issue of the need to implement a more coherent system for crisis management and, as part of it, perform risk and vulnerability analyses at the different levels of society on a regular basis. This was partly a result of a widespread concern that the vulnerability of the society was about to increase due to technological and social developments as well as increasing globalization (e.g. SOU 1995; SOU 2001). At the same time the Cold War had begun to release its grip around the world, and it is likely that other matters had received more notice in its place. A number of what can be seen as crises, or possibly disasters, had also occurred. In a Swedish perspective such crises include the murder of the Swedish Prime Minister Olof Palme in 1986, the *Estonia* ship accident in 1994 and the fire at the discotheque in Gothenburg in 1998. Eventually laws and regulations were issued that heightened demands on authorities to prepare themselves for crises by regular planning (e.g. SFS, 2002a; b). In time such legislation was revised (e.g. SFS, 2006a; b; c). The municipalities have a vital role in the crisis management system. The municipalities³ are obliged to analyse what extraordinary events may happen in peacetime and how these events may affect their activities. The criteria for an extraordinary event is that it diverges from what is normal, means a serious disturbance or an evident risk for a serious disturbance in critical societal functions, and calls for fast action by a municipality or county council (SFS, 2006a). The legislation further proclaims that the results should be evaluated and compiled in a risk and vulnerability analysis. With consideration taken to the risk and vulnerability analyses, the municipalities should also, during every term of office, establish a plan for how to handle extraordinary events (SFS, 2006a).

Central to the Swedish crisis management system are also three principles: responsibility, parity and proximity (Prop. 2005). The principle of responsibility specifies that those responsible for an activity under normal conditions also are responsible during a crisis. The principle of parity states that activities should, as far as possible, be organized and located in the same way during an emergency as they are under normal conditions. The principle

³ This also concerns county councils, which are dealt with to a lesser extent in this thesis.

of proximity declares that emergencies should be managed where they occur and by the closest affected and responsible people. A geographical area responsibility is laid upon the municipalities, the county administrations and the national government. They should make sure that different actors on their geographical level, i.e. the local, regional and national levels, coordinate their activities, concerning both preparedness planning and operative crisis management. In addition to this there are other forms of responsibilities like the sector responsibility.

The central role municipalities and their civil servants and political appointees have in the Swedish crisis management system makes it imperative to understand these officials'⁴ conceptions of crises and crisis management. This is a major reason why municipalities and their officials are focused on in this thesis.

Studying Swedish municipalities and their officials, it is necessary to have some form of basic picture of them and their relation to other public actors. Sweden is divided into 290 municipalities. A municipality is a territory and administrative unit that provides its citizens with a great many services. A municipality is governed by politicians who are elected by the citizens every four years. The work is divided into different municipal committees governed by politicians. The everyday practical work is conducted by civil servants in different departments, usually corresponding with the committee structure. This thesis predominantly considers civil servants. Among these civil servants there are ordinary as well as higher officials.

In addition to the 290 municipalities, there are 18 county councils and two regions, which are a form of county council with an extended regional responsibility for development. The county councils and regions are responsible for activities that cover a greater geographical area and require considerable financial resources, such as health and medical services, dental care and public transportation. Moreover, 21 county administrations⁵ are governmental coordinating authorities with supervisory responsibility.

Even though the legislation states that the municipalities and county councils should make a plan every term of office for handling extraordinary events based on the risk and vulnerability analyses, questions remain as to how risk and vulnerability may be defined and how they may be analysed in this kind of

⁴ For reasons of simplicity, civil servants as well as political appointees will throughout the thesis be termed officials.

⁵ Not to be confused with county councils, although their administrative areas often correspond.

context. The literature occupied with definitions of risk and vulnerability is immense, and although it would be fair to say that some unanimity exists regarding the meaning of these concepts, especially concerning “risk”, there is no definitive characterization of vulnerability. It is beyond the scope of this thesis to make a lengthy review of these different concepts. However, it is necessary to define them briefly, with regard to how they will be used here.

2.2 Vulnerability, crises, crisis management and vulnerability analyses

Risk can be seen as an expression of a scenario, the probability of the scenario and the consequence of the scenario (cf. Kolluru, 1996; Kaplan, 1997⁶; Nilsson, 2003). Vulnerability is a concept that is closely related to risk but is here used in a somewhat different meaning. There have been many attempts over the years to define vulnerability (see Weichselgartner, 2001). One common feature in many of the scholarly definitions is that they stress an (in)capability for persons or groups (e.g. Blaikie, et al., 1994) or systems (Aven, et al., 2004) to withstand a potentially harmful event and to continue functioning (Ibid). In this thesis, vulnerability will follow this stance and be defined broadly as the incapability of a person, group, object, system or some other phenomenon to withstand and manage crises and emergencies that arise from specific internal or external factors and that may threaten what is considered valuable and worth protecting (cf. also Hallin, et al., 2004; Nilsson & Becker, 2009).

Crises and emergencies as well as disasters can likewise be defined in many ways (Quarantelli, 1995; Boin, 2005b; Boin & t’Hart, 2006; Eriksson, 2008). The concepts are overlapping and may sometimes be hard to separate. An approach that may be taken (cf. Uhr, 2009), is to see these concepts as “...*distressful situations in which series of events have or can have very negative consequences for human beings, societal functions or fundamental values.*” (Uhr, 2009 p. 19.) This perspective is somewhat adopted in this thesis, but crisis will still foremost be considered in its relation to the concept extraordinary events, as described above. Moreover, the concept crisis as used here also implies situations characterised by a sense that time is limited and that there is a considerable degree of uncertainty concerning potential outcomes (cf. Sundelius, et al., 1997).

⁶ The author primarily endeavoured to give a quantitative definition of risk.

The crisis management capability can be discussed with regard to four phases: preventive measures, preparedness measures, responsive measures and recovery measures⁷ (McLoughlin, 1985; McEntire, 2003). Mitigation should here be seen as all those activities that aim at reducing the risks, either by reducing the probability or by reducing consequences that would result should an adverse event occur. It involves, for example, land-use planning, setting up restrictions of different kinds, construct safe buildings and establish safety zones. Preparedness is those measures that are taken to develop an operational capability should an adverse event happen. This involves things like training, making plans, setting up communication systems, acquiring resources, etc. Response includes the actions that are taken "...immediately before, during, or directly after an emergency that save lives, minimize property damage, or improve recovery..." (McLoughlin, 1985 p. 166.) It may involve different kinds of processes such as coordination, control, etc (Nilsson, 2009b). Finally, Recovery is the measures taken in a shorter perspective to restore the vital functions of the affected society to a minimum as well as those activities that in a longer time perspective aim at returning the situation to a normal level. In practice these phases are closely related and not always clearly distinguishable (Uhr, 2009). Still, they may be used as approximations in discussing different aspects of crisis management.

In line with the definition of vulnerability chosen here, vulnerability analysis can be defined as a way to assess the incapability of a person, group, object, system or some other phenomenon to protect what is considered valuable from being deteriorated by harmful events. In this definition of vulnerability analysis, at least three components may be identified: 1) something that is seen as valuable and worth protecting, 2) events that may harm such things and 3) the capability to protect what is considered valuable from being depreciated by the harmful event(s) (cf. also Hallin, et al., 2004; Nilsson & Becker, 2009). A vulnerability analysis should include these three components.

Risk and vulnerability analyses can provide qualitative, quantitative or semi-quantitative results and involve methods such as seminar-based scenario methods, traditional risk analysis methods, hierarchical holographic modelling, simulations and index methods (Johansson & Jönsson, 2007). By *method* is here meant a procedural approach aiming at reaching a certain result (Ibid).

The methods have their different advantages and disadvantages. Index methods, for example, provide an opportunity to compare two or more

⁷ McLoughlin (1985) discusses these phases as part of emergency management. Although a distinction may be made between the concepts of emergencies and crises, the phases should be applicable to a crisis management context as well.

municipalities' vulnerabilities. However, information of a more qualitative sort is not obtained here to the same degree as in seminar-based scenario methods. These latter types of methods instead focus on facilitating discussions among groups of people and aim at clarifying in what way specific events may affect the system being studied, i.e. in this case a municipality.

One form of seminar-based method is so-called "tabletop exercises". The Federal Emergency Management Agency (FEMA) defines tabletop exercises as "a *facilitated analysis of an emergency situation in an informal, stress-free environment.*" (FEMA, 2009, p. 2.10) It is often performed in a room where the participants sit at a table (Njå, et al., 2002). The attempt is to create a constructive dialogue among participants, or agents representing different actors, as well as a facilitator. There are at least two objectives of tabletop exercises: 1) To test the capability of the group and 2) to train the group in taking the right decisions (Njå, et al., 2002). In the former case, efforts are made to find weaknesses in the group's or organisation's crisis management capability. In this process the participants try, on the basis of their (pre-) understandings, preconceptions, perceptions, values, beliefs, etc. of crises and capacities, to establish some form of shared mental model of what is a likely and/or satisfactory response to a specific situation, i.e. a scenario as well identifying potential consequences of the conceived responsive actions. A scenario is here defined as: "...a well worked answer to the question; 'What can conceivably happen?' Or: 'What would happen if...?'" (Lindgren & Bandhold, 2003, p. 21) In this process it is likely that the participants try to create meaning around the scenario, which in the end can be seen as a more or less comprehensive narration (cf. Gärdenfors, 2006 on the creation of meaning in narrations).

Since crises have sometimes been hard to conceive of in advance, it is often claimed (e.g. Hallin, et al., 2004) that the participants in the analysis process should be allowed to bring a good amount of creativity in the form of "what if?" questions to the discussions in order to identify the scenarios that reveal weaknesses in the crisis management capability. This may involve everything from deficiencies in technical artifacts to dysfunctional organizational structures. Questioning the organizational capacity may be sensitive, however, and may require an atmosphere in which it has been explicitly stated that the participants should be allowed to think freely and question conditions in the current crisis management capability without fear of repercussions. This is also relevant considering officials learning about crisis management. For learning to be deep and meaningful, it is required that the underlying norms and values may be reconsidered (cf. Argyris & Schön, 1996). At the same time, the scenarios should not be unrealistic, and one should be careful to avoid obvious mistakes, for example, of using outdated names or other factual inconsistencies (Dausey, et al., 2007).

The effect situation and context may have should be recognized when considering the result of vulnerability analyses performed as tabletop exercises. So far I have implicitly touched the effect of social power relations. Such power relations may influence what is expressed in an analysis situation in different ways (cf. Lukes, 1974, 2005 on the way power may be exercised). There are other influential factors, such as those relating to our cognitive functions, that may also be relevant to consider in this context (cf. Nilsson & Becker, 2009). Tacit knowledge is one example (Dreborg, 1993; 1997). Polanyi (1966; 1969) claimed that “all knowledge is either tacit or rooted in tacit knowledge” (Polanyi, 1969:144). Tacit knowledge is connected with two kinds of awareness, subsidiary and focal, which are interacting. Subsidiary awareness is used as a function or tool for focusing our attention (focal awareness) on something (Rolf, 1991) and experiencing it as an object or phenomenon. What is tacit and what is explicit are shifting, though. In a seminar we may, for example, be focally aware of one dimension of the current task but have subsidiary awareness of others. Discussing the same issue at a later time, other dimensions of the problem may be more focused, whereas what was focused on the first time receives less attention this time. Hence, tacit knowledge in this sense can be seen as a factor that explains the output of the analyses in relation not only to the actual crisis management capability but also to situation and context. Tacit knowledge may also stand for knowledge that is so personal and integrated in individuals’ beliefs and values that it is not easy to access, explicate or share verbally with others (cf. Nonaka & Takeuchi, 1995).

Other cognitive mechanisms of relevance here, also considered in Nilsson & Becker (2009), concern schemata and scripts, which can be seen as cognitive functions that simplify our actions. Our schemata can be seen as mental structures that contain knowledge of the world in some sense. They are constantly evolving at the same time as they function as filters that influence what we perceive and remember (Bartlett, 1932; Anderson, et al., 1978). Things that do not fit with our schemata may be filtered out while others take their place in our struggle for creating meaning in what we think we perceive (Mason, 1992). Hence, our conceptions may be a bit tricky in that they may be persistent even though new evidence would make them invalid (Kam, 1988).

A script can be defined as “a set of expectations about what will happen next in a well-understood situation” (Schank & Abelson, 1995, p. 5). Hence, we do things without thinking too deeply.

The more or less explicit purpose of vulnerability analysis in general is to utilize it as a way to improve the crisis management capability. One may imagine a causal link here between analysis and an altered crisis management capability. This is illustrated in Figure 1 below. Three factors strongly influence

the first box (1), Analysis of the organisational crisis management capabilities: a) The individuals participating and their pre-understandings, beliefs, etc., b) situational and contextual factors, which may be of many kinds — several have been explained above and c) the analysis method. The direct outcome of an analysis may be of at least two sorts: 2) documentation and 3) a change in the understandings of those involved in the analysis or of others who make use of the documentation. This can be seen as a form of learning, for the individuals as well the group, and may in itself be a prerequisite for improved crisis management capability. The participants may, however, also convey their understanding further out in the organisation and society. This can be seen as a wider form of organisational learning (4). Eventually the newly gained understanding, on the parts of the single individuals and organisation, may (5) improve the crisis management capability, for example through specific changes or developing an altered disposition to act in accordance with one or several of the phases of crisis management. As will be explained in Chapter 5, the officials' conceptions of their organisations' crisis management capabilities may be analysed at the different stages illustrated here. It should be emphasized that Figure 1 is centred on the analysis situation. Situational and contextual factors, for example, will also influence the degree to which learning will take place after the analysis and whether the officials will act in a crisis situation.

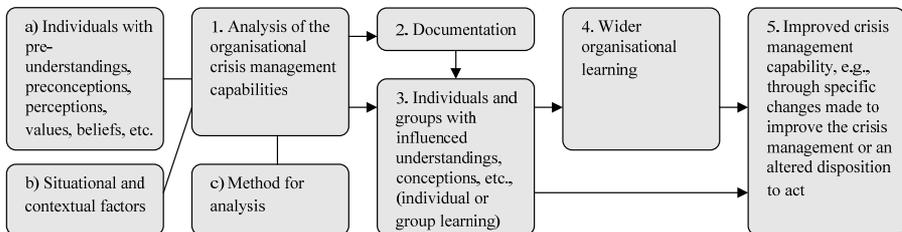


Figure 1. An illustration of how vulnerability analysis may lead to an improved crisis management capability. The arrows indicate a causal chain. Apart from the method itself the individuals' pre-understandings as well as situational and contextual factors are here seen as intrinsic components of the analysis that also influence the analysis and what may come out of it.

2.3 Officials' conceptions – a brief introduction to the research questions

It is suggested (e.g. Swedish Emergency Management Agency, SEMA, 2006) that municipal risk and vulnerability analyses should involve officials from the different municipal activities. There may be different kinds of benefits from such a strategy. For one thing, considering different perspectives in the analysis process may lead to a more comprehensive and “democratic” result. Moreover, the analysis may in itself be seen as a process in which the crisis management capability is developed through the training, learning, and networking the involved individuals may avail themselves of as well as share with others.

In either way, the officials' input will be an important contribution to the analysis result and constitute the basis for plans, measures and improvements, etc. This means that the municipalities' readiness to deal with crises will be influenced by the officials' crisis management conceptions, making it highly important to study these conceptions more closely. *Conception* is a term that may be defined as “*the sum of a person's ideas and beliefs concerning something*” or “*the originating of something in the mind*” (Merriam Webster's Dictionary Online, 2010), “*that which is conceived in the mind; an idea, notion*”, “*an opinion, notion, view*”, “*a general notion*” (Oxford English Dictionary Online, 2010), and is here used as an encapsulating word for considering officials' dispositions towards crises and crisis management.

Conceptions have been more or less included in a large part of the crisis management research conducted over the years. Common weaknesses in crisis management capability, risk perceptions, common misconceptions as well as principles suggested for effective crisis management, for example, indirectly consider, or are part of officials' conceptions. However, there is a need to study the conceptions officials explicitly have of their organizations' crisis management capabilities in an analysis situation in order to better understand the results of such analyses as well as how the analysis procedures may be improved and developed. Can systematic patterns or variations be spotted? What may be the causes of that? What effects can be seen on the officials' understanding as a result of the analyses? These are important questions that will be enlarged on in the following chapter.

3 Aim and Research Questions

This thesis aims at gaining understanding of how officials involved in preparedness planning in general and vulnerability analysis in particular explicitly conceive of their organisations' crisis management capabilities. Focus is mainly on municipal civil servants. The overarching research question is:

What characteristics can be found in the officials' expressed conceptions of their organisations' crisis management capabilities?

It is important to raise and try to answer this question since it may provide information about whether there may be features of a systemic character in the officials' way of seeing things related to their respective organizations' crisis management capabilities. Moreover, if such features can be found, it is vital to consider what the potential causes and implications might be. The answer to the question may also provide information about the effect preparedness planning may have on the officials' learning about crisis management. Knowledge on these matters can be of use for developing society's crisis management capabilities: it may provide guidance on what needs to be improved or considered in the preparedness planning.

The overarching research question is quite broad and embraces too many dimensions to be easily answered. In the following, however, three areas will be distinguished that are particularly central for crisis management capability.

The first area considers *vulnerability* in a general sense. In a vulnerability analysis one should establish what is valuable and worth protecting, identify the hazards and potential scenarios that may pose a threat to it as well as endeavour to identify and deal with weaknesses in the capability of protecting what is valuable against what may be threatening it. But is it really worth the effort of making such analyses in different organisations? Do we not already know on a general level what is valuable in society and what the weaknesses in crisis management systems are? Perhaps we do, but what can be said about the officials' expressed conceptions on these matters in their working contexts, i.e. what do analyses performed by officials in different public organisations show? To what degree does the result vary between organisations and what may be the cause of such a variation? These are significant questions to address, since the answers may show what officials focus on, or perhaps should focus on, in crisis management.

A second area concerns the officials' views on the *dependencies* that exist between the actors in a crisis situation as well as in the everyday situation. The officials' views on the dependencies and even interdependencies may have great importance for the possibilities of preventing undesired scenarios from occurring as well as establishing a well-functioning interaction and coordination among the actors in a crisis situation⁸. What patterns can be seen in the way different actors and even categories of actors are dependent on each other? Are there general features in the way agents representing the actors think about dependencies?

The third area concerns the officials' *learning* about the dynamically changing conditions of crisis management through preparedness planning and the degree to which this is implemented in routines, values and norms of the organisation. We may here talk about learning on the parts of both the individuals themselves and their organisations as a whole. It is an important area to study since it is plausible to believe that crisis management responses are benefitted by the officials throughout the organisation having up-to-date knowledge on conditions relevant to such responses.

Consequently, three important areas, or as they will be called here *themes*, have been distinguished as significant for further studies regarding the overarching research question. The first theme involves questions considering what is valuable and worth protecting, what are potential hazards as well as what weaknesses officials discern in their crisis management capabilities. This is here termed *Vulnerability*. The second theme considers *Dependencies* between actors and how the officials representing them may understand them. The third theme deals with *Learning* that can be gained from preparedness planning, on both the collective as well as the individual level.

In this thesis a thematic research question will be stated briefly for each theme. Each thematic research question will be further broken down into two specific ones. The structure can be seen in Figure 2. The specific research questions are here numbered as subcategories of the themes to which they adhere. The officials considered represent organisations or parts or functions of organisations (mainly municipalities).

⁸ Here, dependency means "The relation of a thing (or person) to that by which it is supported" (Oxford English Dictionary Online, 2010), while being interdependent means being "dependent each upon the other; mutually dependent" (Ibid).

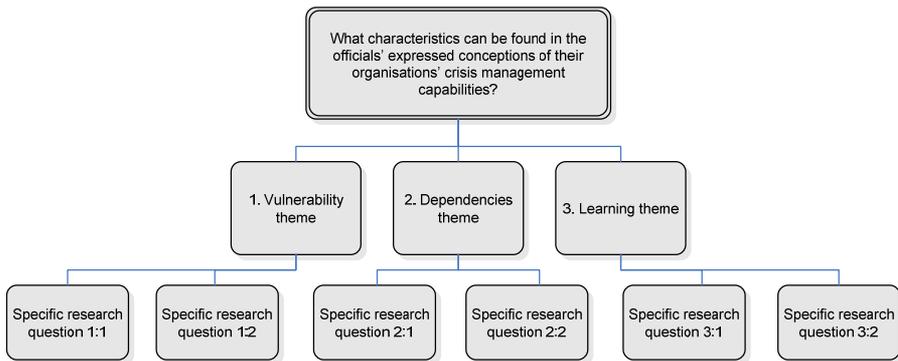


Figure 2. *The relationship between overarching research questions, themes and specific research questions.*

3.1 Vulnerability theme

The first theme deals with officials' conceptions of their crisis management capabilities in a general sense, and is concerned with the outcome of vulnerability analyses. The thematic research question is:

What do officials in different public organisations recognize when analysing their organisations' vulnerabilities?

The thematic research question will here be focused on (1) what is considered valuable and worth protecting and (2) the capability to protect what is considered valuable from deterioration, i.e. the crisis management capability. One reason for not studying the officials' conceptions of potential hazards is that this is an area that has already been dealt with within research into risk analysis and risk perception (e.g. Tversky & Kahneman on judgemental heuristics for assessing probabilities of events, 1974; Lichtenstein, et al., 1978; Slovic, et al., 1980, etc).

3.1.1 Officials' views on what is valuable and worth protecting

Crisis management is fundamentally about protecting what matters, i.e. what is regarded valuable and worth protecting. Although there are regulations as well

as social norms that provide guidance on what is valuable and worth protecting, this is something that varies from individual to individual as well as situation and place. It is the differences in our opinion on what is important that we can say broaden our collective perspective and enrich our society. At the same time, however, if the employees in an organization do not, at least in some form of organisational/societal perspective, have the same opinions or at least can accept the majority's opinion on what is valuable and worth protecting in a crisis, there is a risk that crisis management efforts may become unfocused and fragmented. Hence what is valuable and worth protecting needs to be communicated by the stakeholders in different contexts, for example in different types of organisations, practices and environments. Based on the overarching research question, it is useful to add clarity to this matter by examining just what officials in different organisations express as valuable and worth protecting. Hence, specific research question 1:1 is:

What do officials in different public organisations identify and express as valuable and worth protecting from deterioration?

The objective here is to systematize the outcomes of analyses made in organisations pertaining to the research questions to illustrate individual cases, as well as to compare the different cases and look for similarities and differences.

3.1.2 Officials' views on weaknesses in their organisations' responsive crisis management capabilities

Crisis management is a complex phenomenon that involves different interdependent actors. In order to identify weaknesses in society's crisis management capabilities, everyone should be involved. For practical reasons this may be difficult. At least it is necessary, however, to engage agents, i.e. individuals representing the different actors, in some form of communication. These actors may have vital knowledge of their organizations' prerequisites pertaining to crisis management. However, they are seldom experts on crisis management per se. Hence it is crucial to gain understanding of how they conceive of weaknesses in their organisation's crisis management capability in a general sense. Specific research question 1:2 is:

What do officials in different public organisations identify and express as weaknesses in their organisations' responsive crisis management capabilities?

As with specific research question 1:1, the idea here is to look for patterns in the outcome of the analyses held with officials. Relevant questions include whether specific themes (not to be confused with the three themes in this thesis pertaining to the overarching research question) can be found in the way the officials identify these weaknesses, and whether the weaknesses pertain to some parts or processes of the public organisation more than to others?

3.2 Dependencies theme

Society and its actors can be seen as interconnected in ways where one actor's action in some regard may affect some other actor. One may here use analogies like "systems" (e.g. Buckley, 1967; Ackoff, 1999 e.g. Jackson, 2000 for an overview) or "networks" (e.g. Borell & Johansson, 1996) for understanding and dealing with the complexity of such linkage. A central part of interaction concerns the dependencies and interdependencies between the actors. The second theme focuses on dependencies and interdependencies by asking:

What characteristics can be seen in the outcome of officials' assessments of the dependency relations between the actor they represent and other actors?

This question is here broken down into two specific research questions. The first question focuses on dependencies, while the second is more concerned with interdependencies.

3.2.1 Agents' assessments of their actors' dependencies on other actors

A pertinent question to consider when performing municipal vulnerability analyses in the form of tabletop exercises is to what degree the actors who are considered important, from a dependency perspective, by the agents participating in the tabletop exercise, actually take part in the exercise.

If only a relatively low number of such actors are involved, the validity and reliability of the outcome of the analysis may be questioned because the capabilities of the actors present are related to these other actors. Hence, it is

relevant to find out how big this problem is in the practical everyday preparedness planning. A related question is whether it is possible to see a connection between different actor categories and the involved agents' assessments of how dependent the actors they represent would be on them in a crisis. Can actor categories really be used as an indicator of actors' importance from a dependency perspective? Such information can be useful when making decisions concerning such preparedness measures as which actors can be seen as Key actors who should be invited in the tabletop exercise in the first place. This leads us up to research questions 2:1:

a) To what degree are the actors participating in a tabletop exercise dependent on other actors, not participating in the exercise, for their ability to manage the scenario being analyzed? b) Is it possible to identify actors particularly important for the management of a specific scenario using information provided in a tabletop exercise?

These two related questions may yield relevant information on the actors' dependencies. Still, they only consider the perspective of one actor's dependency on other actors. The other actor's perspective of this particular dependency relation is not involved, but will be considered in the research question below.

3.2.2 Are agents in agreement concerning their actors' interdependencies?

Coordination among actors and other resources can be seen as a prerequisite for effective response management (Uhr, 2009). Coordination basically concerns the management of interdependencies between activities (Malone & Crowstone, 1990; Uhr, 2009). It can be assumed that the better understanding the individuals representing the actors involved have of such interdependencies, the better are the conditions for coordination and successful crisis management.

Consider an example involving a few societal actors: a major hospital in a municipality, the local district heating system, the local water treatment works and the municipal IT unit. These are all societal functions of critical importance for society. Although representatives for the four actors know that their actors have critical relationships, they may not realise how tightly coupled they are. In the short everyday perspective, the hospital is dependent on the district heating system and the water treatment works for delivering drinking water and heat. Moreover, the representatives for the hospital have complete

confidence that the district heating system and water treatment works will deliver their services, in one way or another. The people representing the water treatment works or the district heating system do not realise, however, that the hospital has not thought of alternative ways of getting water and heat. The services of the IT unit are critical for the operations of the district heating system and the water treatment works. However, the people working at the IT unit believe (incorrectly) that these supply systems can also be run manually. Hence, should an IT failure occur, this may result in serious troubles for running the hospital and, as a result, the IT failure would cause harder strains on society than it might have if the dependencies had been adequately understood. Clearly, inadequate understanding of actors' interdependencies in this manner throughout society may create unnecessary weaknesses in crisis management capability. This example only considers four actors. Considering other actors and applying network thinking, one can imagine other actors who in turn may be dependent on these actors to identify different kinds of immediate and ultimate effects.

A central question, pertaining to this example, is to what degree officials representing the different actors in preparedness planning share an understanding of the dependency relations between the actors they represent. Hence, specific research question 2:2 is:

Are the agents' conceptions of dependencies in agreement?

If the answer to this question cannot easily be answered with a "yes", it raises further questions like: *How frequent are discrepancies in officials' conceptions of interdependencies between the actors they represent and of what size are they?*

Interdependencies between actors of whatever kind are likely to be sensitive to the dynamics of the changing conditions of society. In a crisis the interdependencies may therefore change continuously. Such changing conditions will not be considered here. However, different cases and scenarios will be involved in trying to get as broad a picture of how agents regard interdependencies as possible.

3.3 Learning theme

Due to crisis management being an activity that is based on a highly dynamic society, it is of critical importance that the officials involved in preparedness planning continuously learn how to effectively handle crises and that the learning obtained in some form spreads throughout the organisation(s). Hence it is important to find out what the effects of preparedness planning in this regard actually are. The third theme therefore considers the dynamics in preparedness planning in the form of potential learning effects. The thematic research question is:

What do officials and organisations learn from preparedness planning and what prerequisites may be identified as central for learning to occur throughout the municipal organisation?

While themes 1 and 2 consider the output of the actual analysis in which officials have participated, theme 3 is concerned with the learning outcomes of not only these analyses but preparedness planning activities in general. Although one could claim that learning associated with theme 3 in fact is part of the preparedness outcome, it can also be seen as a meta-level in relation to themes 1 and 2 in that the participants themselves reflect on the outcome of the analyses (See Figure 3).

3.3.1 The learning outcomes of tabletop exercises

Learning from tabletop exercises may involve what the individual learns or even the group or the organisation. There have been some discussions, however, on the value of tabletop exercises and other forms of simulations when it comes to learning about crisis management (Dreborg, 1993; Dreborg, 1997; Borodzicz, 2005). Hence there is a need to find out more about this, considering both the individual and organisational level. In this thesis a demarcation is made, however, to mainly study individual learning (cf. Chapter 4). Specific research question 3:1 is:

What do officials involved in tabletop-based vulnerability analyses learn about their organisations' crisis management capability and how it may be improved?

The objective here is primarily to pinpoint similarities and differences in individuals' learning on this matter.

3.3.2 Individual officials' roles for learning throughout the organisation

The second part of the third thematic research question considers learning effects in a somewhat wider perspective. It focuses on the role individuals responsible for municipal preparedness planning take in promoting learning about crises and preparedness issues throughout the municipal organisation. Hence, specific research question 3:2 is:

In cases where problems can be identified regarding learning about crises and preparedness issues throughout the municipal organisation, what characterizes the role-taking of individual officials who have the responsibility for preparedness planning?

The underlying question here is whether officials not directly taking part in preparedness activities also acquire some learning or information about preparedness planning and crisis management due to the preparedness activities.

3.4 Summary of the thematic research questions

A hierarchical structure over the thematic and specific research questions that relate to an organisation's crisis management capabilities was provided in Figure 2. The themes are, however, also connected to each other, which is explained in Figure 3. It should be noted that although the research questions are related in a sense, the ambition in this thesis is not to interrelate them with regard to specific details that may be found in the material, but rather to focus on major characteristics that may be identified. While theme 1 and theme 2 are directly related to the documentation of vulnerability analyses and questionnaires in connection with them, theme 3 can be seen as a level "above" them, considering a subsequent time period.

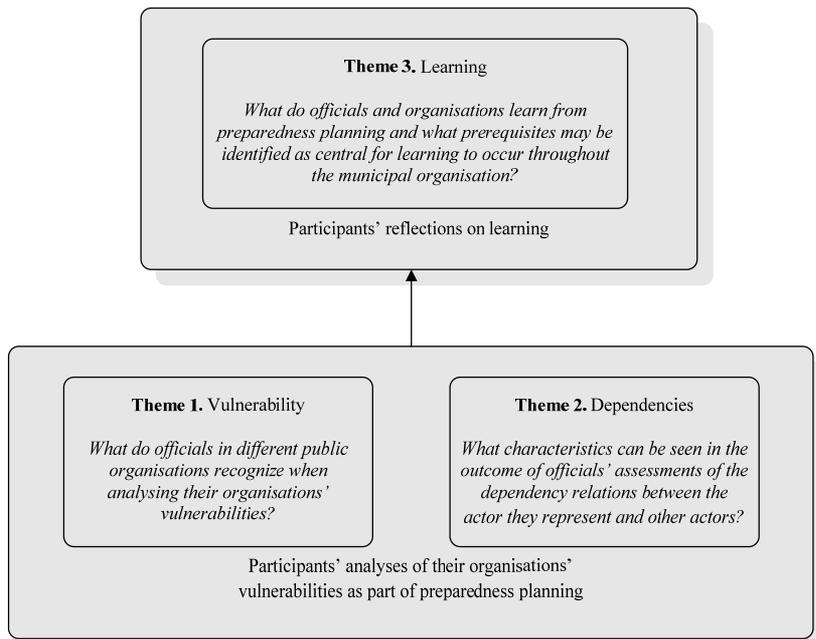


Figure 3. An illustration of how the different themes are connected to each other.

4 Analysing conceptions expressed by officials in preparedness planning

This thesis focuses predominantly on vulnerability analyses and the conceptions officials have of their organisations' crisis management capabilities in such analyses including the learning obtained about organisations' crisis management capabilities. The six specific research questions consider different dimensions of the officials' conceptions of their organizations' crisis management capabilities. In the following, the aim is to sketch out the central dimensions that pertain to the different themes dealt with by the research question.

4.1 Dimensions of vulnerability

4.1.1 Dimensions of what is valuable and worth protecting

One may assume that people may consider very different items, such as concrete objects, structures, moral positions, etc. as valuable and worth protecting. One may also assume that not everything is regarded to be equally valuable, and that things may be valuable for specific reasons. Sometimes some issues are considered valuable for their relation to something else. In philosophical value theory, one speaks here of intrinsic and extrinsic or instrumental values (Stanford Encyclopaedia of Philosophy, 2009). That something has intrinsic value means that it has a value for its own sake. Something regarded valuable that does not have such value has extrinsic value. One form of extrinsic value is instrumental value. This means that something has value as a means to something else.

Theoretically, what is regarded to be intrinsically or extrinsically/instrumentally valuable may differ from individual to individual, and in the social context. In every society there are norms and laws, however, that regulate what is valuable and that indicate what on a general level should be more valuable than something else. The Swedish parliament, taking what can be interpreted as an anthropocentric perspective, has established that the goals for national security should be to protect peoples' life and health, the functionality of society, and the capacity to maintain our basic values, such as democracy, legal security, and human freedoms and claims (cf. Swedish national audit office, 2008). Being quite uncontroversial, it is reasonable to assume that the Swedish officials may relate to this in their everyday practice as well as in vulnerability analyses. It is also reasonable to assume that they will see functionality of society as

instrumentally valuable to life and health. Hence, the goals can be used for comparing the outcomes of the officials' conceptions. Questions remain to be answered however: Do the goals cover the officials' conceptions of what is valuable and worth protecting? What more specifically do officials express regarding these goals?

4.1.2 Dimensions of the organisations' responsive crisis management capabilities

A societal crisis response may involve many different actors, who may be more or less organized. Public organizations often play a central role in these situations; hence, their capability to protect that which is considered valuable and worth protecting is vital. Analysing organizations' crisis management capability can be seen as a step in a process of strengthening these organisations' capabilities. Analysing weaknesses of such organizations in a systematic way requires an understanding of what an organization is and what constitutes it. There are several ways to define an organization. One way is to see it as being "(1) social entities that (2) are goal directed, (3) are designed as deliberately structured and coordinated activity systems, and (4) are linked to the external environment" (Daft, 2004 p. 10). In a similar way Child (2005) claims an organization has "*structural, processual and boundary defining facets*" (Child, 2005 p. 6). Scott (1981) opines that the central elements of an organization are social structure, participants, goals, technology and the environment. Yet another way to define organizations is that they have formal and explicit purposes or goals, people who fulfil functions but can be replaced, and structures where responsibilities are distributed (Forsell & Westerberg, 2007). In order to separate *organization* from *organising* it is also required that the organization should have a lasting and continuous being as well as an identity of its own.

From the above, central elements of an organization may be distinguished. It is here suggested that the organisation has *structures* that facilitate *processes* that are in line with their goals and purpose (cf. also Christensen, et al., 2005). These structures regulate *functions* that are fulfilled by *individuals* and *artefacts*. In its interaction with the environment, the organization makes use of *material and immaterial resources*. Considering structures, it should be remembered that, as in all contexts involving human activities, they are likely to be influenced by culture in the form of personal networks, personal "chemistry" and informal knowledge (cf. Christensen, et al. 2005).

The processes may be of many different kinds. Considering an organization's response to crises a number of specific and central processes may be distinguished, although these clearly overlap. Such processes have been noted in Nilsson (2009b) and include *Sensemaking* (cf. Klein, 2006; Weick & Sutcliffe, 2005), *Communication* (cf. Comfort, 2007), *Coordination* (cf. Comfort, 2007) and cooperation, *Control* (cf. Comfort, 2007) and *Operational processes* (e.g. Coppola, 2007). It should be stressed that this is a simplistic way of looking at organisations' responsive crisis management capabilities. In these processes are also included a number of capabilities related to individuals, such as being able to cope with stress and improvise and solve problems creatively, etc (cf. Comfort, 2007; Westin & Sjöberg, 2007; Amabile, 1996), and also artefacts such as their being dependable and reliable (cf. Höyland & Rausand, 1994) as well as interaction between individuals and artefacts (Rollenhagen, 1997).

4.2 Dimensions of dependencies

There may be different forms of dependencies that are of varying importance from a societal perspective. Some functions that are critical to society have needs that must be recognized for avoiding serious consequences for society. Others are of less importance. An actor may be dependent on another actor in numerous ways. This may involve products as well as services of different kinds (MSB, 2009). Considering, for example, the dependencies between infrastructures specifically, at least four categories (Peerenboom, et al. 2002) can be used for describing them:

- Physical (dependency on materials)
- Cyber (dependency on information)
- Geographic (dependency through co-location)
- Logical (dependency in a form that cannot be connected to the above, e.g. through financial markets)

These relations are often dynamic in the way that they are connected to situation as well as time. Dependencies in relations may, for example, be continuous, intermittent or appear after a while in a certain situation. Dependencies might also be what Ashby (1957) called "immediate" or "ultimate". By *immediate* is meant the effect actor X may have directly on actor Z. By *ultimate* is meant the effect Actor X may have on actor Z through other actors, such as actor Y or even several other actors.

In order for needs and expectations to be met there must be awareness and proper understanding of the dependency relations. This means that it is relevant not only to identify the dependencies in themselves, but people's *conceptions* of them. It may be relevant to identify the significance of the dependency relations as well as potential discrepancies that may exist between two agents' understandings of their actors' dependencies. Ways of grading the strength of dependency relations have been suggested. One may, for example, estimate an activity's dependency in terms of its capability of managing without a specific resource. Concepts like *redundancy*, *exchangeability* and *adaptability* are central here (SEMA, 2007). However, as has been exemplified, dependency relations could be expressed in other terms as well. Hence, if aiming at capturing a person's conceptions at large of a dependency relation, one should be careful not to restrict it in too specific terms.

4.3 Dimensions of learning

So far what has been described are dimensions of conceptions the officials may have expressed during the vulnerability analysis and that may be found in the documentation. However, the analyses also affect the participants. Performing the analysis in a dialogue form makes it possible for the participants to improve their understanding of their respective roles and responsibilities (FEMA, 2009). In this sense the analysis process itself affects the participants' conceptions. It is relevant here to talk about learning. One may consider at least two types of learning: something benefiting a single individual or something that involves a collective. From a perspective of developing organisations' crisis management capabilities, it is interesting to gain understanding into how learning is accomplished on both these levels.

One perspective on individual learning is given by Marton & Booth, who propose that learning "*...proceeds as a rule, from an undifferentiated and poorly integrated understanding of the whole to an increased differentiation and integration of the whole and its parts*" (1997 p. viii). Seeing what is learnt as meaningful can be regarded as deepening the learning.

A fundamental aspect of learning is to learn to experience something in specific ways in new situations that the learner has not been able to do previously (cf. Marton & Booth, 1997). Such learning means that:

“The learner has become capable of discerning aspects of the phenomenon other than those she had been capable of discerning before, and she had become capable of being simultaneously and focally aware of other aspects or more aspects of the phenomenon than was previously the case”. (Marton & Booth 1997 p. 142).

Marton & Booth (1997) claim that every situation has a *relevance structure* in the sense that it relates to a person’s experience of it, or her perceptions of what it demands. When a person has learnt something about a phenomenon in the way described, this person will experience it in more complex ways when this is called for by a situation’s relevance structure. In this context it means that the officials on a more fundamental level may need to learn to experience crises and crisis management in all their phases and dimensions, as well as be able to see important aspects in different situations. In essence this means that the officials’ cognitive schemata may be developed so that they become more susceptible to aspects relevant for crisis management and respond to the situation’s relevance structure.

One may also talk about learning on a *collective level* that goes beyond individual learning. Collective learning may be defined as: “...a broad term and includes learning between dyads, teams, organizations, communities, and societies” (Garavan & McCarthy, 2008 p. 451). It highlights “...characteristics such as relationships, shared vision and meanings, mental models and cognitive and behavioral learning.” (Garavan & McCarthy, 2008 p. 451).

In this thesis the collective learning level focused on is that which relates to organizations. Argyris & Schön (1996) state that organisational learning takes place when the individual learns for the organisation. However, for the learning to become sustainable the organisation must also reconsider its underlying program, e.g. values, norms and objectives. A somewhat different expression of organisational learning is suggested by Attewell who says that an:

“...organization learns only insofar as individual insights and skills become embodied in organizational routines, practices, and beliefs that outlast the presence of the originating individual. These routines may reflect an amalgam of individual learning or skills, and need not correspond to any one individual's understanding” (1992, p. 6).

One may also discuss the organisation as a more active learner. Senge (2006), for example, uses the concept *learning organisation* to denote

“Organizations where people continually expand their capacity to create the result they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together” (Senge, 2006 p. 3).

The leadership is central in accomplishing the learning organization. The leader must be a steward for the visions and simultaneously act as a teacher.

Collective learning need not necessarily follow organisational boundaries, though. We may, for example, speak of learning as something that takes place in certain *communities of practice*. A community of practice in this context means a group of people with a common interest, where the individuals interact regularly through communication and sharing experiences. In this social process the individuals learn from each other and develop their skills and competences (Lave & Wenger, 1991; Wenger, 1998). Information gained in such participation may also spread from one community of practice to another through so called “brokers” that connect the two communities. One may also talk about knowledge transfer in organizations (cf. Argote, et al. 2000; Argote & Ingram, 2000). Knowledge transfer in organizations can be defined as “...*the process through which one unit (e.g. individual, group, department, division) is affected by the experience of another*” (Argote, et al., 2000 p. 3). The implication of knowledge transfer here is that an organization or parts of an organization may learn from other’s experience. Such knowledge transfer is dependent on, for example, individuals’ understandings and social processes (Argote, et al. 2000) as well as the complexity of the task and its connection with the social network (Argote & Ingram, 2000).

In this thesis, the learning focused on is that which relates to crisis management. One may ask what it is that should be learnt. The literature here is considerable and relates to both the individual and organizational levels (Boin & Lagadec, 2000; Boin, 2005a; Quarantelli, 1997; Weick & Sutcliffe, 2001; Perrow, 1984; Flin, et al. 2003). There are dimensions in this literature covering the range from, for example, normal accidents in specific environments such as aviation, to more unexpected events, as well as preparedness measures and responsiveness measures. Overall this ranges from establishing structures and having clarified responsibilities to a readiness to meet the unexpected by being flexible and creative in the responsive phase.

5 Research process and methods

5.1 Understanding the research process

This thesis is an account of empirical material collected during a research process in which the primary aim has been to design a method for analysing the vulnerability of municipalities. The research process has been abductive in character in the sense that there was interplay between developing and testing the method and developing the research questions, as well as between theory and empirics in a broader sense (cf. Alvesson & Sköldberg, 1994).

The initial idea was to design a method that, by making use of indicators, could quantitatively present the municipalities' overall vulnerabilities. This quantitative measure was an amalgamation of an assessment of the capability to manage different scenarios as well as an assessment of crisis management on a generic level (cf. Quarantelli, 1997, agent and response generated needs). Whilst testing this method in municipalities, voices were increasingly raised that although the chosen approach could be useful, it was seen even more worthwhile to invest in an approach that facilitated a dialogue among the officials on the subject of crisis management. It was felt that such a dialogue would increase the understanding of the subject and enhance crisis management capability even as it was being analysed.

This is connected with the fact that preparedness planning can be seen as a continuous design process, where the organisation must consider and adapt to the constant changes that take place in the municipality and shape a relevant crisis management organisation. Such process is about making the best of the resources available. Hence, one is often looking for a satisfactory alternative (cf. Simon, 1996). Exactly what is a satisfactory crisis management organisation and how it should function is something that, guided by the literature and expertise, should be decided by the stakeholders, which in a municipal organisational context may be seen as the officials of the different departments. This requires a great deal of communication among the officials. For that reason a new, seminar-based method was designed. This new method was more dialogue oriented and endeavoured not only to analyse the weaknesses of municipalities' crisis management capabilities but also, and prior to this analysis, identify what is valuable and worth protecting and what events may prove harmful.

The question of design should also be related to the method itself. The question of what is an optimal method for vulnerability analysis more specifically was regarded as too challenging in the development process. Instead the endeavour was to find a satisfactory model. Nevertheless, it was

necessary to ask what a satisfactory alternative would be in terms of the criteria that were established (Simon, 1996). The design criterion established for the method was that, apart from encouraging dialogue of the organisations' crisis management capability, it should facilitate a learning process. It was expected that this should lead to a strengthening of social networks. Further criteria were that it should be generically applicable, be able to analyse the crisis management capability for all types of crises, be user friendly, be easy to update, make explicit responsibilities and roles, and give comparable results.

The method developed⁹ was designed for analysing, in seminar form, risk and vulnerability in three steps for the municipality (or other type of organization) considered. These steps should be seen as different seminars involving the same sets of participants. In the *first* step a platform is established. The objective of this step is to 1) identify what is valuable and worth protecting, and 2) identify and analyse what hazards and events may harm that which is valuable and worth protecting. In the *second* step a recap is made of the first seminar in which the participants may add to what was concluded there. Thereafter an analysis is performed by focusing on one or more scenarios and analysing the crisis management capability to protect that which is considered valuable from being deteriorated by the harmful event(s). In the *third* step the vulnerability analysis is followed up in an additional seminar in which an overall assessment of the organisation's crisis management capability is made and measures for improvements are discussed and compiled in an action plan. The follow-ups, it should be added, were developed to enhance the learning process. In the process of gathering data for this thesis, mainly steps 1 and 2 were involved. Hence, it is required to provide the reader with some input of the design process of these two steps.

Different attempts were made to form a structure for the first step. Initially a seminar form was used in which the participants freely explicated what they found valuable and worth protecting and where a moderator wrote down the discussion on a whiteboard (see Nilsson & Becker 2009). Eventually more elaborate forms emerged where the participants were instructed to identify different categories of what is valuable and worth protecting in their organisations and society, such as subjects/objects, processes and functions, and values of different kinds such as moral positions. Considering the step of identifying and analysing hazards and negative events, a more or less traditional risk matrix was used for facilitating the process.

⁹ MVA: In English: Municipal Vulnerability Analysis. In Swedish (another meaning): Mångdimensionell verksamhetsanalys. See <http://mva-metoden.se/>

Analysing the capability to withstand harmful events (i.e. the second step) required a more elaborate process, however. The overall idea of this form was to provide the participants with a scenario of a crisis-like situation and let them quite carefully describe their organisations' capability to handle it in a way to prevent consequences are prevented. In practice this means that the participants construct and deal with a hypothetical situation where their conceptions and understandings add to the situation and a form of narration is conceived.

The result can be seen as an indication of the organisation's capabilities to handle the specific scenario. To obtain as complete, valid and reliable analysis of the municipality's overall crisis management capabilities as possible, some different scenarios should be analysed. However, the amount of time the municipalities find available for its officials to participate in such analyses affects the degree to which this is possible. A thorough scenario analysis takes time. Some initial tests of using the model revealed that weaknesses and uncertainties were often hidden in details and in implicit agreements that remain undetected if the analysis does not probe deeply. In order to avoid missing vulnerabilities of this sort, a structure was elaborated that built on identifying and making explicit critical components of the crisis management response, such as critical tasks that need to be conducted and the actors who should perform these tasks, and specifying the crisis management capability for these specific actions (see Nilsson, 2009 b; MVA, 2010).

The validity and reliability of the analysis is also affected by the participants' abilities to be critical and recognise weaknesses in their own organisation's crisis management capability, and to identify different scenario paths. Hence, it is necessary to try to create a climate where the participants feel that they will not fear repercussions for their input in the seminars. Hence, every scenario analysis should start by making clear that the seminars offer an opportunity to test ideas as well as take on the roles of being devils' advocates. Furthermore, a part of the method also includes questionnaires that the participants may use for communicating the level of uncertainty in their assessments during the scenario.

The result of the analysis approach described here will inevitably contain levels of uncertainty. The uncertainties that permeate the outcome are often recognised by the preparedness planners in the municipalities, however, who also see seminars like the one explained here as an opportunity for the officials involved to learn more about the crisis management capability and become committed to the issues by creating networks and making something abstract and implicit into something explicit and graspable. During the seminars, learning situations and networking can be seen in the spontaneous dialogue

that continuously arises between the participants on their actors' conditions, their actions, etc. To enhance the learning process, every new seminar started by going back and discussing the result of the previous one.

Having conducted several seminars as a facilitator, research questions arose. The seminars appeared to encourage learning but what was learned? Could any patterns be seen in what officials representing different types of organisations considered valuable and worth protecting? Or in what they conceived of as weaknesses in their organisation's crisis management capability?

One specific discovery made during the vulnerability analyses concerned the participants' different opinions of interdependencies among the actors they represented. This initiated questions of just how frequent and how great these discrepancies are, and also if some categories of actors were recurrently seen as more or less important by the other actors in terms of dependencies.

From a research perspective the vulnerability analysis discussed here provides an opportunity to study the conceptions, or specifically expressed conceptions, officials have of their organizations' crisis management capabilities. However, there are different possibilities to do so. The boxes in Figure 1 in Chapter 2:2 can be used to illustrate some alternatives.

The first option (box marked number 1 in the figure) here is to study what happens and what is said during the analysis. In this process one might want to look for signs that may reveal the process behind what was expressed. Was there a pause, a hesitation or a conflict over an issue? In what order were different issues taken up? What does this mean? Such an approach requires an interpretative element. Of course there is also the possibility of comparing the result with studies of conceptions made prior to the analysis situation.

The second possibility (box 2) is to study documentation of the analysis. This documentation may be everything from recordings to written protocols. Audio and video recordings can be used for making analyses of the same sort as can be done if one were making observations during the analysis. Written documentation, however, does not enable the same type of analyses, but instead reflects conclusions reached through majority decision or consensus agreement.

The third alternative (box 3) is to ask officials about how they relate to the analysis result. One may ask officials involved as well as those who have not been directly involved but have received and considered the documentation, e.g. some kind of decision maker. In the former case, what is said will contain reflections on the issue discussed because the analysis process will inevitably have affected the officials in one way or another. This may be seen as learning in some form, be it that the participants' previous understandings (individually

or as a team or group) have been confirmed or that a new one has been obtained.

The fourth possibility (box 4) is to study to what degree learning obtained by individuals in the analysis has spread to others who have not been involved in the analysis or decision-making process and has become routines and practices. This can be seen as some form of wider organisational learning.

The fifth option (box 5) may be to study whether the crisis management capability has actually been improved, and if changes being made have led to an altered disposition to act. This is very difficult to assess since a crisis is always unique in some way. Still, exercises and new analyses may be one way of obtaining some indicative information about this.

Studying any one of the alternatives may provide information about officials' conceptions of their organizations' crisis management capabilities. One may also consider studying more than one of the alternatives to try to corroborate the findings of the different alternatives.

5.2 Techniques and approaches for collecting data

In order to answer the specific research questions 1:1, 1:2, 2:1 and 2:2 documentation (i.e. box number 2 in Figure 1) from the analysis was studied. To answer specific research question 3:1, individuals having participated in the analysis was interviewed (i.e. box number 3 in Figure 1). In order to answer specific research question 3:2, which has a scope that actually is broader than can be seen in Figure 1, the links between alternatives 3 and 4 were examined by interviewing on the one hand individuals that had participated in the preparedness planning process (of which vulnerability analyses may be seen as a theoretical part) and on the other hand individuals that had not been reached by the preparedness planning activities in a way that was noticeable for them.

The data in this study has been obtained through interviews, seminars, tabletop exercises, and questionnaires. To answer research question 1:1 (*What do officials in different public organisations identify and express as valuable and worth protecting from deterioration?*) four seminar based vulnerability analyses exercises were held in which information was obtained concerning what officials of 7-21 persons in different organisations found valuable and worth protecting as a first step of a risk and vulnerability analysis (the studies involved in total 47 participants). During the seminar the participants were instructed to explicate what they, based on their organisational contexts found valuable and worth protecting. The questions were open in the meaning that the participants did not need to chose between a number of predetermined answers but could give whatever

answer they liked (cf. Ruane, 2006). The seminars lasted only so long that no one easily could add anything more to what had been said. This took about 30-60 minutes. During the seminars only a moderate ad-hoc structuring was made by the facilitator. The documentation consisted of audio recordings made by a Dictaphone.

For research question 1:2 (*What do officials in different public organisations identify and express as being weaknesses in their organisations' responsive crisis management capabilities?*) seminar based vulnerability analyses were held in the form of tabletop exercises with groups of 9-20 participants. Although the analysis approach can be seen as semi-structured, the structure applied was rather meticulous. It was required that the officials identified all tasks that need to be carried out, actors who should perform these tasks, their capability to do so, what may go wrong in the management and what may be improved. The dialogue was structured on a whiteboard which was photographed. The dialogue was also recorded and listened to afterwards to make sure that what had been written down was correct. It was also checked with the participants that the information was correct. All in all ten different vulnerability analyses performed in seven municipalities and at a county administrative board were studied. The studies involved a total of 146 participants.

In order to answer research question 2:1 *a) To what degree are the actors participating in a tabletop exercise dependent on other actors, not participating in the exercise, for their ability to manage the scenario being analyzed? and b) Is it possible to identify actors particularly important for the management of a specific scenario using information provided in a tabletop exercise?* as well as research question 2:2 *Are the agents' conceptions of dependencies in agreement?* questionnaires were used in conjunction with tabletop exercises in order to identify the dependencies between actors identified by the participants in the seminar as having some sort of role during the scenario. The questionnaires contained a quantitative scale ranging from 1 (meaning low dependency) to 5 (meaning high dependency). The questionnaires were given to officials (in this context termed *agents*) who represented different actors in tabletop exercises held in different organisations. The questionnaires contained two questions "on a scale from 1-5 where 1 means low dependency and 5 means high – how dependent are 1) your actor on each of the actors listed below to perform your tasks and 2) the actors listed below on the actor you represent to perform their tasks?"

For answering research question 2:1 the answers to the first questions were used for all actors listed. For answering research question 2:2 both questions were used, but only for the actors whose agents participated in the tabletop exercise. The distinction between the two research questions and the collection of data is exemplified in Figure 4 and Figure 5. Both steps involve the

quantitative assessments made by agents representing different actors in tabletop exercises. The first step is illustrated in Figure 4 and considers assessments made by agents participating in the tabletop exercise concerning their actor's dependency on actors having either been represented in a tabletop exercise (in this case actors A and B) or having been identified by the agents participating in the tabletop exercises as having some form of role in the crisis scenario considered (actor C). The assessments being made is represented by the arrows going *from* the actors of which the assessing agents belonged and concerned the actor's dependency on the actor to which the arrows point. Hence, in figure 4 the agent representing actor A has, for example, assessed actor A's dependency on actor B to be high (5) and on actor C to be low (1).

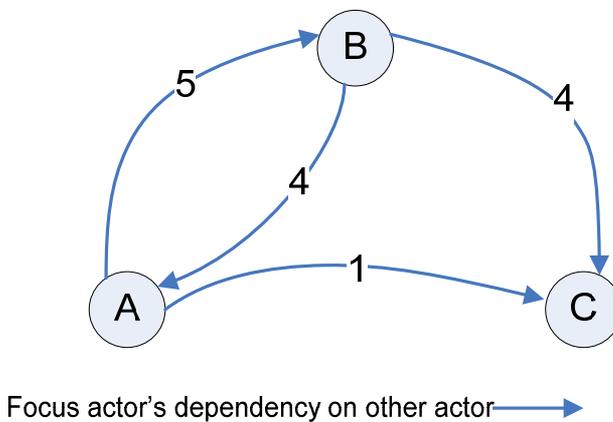


Figure 4. Assessments of focus actor's dependency on other actors

The second step includes additional assessment made by the agents participating in the tabletop exercise concerning the other actors' dependencies of the actor he/she represents. These assessments are represented by the dotted arrows in Figure 5. Again, the arrows are going *from* the actors represented by the assessing agents. The second step aims at comparing the agents' assessments of the dependency relations, hence it involves only those actors whose agents have been present at the tabletop exercises *and* made assessments of the dependencies.

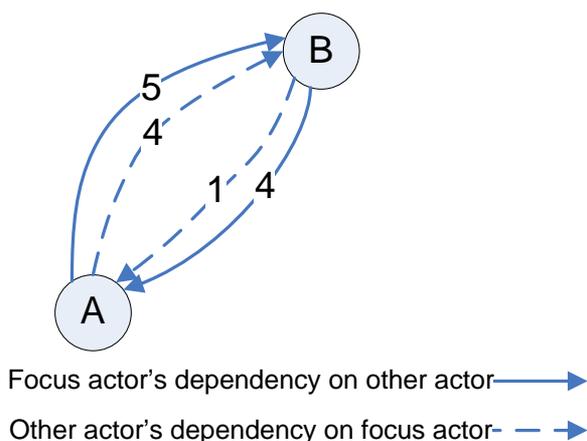


Figure 5. Assessments of actor's dependency on another actor as well as the other actor's dependency on the focus actor.

In Figure 5 one can see that there is a great discrepancy between the assessments made concerning actor A's dependency of actor B. The agent representing actor A has assessed its actor's dependency on actor B to be 5 (high) while the agent representing actor B has assessed actor A's dependency on actor B (the dotted arrow pointing at the opposite direction) to be only 1 (low). Hence there is a big discrepancy ($5-1=4$) in this regard between the two agents' views on actor A's dependency on actor B. At the same there is agreement with regard to actor B's dependency of actor A ($4-4=0$).

To answer research question 2:1, five cases were considered involving a total of 36 participants. For answering research question 2:2, seven cases were studied involving 84 participants.

To obtain information in connection with research question 3:1, (*What do officials involved in tabletop-based vulnerability analyses learn about their organisations' crisis management capability and how it may be improved?*) semi-structured interviews were held with nine officials who had participated in tabletop-based vulnerability analyses consisting of seven seminars with the objective of analysing their organisations' weaknesses and coming up with suggestions on how to improve. The interviews were recorded on a Dictaphone and written down verbatim. For research question 3:2, (*In cases where problems can be identified regarding learning about crises and preparedness issues throughout the municipal organisation, what characterizes the role-taking of individual officials who have the responsibility for preparedness planning?*), open and semi-structured interviews were

conducted with officials in four municipalities. These officials were preparedness planners, members of the local emergency planning committee with a responsibility for their administrations' preparedness planning, and partly administrative managers who had not been involved in the preparedness planning.

5.3 Techniques and approaches for analysing data

In all analyses of the empirical material, the aim was to systematize the results and try to identify patterns, categories and themes (cf. Patel & Davidson, 1994). Different techniques similar to those of coding, categorising and classification (cf. Ejvegård, 2003; Denscombe, 2000; Strauss & Corbin, 1990; Corbin & Strauss, 2008) were used to varying degrees in analysing the empirical material. Based on the empirical material at hand as well as theories and parliamentary decisions, categories were discerned and the empirical material was simultaneously classified in accordance with these categories. Attempts were also made to identify correspondences and relations of different kinds in the structured material.

The quantitative measures of dependencies among actors obtained through questionnaires were analysed by using network analysis and completeness measures as well as calculating and comparing discrepancies between the representatives' assessments of their actors' respective dependencies among one another. The categorisation made in these cases pertained mainly to different actor categories and actor types.

In connection with the research questions 3:1 and 3:2 a qualitative approach was used where the outcome was related to theories on individual and organisational learning as well as principles for effective crisis management. Explicit categories pertaining to learning were discerned for specific research question 3:1. The analysis for answering research question 3:2 took an explanatory approach (cf. Lundahl & Skärvad, 1992). In the interview material, central elements in the officials' views on preparedness planning were identified and compared with theories on the learning organisation. In both research questions 3:1 and 3:2, the interviews were read through many times to identify patterns (cf. Patel & Davidson, 1994).

5.4 Research settings for empirical data collection and the selection of participants

The research presented in this thesis aims at gaining understanding of how officials involved in risk and vulnerability analyses conceive of their organisations' crisis management capabilities. The term "officials" is here used to include both civil servants and political appointees. The organisations in focus are primarily Swedish municipalities and their departments, but civil servants working on a regional and national level such as police departments, the Swedish defence sector, county administrative boards and county councils were also included.

In total, 31 cases involving 330 participants are included in the thesis. 24 of these involve officials in ten different municipalities. 3 of the cases were in 2 different county councils (Regions), and 3 of the cases were in a county administration. The largest municipality in the study has about 10 times as many residents as the smallest. This difference in size also means differences in the complexity of these organizations. Some of the analyses have involved several municipal departments/administrations and officials with all-embracing functions of the municipalities, while others have focused on a single department or municipality. Members of two county administrations, relating to these municipalities, were also involved in some of the municipal studies. A tabletop exercise involving municipal, regional and national authorities was held at one of these two county administrative boards. In this case, dependencies between different actors were also assessed by the people taking part in the exercise. Two county councils (regions) were also considered. One such county council was studied on the basis of internal dependencies being assessed by representatives of different departments and functions. Another county council was studied with the aim of analyzing what representatives for this organization found valuable and worth protecting.

The selection of local officials for these studies was made primarily by preparedness planners in the municipalities, county councils and the county administration in consultation with a research team of which the author was a member. Sometimes (especially concerning research question 1:2) departmental managers were approached and asked explicitly to select individuals on the premise that they had operative roles. For answering specific research question 3:2, the selection of participants included not only preparedness planners and members of the local emergency planning committee, LEPC, but also officials who were not members of any LEPC.

Table 1 displays the research questions as well as the corresponding techniques utilised for collecting and analysing data.

Table 1. An overview of the specific research questions in relation to the appended papers in this thesis

Theme and thematic research question	Specific research questions	Techniques for collecting data	Techniques for analysing data
<p><u>Vulnerability theme:</u></p> <p><i>What do officials in different public organisations recognize when analysing their organisations' vulnerabilities?</i></p>	<p>1:1 <i>What do officials in different public organisations identify and express as valuable and worth protecting from deterioration?</i></p>	Seminar based vulnerability analyses with open questions.	<ul style="list-style-type: none"> • Categorisation and classification.
	<p>1:2 <i>What do officials in different public organisations identify and express as weaknesses in their organisations' responsive crisis management capabilities?</i></p>	Table top exercises (Seminar based vulnerability analyses with semi-structured questions).	<ul style="list-style-type: none"> • Categorisation and classification.
<p><u>Dependencies theme:</u></p> <p><i>What characteristics can be seen in the outcome of officials' assessments of the dependency relations between the actor they represent and other actors?</i></p>	<p>2:1 a) <i>To what degree are the actors participating in a tabletop exercise dependent on other actors, not participating in the exercise, for their ability to manage the scenario being analyzed? b) Is it possible to identify actors particularly important for the management of a specific scenario using information provided in a tabletop exercise?</i></p>	Questionnaires given to individual officials participating in vulnerability analyses performed as tabletop exercises.	<ul style="list-style-type: none"> • Categorisation and classification. • Network analysis and completeness analysis
	<p>2:2 <i>Are the agents' conceptions of dependencies in agreement?</i></p>	Questionnaires given to individual officials participating in vulnerability analyses performed as tabletop exercises.	<ul style="list-style-type: none"> • Categorisation and classification. • Comparison calculations
<p><u>Learning theme:</u></p> <p><i>What do officials and organisations learn from preparedness planning and what prerequisites may be identified as central for learning to occur throughout the municipal organisation?</i></p>	<p>3:1 <i>What do officials involved in tabletop based vulnerability analyses learn about their organisations' crisis management capability and how it may be improved?</i></p>	Semi-structured interviews held with individual officials having participated in tabletop exercises.	<ul style="list-style-type: none"> • Categorisation and classification. • Interpretative qualitative analysis based on theories on individual learning
	<p>3:2 <i>In cases where problems can be identified regarding learning about crises and preparedness issues throughout the municipal organisation, what characterizes the role-taking of individual officials who have the responsibility for preparedness planning?</i></p>	Open and semi-structured interviews held with individual officials.	<ul style="list-style-type: none"> • Interpretative qualitative analysis based on theories on organisational learning

6 Research Contributions

In this chapter, papers corresponding to specific research questions will be presented and summarized in an attempt to answer the overarching research question: *What characteristics can be found in officials' expressed conceptions of their organisations' crisis management capabilities?* The order can be seen as going from papers dealing with fundamental questions in risk and vulnerability analyses towards those on a more meta-oriented level, dealing with learning outcomes of the analyses. Four of the six papers are written with co-authors, and my contribution to these four is clarified.

6.1 Summary of papers

Paper I. What's important? Making what is valuable and worth protecting explicit when performing risk and vulnerability analyses

Paper I attempts to establish what officials express as valuable and worth protecting when performing risk and vulnerability analyses in their organisations, and to discuss the underlying reasons for their stipulations. A theoretical framework is elaborated and applied to the outcome of four seminars, in which participants from four different Swedish public organisations express what they consider valuable and worth protecting.

The seminars went on for 30-60 minutes and were led by a moderator who wrote down all views on what is valuable and worth protecting in short phrases on a whiteboard until no one easily could add anything more. The participants' opinions on what is valuable and worth protecting were thereafter analysed by the authors, using a model that pertained to what may be important to protect from harm in society. This model was based on the Swedish parliament's decision that the goals for national security should be to protect peoples' life and health, the functionality of society, and the capacity to maintain our basic values, such as democracy, legal security and human freedoms and claims (cf. Swedish National Audit Office, 2008). From this the authors conceived three central categories, 1) Life and health, 2) Individuals' needs (that should be attended to) and 3) the functionality of the organisations and society for maintaining the life, health and needs of the individuals by supplying products and services. This third category was simply termed Organisational and societal supplies. It was considered plausible by the authors to see these categories related in a manner where the functionality of society and its organisations is valuable in its role of satisfying individuals' needs. Such needs should be fulfilled in order for individuals' life and health to be maintained. The items

mentioned by the officials as valuable and worth protecting were coded and classified in one of the three categories. Further subcategories were identified, and the items were subsequently placed in these subcategories.

The results show both differences and similarities in what the officials in different organisations identified as valuable and worth protecting. The differences appeared partly to correspond to the different organisations involved. Some issues that one would assume to be classified by most people as valuable and worth protecting, such as Life and health, are not always mentioned. This implies that what the participants believe is valuable and worth protecting is implicit in ways that make it difficult to render explicit in the form of analysis technique employed here. A more structured approach is probably needed. Further explanations for the variation and the usefulness of the outcomes of the different seminars are also discussed.

My contribution: Conceiver, main writer, conducted the data collection, performed the data analysis.

Paper II. What's the problem? Local officials' conceptions of weaknesses in their municipalities' crisis management capabilities

Paper II focuses on local officials' conceptions of weaknesses in their municipalities' crisis management capabilities. Ten tabletop exercises performed in eight different organisations were analysed. Seven of the organisations were municipalities, while one of the analyses included different organisations such as the Police, the Swedish defence, national authorities, a regional company and a county administrative board. The analysis was performed at the county administration. Based on documentation made during the analyses, the endeavour was to find patterns in how the officials conceived of the weaknesses in their organisations' crisis management capabilities. This was done by trying to relate the officials' statements on weaknesses to the different parts, or elements, in a model describing an organisation. The elements considered here were Structure, Function, Individuals, Artifacts and Material and immaterial resources. These were termed "element categories". However, the primary motivation for an organization is to perform different processes to reach its goals. Efforts were also made to relate the weaknesses to different types of processes. Central process categories pertaining to operational crisis management capability identified in the paper were Sensemaking, Operational processes, Strategic control, Operational control, Coordination/cooperation, External communication and Internal communication.

In the analysis, a restricted number of themes about how problems were described were identified. These themes could be seen as pertaining to the different “element categories” and “process categories”. A record was kept of each time a problem could be related to the different element categories and process categories.

The results show that conceived weaknesses in the organisations’ crisis management capabilities might be related considerably more often to some organisational elements, such as structures, than to for example artefacts or material and immaterial resources. The process categories mostly involved in the descriptions of weaknesses were operational processes and operational control. More rarely problems could be related to sensemaking, or strategic control or internal information. Still, there was some variation between the cases as well, suggesting the influence of the scenario involved as well as participants’ backgrounds and roles.

The results are discussed in terms of what they indicate concerning the understanding these officials had of their municipalities’ crisis management capabilities. In order to avoid the risk that some aspects of the crisis management capabilities are not simply forgotten, it is suggested, considering tabletop exercises, that some form of checklist encompassing key words is used at some time in the analysis processes.

My contribution: I conceived and wrote the paper.

Paper III. Using Network Analysis to Evaluate Interdependencies Identified in Tabletop Exercises

This paper considers officials’ assessments of their actor’s dependencies on other actors identified in tabletop exercises. Tabletop exercises have become common in preparedness planning for estimating the capacity of society to deal with various emergencies. In combination with such exercises, important information on dependencies between organizations involved in managing crises may be obtained. The paper considers five cases where officials taking part in tabletop exercises anonymously through questionnaires assessed their actors’ dependencies on other actors identified in the tabletop exercises.

A way of analyzing such information using a network model that represents the various organizations and their assessments of which actors they are dependent on to perform their tasks is presented. The model allows for the classification and identification of actors and actor categories that are important for many of the other actors’ abilities to perform their tasks. Two

measures were used in analyzing the actors' and actor categories' importance in this regard. One measure was the fraction of all possible dependencies, i.e. the number of relations identified by other actors divided by the total number of actors participating in the tabletop exercise. The other measure was the ratio of the number of *strong* dependencies to the total number of dependencies a specific actor has.

The two measures were plotted against each other in a diagram. The diagram was divided in four fields. Each field was associated with a specific actor type. The actor types were named *Key actor*, *Supporting actor*, *Specialist actor* and *Background actor*.

A *Key actor* in this context is one on whom many others are dependent and where the majority of the dependencies are strong. The opposite of the *Key actors* are the *Background actors*. These are actors who have a low fraction of possible dependencies as well as a low fraction of strong dependencies. This means that relatively few actors are dependent on the background actor, and that the dependencies are weak. *Specialist actors* refers to actors that few other actors are dependent on, but where the dependencies are strong. *Supporting actors* are actors on which a majority of the other actors are dependent, but where the dependencies are not very strong.

By classifying the actors into different categories (e.g. Information, Municipal social services and care, etc.) and identifying which of the four types (i.e. Key actors, Background actors, etc.) a majority of actors of a specific category related to, a classification of the different actor categories into actor types could also be made.

In this way the results show similarities in the officials' views of their dependencies on some actor categories. The results of the analyses of five cases indicate, for example, that actors belonging to a specific category could often be classified as a certain actor type. Actors of the categories Information and Municipal information were often classified as Key actors. Some actor categories appear to be of the same actor type regardless of scenario, while others tend to be more sensitive in their classification depending on the scenario.

A completeness measure was also calculated for the different cases. This measure showed the degree to which the actors for which dependencies had been recognized in the tabletop exercise actually had had agents participating in the analysis. A value of 0 means that all involved actors' dependencies would be to actors who did not participate in the analysis. A value of 1 means that all actors for which a dependency had been identified also had had agents represented in the analysis. The values in the paper can be said to be relatively

low, although they increased as the screening level increased. One explanation for the low values that should be considered, however, is that not everyone participating in the tabletop exercise answered the questionnaire. In practice, then, the completeness was better than demonstrated in the paper. Still, the question of completeness is valuable to add to the tabletop exercises.

My contribution: Co-writer, collected the data, participated in the development of methods for analysis and in the analyses of the empirical material.

Paper IV. Discrepancies in agents' conceptions of interdependencies

Paper IV considers officials' views on interdependencies in preparedness planning. Managing societal crises requires the efforts of many interconnected actors. The involved actors need to coordinate their actions. For such efforts to be effective, it is vital that the involved actors give to and receive adequate support from one another. Sharing of support should be facilitated by the people representing the actors (i.e. officials, employees, etc.) understanding the interdependencies, at least of the interdependencies between their actor and other actors. Different views indicate problems in the crisis management capability of society. Hence, a vital part of the preparedness planning should be to establish the officials' views on interdependencies. Such views on interdependencies are analysed in this study.

The objective of the paper is to find out if agents (officials) are in agreement concerning their conceptions of dependencies between their actors. A central question concerns the frequency of discrepancies in officials' conceptions of interdependencies between the actors they represent, and how big these discrepancies are. The study is delimited to quantitative assessments made by officials (i.e. agents) representing different actors in tabletop-based vulnerability analyses of the interdependencies between their actors and other actors. Seven cases are involved where the agents represent different organisations or departments or functions of organisations. Two cases consider a county council. One case considers the views of agents representing different local, regional and national actors in a case conducted at a county administrative board. Four cases consider municipalities. In general the results show that in every third instance, where two agents separately assess one actor's dependency on the other they are in perfect agreement. It can also be seen that in every sixth situation where the two actors estimate the dependency relations, a big or very big difference between their assessments can be

identified. This means that there is a disagreement of the value 3 or 4 on a scale from 0 to 4.

The results further show that there is a great variation between different agents with regard to how many of their assessments have a high degree of discrepancy. This variation can also be related to different actor categories. In addition, the results indicate that the agents generally tend to assess their actors' dependency on other actors as higher than other actors' dependency on their actor. The usefulness of making explicit and comparing agents' conceptions of dependency relations is discussed.

My contribution: Main writer, collected the data, performed the data analysis.

Paper V. Using tabletop exercises to learn about crisis management: Empirical evidence

Tabletop exercises are often used for learning purposes in the area of crisis management, yet their potential for this is far from clear. The study examines the learning outcomes achieved by a group of officials from a municipal healthcare organisation taking part in tabletop exercises in which they assess the crisis management capabilities of the organization to which they belong and suggest possible improvements. The study starts by giving an overview of theories connected with individuals' learning as well as a brief overview of normative principles about what constitutes effective crisis management in general on the parts of both individuals and organisations. The author then attempts to correlate these theories with statements made by the participants in interviews on the learning they consider to have gained by participating in the tabletop exercises. A categorization is made that tries to clarify on the one hand whether the learning outcome can be related to the officials themselves or the organisation as a whole, and on the other hand whether it relates to the preparedness phase and what is important here, or what is important in a responsive situation.

The analysis provided evidence of positive learning. Although the effects are to a large extent in line with generally accepted normative principles of crisis management, the degree of understanding that participants gain appears to vary considerably. They appear to have gained knowledge of a variety of issues, and it seems, based on the interviews, that this learning varies in depth as well. There appears to be some correlation between the participants' learning and the function/position they have in the organisation. Yet this is not clear-cut. It

may be that they have a bank of tacit knowledge in the sense that they were not able to articulate it at the time or that it was knowledge that was hard to verbalize.

My contribution: I conceived and wrote the paper.

Paper VI. The Role of the Individual – A Key to Learning in Preparedness Organisations

Paper VI focuses on the concepts of “the learning organisation” and “communities of practice” and their connection with preparedness activities in Swedish municipalities. The “learning organisation” can be seen as a designation for an organisation whose participants expand their learning and learn together. Such widened organisational learning can be seen as a prerequisite for preparedness planning to have any considerable effect on municipalities’ crisis responsiveness. The leadership of the learning organisation is crucial. The leaders have to take on roles in which they develop strategies, visions and values for people to learn. At the same time, the “communities of practice” specifies that learning occurs through social participation in different communities where it is required that so-called “brokers” straddle different communities of practice in order for learning to spread from one community of practice to another in a more general sense.

In municipalities, so-called local emergency preparedness committees, LEPCs, are often established. Their members are chosen from the different departments of the municipalities. One general thrust of these committees is to merge the perspectives in preparedness planning, simultaneously making their members get a broader understanding of the conditions of the municipalities’ crisis management capabilities as well as making them become ambassadors for preparedness planning issues in their own departments. In this sense, the LEPCs can be seen as communities of practice, and the members can be seen as potential leaders and brokers for the preparedness issues in their organisations. Another type of leader for preparedness issues is the municipalities’ coordinating preparedness planners. They are often the ones who gather the members in LEPCs for meetings and other activities.

The paper scrutinizes the role the preparedness planners and the members of the LEPCs assume for learning to be accomplished. It aims to find out if these individuals reason and act in ways that promote learning about crises and preparedness issues throughout the municipal organisation. Six different municipalities are involved. In two of the larger ones, the coordinating

preparedness planners emphasize the social perspectives for making preparedness function. They claim that they try to make sure that vision and values are a central part of the preparedness planning and that they struggle to develop the employees' commitment to crisis management. In this regard the coordinating preparedness planners appear to act as leaders for the learning organisation. However, in these municipalities no further studies were conducted to discover whether the two different designs worked as intended. This was done more so in four smaller municipalities. The results show that although the preparedness planners in these municipalities set up strategies for choosing members for the LEPCs, these individuals' commitment to the issues is low. Several examples illustrate that they do not take on roles for acting in ways that are required in order for a learning organisation to be established.

My contribution: Main writer, collected the majority of data. Participated in the analysis of the data.

6.2 Results

The main results of the papers will here be related to the different thematic and specific research questions.

6.2.1 Addressing the vulnerability theme

The thematic research question related to overall crisis management was: *What do officials in different public organizations recognize when analysing their organisations' vulnerabilities?*

The first specific research question of this theme (i.e. 1:1) was:

What do officials in different public organisations identify and express as valuable and worth protecting from deterioration?

This research question is addressed in paper I. In this paper four seminars (A-D) were held in which officials in four different organisations were given the task of identifying what is valuable and worth protecting. Seminar A includes the view of nine managers in a municipal healthcare department. Seminar B

considers the opinions of seven civil servants in a municipal housing and environment department together with one coordinating preparedness planner. Seminar C covers the views of nine individuals representing mainly preparedness planning and media functions in a municipality. Seminar D describes the opinions of 21 individuals representing preparedness planning functions in different parts of a county council with responsibility for medical service, public transport, industry development and culture.

In the subsequent analysis of the material, the author related the items taken up under the seminar to three categories that were seen as describing the basic goals of national security as established by the Swedish parliament. The categories were 1) Life and health, 2) Individuals' needs and 3) Organisational and societal supplies. These three categories had been related in an intrinsic/extrinsic structure where Organisational and societal supplies was seen as extrinsically (instrumentally) valuable to Individuals' needs and where Individuals' needs were seen as extrinsically valuable to Life and health.

Classifying what the officials identified as valuable and worth protecting in accordance with the three categories made it possible to see patterns of variations and similarities with regard to what was taken up. Further sub categories of two of the three main categories were identified. Four subcategories could be identified in the category "Individuals' needs": 1) biological needs, 2) affective and emotional needs, 3) social needs, and 4) environmental needs. For the category 'Organisational and societal supplies' five subcategories could be identified: 1) processes and functions, 2) structures (of the organisation), 3) culture and attitudes, 4) equipment and resources (including natural and human resources), and 5) infrastructure and real estate. Relatively few items were associated directly with Life and health, so a further categorisation did not appear meaningful here.

The outcome of the different cases displayed both variations and similarities. Table 2 from paper I (Nilsson & Becker, 2009) illustrates the similarities and differences in what categories that were taken up could be related to by the authors.

Studying the category level(s) one could see that of the 151 items identified in the four seminars most (97) related to the category Organisational and societal supplies. Thereafter 46 items could be seen as relating to Individuals needs and 8 items directly to Life and health. Studying the subcategories it could be seen that what was mentioned most frequently considering all four seminars were items that were part of the category "Organizational and societal supplies". Particularly often, items could be related to the subcategories "Infrastructure and real estate" and "Processes and functions", which are quite close to each other in character. Still, there was a considerable variation between the

different cases in what was identified. This variation appeared partly to mirror the different types of organizations.

The municipal healthcare department, for example, identified relatively many items pertaining to the category Life and health. This may very well be due to the participants' close contact with clients unable to take care of themselves, and where they must satisfy such needs. As a contrast, the participants of the municipal housing and environment department identified many environmental needs. Comparing the content of the subcategories between the seminars (see Figures 2-5 in paper I), an additional variation can be seen in what was taken up by the participants. This can be seen in some marked examples. In seminar A (the municipal healthcare administration), for example, clients, journals and home help service were mentioned. In seminar B (the municipal housing and environment department) supplying housing and a good living environment were identified. In seminar C (preparedness planners and media functions in a municipality), Interpretation capability and maintaining people's confidence in the local authority's power to act was seen as important. In seminar D Pre-hospital and emergency medical centre as well as Medicals were recognized. The only specific item that was identified in all cases relate to elderly care (and in a broad sense).

In one way the results show that different things are considered valuable in different organisations, at least in the everyday perspective of these organisations. However, the results may also suggest that the officials in the different organizations are affected by the type of organization they work in so that they come to think of different things as valuable and worth protecting, for example due to their responsibilities in their working roles. This "come to think of" is also indicated in the presence of what appeared to be "omissions", i.e. things that did not become explicit in the minds of the participants and/or were not expressed. That, for example Life and health and Biological needs which, again taking an anthropocentric perspective, can be seen as rather basic items relevant for all departments in some sense, as well as strongly related to the basic goals of society's security, were not always identified may be due to the fact that only an ad-hoc structuring was applied during the seminars in conjunction with the effects of what is here termed situational and contextual factors such as schemata and scripts. This could, for example, be seen in the associative approach in which the matters were taken up (see the numbers in Figures 2-4 in Paper I). One thing mentioned leads to the thought of another and so on. The interplay between subsidiary and focal awareness can also serve as an explanation here. Some things are simply tacit while serving as a tool for focal awareness. Mentioning supply systems for drinking water as valuable should mean that the participants also see drinking water as valuable and worth protecting

It is argued here that establishing and making what is valuable and worth protecting explicit should be a fundamental step in risk and vulnerability analyses. The results obtained show that different organizations identify different items in this regard. Still, this study may suggest that a mere discussion does not necessarily lead to what one may suppose to be central in this regard coming up easily. In order to avoid the risk of what may be “omissions” of items, or issues, that may be very central when considering this type of analyses, they should be structured with regard to some central categories (possibly the ones presented here) at some point during the seminar (or considering other techniques involved) so that it is easier to identify the potential lapses. It is also relevant, in order to be able to establish priorities in crisis management, to relate items found valuable in some way. In this study, one specific arrangement was made so as to be able to compare the cases. It should be stressed that this arrangement is one of many ways to see the relation between what is valuable and worth protecting. In public organisations the officials themselves should establish the relations considering national laws, agreements and other stakeholders’ interests. Participating in such a process may in itself enhance the crisis management capability, since the participants may gain insight in why some things are valuable and why some things should be prioritised in being protected from deterioration.

Summing up, the answer to the research question is that there are marked variations as well as similarities in what is taken up in categories of items that officials in different organisations express as valuable and worth protecting (i.e. items could relatively often be seen as pertaining to categories Infrastructures and real estate as well as to Processes and functions). In both cases, these were subcategories of Organisational and societal supplies which related to a model based on the Swedish parliament’s decision on what should be the national goals of national security. The results indicate that the individuals’ pre-understandings, situational and contextual factors as well as the analysis procedure were at work here.

The second specific research question of this theme (i.e. 1:2) was:

What do officials in different public organisations identify and express as weaknesses in their organisations’ responsive crisis management capabilities?

This research question is considered in paper II. An analytical model of the public organization was developed. The model consisted of different elements that any organization is based on, i.e. Structure, Function, Individuals, Artifacts and Material and immaterial resources. The organizations are also involved in different processes. Central process categories pertaining to operational crisis management capability identified in the study were Sensemaking, Operational processes, Strategic control, Operational control, Coordination/cooperation, External communication and Internal communication.

The model was applied on ten cases in which tabletop exercises had been performed with the aim of identifying weaknesses in their organizations' crisis management capabilities. Every problem the participants had identified was classified and registered as an element category and a process category, i.e. if the participants had identified that there was a problem with structure for internal information, this was registered as both "structure" and "internal information". This provided an opportunity to see a pattern, or distribution, in what parts of the organizations the officials located problems. The result (see Table 1 and 2 Nilsson, 2009a) clearly showed that the officials in general identified problems that could be related more often to some categories than to others. Considering the element categories, Structure was most often involved. It was registered almost as many times as all other element categories together. Thereafter came Individuals and Functions. Relatively few problems could be associated with Artifacts or Material and immaterial resources. A similar result could be seen for the process categories. Roughly three levels can be identified. Most problems could here be related to Operational processes and Operational control. A "level down", not registered as often as those categories, one finds Coordination/cooperation and External communication. Least often, the problems could be associated with Internal communication, Strategic control and Sensemaking. Although the figures indicate a general tendency in the material, there was also variation between the cases in how often the problems the participants had identified in their organizations' crisis management capability could be related to the different categories. This could for example be seen in the county administration case where relatively many weaknesses could be seen as pertaining to the category "Individuals". This suggests that the outcome may be related to the participants' functions and the scenario, as well as to whether the participants, as in the county administration case, come from different organizations. However, there is no strong evidence here on this matter.

Trying to see the complexity of the problems identified for the different categories, different themes were identified in the way the problems had been described. It could be seen that the weaknesses the officials identified in their organizations' crisis management capability for performing certain tasks could

be boiled down to a restricted number of themes relating to the different element categories. More themes as well as variation on these themes could be found for some of these elements, i.e. Individuals and Structure, than the others, however. Still, no more than four different themes for each of these two categories (as well as some variations on these different themes) were found. These themes may be a central characteristic of the way officials conceive of problems in their organizations' responsive crisis management capability. The difference in the number of themes and variations on the themes that could be identified possibly suggests a difference in the officials' opinions of the complexity of these categories when it comes to identifying problems in their organizations' crisis management capabilities by using tabletop exercises.

Summarizing this theme: *What do officials in different public organisations recognize when analysing their organisations' vulnerabilities?*

The two studies have shown a number of examples of what officials recognize when they are analyzing what is valuable and worth protecting as well as what weaknesses exist in their organizations' crisis management capabilities. It could be shown that what was recognized could be related to a modest number of categories, subcategories and themes. Some of these appear to be clearly more focused on than others, however. At the same time there is variation that, at least in part, may be connected with the types of organizations and the participants' functions.

The study connected with paper I suggested that the officials, when in groups discussing what is valuable and worth protecting, do not easily access and/or express what one might consider central elements. There were some strong indications, however, that what is expressed in such exercises is easily influenced by the situation and method, and that it may be necessary, during some part of the analyses, to structure the results as well as return to the subject at later occasions. It is likely, bearing in mind the influence of situational and contextual factors, that such recaps may add to the results.

6.2.2 Addressing the dependencies theme

The thematic research question related to dependencies was:

What characteristics can be seen in the outcome of officials' assessments of the dependency relations between the actor they represent and other actors?

The first specific research question(s) of the second theme (2:1) was:

a) To what degree are the actors participating in a tabletop exercise dependent on other actors, not participating in the exercise, for their ability to manage the scenario being analyzed? b) Is it possible to identify actors particularly important for the management of a specific scenario using information provided in a tabletop exercise?

The information obtained to answer these related questions came from questionnaires given to officials participating in tabletop exercises as explained in Chapter 5. In these questionnaires the officials assessed their actors' dependencies on other actors identified as having a role in the scenario.

In answering the first part of the research question a completeness measure was used. This measure provided an opportunity to identify the degree to which those actors identified by agents in a tabletop exercise as having a function for the actors represented at the tabletop exercise participated. The definition of completeness is the number of links between nodes (i.e. dependencies) representing actors who participated in the exercise, divided by the total number of links (i.e. dependencies) in the network. Theoretically the value may be between 0 (all dependencies are on actors outside the table top exercise) and 1 (all dependencies are on actors participating in the tabletop exercise).

Since the links here were assessed on a five-point scale, the completeness value may be calculated with different screening levels. The values were relatively low when all levels were considered (cf. Tehler & Nilsson 2009). Screening the weaker dependency links increased the completeness value, but it was still relatively low (not more than about 0,25). This indicates that the actors involved in the tabletop exercises had a relatively large number of significant dependencies on actors not represented in the exercises, and that much of the result of the tabletop exercises may be based on assumptions regarding other actors' capabilities, assumptions that may be or may not be in agreement with the views of these other actors. However, it should be recognized that not everyone participating in the tabletop exercise answered the questionnaire. In

practice, then, the completeness was better than showed here. Nevertheless, the low values in the study suggest that it may be difficult to include relevant actors in tabletop exercises, and that the result must be communicated with the people not involved in the tabletop analysis to guarantee the level of validity and reliability.

The information obtained in the questionnaires was also used for answering the second part (b) of the specific research question, 2:1. Efforts were made to classify the different actors according to four types. The attempt was to find *Key actors*, but in the process other types of actors were also identified such as *Background actors*, *Supporting actors*, and *Specialist actors* based on the dependency assessments. The analysis showed that many actors that could be seen as belonging to a specific actor category (based on their functions and activities) such as “Municipal information” or “Municipal social services and care” could be classified as the same actor type, e.g. *Key actor*, etc. This means that the category to which a specific actor belongs in this case, seems to be a good indicator of the characteristics of that actor in terms of other actors’ dependencies on the actor in question. The actor categories Municipal information, Information and municipal management, for example, could often be classified as Key actors. Some typical Supporting actors in this context were regional (i.e. adjacent municipalities and county administration) and national authorities (in three out of five cases). Specialist actors proved to be very rare and only few actors could be identified as such. Background actors were relatively often those who could be classified as belonging to private industry. It was also found, however, that classifying the actor categories into different types was sensitive to the scenario involved for some actor categories (such as county council), while other actor categories could be seen as maintaining their actor type irrespective of the scenario. This indicates that some actors performs tasks related to so-called response-generated demands, while others perform tasks that are more related to the disaster agent in question. (cf. Quarantelli, 1997)

This result suggests that it actually is possible, by using information on dependencies obtained through questionnaires provided in a tabletop exercise, to identify actors particularly important for the management of a specific scenario, at least from a dependency perspective. At the same time the information may provide an opportunity to identify actors of other types, such as specialists (although these proved to be rare). This information may be used for strengthening society’s crisis management capability. In preparedness planning, the actor category may, for example, be used as an indicator of what actors should be invited to participate in tabletop exercises dealing with a specific scenario.

Summing up, using the approaches described here for analysing dependencies allows the comparison of tabletop exercises focusing on different scenarios. In general, the result shows that the degree to which actors participating in tabletop exercises are dependent on other actors not participating may be considerable and that it is possible to identify some actors and categories of actors that are particularly important for the management of a specific scenario. The information can then be used when making decisions concerning preparedness measures. Conclusions can also be drawn regarding the credibility of the other kinds of information produced during the tabletop exercise.

The second specific research question of the second theme (i.e. 2:2) was:

Are the agents' conceptions of dependencies in agreement?

It is reasonable to assume that not all officials agree on all dependency relations, so ancillary questions are: How frequent are discrepancies in officials' conceptions of interdependencies between the actors they represent and of what size are they?

In paper IV (Nilsson & Tehler, 2010), officials' (also termed agents) assessments, not only of their actor's dependency on another actor but also of other actors' dependencies on their actor, were used. Pair-wise analyses between the agents' assessments on every actor's dependency on another actor were made. For reasons of clarity the concept *focus actor* was introduced. A focus actor is the actor that an agent represents while making assessment of its dependency on another actor. The result showed that big or very big discrepancies are not uncommon. In every sixth situation, where two officials individually estimate one actor's dependency on the other, a big or very big difference between their assessments can be identified. This means that there is a disagreement of the value 3 or 4 on a scale from 0 to 4. Only in every third situation they are in complete agreement.

In addition, it was considerably more common that the focus actor assessed their actor's dependency higher than lower in comparison to the assessments made by the other agents, i.e. there was a clear tendency for the agents representing different actors in the preparedness planning to see their actor as being more dependent on other actors in comparison to the other actors' dependency on their actor.

In two of the cases many of the agents involved were the same people and represented the same actors, which made it possible to compare the two cases with regard to the discrepancies that each individual agent was involved in for different scenarios. Displaying and comparing the big discrepancies (i.e. those of value 3 and 4) identified for the different agents in the first of these two cases, a notable variation could be seen in the number of discrepancies each agent was involved in. A variation could also be seen in whether these discrepancies concerned the official's role in representing the focus actor or "the other" actor. The result for the different officials in this regard differed when comparing the first case with the second one. Hence, the agents' conceptions of dependency relations and consequently their specific disagreement varied with the scenario involved. This means that the disagreements are not necessarily between two specific officials but change as circumstances change.

Summing up the theme: *What characteristics can be seen in the outcome of officials' assessments of the dependency relations between the actor they represent and other actors?*

Studying officials' assessments of their actors' dependencies on other actors can identify what actors and categories of actors are particularly important (from a dependency perspective) in the managing of a specific scenario. Such actors can be termed Key actors. However, it is also possible to identify what is here termed Specialists, Support actors and Background actors. Furthermore, it seems not to be uncommon that officials consider their actor to be dependent on many other actors than those involved in tabletop exercises. This is relevant for considering the credibility of the result of such exercises. It can also be seen that officials are far from being in perfect agreement regarding the actors' interdependencies. Some specific patterns regarding discrepancies in their opinions were found in this study.

6.2.3 Addressing the learning theme

The third theme considered the dynamics in preparedness planning by studying potential learning effects. The thematic research question was:

What do officials and organisations learn from preparedness planning and what prerequisites may be identified as central for learning to occur throughout the municipal organisation?

The first research question of the third thematic research question (i.e. 3:1) was:

What do officials involved in tabletop-based vulnerability analyses learn about their organisations' crisis management capability and how it may be improved?

Paper V (Nilsson, 2009 a) gave several examples of what individuals learned about their organisations' crisis management capability and their consideration of how it might be improved, due to their participating in tabletop exercises. Different dimensions in what they had learnt could be identified. One dimension concerned whether their learning involved themselves and their role in a crisis or it concerned the organization as a whole. Another dimension concerned responsive action in a crisis or preparedness planning.

On the individual level and as part of responsive actions, the participants mentioned the importance of being able to take initiative, being able to improvise and solve problems creatively supporting colleagues, keeping calm, establishing appropriate priorities and being of assistance when there was no explicit role for one self. Preparedness issues on the individual level included practicing as well as obtaining more practical knowledge about relevant things.

There was an emphasis, however, on matters that the participants regarded important at the organizational level, i.e. important explicitly for the whole of the organization. These included some aspects already mentioned, like practicing and taking initiative and improvising, but also matters that refer to structural matters as part of increasing preparedness. As part of heightening their organization's crisis management capability, almost everyone touched the relevance of clarifying and discussing responsibilities, at least to reduce the risk of perplexity in a crisis. In some cases it was also deemed necessary to establish some form of plan as well as set up some kinds of information and decision structures. Other relevant examples here include practicing, establishing a preparedness organization and specific routines for trying to update the crisis management capability, and guaranteeing access to resources.

It could also be seen that the participants discussed the organization's relations to other actors here, which is important and may be related to the discussion of extending and expanding organizations (Quarantelli, 1997). Close to this is the realization that the organization may also have to become responsible for new groups of people, which is an important element for understanding that new relationships may be met in a crisis (Quarantelli, 1997).

All participants had realized that their organization has a responsibility for taking action in a crisis and that they had to increase their own ability as well. They felt that they could not trust in patterns of established organizations. This can be seen as an expression of the participants' realizing that they had to increase their endurance and have looser couplings (cf. Perrow, 1984) to other organizations. However, considerable variation could be seen in what participants learnt from tabletop exercises as well as how deep this learning appeared to be. A variation in experiencing crisis management could be seen in that some of the individuals claimed to see a new perspective, while others wondered to what degree their perspectives had actually changed. Even if some things are shared, each individual's "learning profile" may look quite unique. The result indicated some correspondence between the participants' roles and what they had learnt. This suggests that one learns what appears to be relevant and meaningful for one self. Yet the outcome for the different individuals could not be explained only by their roles. However, the questions did not probe deeply, and it may be that some of the participants had a bank of knowledge that did not become explicit in the interview situation, either due to it being tacit and personal (cf. Nonaka and Takeuchi 1995) or due to the participants' simply not becoming focally aware of it at the interview situation. Nevertheless, the participants seem to have understood, on the whole, that crisis management requires both predefined structures *as well as* a capability to improvise and find solutions to problems in a creative manner. The study also showed that some of the participants had endeavored to try to pass on their new understanding to their colleagues. However, they had not been particularly successful, suggesting that it may be necessary to actually participate in a tabletop exercise or something similar, like a drill, to acquire a good sense of crisis management.

To summarize: There is a variation in what officials participating in tabletop exercises appear to learn and how deep that learning goes. Some correspondence can be seen with the roles the officials have in their organizations, but the evidence for this is not clear-cut.

The second specific research question of the third theme (i.e. 3:2) endeavoured to clarify whether preparedness planners tend to act in ways that promote learning about crises and preparedness issues throughout the municipal organisation. It was formulated as:

In cases where problems can be identified regarding learning about crises and preparedness issues throughout the municipal organisation, what characterizes the role-taking of individual officials who have the responsibility for preparedness planning?

It is not uncommon that so-called local emergency planning committees (LEPCs) are constituted in order for the municipal preparedness issues to be characterised by a broad perspective. It may be seen as a step towards what is sometimes called a learning organisation. However, for learning organisations to be successful, the involved members must act in such ways that they pass on the understanding they gain to others in other contexts. One may here talk about the need of spreading the knowledge, or at least information, from one “community of practice” to another and implementing it there as well. By “community” can here be meant many things, such as LEPCs or municipal administrations (i.e. departments). For this “knowledge transfer” to function, the members need to act as brokers between such communities of practice. The connection with leadership is important. The leaders must act as teachers and stewards for visions of the organisation (see Nilsson & Eriksson 2008).

A study of four small municipalities in paper VI showed that the coordinating preparedness planners in two of these municipalities had thought about strategies for such “brokerage” between the LEPCs and the different municipal departments and had set up criteria for selecting people for the committees. Such criteria meant that the persons should have a central position and be well-known in their administrations. At the same it was suggested that it should not be the administration’s manager since it was believed that this person often has so much work to do that he or she will not have time to participate in the LEPC meetings. In one municipality, interest in crisis management issues was a further criterion.

However, it may be questioned whether these criteria are sufficient. The coordinating preparedness planners in these cases had realised that the understanding developed in the LEPC about crisis management does not leave the group. Interviews with the departmental managers as well as the members of the LEPC, give a similar picture. At best, information is distributed but there appears to be no control or interest of people’s learning on the issues. Consequently, it can be said that the commitment among LEPC members for

implementing the crisis management issues into their own organisations seems to be low. It appears the members of the LEPC do not take on the role of being brokers, stewards or teachers for the crisis management issues. Hence the effectiveness of the planning activities may be questioned in these cases.

Summing up the thematic research question:

What do officials and organisations learn from preparedness planning and what prerequisites may be identified as central for learning to occur throughout the municipal organisation?

Studying tabletop exercises as a specific part of preparedness planning, it can be seen that the participating officials may learn a variety of things that may enhance their organisation's crisis management capabilities. The relevance as well as the extent of what they learn can always be discussed. Nevertheless, in the studied case there were on the whole positive effects, although there was considerable variation in what different individuals learnt as well as how deep that learning seemed to go. Some officials claim to experience crisis management in new ways, while others are less certain to what extent their perspectives have changed. This variation in the learning outcome of tabletop exercises is something that a facilitator or a coordinating preparedness planner should be aware of and deal with.

Both studies point at the difficulties of passing on the knowledge from the community of practice that an LEPC may be seen as, or even a tabletop exercise, to another community, such as officials' own departments or perhaps even other constellations. The second study considering this theme points at the important function individuals may have in their role-taking as leaders and brokers for accomplishing learning on crisis management throughout the organisations.

6.2.4 Addressing the overarching research question

The overarching research question of this thesis is:

What characteristics can be found in the officials' expressed conceptions of their organisations' crisis management capabilities?

Results connected with this question have been obtained for three specific themes in which single officials as well as groups of officials in different organizations (mainly municipal ones) have been focused on. Considering the

results of the studies conducted for the three themes altogether, and relating them to the overarching research question, some general characteristics can be outlined. These characteristics can be described in terms of *similarities*, *variations* and even *disagreements* between officials' conceptions of the matters studied.

The *variation* can be seen in terms of what was expressed and not expressed in seminars and interviews by officials in different organizations and in their opinions on degrees of dependencies. A variation could, foremost, be seen in what officials in different organizations 1) identified as valuable and worth protecting (paper I), 2) what weaknesses they saw in the organizations' crisis management capabilities (paper II), 3) the variation in their actors' dependencies on some actors and categories of actors in different scenarios (paper III), 4) the different opinions, i.e. *disagreements* they had about dependency relations between the actors they represent (paper IV) and 5) what they learnt in tabletop exercises as well as how deep that learning goes (paper V).

At the same time, *similarities* could be found in the same material in the way the officials in the studies focused on and developed some aspects of crisis management capability more than others. This could be seen in that 1) Items pertaining to categories such as Infrastructure and real estate as well as Processes and functions were more often mentioned as valuable and worth protecting in paper I than others. 2) Weaknesses in their organizations' crisis management capabilities were more often identified that relate to some of their organizations' elements and processes such as Structure and Operational processes/Operational control in paper II. Here, it could also be seen that the officials' descriptions of weaknesses could be condensed into a number of themes. 3) Some actors and actor categories could be classified into different types in accordance with their importance for other actors in managing different scenarios and that for some actors and actor categories this classification was not sensitive to the scenario involved. 4) Although there were degrees of disagreements between actors with regard to their actors' dependencies, there were also agreements. 5) The learning the participants involved in tabletop exercises claimed to have availed themselves of pertained on the whole often to becoming less dependent and more consistent, as well as clarifying responsibilities and determining whether such responsibilities may extend in a crisis. 6) Members of so-called LEPCs do not take the responsibility that is required for the learning organization to be established.

These are all findings that should be central to recognize considering the development of society's crisis management. In Chapter 7 I will reflect on the implications of the findings, the validity and reliability of the studies as well as point at interesting areas for further research.

7 Discussion

This chapter will discuss the implications of the results, the issue of validity and reliability as well as suggest areas for further research.

7.1 Perspectives

This thesis aims at gaining understanding of how officials involved in preparedness planning in general and vulnerability analysis in particular explicitly conceive of their organisations' crisis management capabilities. Knowing more about officials' conceptions of this sort is important when considering how to improve society's crisis management capability.

Studying officials' expressed conceptions, mainly in municipalities, has yielded new information that relates to three themes: vulnerability, dependencies and learning. In the case of *vulnerability*, new understanding has been obtained concerning what officials in different public organisations express as being valuable and worth protecting and what they see as weaknesses in their organisations' crisis management capabilities. The studies show that context matters in what is expressed. There is variation between different cases in what is taken up. At the same time, some aspects of the crisis management system are on the whole considerably more often recognized than others. Concerning what is valuable and worth protecting, this concern in particular items related to Infrastructures and real estate and Processes and functions. Regarding weaknesses in the organisations' crisis management capabilities, it involves structure and operational processes.

Concerning *dependencies*, information on how officials conceive of actors' and categories' of actors dependencies in general, the degree to which important actors are included in tabletop exercises and their level of agreement or disagreement on their actors' interdependencies has been obtained. It is suggested that the credibility of municipal vulnerability analyses may be questioned if the actors involved have a high degree of dependencies on many other actors that for practical reasons can not participate simultaneously. Moreover, the actors and categories of actors can be classified into four types — Key actors, Specialists, Support actors and Background actors — based on their importance, as valued in other actors' dependencies, for managing specific scenarios. Typical key actors here were those of the category Municipal information, Information and municipal management. It can also be seen that there are notable degrees of discrepancies in agents' conceptions of their actors' interdependencies. In every sixth situation, where two agents (officials)

individually assess one actor's dependency on the other, a big or very big discrepancy between their assessments can be identified. Finally, considering the *learning* theme, insights has been gained into the knowledge officials' obtain by participating in tabletop exercises, as well as what may characterize problems in disseminating the new awareness to a wider organisational context. It was found that the learning outcome for the individuals involved in the tabletop exercises varies considerably and that this variation to some extent relates to their roles and positions in the organisation. It was also found that individuals' role-taking and situation are important prerequisites for disseminating learning gained in the preparedness planning to others in the municipal organisation.

On a *general level*, the results point at recurrent characteristics in the form of similarities, variations and even disagreements between officials' conceptions on the matters studied (cf. Chapter 6.2.4). The variation in the different cases appeared partly to be caused by the type of organisation and the individuals' functions, something which can be connected to the individuals' schemata, scripts and the specific communities of practice they may be involved in. Indications of this could be seen in papers I to V in varying degrees. In the cases where different scenarios were used (e.g. papers II, III and IV) as a basis for the subsequent analyses, it could be seen that this had some effect on the outcome. In Chapter 2, situational and contextual factors that might influence what the officials might express in an analysis situation were exemplified. The results suggest that knowledge of issues related to crisis management is often implicit/tacit or remains subsidiary and used as a tool for the participants to direct their focal awareness on, thus becoming explicit in the analysis situation. This is perhaps most evident in paper I. In this paper it seemed that what was mentioned as valuable and worth protecting was not easily accessed and could in this sense be seen as located to the participants' subsidiary awareness and made explicit through the participants' associations. It may be suggested that by mentioning one item, others are implicitly included in the sense of supporting our focal awareness. Hence, it suggests that not all that was relevant for the officials was made explicit in these studies.

The question of why some items on the whole were more often mentioned than others is harder to answer. More studies are needed that probe into this matter. Nevertheless, the findings obtained here deserve to be recognized. It indicates that some aspects of the crisis management system are in greater need than others of being elicited. If some aspects of the crisis management capability are not easily identified or even accidentally omitted in analyses, there is a risk that the crisis management capability of the organisations will not live up to its potential. The same is true when considering dependencies specifically. Building crisis management on wrong assumptions poses a risk for

the entire crisis management system. Such a system can not be stronger than its weakest link. If an actor cannot function due to another actor's inability to provide the first actor with the support needed in a specific crisis, this may threaten the entire crisis management system.

The results here point both to the potential for organisations in conducting analyses of the sort described here for finding deficiencies as well as for endeavouring to make the officials experience crisis management in new ways. One part of this means trying to accomplish greater group and individual awareness of central issues of an organization's crisis management capabilities, such as what is valuable and worth protecting in the organization's crisis management. Analyses in the form of seminars and tabletop exercises can be useful here. However, it is vital to be reflective with regard to the way the analyses are performed as well as in interpreting their results. Although it, for example, may be beneficial to start an analysis of what is valuable with open questions to avoid blocking creativity, this study suggests that it is useful to structure the analysis at some point and possibly use checklists to avoid omissions and contribute to more comprehensive analysis results. The answers given to the question "What is valuable and worth protecting?" should be followed by the questions "Why is it valuable?" and "How (i.e. in what way(s)) is it valuable?" Results may then be obtained revealing relations between different valuable items. Recognizing such relations may heighten the involved participants' understandings of the organisation as a whole as well as of its parts (cf. Marton & Booth 1997 on what characterizes learning). In this respect the participants may gain a system perspective where the value of the single element in its relation to the whole, or what may be intrinsically valuable, is grasped. Such knowledge may then be used for making adequate priorities for the managing of crises. It should also be recognized that the question of what is valuable and worth protecting is something that may also be taken up after a scenario analysis in order to consider whether what had been identified as valuable was also considered in the analysis or if additional aspects of it were identified as a result of the process.

If analyses are performed as seminars, it is also important for a facilitator to be aware of the roles played by situation and context, and that it may be helpful to introduce some elements of anonymity for officials providing information on issues like what is valuable and worth protecting. An example including elements of anonymity involved here considered analysing the officials' understanding of dependencies and interdependencies between their actors. The information obtained through anonymous questionnaires can be used in different ways. Here, it was used, amongst other things, for identifying differences in the officials' understanding of their actors' dependency relations.

The result may show where the communication between actors such as different organizations and their representatives must be deepened in particular as well as conveying the information to the agents that they in general see their actor as being more dependent than other actors and should be aware of this. It is central to recognize, however, that the relations between organizations may be very complex. An organization may have many activities and employees and it may be hard for one agent to understand all the connections between two organizations. This, however, emphasizes the need of communicating within the organization what the external dependencies are so that the agent(s) may have better knowledge when representing the organization in a vulnerability analysis. Interestingly, the findings obtained in paper IV predominantly concerned actors who were part of the same organization. Hence, considering their dependencies on external actors may show even bigger discrepancies in the agents' assessments.

In paper III information on dependencies was used for identifying which actors may be relevant from a dependency perspective in different scenarios. The information was also used to establish the degree of completeness for the involvement of important actors in tabletop exercises. These measures may, for example, be helpful in finding Key actors. However, one should be aware of the dynamics in real crisis situations, and that they may lead to new relations between organisations (cf. Quarantelli 1997) of which one may not have thought during preparedness planning. Hence, the methods discussed in paper III should be seen as an indicator of which actors need to be involved. However, a facilitator should not always only consider inviting the Key actors. It may very well be that background actors may have a different opinion of the dependency relations; hence it may be relevant to involve these types of actors as well from time to time.

The fact that learning is not easily accomplished in organisations is vital to understand for those who have coordinating roles in organisations' preparedness. Not realising this or not engaging in it may lead to organisations with a highly insecure crisis management capability. The problem of knowledge transfer has been recognized in many contexts (e.g. Argote & Ingram 2000; Argote et al., 2000) and may be particularly difficult in the preparedness planning where crises may appear to be far away. Nevertheless, the problem must be solved, and it appears that the role members of the LEPC take - or rather do not take - is particularly vital to consider here. From the study it cannot be said whether the problem behind these individuals' role-taking lies in a lack of understanding on their parts regarding what crisis management requires of them and their organisations, or whether the task of transferring the knowledge is difficult and requires specific forms of communication. The question is *how* the members of the LEPCs may change

their colleagues' ways of experiencing crisis management and make them see the relevance structure in different situations that are significant to preparedness planning. Spreading information to each and every one individually appears not to be sufficient. Although tabletop exercises and other forms of seminars and simulations may be limited in their sense of creating feelings of stress, and may provide participants with different understandings of crisis management, the study still indicates that they may develop the participants' conceptions. Nevertheless, they should be combined with debriefing activities, not only to find out what people involved in simulations learn from them but also for enhancing their understanding (e.g. Thiagarajan 1994; Warrick et al., 1979¹⁰; Dreifuerst; Petranek et al., 1992).

The results found point to the need of deeper studies. Some suggestions will be made in Chapter 7.3. Moreover, methods need to be developed that consider the findings obtained here. This involves not only making sure that a grasp of the organisations' vulnerability is obtained, but also developing forms and methods for disseminating the knowledge obtained in preparedness planning in wider circles.

7.2 Methods, validity and reliability

It should be recognized that for all techniques utilised in this thesis to gather data, situational and contextual factors like the ones described in Chapter 2 may influence what is expressed.

Seminars and tabletop exercises were used in this study to identify what officials identified as valuable and worth protecting as well as weaknesses in their organisations' crisis management capabilities. One advantage of seminars is that they may provide a social interplay among the participants, which potentially could give a broader perspective on the issue in the end. One disadvantage is the possibility of groupthink. Groupthink is often seen as "...a deterioration of mental efficiency, reality testing, and moral judgment that results from in-group pressures" (Janis 1982, p. 9).

Considering tabletop exercises more specifically, one advantage is the possibility to move back and forth in time and discuss a number of potential dimensions. One pitfall of tabletop exercises is that they may provide a false assumption of what are vital aspects in a crisis situation (Njå et al. 2002). Moreover, it may be difficult to evoke feelings of stress that may complicate the situation even further. Efforts were nevertheless made to try to reduce

¹⁰ Considering experiential learning, specifically.

potential negative effects in the tabletop exercises. It was suggested to the participants that the seminars should be seen as an opportunity to test ideas, and that the participants were allowed to be devils' advocates. Nevertheless, the possibility that existing power relations and "group thinking" might affect the validity and reliability of the result can not be eliminated. Alternatively, the seminar form chosen could have had added elements of anonymity. Further studies may indicate to what extent different forms of seminar may affect the result.

One important design criterion established for the vulnerability analysis being developed and used was that it should encourage dialogue and a learning process as well as facilitate the creation of social networks. Observing the method in practice, it can be said that this requirement has been met. The dialogue during the analysis of a scenario leads to many spontaneous questions amongst the participants in an attempt to better understand the organisations' crisis management capabilities and each other's roles and resources. Questions are raised and ideas are tested continuously. This communication can also be seen as a prerequisite for creating networks.

Questionnaires were used in connection with officials' conceptions of dependencies between their actors. One advantage of using questionnaires is that it allows anonymity and that the different agents may dare to give their opinion on dependencies as they really understand them. A disadvantage in comparison to, for example, open dialogue in seminar form is that it may restrict the opportunity to get answers that may have been illuminated from many people's perspectives in the form only dialogue may accomplish. An advantage of using a quantitative scale concerning dependencies is that it avoids demarcating too tightly in advance what may constitute a dependency. Instead, the different stakeholders can involve different things in their assessments. A disadvantage is that it creates some ambiguity about what is behind the figures. However, although there is a risk that two agents might assess dependencies between their actors as being the same in "qualitative terms" yet quantitatively different, differences of high value should be seen as strong indicators of a relation where the agents really have quite different views on the relationships between their actors. This needs to be followed up with discussions on what these differences consist of.

One specific question that may be related to the validity of the output of the analyses in the studies concerns the degree to which the officials' assessments of things reflect actual states of affairs. Did the participants, for example, adequately assess real weaknesses? This is also difficult to say for certain. One may look for signs of common misconceptions and myths, but every crisis is unique, as are the specific conditions and relations of the organisation studied.

A somewhat related question, regarding especially the validity in paper I is whether opinions on what is considered valuable can be analysed by examining the participants' explicit statements on the issue. It is not unlikely that there may be a discrepancy between what people think is valuable, and how this is expressed how they act, and what they express as being valuable. This is a relevant question to raise considering for one thing that the analyses were conducted as group seminars where culture and power relations could play a role, and that studies have shown that the link between attitude and behaviour is not clear-cut (cf. Albarracin et al. 2005). Even though these questions are relevant, they are not focused on in this thesis.

In papers I to V the material was categorized and classified. The categories were identified by the author(s) as were the subsequent classifications. This act may be somewhat subjective. However, attempts were made to clarify what was put in the different categories (cf. paper I and II) so that transparency in the judgements was assured.

The analyses involved quantitative elements in which the author(s) attempted to compare different categories and different cases based on the number of times an item or problem could be seen as pertaining to a certain category. The result of such analyses should not be seen as exact, and care should be taken when interpreting the results. In some studies the numbers of cases were quite low (especially paper I and V). Moreover, in paper I the time of the analysis for empirical data collection was relatively short. Nevertheless, the results can be seen as strongly indicating certain aspects of the officials' conceptions.

The completeness measure employed in paper III is useful for showing the degree to which actors participating in tabletop exercises are dependent on other actors. However, it should also be recognized that the more skilled the officials at the tabletop exercise are at identifying actors on whom their actors are dependent, in the scenario analyzed the lower the completeness value may become. This is something that must be considered in interpreting the value of the completeness measure.

Finally, the question that should be considered here concerns the external validity of the results, i.e. to what extent could the results be generalized (cf. Runae 2006)? This question cannot be easily answered. First of all, only Swedish officials, mainly municipal, are considered here. Culture, organisation and many other things may differ in relation to other countries, as they may do from time to time and from workplace to workplace. Still, there may be central elements in what has been found here that could also be found in other contexts. In particular this can be seen in that there is a variation in what officials in different contexts consider valuable and worth protecting, that there are disagreements in officials' conceptions of their actors'

interdependencies, that there is a considerable variation in what people may learn from tabletop exercises and that individuals in local emergency planning committees may not act as brokers and teachers in relation to their own departments.

7.3 Further research

Based on the results of the studies in this thesis, some areas can be discerned as germane for further studies.

- It is suggested here that in order to develop the crisis management capability of any organisation or system, it is vital to make explicit what is valuable and worth protecting. But do conceptions made explicit really lead to improved crisis management capability? This should be examined.
- Studies are needed that may not only explain variations between the cases but also endeavour to find out why officials tend to develop some aspects of what is valuable and worth protecting as well as some aspects of their organizations' crisis management capabilities than others.
- One pertinent research question would be to clarify the relationship between officials' conceptions of issues related to their organisations' crisis management capabilities and the organisations' actual crisis management capabilities. To what extent do the officials' conceptions of the issues discussed here in any sense correspond to a more expert point of view? What would the result of a Delphi panel show?
- A similarly relevant question concerns to what degree people's conceptions are synonymous with their verbal expressions of them, or even their linkage with behaviour? There is a need for additional studies that more deeply penetrate the relation between officials' conceptions of their crisis management capability and their expressions of it, and how they will act in crisis situations.
- Do the officials' conceptions on their organisations' crisis management capability change with time as they learn more? Do the (risk and) vulnerability analyses lead to significant changes in the crisis management capability? More studies are needed that look into this.

- Finally, important questions that should be addressed in further research concern what specifically is required to develop a learning crisis management organisation? What hindrances and possibilities can be identified? How may learning be enhanced in tabletop exercises? What mechanisms may be created for overcoming problems with knowledge transfer in the municipalities? What is required to make officials motivated for acting like teachers, stewards, and brokers of the learning organisation?

8 Conclusions

In order to answer the overarching question *What characteristics can be found in officials' expressed conceptions of their organisations' crisis management capabilities?*, three thematic and six specific research questions were raised. In answering these questions, studies were conducted, mainly in municipalities, in which information on the officials' conceptions were gathered through questionnaires, interviews, seminars, and tabletop exercises. The material was then analyzed by trying to structure it, e.g. in the form of categorizing and classifying it, and identifying patterns. Characteristics in the form of similarities, variations and even disagreements were found that must be considered in the development of society's crisis management capability. The conclusions with regard to the different themes are as follows.

Vulnerability

- Officials in different organisations consider different items, specific for their contexts, to be valuable and worth protecting. However, there are also similarities in that they focus and develop some categories of items, more than others, such as Infrastructures and real estate as well as Processes and functions. The study suggests that analysis technique and situational and contextual factors strongly influence the result.
- Officials' conceptions' of weaknesses in their organisations' crisis management capabilities could be seen as relating to a rather restricted number of themes and variations on these themes. Moreover, the problems could also be related to some organisational elements, such as structure, and some types of processes, such as operational processes and operational control, more often than to others.

Dependencies

- Based on officials' assessments on actors' dependencies, actors and categories of actors could be classified into different types such as Key actors, Supporting actors, Specialist actors and Background actors showing their overall degree of importance for other actors in specific scenarios. The information can be used to indicate which actors and categories of actors are vital to involve in tabletop exercises.

- Only in every third situation, where two agents (officials) individually assess one actor's dependency on the other they are in perfect agreement. Moreover, in every sixth such situation, a big or very big discrepancy between their assessments can be identified. This is serious, and the crisis management system may face a risk of being built on false assumptions.
- It is far more common that the officials assess their actor's dependency on other actors as higher than they assess other actors' dependency to be on their actor. This result indicates some kind of inward focusing in the officials' perspectives, and may lead to sub-optimization of society's crisis management system.

Learning

- The learning officials appropriate by taking part in tabletop exercises is far from uniform. It varies in both breadth and depth. It is important that the ones responsible for conducting such exercises understand that it may have a very diverse effect on its participants, and that it may be necessary to follow up tabletop exercises with debriefing activities. Such debriefing activities may, however, enhance the learning process.
- The learning that officials acquire by participating in so-called local emergency preparedness committees in general, or vulnerability analyses in the form of tabletop exercises in particular, appears not to spread easily throughout the organisation. One reason that was found for the low knowledge transfer is that individuals in local emergency planning committees do not take on the role for acting in ways that are required in order for a learning organisation to be established. It is of utmost importance to examine more closely the reasons for the low commitment on the part of these members in order to strengthen organisations' crisis management capabilities.

Overall findings

- In order to develop the crisis management system of the municipalities as well as society at large, the officials' conceptions of their organizations' crisis management capabilities need to be made explicit and discussed in an analytic manner regularly, so that the overall characteristics become visible. Involving the officials themselves in such self reflexive discussion

should be central in that it may upgrade their ways of experiencing crisis management and make learning about crisis management feel meaningful. The studies carried out in this thesis indicate that tabletop exercises play an important role here.

References

- Ackoff, R. L. (1999), *Re-creating the corporation: a design of organizations for the 21st century*. New York: Oxford University Press.
- Albarracín, D., Johnson, B. T. & Zanna, M. P. (Eds.) (2005), *The handbook of Attitudes*. Lawrence Erlbaum Associates, Inc. Mahwah, New Jersey.
- Alexander, D.E. (2007), Misconception as a barrier to teaching about disasters. *Prehospital and Disaster Medicine*. Vol 22(2), pp 95-103.
- Alvesson, M. & Sköldbërg (1994), *Tolkning och reflektion. Vetenskapsfilosofi och kvalitativ metod*. Studentlitteratur. Lund (in Swedish).
- Amabile, T. M. (1996), *Creativity in Context*, Westview Press, Inc. Boulder, Colorado.
- Anderson, R. C., Spiro, R. J. and Anderson, Mark C. (1978), Schemata as Scaffolding for the Representation of Information in Connected Discourse, *American Educational Research Journal*, Vol. 15, No. 3, pp. 433-440.
- Argote, L., Ingram, P., Levine, J., M. & Moreland, R., L. (2000), Knowledge Transfer in Organizations: Learning from the Experience of Others. *Organizational Behavior and Human Decision Processes*, Vol. 82, No. 1, pp. 1-8.
- Argote, L. & Ingram, P. (2000), Knowledge Transfer: A Basis for Competitive Advantage in Firms. *Organizational Behavior and Human Decision Processes*, Vol. 82, No. 1, pp. 150-169.
- Argyris, C., & Schön, D. A. (1996), *Organizational Learning II: Theory, Method, and Practice*, Addison-Wesley Publishing Company, Reading, Massachusetts.
- Ashby, W. R. (1957) *An Introduction to Cybernetics*, London, Chapman & Hall Ltd.
- Attewell, P. (1992), Technology Diffusion and Organizational Learning: The Case of Business Computing. *Organization Science*, Vol. 3, No. 1, pp. 1-19.
- Aven, T., Boyesen, M., Njå, O., Olsen, K. h. & Sandve, K. (2004), *Samfunnsikkerhet*. Universitetsforlaget, Oslo.
- Bartlett, Frederic C. (1932, reissued 1995), *Remembering. A Study in Experimental and Social Psychology*. Cambridge University Press, Cambridge, United Kingdom.
- Bjerstedt Å (1992), Conceptions of future threats and developments. Psychological starting points and educational possibilities. In Svedin, U. & Aniansson, B. (eds.), *Society and the Environment*. Dodrecht: Kluwer Academic Publishers, 1992, pp 229-255.

- Blaikie, P., Cannon, T., Davis, I. & Wisner, B. (1994), *At Risk: Natural Hazards, People's Vulnerability, and Disasters*. Routledge, London.
- Boin, A. (2005a), Att utforma effektiva krishanteringsstrukturer, *Sverige och Tsunamin – granskning och förslag, SOU 2005:104*, Stockholm: Lind & Co (in Swedish).
- Boin, A. (2005b), Back to nature? A reply to Stallings. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster?* (pp. 280-285). Philadelphia: Xlibris Corporation.
- Boin, A., & 't Hart, P. (2006). The crisis approach. In H. Rodriguez, E. L. Quarantelli & R. Dynes (Eds.), *Handbook of disaster research* (pp. 42-54). New York: Springer.
- Boin, A. and Lagadec, P. (2000), Preparing for the future: critical challenges in crisis management, *Journal of Contingencies and Crisis Management*, Vol. 8, No. 4, pp.185–191.
- Borell, K. & Johansson, R. (1996), *Sambället som nätverk. Om nätverksanalys och samhällsteori. Studentlitteratur*, Lund (In Swedish).
- Borodzicz, E. P. (2005), *Risk, Crisis & Security Management*, Southern Gate, Chichester, West Sussex, England: John Wiley & Sons Ltd. The Atrium.
- Buckley, W. F. (1967). *Sociology and modern systems theory*. Englewood Cliffs: Prentice-Hall.
- Child J. (2005), *Organization - Contemporary Principles and Practice*. Blackwell Publishing, Malden.
- Christensen, T. Læg Reid, P., Roness, P., G. & Røvik, k., A. (2005) *Organisationsteori för offentlig sektor*. Liber ekonomi, Malmö (in Swedish).
- Comfort, L. (2007), Crisis Management in Hindsight: Cognition, Communication, Coordination and control, *Public Administration Review*. Vol. 67 Issue s1, pp. 189 – 197.
- Constable M. (2008), 'Disaster mythology: looting in New Orleans'. *Disaster Prevention and Management*. Vol. 17 No. 4, 2008, pp. 519-525.
- Coppola D. P. (2007), *Introduction to International Disaster Management*. Butterworth-Heinemann, Elsevier.
- Corbin & Strauss (2008), *Basics of qualitative research. Techniques and procedures for developing grounded theory - 3rd ed.* Sage Publications Inc. Los Angeles.
- Daft, R. L. (2004), *Organization Theory and Design. 8th edition*. Vanderbilt University. RR Donnelley & Sons Company, Willard, OH.

- Dausey, D. J., Buehler J. W., Lurie, N. (2007), Designing and conducting tabletop exercises to assess public health preparedness for manmade and naturally occurring biological threats. *BMC Public Health*. Vol 7:92.
- Denscombe M. (2000), *Forskningshandboken – för småskaliga forskningsprojekt inom samhällsvetenskaperna*. Studentlitteratur, Lund (in Swedish).
- Dreborg, K. H. (1993) *Spela för att lära. Om spel och övningar I civil beredskap*. Försvarets forskningsanstalt. Huvudavdelningen för försvarsanalys. Sundbyberg (in Swedish).
- Dreborg, K. H. (1997) *Gaming and Backcasting. Two Approaches in the Face of Uncertainty*. Royal Institute of Technology. Department of Infrastructure and Planning (in Swedish).
- Dreifurst, T. D. (2009), The Essentials of Debriefing in Simulation Learning: A Concept Analysis. *Nursing Education Perspectives*, Vol. 30, No. 2.
- Dynes, R. R. (1983), Problems in emergency planning. *Energy*, Vol. 8 (8-9), pp. 653-660.
- Dynes, R. R. (1994), Community Emergency Planning: False assumptions and Inappropriate Analogies. *International Journal of Mass Emergencies and Disasters*, Vol 12, No. 2, pp.141-158.
- Ejvegård R. (2003), *Vetenskaplig metod*. Studentlitteratur, Lund (in Swedish).
- Eriksson K. (2008), *Designing Preparedness – Emergency Preparedness in a Community Context*. Department of Fire Safety Engineering and Systems Safety. Lund University, Sweden.
- FEMA (2009), *Unit 2: Comprehensive Exercise Program*, accessed 2010-01-28, <http://training.fema.gov/emiWeb/downloads/is139Unit2.doc>
- Fischer III H. W. (1998), *Response to Disaster: Fact Versus Fiction & Its Perpetuation. 2nd Edition*. University Press of America, Inc. Landham, Maryland.
- Flin, R., Martin, L., Goeters, K-M., Hormann, H-J., Amalberti, R., Valot, C. and Nijhuis, H. (2003), Development of the NOTECHS (Non-technical skills) system for assessing pilots' CRM skills', *Human Factors and Aerospace Safety*, Vol. 3, No. 2, pp.97–119.
- Forsell A., & Westerberg A. I. (2007), *Organisation från grunden*. Liber AB, Malmö (in Swedish).
- Garavan, T. N. & McCarthy, A. (2008), Collective Learning Processes and Human Resource Development. *Advances in Developing Human Resources* Vol. 10, No. 4 pp. 451-471.

Gärdenfors P. (2006), *Den meningssökande människan*. Natur och Kultur. Stockholm (in Swedish).

Hallin, P.-O.; Nilsson, J. & Olofsson, N. (2004), Kommunal sårbarhetsanalys. Krisberedskapsmyndigheten, Stockholm. (In Swedish)

<http://mva-metoden.se/2010-01-28>. (In Swedish)

Høyland A. & Rausand M. (1994), *System Reliability Theory: Models and Statistical Methods*. John Wiley & Sons, Inc, New York.

Jackson (2000): *Systems Approaches to Management*. University of Hull. Kluwer Academic Publishers, Boston/Dordrecht/London.

Janis, I., L. (1982), *Groupthink. Second edition*. Houghton Mifflin Company. Boston, Massachusetts.

Johansson H. & Jönsson H. (2007), *Metoder för risk- och sårbarhetsanalys ur ett systemperspektiv*. Rapport 1010, LUCRAM, Lund University Centre for Risk Analysis and Management, LUCRAM, Lund. (In Swedish).

Kam E. (1988), *Surprise attack. The victim's perspective*. Harvard University Press. Cambridge Massachusetts. London England.

Kaplan S. (1997), The Words of Risk Analysis. *Risk Analysis*, Vol. 17, No. 4, pp. 407-417.

Klein, G. Moon, B. Hoffman, R.R (2006), Making Sense of Sensemaking 1: Alternative Perspectives, *IEEE Intelligent Systems*, Vol. 21, No. 4, pp. 70-73.

Kolluru, R. V. (1996), Risk Assessment and Management: A Unified Approach. In Kolluru, R., Bartell, S., Pitblado, R. & Stricoff, S. (Eds.), *Risk Assessment and Management Handbook For Environmental, Health and Safety Professionals* (pp. 1.1-1.41)

Kreps, G.A. (1991), Organizing for emergency management, in Drabek, T., Hoetmer, G. (Eds), *Emergency Management: Principles and Practice for Local Government*, International City Management Association, Washington, DC

Lave, J. & Wenger E. (1991), *Situated learning. Legitimate Peripheral Participation*. Cambridge University Press.

Lichtenstein, S., Slovic, P., Fischhoff, B. Layman, M. & Combs, B. (1978), Judged Frequency of lethal events. *Journal of experimental psychology. Human learning and memory*. Vol. 4, pp. 551-578.

Lindgren, M. & Bandhold, H. (2003), *Scenario planning – the link between future and strategy*. Palgrave Macmillan. New York.

- Lukes, S. (1974), *Power: a radical view*, London: Macmillan.
- Lukes, S. (2005), *Power: a radical view, 2nd ed.*, Basingstoke: Palgrave Macmillan.
- Lundahl & Skärvad (1992), *Utredningsmetodik för samhällsvetare och ekonomer*. Studentlitteratur, Lund (in Swedish).
- Malone T.W. and Crowston, K. (1990), *What is coordination theory and how can it help design cooperative work systems? Proceedings of the conference on computer supported cooperative work*. Los Angeles, 1990.
- Marton, F. and Booth, S. (1997), *Learning and Awareness*, Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Mason, D. (1992), The role of schemata and scripts in language learning. *System*, Vol. 20(1), pp. 45-50.
- McEntire, D. A. (2003), Searching for a holistic paradigm and policy guide: a proposal for the future of emergency management, *Int. J. Emergency Management*, vol. 1, no. 3, pp. 298-308.
- McLoughlin, D. (1985), A Framework for Integrated Emergency Management, *Public Administration Review*, vol. 45, no. Special Issue: Emergency Management: A Challenge for Public Administration, pp. 165-172.
- Merriam Webster's Dictionary Online (2010), 'Conception', accessed 2010-01-28, <http://www.merriam-webster.com/dictionary/>
- MSB, Swedish Civil Contingencies Agency (2009), *En sammanfattning av rapporten 'Faller en - faller då alla?'*. Myndigheten för Samhällsskydd och beredskap (in Swedish).
- MVA (2010) <http://mva-metoden.se/> accessed 2010-02-07
- Nilsson J. & Becker P. (2009), What's important? Making what is valuable and worth protecting explicit when performing risk and vulnerability analyses. *International Journal of Risk assessment and Management*. Vol. 13, No.3/4 pp. 345 - 363.
- Nilsson J. & Eriksson K. (2008), The Role of the Individual – A Key to Learning in Preparedness Organisations. *Journal of Contingencies and Crisis Management*. Vol. 16, No. 3, pp 135-142.
- Nilsson J. & Tehler H. (2010), Discrepancies in agents' conceptions of interdependencies. Submitted to an international journal.
- Nilsson J. (2003), *Introduktion till riskanalyismetoder*. Department of Fire Safety Engineering. Report 3124, Lund University (in Swedish).

Nilsson J. (2009 a), Using tabletop exercises to learn about crisis management: Empirical evidence, *International Journal of emergency management*. Vol. 6, No.2 pp. 136 - 151.

Nilsson J. (2009b) What's the problem? Local officials' conceptions of weaknesses in their municipalities' crisis management capabilities. Accepted for publication in *Journal of contingencies and crisis management*.

Njå O., Boyesen M. & Olsen K. H. (2002), *Veiledere for beredskapsopplæring. En sjekkliste over viktige momenter*. Studiet I samfunnssikkerhet. Høgskolen i Stavanger (in Norwegian).

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge Creating Company. How Japanese Companies Create the Dynamics of Innovation*, New York: Oxford University Press.

Oxford English Dictionary Online (2010), 'Conception', 'Dependency', 'Interdependent' accessed 2010-01-28, <http://www.oed.com/>

Patel, R. & Davidson, B. (1994), *Forskningsmetodikens grunder. Att planera, genomföra och rapportera en undersökning*. Studentlitteratur, Lund (in Swedish).

Peerenboom, J., Fisher, R. E., Rinaldi, S. M. and Kelly, T. K. (2002), Studying the Chain Reaction, *Electric Perspectives*, Volume 27, Number 1, pp. 22-33.

Perrow, P. (1984), *Normal accidents. Living with High-Risk Technologies*. Basic Books, Inc., Publishers. New York.

Perry, R. W. & Lindell, M. K. (2003), Preparedness for Emergency Response: Guidelines for the Emergency Planning Process. *Disasters*, Vol. 27, No. 4, pp. 336-350.

Petranek, C. F., Corey, S. & Black, R. (1992), Three Levels of Learning in Simulations: Participating, Debriefing, and Journal Writing. *Simulation & Gaming*, Vol. 23, No. 2, pp 174-185.

Polanyi, M. (1966), *The Tacit Dimension*. Reprinted 1983, by arrangement with Doubleday & Company, Inc.

Polanyi, M. (1969), *Knowing and Being*. Routledge & Kegan Paul, London.

Prop. (2005) Regeringens proposition 2005/06:133. *Samverkan vid kris – för ett säkrare samhälle*. Försvarsdepartementet, Stockholm (in Swedish).

Quarantelli, E. L. (1995), What is a disaster? *International Journal of Mass Emergencies and Disasters*, 13(3), 221-229.

Quarantelli, E. L. (1997), Ten Criteria for Evaluating the Management of Community Disasters. *Disasters*, Vol. 21, No. 1, pp. 39-56.

- Rolf, B. (1991), *Profession, tradition och tyst kunskap*. Bokförlaget Nya Doxa. Övre Dalkarlshyttan, Sweden (in Swedish).
- Rollenhagen, C. (1997), *Sambandet Människa, Teknik och Organization – en introduktion*. Studentlitteratur, Lund (in Swedish).
- Ruane J. M. (2006), *A och O i forskningsmetodik. En vägledning i samhällsvetenskaplig forskning*. Studentlitteratur, Lund (in Swedish).
- Schank, R. C. & Abelson R P (1995), Knowledge and Memory: The Real Story In: Robert S. Wyer, Jr (ed) *Knowledge and Memory: The Real Story*. , Hillsdale, NJ. Lawrence Erlbaum Associates.
- Scott, W. R. (1981), *Organizations – Rational, Natural, and Open Systems*. Second Edition.
- SEMA (Swedish Emergency Management Agency) (2006), *Risk- och sårbarhetsanalyser. Vägledning för kommuner och landsting* (In Swedish) [Risk and vulnerability analyses. Guidelines for local governments and county councils]. Krisberedskapsmyndigheten, Stockholm (in Swedish).
- SEMA (Swedish Emergency Management Agency) (2007), *Gränsöverskridande beroenden - en studie om samhällsviktiga verksamheters beroenden över nationsgränser*. Krisberedskapsmyndigheten, Stockholm (in Swedish).
- Senge, P. M. (2006), *The Fifth Discipline: The Art and Practice of the Learning Organization (Rev. and updated ed.)*, Random House Business, London.
- SFS (2002 a), Lag (2002:833) om extraordinära händelser i fredstid hos kommuner och landsting. Swedish statutes (in Swedish).
- SFS (2002 b), Förordning (2002:472) om åtgärder för fredstida krishantering och höjd beredskap. Swedish statutes (in Swedish).
- SFS (2006 a), Lag (2006:544) om kommuners och landstings åtgärder inför och vid extraordinära händelser i fredstid och höjd beredskap. Swedish statutes (in Swedish).
- SFS (2006 b), Förordning (2006:637) om kommuners och landstings åtgärder inför och vid extraordinära händelser i fredstid och höjd beredskap. Swedish statutes (in Swedish).
- SFS (2006 c), Förordning (2006:942) om krisberedskap och höjd beredskap. Swedish statutes (in Swedish).
- Simon, H. A. (1996), *The sciences of the artificial. 3rd edition*. MIT Press, Cambridge.

Slovic, P., Fischhoff, B. & Lichtenstein, S. (1980), Facts and fears: understanding perceived risk. In R.C. Schwing & W. A. Albers, (eds): *Societal risk assessment: how safe is safe enough* (pp 181-216). New York, Plenum Press.

Slovic, P. (1987), Perception of risk. *Science*, Vol. 236 Issue (4799), pp. 280-285.

Slovic P. (1998), Perception of risk. In Löfstedt, R. & Frewer, L. (Eds.), *Risk & Modern Society*, (pp. 31-43). Earthscan Publications Ltd, London.

SOU (1995), *Ett säkrare samhälle*. Huvudbetänkande av Hot- och riskutredningen, Stockholm Norstedts Tryckeri (Statens offentliga utredningar 1995:19) (in Swedish).

SOU (2001), *Säkerhet I en ny tid*. Sårbarhets- och säkerhetsutredningen, Fritzes offentliga publikationer, Stockholm (Statens offentliga utredningar 2001:41) (in Swedish).

Stanford Encyclopaedia of Philosophy (2009) Metaphysics Research Lab, Stanford University, [URL document], 2009-03-11, <http://plato.stanford.edu/entries/value-intrinsic-extrinsic/#TheSucThiIntValAll>

Strauss, A.L. and Corbin, J. (1990), *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Sage, Newbury Park, CA.

Sundelius B., Stern E. & Bynander, F. (1997), *Krishantering på svenska - teori och praktik*. Nerenius & Santérus Förlag AB (in Swedish).

Swedish National Audit Office (2008), *Regeringen och Krisen*, Riksdagstryckeriet, Stockholm (in Swedish).

Tehler H. & Nilsson J. (2009), Using Network Analysis to Evaluate Interdependencies Identified in Tabletop Exercises. Submitted to an international journal.

Thiagarajan, S. (1994), How I designed a game and discovered the meaning of life, *Simulation and Gaming*, Vol. 25, No. 4, pp.529–535.

Tversky A., Kahneman D. (1973), Availability: A Heuristic for judging Frequency and Probability. *Cognitive Psychology*, Vol. 5, pp. 207-232.

Tversky A., Kahneman D. (1974), Judgement under Uncertainty: Heuristics and Biases. *Science*, Vol. 185. no. 4157, pp. 1124 - 1131.

Uhr C. (2009): *Multi-Organizational Emergency Response Management – A Framework for Further Development*. Department of Fire Safety Engineering and Systems Safety. Lund University.

- Warrick, D. D., Hunsaker P. L., Cook, C. W & Altman, S. (1979), Debriefing Experiential Learning Experiences. *Journal of Experiential Learning and Simulation*, 1, pp 91-100.
- Weichselgartner, J. (2001), Disaster mitigation: the concept of vulnerability revisited, *Disaster Prevention and Management*, Vol 10, No. 2, pp. 85-94.
- Weick, K.E. and Sutcliffe, K.M. (2001), *Managing the Unexpected – Assuring High Performance in an Age of Complexity*, San Francisco: Jossey-Bass.
- Weick K. E. & Sutcliffe K. M. (2005), Organizing and the Process of Sensemaking. *Organization Science*, Vol. 16, No. 4, pp 409-421.
- Wenger, E. (1998), *Communities of practice: learning, meaning, and identity*, Cambridge University Press, Cambridge.
- Westin J. & Sjöberg E. (2007), *Kreativitet som hot och möjlighet i kärnverksamheten* FOI-R—2288—SE (In Swedish). [FOI – Swedish Defence Research Agency. Stockholm.
- Wildavsky, A. & Dake, K. (1998), Theories of Risk Perception: Who Fears What and Why? In Löffstedt, R. & Frewer, L. (Eds.), *Risk & Modern Society*, (pp. 91-100). Earthscan Publications Ltd, London.