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# **Preparing for Preparedness**

**- Shaping Crisis Planning Processes in Local Authorities**

Kerstin Eriksson

Department of Fire Safety Engineering  
and Systems Safety  
Lund University

Doctoral Thesis

Lund 2010

# Preparing for Preparedness – Shaping Crisis Planning Processes in Local Authorities

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**Till min pappa Göran**



# Summary

In the developed countries the public expect society to be prepared for, and step in, if something out of the ordinary happens. This public pressure appears to have increased the demand for crisis preparedness planning. In crisis management the local authority serves as the first line of defence and will more or less always be involved in responding to crises. It is therefore important to study how they should work with preparedness planning.

The overall aim of the research on which the present thesis is based has been to study how local authorities should shape their preparedness planning processes in order to enhance their ability to respond to crises. Organisations are different; they have dissimilar prerequisites and are vulnerable to different hazards. Preparedness planning must always be adapted to the specific conditions and there is thus no detailed model that fits all organisations. In this thesis I have addressed two research questions concerning preparedness planning. The first question addressed the factors preparedness planners and researchers perceived as vital to consider when shaping the process of preparedness planning. The second research question dealt with the implications crisis management has on the preparedness planning process.

The answers to both research questions can be summarised as follows. While acknowledging that there is no “model planning” that will serve every local authority effectively, there were four implications that were perceived as vital. The first implication is that there are several aims of preparedness planning, and those aims might be in conflict with each other. The second implication, at the operational level to shape a preparedness planning process, is that there is a need to create a continuous process. Furthermore, I have found three different perspectives relevant for shaping this process. These are to address the organisation’s internal vulnerabilities, to deal with aspects of learning and to consider who should learn what and how. The third implication is that it will almost never be possible to completely “stick to the plan”. There will always be a need for improvisation. It is thus wise to plan for improvisation. The fourth and final implication is that one needs to be cautious when evaluating a plan in hindsight.



# Sammanfattning

I i-länderna förväntar vi oss att samhället ska vara förberett för och kunna ingripa om något utöver det vanliga inträffar. Dessa förväntningar från allmänheten verkar att ha ökat efterfrågan på förberedelser inför kriser. Kommunen är en aktör som nästan alltid kommer att bli involverade vid hanteringen av en kris. Att studera hur kommunen bör arbeta med att utforma sina förberedelseprocesser är därför viktigt.

Det övergripande syftet med denna avhandling har varit att studera hur kommuner bör utforma sina förberedelseprocesser i syfte att förbättra sin förmåga att hantera kriser. Organisationer är olika, de har olika förutsättningar och är utsatta för olika typer av risker. Planeringen måste därför alltid anpassas till den specifika organisationen. Det finns inga absoluta regler för hur en kommun ska arbeta med att förbereda sig. I denna avhandling studerar jag två frågeställningar rörande förberedelser. Den första frågeställningen behandlar vilka faktorer som säkerhetssamordnare och forskare uppfattar som väsentliga att ta hänsyn till vid utformningen av förberedelseprocessen. Den andra frågeställningen behandlar vilka implikationer som den övergripande krishanteringsprocessen har på förberedelserna.

Svaren på båda frågeställningarna kan sammanfattas enligt följande. Med utgångspunkt från att det inte finns någon detaljerad metod för förberedelser som fungerar effektivt i alla kommuner diskuterar jag i avhandlingen fyra implikationer och tre perspektiv på faktorer som organisationen bör ta hänsyn till. En första implikation är att det finns flera syften med förberedelser och dessa syften strider ibland mot varandra. En andra implikation är att på operativ nivå finns det ett behov av att skapa en kontinuerlig förberedelseprocess. I denna avhandling har jag identifierat tre olika perspektiv på faktorer att ta hänsyn till för att utforma denna kontinuerliga process. Dessa är att identifiera och erkänna den egna organisationens interna sårbarheter, reflektera över och ta hänsyn till faktorer för lärande och slutligen överväga vem som ska lära sig vad och hur. En tredje implikation är att det vid en verklig kris oftast inte är möjligt att exakt följa den uppgjorda planen. Det kommer alltid att finnas ett behov av improvisation. Det är därför klokt att redan från början planera för detta. En fjärde implikation är att man måste vara försiktig när man utvärderar en planering efter en kris då det är lätt att vara efterklok.





# Acknowledgements

During these years I have studied several crisis preparedness plans, the products of different organisations preparedness planning processes. This thesis is my product, the result of my research process. This has been a process to become a researcher as well as a process of personal development. Within this process I have learnt how to question things, prioritise between different tasks and better handle stress. I hope that this is not the end of my research process but a very good beginning. Several persons have pushed me forward in this process and I would like to thank them all.

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Lund, 1 November 2010

A handwritten signature in black ink, reading "Kerstin Eriksson". The script is cursive and fluid, with the first name and last name clearly distinguishable.

Kerstin Eriksson

# List of Appended Papers

This thesis is based on the following papers, which will be referred to by their roman numbers in the text. The papers are appended at the end of the thesis.

**Paper I** Eriksson, Kerstin (2009). Knowledge transfer between preparedness and emergency response: A case study. *Disaster Prevention and Management: An International Journal*, 18(2), 162-169.

**Paper II** Nilsson, Jerry, & Eriksson, Kerstin (2008). The role of the individual – A key to learning in preparedness organisations. *Journal of Contingencies and Crisis Management*, 16(3), 135-142.

*Both authors formulated the aim of the paper. I formulated the methods and collected empirical data in one of the two studies included. Both authors designed and carried out the analysis and wrote the paper. Both authors reflected on the results and discussion.*

**Paper III** Brown, Christer, & Eriksson, Kerstin (2008). A plan for (certain) failure: Possibilities for and challenges of more realistic emergency plans. *International Journal of Emergency Management*, 5(3/4), 292–310.

*Both authors formulated the aim of the paper. Both authors were involved in discussing and reflecting on the theme and the content of the paper. Both authors were involved in writing and structuring of the text.*

**Paper IV** Eriksson, Kerstin (forthcoming). Crisis preparedness planning – Relevant factors when shaping the process. Under review in an international scientific journal.

**Paper V** Eriksson, Kerstin, & McConnell, Allan (forthcoming). Contingency planning for crisis management: Recipe for success or political Fantasy? Under review in an international scientific journal.

*Both authors formulated the aim of the paper. Both authors were involved in discussing and reflecting on the theme and the content of the paper. Both authors were involved in writing and structuring of the text.*

# List of Related Publications

Borell, Jonas, & Eriksson, Kerstin (2008). Improving emergency response capability: An approach for strengthening learning from emergency response evaluations. *International Journal of Emergency Management*, 5(3/4), 324-337.

Borell, Jonas, & Eriksson, Kerstin (2009). Challenges to intra-organizational risk and vulnerability information flow in public organizations [Electronic version], *Proceedings of the 16th TIEMS Annual Conference*, Istanbul, Turkey.

Borell, Jonas, & Eriksson, Kerstin (2010). Goal directed learning for effective emergency exercises. *Proceedings of the 17th TIEMS Annual Conference*, Beijing, China, 17, 261-269.

Eriksson, Kerstin (2008). *Designing preparedness – Emergency preparedness in a community context* (Licentiate dissertation, Report 1039), Lund, Sweden: Lund University: Fire Safety Engineering and Systems Safety.

Eriksson, Kerstin, Abrahamsson, Marcus, & Fredholm, Lars (2007). An analysis of assistance needs during the storm Gudrun. *Proceedings of the 14th TIEMS Annual Conference*, Trogir, Croatia, 14, 65-72.

Eriksson, Kerstin, & Borell, Jonas (2008). Effective learning from emergency responses, *Proceedings of the European safety and reliability conference, ESREL 2008, and 17th SRA-Europe*, Valencia, Spain, 83-88.

Eriksson, Kerstin, & Borell, Jonas (2010). Broad capability through variation in emergency exercises. *Proceedings of the 17th TIEMS Annual Conference*, Beijing, China, 17, 270-276.

Guldåker, Niklas, Nieminen Kristofersson, Tuija, & Eriksson, Kerstin (2010). Riskhantering i en socken [Risk management in a parish]. In M. Höst, T. Nieminen Kristofersson, K. Petersen & H. Tehler (Eds.), *FRIVA – Risk, sårbarhet och förmåga - Samverkan inom krishantering* (pp. 79-92). Lund, Sweden: Lund University, LUCRAM.

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# Chapter 1

## Introduction

The frequency, nature and consequences of crises and disasters seem to be shifting (Boin, 2009). Reasons are claimed to be globalisation and the development of larger and more integrated systems that have led to a more complex and interconnected society (Boin & Lagadec, 2000). The interconnected society can be illustrated, for example, by the financial crisis that started in 2007 in the USA but in the end affected large parts of the world. Crises have become more and more transboundary, and even when the disaster agent is well known it might affect society in new ways by crossing geographical borders as well as functional and time boundaries. Today there is no single reason and no specific organisation that “owns” a crisis (Boin, 2009). The “new” crises and disasters are “unthinkable” and “inconceivable”, as can be discerned in recent crises. For example, not many of the affected regions had planned for the Swedish storm Gudrun in 2005 that resulted in 75 million cubic meters of blown down trees and 340 thousand homes without power (Eriksson, Abrahamsson, & Fredholm, 2007). The reality is that we do not know what will happen in the future, and this makes it very hard when trying to prevent and prepare for future crises (Lagadec, 2006).

Populations in today’s developed countries have high expectations for safety and security (e.g. Boin, 2005a; Clarke, 2006; Kapucu & Van Wart, 2006). The public expects to be safeguarded by their state if something out of the ordinary happens (Boin & 't Hart, 2003). Due to this, many such countries have during the last decades focused more and more on planning for crises such as natural disasters, infrastructure breakdowns and terrorist attacks. In many countries there is today a new structure with accompanying legislation for crisis management (McConnell & Drennan, 2006). This is also the case in Sweden, where a new system for crisis management has been established. Public authorities in Sweden today are required by law to prepare for crises, emergencies, disasters and



accidents, which includes for example conducting exercises, writing plans and carrying out risk and vulnerability analyses (SFS 2006:544).

One can argue that our capacity to deal with crises and disasters is growing, and evidence suggests that we are safer than we have ever been before (Boin, 2009). Even so, the management of several of the recent years' crises and catastrophes is regarded as bad or insufficient; for example the management of Hurricane Katrina in 2005 was widely criticized (e.g. Birkland & Waterman, 2008; Waugh Jr, 2006). One problem might be that if the world of crises has changed, the approaches that were effective for preparing and managing yesterday's crises might not work on today's or tomorrow's (Boin, 2005b). Thus merely focusing on learning from experience and planning for "the last war" might lead us to follow the wrong track. When trying to prepare for crises, there is no uniform model to strictly follow and no non-disputed solutions for creating good preparedness planning (e.g. contrast the references Alexander, 2005; Clarke, 1999; Perry & Lindell, 2007). Still public authorities are today forced by legislation and by expectations from the public to plan and prepare.

Planning processes must acknowledge that crises are unexpected, which makes them very challenging to prepare for, but still there is a need to meet the high expectations from the public. In addition, the process must acknowledge that there are no easy solutions to how one should shape preparedness planning and still meet the factors that are perceived as vital in society as well as the requirements from the legislation. In general, for the public authorities a main goal of response to a crisis is to support and assist the affected individuals (Enander, 2006; Eriksson et al., 2007; Fredholm, 2006). This is explicitly stated in the Swedish legislation, where it is pointed out that one main goal for safety is to protect life and health of the population (Government bill 2005/06:133). To be able to support and assist the individual is thus a main goal of preparedness planning.

The local authority has an important role in the crisis management system (Alexander, 2005; McLoughlin, 1985). Although crises today typically are transboundary, the local level is arguably the first line of defence and will more or less always be involved in the immediate response. As McEntire (2006, p. 168) claims, "the bulk of responsibility in disasters typically falls on local jurisdictions". The importance of the local authority is also expressed in the descriptions of the Swedish crisis management system. In Sweden the local authority level is the municipal organisation. The Swedish system is built on three principles. The first principle, the principle of responsibility, specifies that the actors responsible during normal conditions also maintain responsibility

during crises. The second principle, the principle of parity, expresses that as far as possible, activities should be organised and located in the same way during a crisis as they are under normal conditions. The third principle, the principle of proximity, states that a crisis should be managed where it occurs and by the closest affected and responsible parties (Government bill 2005/06:133). This means that actors at the municipality level will have a prominent role in most Swedish crises.

In the research on which this thesis is based, I aim to deepen our understanding of how preparedness planning processes should be shaped in a local authority, focusing on Swedish municipalities.

## 1.1 Definitions

There is a continuous debate concerning the definition of terms such as *disaster*, *catastrophe*, *emergency*, *crisis* and the like. Here I will mainly use the term *crisis*, which I define as an event natural or anthropogenic that threatens human life, critical societal functions or the environment, and that exceeds the capacity of the organisation and its normal resources and routines to cope with it. The decision to use the term crisis is not self-evident. Further on I discuss definitions and the reasons I chose this term.

The research on which this thesis is based focus on preparedness planning at the local authority or local level of government, in Sweden called the municipal level. According to Swedish legislation, the municipalities are responsible for coordinating the work of crisis management in their geographical area (SFS 2006:544). *Crisis management* is here seen as the overall process of managing crises before, during and after an event.

The focus was on *preparedness planning* in the municipal organisation, concentrating on the *preparedness planner*, that is the function responsible for coordinating preparedness planning in the municipality. There is no real agreement on what preparedness planning actually is and how it should be defined (McEntire, 2007). Nonetheless, it is usually seen as something undertaken before a crisis occurs as a way of becoming better at managing crises. In the research on which this thesis is based, preparedness planning was seen as a continuous process aiming to enhance an organisation's ability to respond to crises. Such a process consists of different activities such as conducting exercises, seminars and writing plans. But preparedness planning is more than just separate activities. It is about creating learning throughout the organisation, gaining acceptance for the work and coordinating the work with other actors.

## **1.2 Outline of this Thesis**

In Chapter 2 the overall research aim and the two research questions of the research on which the present thesis is based will be presented and discussed. Chapter 3 will deal with theoretical considerations around the concept preparedness planning. In Chapter 4 the research process and design are outlined. In Chapter 5 the research results and contributions are presented. In Chapter 6 a discussion of the research can be found, as well as suggestions for further research. Finally, in Chapter 7, the conclusions are presented. The five papers on which this thesis is based are included in the Appendix.

## Chapter 2

# Research Aim and Questions

*In this chapter I will present and discuss the overall research aim and the specific research questions of this research. In addition, I will discuss the limitations and demarcations of the work.*

The existence of a prepared society that is capable of responding to possible future crisis events is something that the public (as taxpayers and potential victims) expects (Boin, 't Hart, Stern, & Sundelius, 2005). Regrettably, evaluations of the response to crises that have affected Sweden in recent years, for example the storm named Gudrun over southern Sweden in 2005 (SEMA, 2005a, 2005b) and the December 2004 Indian Ocean Tsunami (Swedish Government Official Reports, 2005), point at shortcomings in the Swedish society's crisis management abilities. In addition, a published government performance audit shows that even if the Swedish government made significant improvements due to the criticism following their response to the 2004 Tsunami, there are still major weaknesses in the ability to manage future crises (The Swedish National Audit Office, 2008). These reports claim that there is a need to develop the work of crisis management and improve the Swedish society's ability to respond to them. But how should preparedness planning be shaped to ensure a comprehensive and continuous process addressing issues such as learning, involvement and commitment? How should a continuous preparedness planning process be shaped?

### 2.1 Aim and Questions

The research presented in this thesis is one part of the FRIVA research programme (Framework Programme for Risk and Vulnerability Analysis). The aim of this programme is to study risk and vulnerability analysis from a number of different perspectives with the aim of improving the Swedish crisis management system. One of these perspectives, which was the starting point for the research on which the present thesis is based, was to study how risk and

vulnerability analysis could be used as a basis for planning and preparing for future crises. After an initial study, the project perspective was broadened to focus on the overall preparedness planning process, where risk and vulnerability analysis is but one of several activities. In addition, the initial study revealed that at the local authority level, preparedness planning was under major development, and this level was therefore considered as interesting to study further. In line with this, the overall research aim of this research follows:

*To study how local authorities should shape crisis preparedness planning processes in order to enhance their ability to respond to crises.*

The overall research aim intends at pointing out a direction of the research but is so broad that it does not allow a single or specific answer and is thus much broader than the material presented in this thesis. One part of the overall research aim is the question of how preparedness planning should be shaped in a local authority. Preparedness planning is done within different organisational settings with different prerequisites and in organisations that are vulnerable to different hazards. It must therefore always be adapted to the organisations specific conditions (Tierney, Lindell, & Perry, 2001). When discussing how a preparedness planning process should be shaped this was taken into account and instead of going into specific methods of preparedness planning I choose to study different factors that should be considered. The factors were studied from three different perspectives. The first perspective (a) discusses factors that were considered as corresponding to vulnerabilities in preparedness planning. The second perspective (b) considers factors that were perceived as vital for enabling effective learning. To study the concept of learning is essential since it is strongly connected to the aim of preparedness, that is enhancing an organisation's ability to respond to crises. The last perspective (c) considers factors that were perceived as important when develop a preparedness planning process. The first specific research question with the different perspectives (a-c) follows:

*Which factors are, by preparedness planners and researchers, perceived as vital to consider when shaping the process of preparedness planning:*

- a. ...to identify organisational preparedness planning vulnerabilities?*
- b. ...to enable effective learning?*
- c. ...to enable planning process development?*

The first research question focuses on which factors that were perceived as vital to consider when shaping a preparedness planning process but does not go further and explore preparedness planning in a broader context. The main aim with preparedness planning was here seen as enhance an organisation's ability to respond to crises. This assumes a link between preparedness planning and the ability to respond. There is also an assumed link between preparedness planning and crisis management outcome. These connections or links are rarely examined or questioned, neither in the research literature nor by practitioners. Furthermore, individuals and organisations might have other goals than enhancing their ability. It thus seemed interesting to further study preparedness planning but to do this in a broader context by study it in relation to crisis management. The second specific research question follows:

*What implications does crisis management have on the preparedness planning process?*

## **2.2 Limitations and Demarcations**

The central area of interest of the research on which the present thesis is based was to study how local authorities should shape crises preparedness planning processes in order to enhance their ability to respond to crises.

The research was limited to study preparedness planning. Thus I do not focus on how to prevent crises from occurring or how to respond to them. Nevertheless, it is important to mention that the disaster phases (mitigation, preparedness, response and recovery) are not mutually exclusive but instead intertwined (Neal, 1997). When working with crisis management at the municipal level there is thus a need to work with all of these. Activities that I consider as parts of the overall preparedness planning process will, in several cases, also effect mitigation and thus be a part of preventing a crisis from happening.

The focus was to study preparedness planning at the local authority level. The reason for choosing the local authority level was that they have a vital role in the emergency management system (Alexander, 2005). This is very distinct in many countries where the local authority is the one responsible for coordinating the preparedness planning at the local level. The local authority thus has a key role in the system, and is thus especially interesting to study. Since the focus was on the local authority, the roles of other actors at the local level, for example private companies and individuals, were not considered, although experience shows that these actors also contribute. Nor was preparedness planning at the national and regional level considered. Still, these actors have a major administrative and practical role in crisis management, and it is important to consider the

arrangement between different levels during research and especially when preparing for crises.

One main actor in the municipal organisation when it comes to preparedness planning is the preparedness planner (the function responsible for coordinating preparedness planning in a local authority). In my research the municipalities were studied through individual representatives of the organisations, primarily the preparedness planners. Accordingly, the result presented in this thesis will be affected by this assumption. Still, since the concern was how to shape preparedness planning, the preparedness planner was seen as the most knowable and vital actor.

The focus was to consider preparedness for all types of crises. This is similar to the approach that the Swedish municipalities are required to have by law. Since one does not know what will happen in the future, the local authorities' role as the "first line of defence" makes it essential for them to prepare for the whole variety of possible futures. This is in line with an all-hazard approach, that is, creating overall planning for all hazards by preparing for aspects that are commonly observed. Further, this generic planning can if needed be combined with more specific planning for likely events. But these more specific planning processes are not studied in this research.

Furthermore, the focus was to study events that exceed the capacity of the organisation and its normal resources and routines to cope with them. I am thus not interested in the scale of events that Quarantelli (2000) defines as smaller emergencies, for example a crash with a single car. A main reason for this was that these types of situations are relatively common and often well planned for. Finally, I will not address the question of the extent to which the scale of the event plays a significant role in preparedness planning, one issue currently being debated in the literature.

## Chapter 3

# Theoretical Considerations

*The purpose of this chapter is to consider theoretical standpoints around the concept of preparedness planning. Within this discussion also some related concepts will be examined and their meaning in this text will be defined.*

### 3.1 Definitions of Terms

There are no commonly accepted interpretations of the terms *emergency*, *crisis*, *disaster*, *catastrophe* and the like. Sorting out this issue is a presumably impossible task that researchers have spent years on. Still it is a developing exercise that is needed within the area (e.g. Perry & Lindell, 2007; Perry & Quarantelli, 2005; Quarantelli, 1995, 1998b). The struggle to define these terms and also when to use which term can also be recognised in the work behind this thesis. Since the work was done in an interdisciplinary field it was not possible to just stick to one term. Thus, in the papers that this thesis is built on both the terms *emergency* and *crisis* have been used.

Emergencies, crises and the like are all social phenomena (Perry, 2006; Quarantelli & Dynes, 1977). It is how individuals perceive a specific situation that decides whether it is a crisis or not. If a situation is regarded as a crisis also depends on which level one studies. A situation that is a crisis for one individual might not be a crisis for the local authority or for the whole country. The research on which the present thesis is based focuses on the local authority level and their work with preparedness planning. The local authority was mainly studied through the *preparedness planners* (i.e. the function responsible for coordinating preparedness planning in a local authority). If a situation was defined as a crisis or not will thus be affected by how the preparedness planner perceived it.

There are several definitions of the term *emergency* within the research literature. Emergency can for example be defined as “those events which cannot be dealt with by ordinary measures or routines” (Dynes, 1983, p. 653). A similar



definition to describe an emergency is “as an exceptional event that exceeds the capacity of normal resources and organizations to cope with it” (Alexander, 2002, p. 1). Another definition of emergency is as an event, either natural or anthropogenic, that threatens human life, critical infrastructure and/or the environment, necessitating a rapid response (see Paper III, p. 295). All these definitions correspond to the situations that were studied within the research on which the present thesis is based.

The decision to use emergency in this broad sense is not unproblematic. The term is often used to describe incidents that regularly occur, are predictable and narrow-scoped (Perry & Lindell, 2007). For example, Hoetmer (1991, p. xvii) defines emergencies as “‘routine’ adverse events that do not have a communitywide impact or do not require extraordinary use of resources or procedures to bring conditions back to normal”. The reason behind the decision to use emergency as the term in two of the papers was that it is often used in terms such as *emergency management* and *emergency preparedness planning* as well as in titles of books within the area (see for example the titles of Drabek & Hoetmer, 1991; Perry & Lindell, 2007) and thus emergency was seen as an accepted word for the types of events that I study. Still, since it might be understood as a routine event, I have chosen not to use it as the main term in this text.

The other term that has been used in three of the papers that are appended to this thesis is *crisis*. A main reason for using the term crisis was that the Swedish Civil Contingencies Agency (MSB) uses the term and thus it is an established term in Swedish society. Boin (2004) mentions that the term crisis often is used as a concept that tries to include all types of “un-ness” events (i.e. situations that are unwanted, unprecedented, etc.). Crisis is thus sometimes used as the central concept (Quarantelli, Lagadec, & Boin, 2006). The term is commonly used within the political science field and can be defined as a situation where central decision makers perceive that basic values are threatened, limited time is available and there is a considerable degree of uncertainty (Sundelius, Stern, & Bynander, 1997). According to this definition a situation is defined as a crisis if the decision makers perceive it as such. One problem is thus that it is an elite construction and it is the decision maker who decides if a situation is a crisis or not (Boin, 2005b). In my research the focus is not on the central decision maker but the preparedness planner. Thus this definition of crisis was not entirely applicable for this research. Still, the situations studied correspond to the approach to crisis as a general concept including all “un-ness” events. For example in Paper V (p. 2), crisis was used as an umbrella term to capture the magnitude of threats beyond the “normal” mode of operational responders and political-strategic elites.

Beside the two terms used in the papers appended to this thesis, there are two other related terms that need to be mentioned: disaster and catastrophe. This is because they are often used within the research literature that is the basis for the research that this thesis is based on. The first term, *disaster*, can be defined as “sudden onset occasions that seriously disrupt social routines, cause adoption of unplanned action to adjust to the disruption, are designated in social space and time, and endanger valued social objects” (Perry & Lindell, 2007, p. 3). The distinction between crisis and disaster is not entirely clear. Crisis is sometimes seen as the general concept that includes disasters (Stallings, 2005). It has also been claimed that “a disaster is a crisis with a bad ending” (Boin, 2005b). Even if the definition of disaster can be used to describe the events that are studied in this thesis, the term crisis was seen as more suitable since it can be seen as the overall concept. When defining *catastrophes*, most researchers seem to agree that these are situations with large impact that affects multiple communities (e.g. Perry & Lindell, 2007). This is also claimed by Quarantelli (2000), who describes ascendant dimensions of seriousness by the three terms everyday emergencies, disasters and catastrophes. What Quarantelli defines as catastrophes are events where most of the community-built structures are impacted, everyday community functions are interrupted, and local responding organisations are also heavily impacted and unable to assume their roles. In addition, the neighbouring communities cannot provide any help since they also are heavily impacted. Even so, there is no absolute definition of what this actually means in quantitative measures or where the operational threshold between disaster and catastrophe is (Alexander, 2002). Still, catastrophe does not seem to be an appropriate term for describing the broad range of situations that is prepared for during the preparedness planning process.

Summing up, the choice of definition depends on the purpose of the study. In this thesis the focus was on preparedness planning in a local authority and primarily on the coordinator of this work, the preparedness planner. The definition in this thesis needs to capture the situations that the preparedness planner prepares for. The situations that the preparedness planners perceive will be beyond the municipalities’ routine ways of operating. In this thesis the term *crisis* will be used to define an event natural or anthropogenic that threatens human life, critical societal functions or the environment, and that exceeds the capacity of the organisation and its normal resources and routines to cope with it. When other terms are used (e.g. because they were used in the discussed research papers), they will be seen as synonymous to what I define as a crisis.

## 3.2 Preparedness Planning

The focus of the research on which this thesis is based was on crisis preparedness planning at the local authority level. Below I will mainly elaborate on the concept preparedness planning, but also mention the adjacent concepts *planning*, *plans* and *crisis management*.

When studying preparedness planning and in particular the definition of the word *preparedness* there is no unambiguous definition, but some common features can be found. Several researchers mention that preparedness is undertaken before a crisis occurs (e.g. Godschalk, 1991; Schwab, Eschelbach, & Brower, 2007). For example Kreps (1991, p. 34) maintains, “To prepare is to organize for emergency response before an event”.

McEntire (2007) mentions three different perspectives of the word preparedness that he has identified. Scholars using the first perspective understand preparedness as separate pre-disaster activities that are used to improve the response. This can be exemplified by Gillespie and Streeter (1987, p. 155), who identify preparedness as “planning, resource identification, warning systems, training and simulations, and other predisaster actions intended to improve the safety and effectiveness of community response to disaster”. This description of preparedness does not touch on the dependencies and connections between the different activities nor on how an organisation goes from separate activities to a continuous preparedness process.

The second perspective understands preparedness as an activity to foresee potential problems and project possible solutions (McEntire, 2007). For example, Kreps (1991, p. 34) mentions that “the goals of preparedness are to anticipate problems and project possible solutions”. One difficulty with this approach to preparedness is that it is not possible to actually identify all problems that might occur beforehand. If one could identify all problems one could of course plan to manage them, but what do we do when problems arise that we have not identified beforehand?

The third perspective understands preparedness as building capabilities, abilities or readiness to improve the effectiveness of response (McEntire, 2007). This is for example in line with Tierney, Lindell and Perry (2001, p. 27) who claim that “the objective of emergency preparedness is to enhance the ability of social units to respond when a disaster occurs”. This perspective also has some difficulties. For example there is an ambiguity about how to create this ability and even more important what this ability actually is.

In this thesis the aim of preparedness planning was seen in line with the third perspective, enhancing an organisation's ability to respond to crises. However, it could be argued that this also includes the other two definitions, since one step to create this ability is to conduct different preparedness activities as well as anticipate potential problems.

When using this approach to preparedness planning there is a need to discuss what abilities are needed to respond to crises. In general it is claimed that preparedness planning should focus on general principles rather than specific details (e.g. Drabek, 1985; Dynes, 1983; Perry & Lindell, 2003; Quarantelli, 1997a, 1997b, 1998a). One important aspect is that different individuals within the organisation need different abilities; since they will have dissimilar tasks during a potential crisis there is thus a need to determine who needs what abilities (Eriksson, 2008). Alexander (2002, p. 288) discusses what he calls educational needs and concludes by saying that a "well trained disaster manager will be able calmly but rapidly to analyze complex situations, make decisions firmly, and manage people and resources under pressure".

Preparedness planning is seen as a continuous process in this thesis. On a more concrete level, the preparedness planning process includes different activities such as writing plans, carrying out exercises, conducting seminars and learning from previous experience. But preparedness planning is more than just separate preparedness activities. It also involves developing social networks, gaining acceptance and promoting learning throughout the organisation and across different networks. However, there is no uniform model for shaping the process or, as Perry and Lindell (2003, p. 342) argue: "there is no 'model plan' that will serve every community effectively". This can also be discerned when studying organisations' preparedness planning processes. Quarantelli (1993, p. 29) for example found, when studying preparedness planning at a local level, that:

heterogeneity still exists; there is still considerable variations in structure and function .... - we told FEMA this is for the good, not for the bad. The variability may create problems in terms of national policy and planning. However, the fact is that at the local community level, the reason you have variations is because the variation reflects local conditions and circumstances. If you were to impose an artificial structure and function in a locality, then it would no longer be rooted in the local community and would not really be very effective.

Organisations are different and they are vulnerable to different hazards. There is thus always a need to adapt the preparedness planning process to the organisation's specific conditions and context (Tierney et al., 2001).

Before leaving the discussion of preparedness planning I will also bring up the concept of *planning*. Planning is used in the literature both as the specific process that leads to the creation of a plan and as synonymous with the preparedness process. In this thesis the terms *preparedness planning*, *preparedness process*, *preparedness planning process* and *planning* will be used as synonyms describing the process that aims to enhance an organisation's ability to respond to crises.

In addition, there is an important distinction between preparedness planning and the *plan*. Planning is the continuous process of learning rather than the product. The plan is instead the product and can be seen as a "snapshot of that process at a specific point of time" (Perry & Lindell, 2003, p. 338). Like the planning process, the plan must be developed with the planning (Perry & Lindell, 2007). Creation of the plan is one of several activities that might be a part of the preparedness planning process.

Another related concept is *crisis management* (or similarly *emergency management* and *disaster management*) that can be used to describe the overall process of managing crisis before, during and after the event. The crisis management process or cycle is often described as consisting of different phases or periods. A frequently used model of this is the comprehensive emergency management (CEM). According to CEM an emergency consists of four phases: mitigation, preparedness, response and recovery (Godschalk, 1991). The approach to perceive crisis management as consisting of different phases or periods is widely used within the area, but at the same time questioned (see, e.g. Eriksson, 2008; Kelly, 1999; Neal, 1997). Reasons behind the questioning are for example that different individuals, groups and organisations may experience the phases at different times, as well as that the phases overlap and blend into each other (Neal, 1997). For example, it is not always possible to know if an effort is made to mitigate or to prepare for a crisis. In fact an effort is commonly made for both reasons. Neal (1997, p. 260) questions the usefulness of the phases and claims that there is a need to develop "a more systematic, scientific approach to describe disaster phases (assuming we find that they actually exist)". The focus on the present thesis is on the preparedness phase, bearing in mind the difficulties pointed out above.

## Chapter 4

# Research Process

*In this chapter the research process for this thesis will be discussed. In the first part, short descriptions of the research approaches that have been used will be presented and discussed. In the second part, the selected approaches in relation to the different research questions and papers will be treated.*

### 4.1 Research Approaches

The overall research aim of this thesis was to study how local authorities should shape preparedness planning processes in order to enhance their ability to respond to crises. The thesis consists of both studies that are mainly empirical and studies that are mainly based on theoretical discussions and argumentations.

In this thesis, literature studies were used for two different purposes. The first was as an overall background study and a way to become familiar with the research area. The second purpose was to use the result from the literature studies as an input for identifying themes for analysing empirical data. For example, in the research presented in Paper IV both a comprehensive literature study and an analysis of the selected references were carried out as one main part of the study.

This thesis consists of three empirical studies (Papers I, II and IV) where empirical data have been collected in different settings. The research presented in Paper I is based on a study of one specific situation (an emergency) in one municipality, while the other two empirical studies (Papers II and IV) are studies of a specific phenomenon (an preparedness planning process) in several municipalities. Empirical studies aim at examining and analysing different circumstances in society by collecting different kinds of empirical data (Grønmo, 2006). The type of empirical study used in this thesis was inspired by case study methodology (see e.g. George & Bennett, 2005; Yin, 2003).

### **4.1.1 Selection of cases**

In this thesis the unit of analysis was the municipal organisation managing a crisis or working with preparedness planning. The cases have been selected based on what was seen as purposeful for the different studies. They were either chosen to be unique cases, such as the study of the emergency situation presented in Paper I, or more typical cases of municipal preparedness planning processes such as the research presented in Papers II and IV. In addition, the cases were chosen because they were information rich, could be studied in depth, the municipalities and the informants were interested in participating, and the municipalities were easily accessible for the researcher. The choice to use a purposeful selection distinguishes these studies from more quantitative studies where random sampling is used. In purposeful selection the logic is that the strategy for sampling should serve the purpose of the study (Patton, 2007).

Within the empirical studies, different numbers of cases, from one up to seven, have been used. There are no absolute rules governing the perfect sample size. Instead there is always a trade-off between breadth and depth (Patton, 2002). This means that in the studies where several cases have been considered, this was done at the expense of depth.

### **4.1.2 Collection of empirical data**

In this thesis interviews as well as documents have been used as sources of empirical data. Other examples of sources of data are direct observations, participant observations and physical artefacts (Yin, 2003). There are different reasons for the choice of using interviews and documentations. For the storm Gudrun (Paper I) I had no contact with the municipality prior to the emergency, and could meet with actors from the studied municipality only five months after the event. It was thus not possible to observe the actual response. Consequently, interviews and documentations became my two main data sources. In the studies of preparedness planning (Papers II and IV) interviews were also used as the main source of data. The reason for using interviews was that I wanted to capture the municipalities' overall preparedness planning processes and not merely, for example, separate exercises. In addition, I also collected preparedness planning documents. Other possibilities for collecting empirical data about preparedness planning, for example to observe or participate in different preparedness activities, were not seen as applicable for reaching the goal of the studies since they would not give a description of the overall process.

The interviews in this thesis were primarily semi-structured (see, e.g. Ayres, 2008a; Brinkmann, 2008). The reason for using semi-structured interviews was that I did not want to steer the interviewees too much; instead I wanted their

words without too much interference. Thus in advance I came up with open-ended questions for the interviews around the area that I was interested in. The use of semi-structured interviews made it possible to further discuss interesting sidetracks if they arose during the interviews. During the interviews only one interviewee was present at a time except for one occasion on which two interviewees were present simultaneously. The interviews lasted for about one hour. All my interviews were taped and transcribed. In the study presented in Paper II, unstructured interviews were also used in the part of the study done by the other author.

The other source of empirical data, written documentation, was gathered in connection with the interview occasions, from the studied organisations' home pages and also from different newspapers. Examples of documents that were gathered were diary notes entered during a crisis response, evaluations of crisis responses and preparation materials (i.e. crisis plans as well as risk and vulnerability analyses).

#### **4.1.3 Analysis of empirical data**

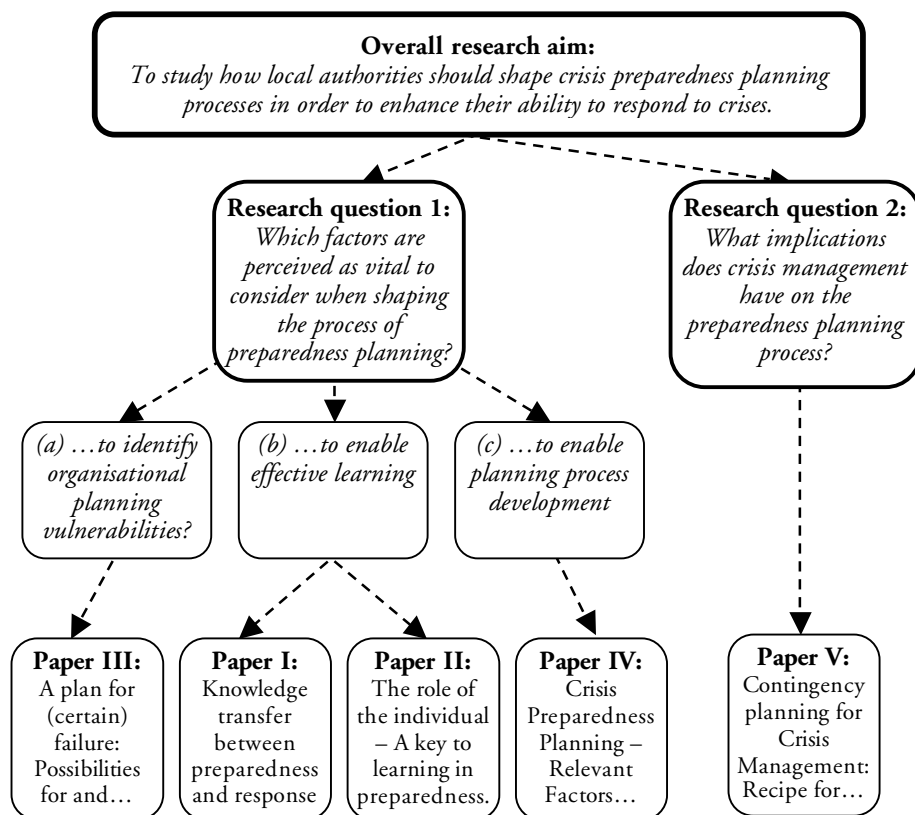
In the research presented in Paper IV, content analysis was used to analyse research literature. Content analysis is here defined in a broad sense as “any qualitative analysis reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meaning” (Patton, 2002, p. 453). The research literature was analysed to create themes or patterns of preparedness planning to use in a subsequent thematic analysis. Content analysis was also used to analyse the results in Papers I and II when addressing research question 1b.

In Papers I and II, the collected data (in the form of documents and transcribed interviews) were analysed and categorised based on predefined themes resulting from reviews of research literature. In Paper IV the collected data were analysed and categorised based on predefined themes based on a content analysis of research literature, that is a thematic analysis (see e.g., Ayres, 2008b; Patton, 2002). A thematic analysis is here seen in a broad sense as an analysing strategy where the data are segmented, categorised, summarised and reconstructed in a way that captures the most important themes in the empirical material (Ayres, 2008b).



## 4.2 Approaches in Relation to the Research Questions

This thesis is based on one overall research aim and two research questions. In Figure 4:1 these are presented together with the different papers.



**Figure 4:1** Overview of the research aim, questions and papers.

### 4.2.1 Research question 1

Research question 1 has been studied by two different research approaches. The research presented in Papers I, II and IV was mainly based on empirical studies. The research presented in Paper III was instead based on a theoretical discussion and argumentation around plans and planning.

#### Paper I

Paper I presents an empirical study of an emergency response case. A main reason for performing this study was that the studied emergency case (the storm named Gudrun) occurred and provided a good opportunity to study emergency

management in practice. The case selected was the municipality most affected by the storm. The municipality had also initiated their work with preparedness planning before the storm, which was seen as useful for the study since it offered a possibility to examine response in relation to preparedness planning.

Data were gathered by interviews and from documents, such as the municipal risk and vulnerability analysis and documentation about the emergency case. The interviews were all semi-structured and conducted with individuals chiefly involved in preparedness planning or in the response to the emergency studied. The initial selection of interviewees was based on a dialogue with the individual responsible for coordinating the response to the storm in the municipality. From these first interviews, additional actors were identified as important and were also interviewed, resulting in a total of eight interviews. All the informants were individuals with a manager's role in the municipal organisation or other authorities involved in the response. Questions were asked about the interviewees' experience of the specific response as well as their experience (or, in some cases, lack of experience) with the municipality's preparedness planning, and of earlier emergencies. The interviews were all recorded and later transcribed.

The data were analysed on the basis of pre-defined themes (in this study expressed as analysis questions) emerging from a literature review. The first theme was preparedness planning and its use during the emergency. The second theme was the demands that the acute emergency situation had on preparedness planning.

## Paper II

Paper II presents an empirical study of six Swedish municipalities' work with preparedness planning. One reason behind this study was to broaden my understanding of factors that could affect learning by studying more municipalities than was done in the study presented in Paper I.

The study was based on interviews with twelve municipal employees in the six Swedish municipalities. The interviewees were primarily preparedness planners responsible for the preparedness work in the municipalities, but included some administrative managers not involved in preparedness planning. The interviews were conducted during two earlier studies of preparedness planning in Swedish municipalities carried out by the authors individually. Thus the decision of whom to interview and what type of questions to ask was based on the aims of the previous studies. But even so, the collected data were seen as beneficial also for the analysis done in this study. This was because the interviews partly deal with the main focuses in this study, that is how the work with preparedness planning was

organised in the municipalities and how the individual preparedness planners worked with this issue.

The interviews were analysed on the basis of themes emerging from two learning theories (see Senge, 1990, 2006; Wenger, 1998). From Senge's (1990, 2006) theory of *learning organisations*, we use the approach that the leader should simultaneously be a *designer*, a *teacher* and a *steward*. From Wenger's (1998) theory of *communities of practices* we borrowed the concept of *brokering*, that is the task of introducing elements from one community to another and thus bring about learning. The analyses were aimed at determining whether the individuals responsible for preparedness planning were reasoning and acting in ways that are seen as beneficial for creating learning in their organisations.

### Paper III

Paper III presents a theoretical discussion and argumentation around emergency management plans. One basis for the paper was a literature study within the area of emergency management and preparedness planning. In the paper we maintain that it should be possible to create plans that are more "realistic" than those used today.

### Paper IV

Paper IV presents an empirical study based on interviews with preparedness planners in seven Swedish municipalities. The study aims to go a step further from studying municipalities and how they today work with preparedness planning to actually discussing how to move forward and study how preparedness planning should be shaped in an organisation. Another reason behind the choice of study was that even if the research literature is filled with lists of recommendations and principles on how best to prepare, there is not so much about the extent to which these recommendations are known or agreed on by preparedness planners (Tierney et al., 2001).

An empirical study focusing on preparedness planning was performed. The aim of the study was to study factors that should be included when shaping preparedness planning in a local authority. This was done by studying what preparedness planners perceived relevant in relation to the current state of research within the area of preparedness planning with the purpose of identifying how the preparedness planners interpret and express the factors.

The study consisted of two parts. The first part was a literature review. Research literature within the area of crises preparedness planning was analysed with content analysis. This resulted in a synthesis of factors (different themes) that were claimed by researchers to be important to consider when preparing for

crises. The factors were organised in a table with four overall areas: *Prerequisites for preparedness planning*; *Who should be involved?*; *What is to be learnt?* as well as *How should the work be structured?*

The second part was an empirical study of the seven Swedish municipalities. These were selected to capture the phenomenon *preparedness planning* in municipalities of different sizes and with preparedness planners with different backgrounds, educations, experiences and genders. Interviews were conducted with six preparedness planners coordinating the crisis preparedness planning in the seven municipalities. The informants in all municipalities were responsible for coordinating the preparedness planning in the municipality, that is preparedness planners. An interview guide was made based on the synthesis of factors created from the research literature. The interviews were all recorded and transcribed. The transcribed material and other collected documents of the municipalities' preparedness planning were analysed on the basis of the themes identified in the analysis of the research literature, that is a thematic analysis. This resulted in an updated version of the synthesis of factors regarded as vital to consider when shaping a preparedness planning process.

#### **4.2.2 Research question 2**

To get insights into the second research question I have chosen to use theoretical discussions and argumentation.

##### **Paper V**

Paper V presents a theoretical discussion and argumentation around contingency planning (in this text termed preparedness planning). There is often assumed to be a positive connection between contingency planning and successful crisis management outcome, but explicit discussions around this are rare. In addition, any implications crisis management has on contingency planning are hard to find.

### 4.3 Summary of Research Approaches

For a summary of the different research approaches in relation to the different papers, see Table 4:1. The table also present the methods used in the empirical studies for collecting and analysing data.

**Table 4:1** Summary of the research approaches used as well as the methods used in the empirical studies for collecting and analysing data.

Research question	Paper	Aim	Research approach	
			Methods for collecting data	Methods for analysing data
1b	I	To study the transfer of knowledge between preparedness planning done beforehand and emergency response at the municipal level.	Empirical study	
			Interviews Documents	Data analysed based on pre-different themes.
1b	II	Determine whether individuals responsible for preparedness planning reason and act in ways that promote learning about crisis and preparedness issues.	Empirical study	
			Interviews	Data analysed based on pre-different themes.
1a	III	Demonstrate the need for discussing and disclosing organisational vulnerabilities impacting on response, and to suggest how to develop plans that reflect those vulnerabilities.	Theoretical discussions and argumentations	
1c	IV	Study factors that should be included when shaping preparedness planning in a local authority.	Empirical study	
			Interviews Municipal documents	Content analysis of research literature and thematic analysis of data.
2	V	To achieve a broader and deeper understanding of planning.	Theoretical discussions and argumentations	

## Chapter 5

# Research Contributions

*In this chapter the research contributions of this thesis will be presented. First the appended papers will be summarised and their main results will be presented. Then the two research questions as well as the overall research aim will be addressed.*

### 5.1 Summary of Appended Papers

In this chapter the papers that are appended to this thesis are summarised and their main results are highlighted.

#### 5.1.1 Paper I

Eriksson, Kerstin (2009). Knowledge transfer between preparedness and emergency response: A case study. *Disaster Prevention and Management: An International Journal*, 18(2), 162-169.

##### Summary

An empirical study of a major Swedish emergency, a storm called Gudrun, was carried out by studying the response to it by a Swedish municipality. The aim was to study the transfer of knowledge between preparedness planning done beforehand and emergency response at the municipal level. The study indicates that preparedness planning performed before Gudrun was not used in the emergency response. One reason for this seems to have been that there was a problem in the knowledge transfer between the individuals working with preparedness and the individuals responding. In addition, the preparedness planning undertaken was not applicable to the specific emergency situation that arose. Instead of using the preparedness planning (referring to the explicit work done in the municipal preparedness group) the responding organisations used similar management patterns that they used in a previous emergency (flooding) that happened half a year before.

### Main results

The study illustrates two difficulties when developing and implementing preparedness planning in an organisation. The first difficulty is how to create a preparedness process that permeates the whole municipality. The study demonstrates that it was not enough to merely identify and measure risks and vulnerabilities in a separate preparedness group. The proposal in the paper was to complement the work done by the group with a preparedness process that supports transfer of knowledge throughout the organisation. The second difficulty was to create knowledge that is useful when responding to an emergency. The interesting aspect is whether there is any knowledge that is generic and thus probably can be used in a variety of emergencies. The paper presents needs, such as dissemination of information, which the municipality had to manage in both the flood that occurred in 2004 and the storm Gudrun in 2005.

### 5.1.2 Paper II

Nilsson, Jerry, & Eriksson, Kerstin (2008). The role of the individual – A key to learning in preparedness organisations. *Journal of Contingencies and Crisis Management*, 16(3), 135-142.

### Summary

Preparedness planners' role in creating learning in their municipalities while working with crises preparedness planning was studied. The aim was to determine whether individual municipal employees, who had the responsibility for preparedness planning, reasoned and acted in ways that promoted learning about crises and preparedness issues throughout the municipal organisation. Creating preparedness in an organisation is not easy, and preparedness planners have a difficult task as the coordinators and promoters of preparedness planning. Some of the interviewed preparedness planners discuss the leadership qualities that were needed to manage the work. For example, when designing the preparedness organisation it was seen as vital to establish social networks and include key individuals. In addition, they stress the need for creating an environment of trust that also feels meaningful to work in. The preparedness planners' description of their work was much in line with Senge's (2006) descriptions of the leader of a learning organisation. In some other municipalities the preparedness planners seem less successful in their roles as leaders. Several of the key individuals (sometimes including the preparedness planners themselves) involved in the preparedness planning apparently have not taken on the role as leaders (see Senge, 2006). In addition, they did not seem to have taken on the responsibility to act as brokers (see Wenger, 1998) and transfer knowledge

throughout the organisation. This resulted in the preparedness planning becoming a demarcated activity known by only a handful of individuals.

### Main results

The study demonstrates the difficult role preparedness planners and other key individuals have when shaping preparedness planning processes in an organisation. Some of the interviewees emphasise the importance of assuming the role as leader for preparedness planning. One can compare their discussions about such leaders' tasks with the roles that Senge (2006) claims the leader for a learning organisation should have. Other interviewees mention that they have tried to design the preparedness planning to promote interactions, but when studying these municipalities in more depth they seem to have failed. Comparing with Senge's (2006) discussions about the roles of the leader, the interviewees did not seem to perceive themselves as simultaneously designers, teachers and stewards. Nor did they act as brokers that actively transfer the work throughout the organisation (see Wenger, 1998).

#### 5.1.3 Paper III

Brown, Christer, & Eriksson, Kerstin (2008). A plan for (certain) failure: Possibilities for and challenges of more realistic emergency plans. *International Journal of Emergency Management*, 5(3/4), 292–310.

#### Summary

It is not unusual for organisations to deviate from their preparedness plans when responding to emergencies. This may be due to the fact that plans are not always crafted so as to effectively deal with unknown future emergencies. Those plans may become “fantasy documents” that describe an imagined organisational capacity (Clarke, 1999). The aim behind the paper was to demonstrate the need for discussing and disclosing organisational vulnerabilities impacting on response, and to suggest how to develop plans that reflect those vulnerabilities. In the paper we discuss how plans can be adapted to better suit the dynamic emergency situation by providing a systematic presentation of different measures that should be taken into account when developing “realistic” plans. One main argument was that there is a need to not only analyse external threats and risks in preparedness planning, but also to consider internal vulnerabilities. However, the measures aimed at improving overall organisational preparedness are not without their own inherent obstacles. For example they are costly, and in addition it is hard for the leaders to be open about the organisation's vulnerabilities. Still we claim that it should be possible to create a culture where plans are allowed to “fail gracefully” without surprising the users and the society.



### Main results

The main result was the discussion concerning what realistic plans can be. A main step in developing such a plan was argued to be that the organisation becomes more self-aware and considers its own vulnerabilities. A better understanding of the vulnerabilities helps the organisation to better describe its embedded capabilities. Yet this will be challenging due to political, bureaucratic and/or organisational cultural realities. For example it will be hard for political leaders, as well as preparedness planners, to admit their own vulnerabilities and even more to be open about them.

#### **5.1.4 Paper IV**

Eriksson, Kerstin (forthcoming). Crisis preparedness planning – Relevant factors when shaping the process. Under review in an international scientific journal.

### Summary

The aim was to study factors that should be included when shaping preparedness planning in a local authority. This was done by studying what preparedness planners perceived relevant in relation to the current state of research within the area of preparedness planning, to identify how they express the factors. As a first step a synthesis of the factors within the research literature perceived as important when working with preparedness planning was presented and discussed. The factors were divided into four areas: Prerequisites for preparedness planning; Who should be involved?; What is to be learnt? as well as How should the work be structured? In the next step, interviews were conducted with six Swedish municipal preparedness planners, examining the factors of preparedness from the synthesis. The study results in an updated synthesis of factors of preparedness planning and also a discussion around how the preparedness planners express the different factors.

### Main results

The main result of this study was a synthesis of factors purported to be important when working with preparedness planning processes in an organisation. These factors were based on both researchers' and preparedness planners' view of preparedness planning. The factors were divided into four areas: Prerequisites for preparedness planning; Who should be involved in the preparedness work?; What is to be learnt from the preparedness work? as well as How should the work be structured? One main argument in the study was that to create a prepared organisation it would be beneficial to work with a broad range of factors and thus capture all of the areas discussed.

### 5.1.5 Paper V

Eriksson, Kerstin, & McConnell, Allan (forthcoming). Contingency planning for crisis management: Recipe for success or political fantasy? Under review in an international scientific journal.

#### Summary

It is usually assumed that contingency planning (i.e. preparedness planning) contributes to successful crisis management outcome. Still, this claim is seldom examined or questioned. The aim of the paper was to achieve broader and deeper understanding of crisis planning. To do this, an initial step deemed as important was to consider that planning might have several aims, and even if it fails to produce a successful response it might have been successful in the pre-crisis stage, for example as a rhetorical instrument that reduces uncertainty in society. For the discussion we separate successful pre-crisis contingency planning from successful crisis management. In the paper we also discuss possible influences on crisis management outcome other than planning, for example the nature of crises, leadership and other actors involved. Finally we examine some analytical and policy implications for contingency planning. These are: contingency planning still has an essential role for public authorities; “sticking to the plan” is not a guarantor of successful crisis management; contingency planning processes are just as important as contingency plans/programmes; being cautious about viewing pre-crisis planning with post-crisis hindsight; contingency planning has political rationality and contingency planning can mask internal contradictions.

#### Main results

The main results are some implications for planning related to crisis management. Planning might have different aims and can, for example, be developed with the aim of convincing the public and the government that one is in control and is prepared. In addition, apart from planning, several other factors that possibly influence the crisis management outcome were mentioned. That also other factors might have an impact makes it hard to discern how planning influences crisis management. These realities help to elicit some implications for what we should expect of planning.

## 5.2 Summary of Results of Appended Papers

A summary of the main results from the papers is presented in Table 5:1.

**Table 5:1** Summary of the aims and the main results within the different papers.

Research question	Papers	Aim	Main results
1b	I	To study the transfer of knowledge between preparedness planning done beforehand and emergency response at the municipal level.	Identification of two difficulties when developing and implementing preparedness planning: creating a preparedness process that permeates the whole municipality and creating generic knowledge that is useful in a variety of emergencies.
1b	II	Determine whether individuals responsible for preparedness planning reason and act in ways that promote learning about crisis and preparedness issues.	Demonstration of the difficult role for key individuals to act in ways that are seen as beneficial for establishing learning in an organisation.
1a	III	Demonstrate the need for discussing and disclosing organisational vulnerabilities impacting on response, and to suggest how to develop plans that reflect those vulnerabilities.	Discuss the advantages of developing “realistic” plan documents that are frank about the organisation’s internal vulnerabilities.
1c	IV	Study factors that should be included when shaping preparedness planning in a local authority.	A synthesis of factors purported as important to consider when shaping a preparedness planning process in a municipality.
2	V	To achieve a broader and deeper understanding of planning.	Implications for planning due to crisis management.

## 5.3 Addressing the Research Questions

In this chapter the two specific research questions of the thesis will be addressed.

### 5.3.1 Research question 1

Research question 1 consists of an overall question that was studied from three different perspectives (a-c). I will first discuss each of these perspectives individually and then the overall research question. The question follows:

*Which factors are, by preparedness planners and researchers, perceived as vital to consider when shaping the process of preparedness planning:*

- a. ...to identify organisational preparedness planning vulnerabilities?*
- b. ...to enable effective learning?*
- c. ...to enable planning process development?*

#### Research question 1a

Plan underutilisation or deviation is a likely if not inevitable element of crisis response (Paper III). It has for example been claimed that improvisation will always be an element in the managing of a disaster since the situation is dynamic (Tierney, 2002; Webb & Chevreau, 2006). This argument should not to be seen as a statement that plans and planning are unnecessary; instead it is a motive to further study how planning can be adapted to better suit dynamic crises.

There is a wide range of factors with the potential to influence an organisation's ability to utilise the current plans and planning. Such factors need to be considered in creating an improved approach for preparedness planning that better describes the organisation's embedded abilities (in Paper III called realistic plans). The factors that can be used to indicate possible vulnerabilities in the planning are results of not only external but also internal threats and vulnerabilities. The factors identified in the research literature and presented in Paper III separated into *during the pre-event phase* and *during the crisis phase* are the following:

During the pre-event phase:

- Weak, ill-positioned and/or poorly funded organisational planning functions (e.g. low status or isolated from sources of power). Sometimes with limited dissemination capabilities (e.g. not enough training, exercises and seminars).
- Inadequate plan-specific training, funding and/or organisational buy-in.

- Inaccurate or undeveloped organisational threat identification and vulnerability assessments.
- Information management challenges (for example suboptimal staffing and education) for the task of collecting and analysing data to predict the impacts of different threats (e.g. with risk analyses and GIS tools).
- The design of the plan is not focused on practical usability (for instance, the plan is too long and does not have a suitable level of abstraction).

During the crisis phase:

- Divergent organisational perspectives on a crisis's nature and/or implications.
- Not prepared for multi-agency response (e.g. to cooperate with organisations with divergent perspectives and with emergent groups but also how to manage outsourced critical functions).
- Not prepared for a possible information, communication and technology collapse (e.g. for how to communicate within and between the responding organisations without telephones or Internet).
- Decision makers and others are not used to operate under highly unfamiliar and stressful conditions (e.g. long working hours, fatigue, overwhelming flow of information and media).

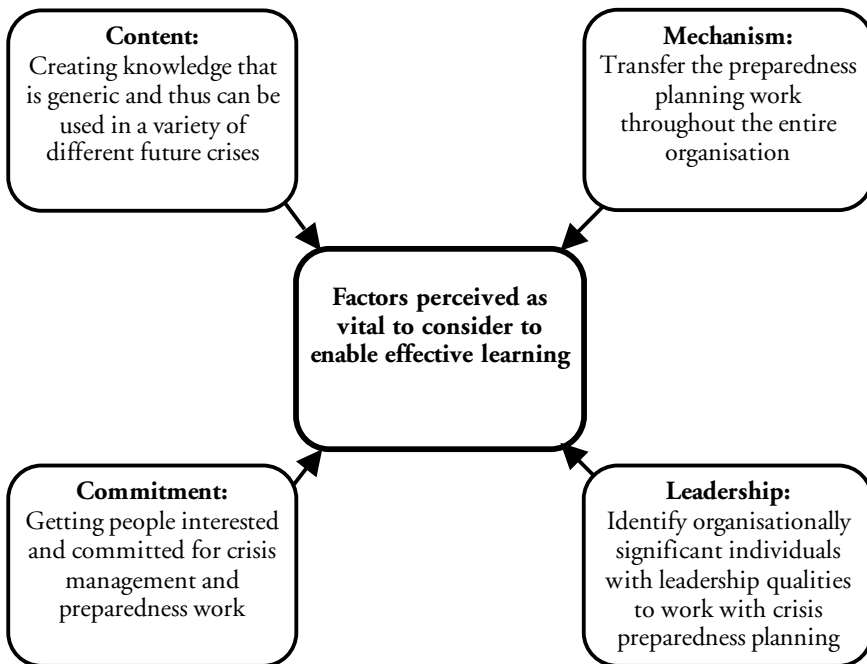
Identification of any of the described factors in an organisation's preparedness planning might be a result of internal vulnerabilities in the organisation. In Paper III we argue for the need to acknowledge one's own vulnerabilities and accept that one might not be able to manage everything. A better understanding of one's own vulnerabilities will facilitate the creation of realistic plans, that is plans that describe the organisation's embedded abilities. Maybe also planning that goes so far as to predict the possibility of one's own failure. The question is just how to incorporate this type of planning in an organisation. The list of factors presented can be used as indicators when identifying the organisation's weaknesses. There is also a need to go a step further and to create plans and planning processes that better reflect one's own weaknesses and vulnerabilities. To do this, some proposals are to focus on training, exercise, funding and buy-in. It is also vital to change the culture so that organisations feel comfortable in revealing their vulnerabilities. However, this is problematic due to political, bureaucratic and/or organisational cultural realities. Leaders as well as planners seldom feel comfortable about admitting their organisation's vulnerabilities. In addition, some organisations that are responsible for critical functions might be unable to actually reveal such information without increasing their own risks.

Summing up, a list of different factors indicating vulnerabilities within the organisation's preparedness planning has been presented. To acknowledge the organisation's internal vulnerabilities is a step in improving plans and planning processes. Apart from acknowledging them, there is also a need to share them widely within society.

#### Research question 1b

Learning is about acquiring knowledge of something or the ability to do something. When it comes to preparedness planning it is the abilities to manage crises that are strived for. Thus the aim of preparedness planning is seen as enhancing an organisation's ability to respond to crises.

When analysing the research presented in Papers I and II, four factors were identified that were perceived as vital to enable effective learning. The factors identified were labelled: *mechanism*, *leadership*, *commitment* and *content* (see Figure 5:1).



**Figure 5:1** Factors that were perceived as vital to consider to enable effective learning in the local authority.

The first factor, labelled mechanism, was about the importance of transferring the preparedness work throughout the organisation. The key word, *transfer*, is a pedagogical concept used to describe how principles or rules that an individual gains from one experience can be used during another (Reber, 1995). Since the focus in this thesis is on organisations, transfer is here discussed at the organisational level, meaning “the process through which one unit (e.g., group, department, or division) is affected by experience of another” (Argote & Ingram, 2000, p. 151). Transfer at the organisational level involves both transfer on an individual level and between different individuals or organisations.

As discussed in Papers I and II, there were no planned processes in the municipalities studied for transferring the results of preparedness planning throughout the organisation. Transferring knowledge throughout an organisation is a complex task that is difficult to accomplish (Argote, Ingram, Levine, & Moreland, 2000). It is not enough merely to write a preparedness plan. Nor is it sufficient that the work only improves the competence of the small group of individuals involved, for example, in the work of risk and vulnerability analyses or writing plans. Unfortunately, this seems to be the case in several of the municipalities studied (Papers I and II). What is needed is a process for transferring the result throughout the organisation consisting of different activities such as exercises and seminars. Auf der Heide (1989) even claims that planning should be done by the users. One problem here is that when it comes to preparedness planning, there are numerous possible users and it is hard to manage a process with too many individuals involved. To involve all individuals identified as possible users there is a need to have several activities within the process so that not everybody needs to participate each time. The importance of transferring the result is also connected to the well-known fact that the most important part of preparedness planning is the *process* and not the *plan*. It is thus not the result that is transferred, since there is no result in that sense. Rather, all activities create knowledge, and this hopefully creates an ability in the organisation to manage future crises.

The process of learning between groups has also been discussed by Wenger (1998), who claims that learning takes place within communities of practise, and that sharing knowledge between different communities requires brokers, that is individuals who cause learning by introducing elements from one community into another. This points to the importance of involving people in the preparedness planning groups who are willing to act as brokers and actually transfer knowledge between the core group involved in preparedness planning and the different municipal administrations. In the studied municipalities this

was not always the case, and several of the individuals involved in the preparedness work did not see this as their task (Paper II).

The second factor, labelled leadership, deals with the importance of identifying organisationally significant individuals to work with preparedness planning. In Paper II we affirm that it is vital to involve key individuals already during the preparedness planning. These individuals should have operational experience and decision authority. It is also vital that these individuals act as brokers (see Wenger, 1998) between the core group involved in preparedness planning and the different administrations in the organisation. One of the tasks of a leader is to be a *designer* (Senge, 2006). In line with the task of a designer, the interviewed preparedness planners discussed the importance of establishing social networks and involving key individuals in the work to make sure that the vision and values of preparedness planning become shared in the organisation. Another vital task for the leader is to be a *steward* (Senge, 2006). In line with this the preparedness planners also work with creating an environment that they believe is beneficial for developing commitment to the work and the vision within the municipality.

The third factor, labelled commitment, deals with the importance of making people interested and committed to crisis management and preparedness work. Preparedness planners have difficulties inspiring others in the organisation to be interested, committed and dedicated to preparedness issues, including top-level management (Paper II). Perry and Lindell (2007) state that it may even be necessary to overcome resistance to preparedness planning. In the organisations studied, the preparedness planners try to create an environment where commitment is prioritised and where there is a genuine sense of trustworthiness and meaningfulness (Paper II). According to Senge (2006), one task of the leader is to be a designer. The preparedness planners studied seem to work a lot with designing preparedness planning. They are involved in such matters as creating the governing idea and building a shared vision. In addition, they seem to work a lot with involving people and assuring their commitment.

The fourth factor, labelled content, deals with the importance of creating knowledge that is generic and thus can be used in a variety of different crises. In Paper I I propose that preparedness planning should not be too narrowly focused. For example, when identifying risks and vulnerabilities, they need to be applicable to a broad range of possible crises. It is argued that even if crises vary, for example when it comes to physical characteristics and scenarios, the challenges for the organisations managing it are not so unique (Brändström, Bynander, & 't Hart, 2004). The response to a particular crisis often has similarities to responses to other crises. Quarantelli (1997b) discusses this by separating



between two types of needs or problems that the responding organisation has to manage. These are called agent-generated and response-generated needs. Agent-generated needs are those created by the crisis itself; that is they are created by the disaster agent (for example a storm or a flood). Response-generated needs are instead created by the response to the crisis and are much more general than the agent-generated ones. It is therefore claimed that when preparing for future crises one should focus on planning for response-generated needs (e.g. Dynes, 1994; Quarantelli, 1997b).

Summing up, when it comes to enabling learning in an organisation, an analysis of the results presented in Papers I and II has identified four essential factors to consider. These are labelled mechanism, leadership, commitment and content.

### Research question 1c

While working on this thesis I have addressed research question 1c by using an empirical study presented in Paper IV. The study examines what preparedness planners perceived relevant in relation to the current state of research within the area to identify how the preparedness planners interpret and express the factors. The result of the study was a synthesis of factors that were regarded as important to consider when shaping a preparedness process in a local authority. The resulting synthesis was created in two steps. In the first step, themes of preparedness planning were developed on the basis of a content analysis of research literature. In the second step, preparedness planners' ideas about how to shape preparedness planning were analysed on the basis of the pre-identified themes.

The synthesis does not aim to be a detailed model of how an organisation ought to do their work, but instead a synthesis of factors that were perceived as important to consider when shaping one's own preparedness planning process. The factors were structured into four areas: *Prerequisites for preparedness planning*; *Who should be involved?*; *What is to be learnt?* as well as *How should the work be structured?* (see Table 5:2). For a more detailed description of the synthesis and discussions around it, see Paper IV.

**Table 5:2** A synthesis of factors pertaining to preparedness planning organised into four areas identified in the research literature. The synthesis is based on both analysis of research literature and interviews with preparedness planners (see Paper IV).

<b>Prerequisites for preparedness planning</b>	<b>Who should be involved?</b>	<b>What is to be learnt?</b>	<b>How should the work be structured?</b>
<ul style="list-style-type: none"> <li>• <b>Legislation and jurisdictions</b></li> <li>• <b>Aim of preparedness planning</b></li> <li>• <b>Level of ambition</b></li> <li>• <b>Acceptance for the work</b> <ul style="list-style-type: none"> <li>• Interest</li> <li>• Commitment</li> <li>• Awareness</li> </ul> </li> <li>• <b>Adequate resources</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>The preparedness planner</b></li> <li>• <b>Intra-organisational cooperation</b> <ul style="list-style-type: none"> <li>• The top-level managers and politicians</li> <li>• Communication</li> <li>• Administrations responsible for vulnerable community members</li> <li>• Administrations with key functions</li> </ul> </li> <li>• <b>Coordination with external actors</b> <ul style="list-style-type: none"> <li>• The public</li> <li>• Authorities</li> <li>• Private companies</li> <li>• Interest associations and organisations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>General principles vs. Specific details</b></li> <li>• <b>Generic disaster tasks</b></li> <li>• <b>All-hazard approach and/or Single-hazard approach</b></li> <li>• <b>The phases of the “disaster cycle”</b></li> <li>• <b>Accurate knowledge of risks and human behaviour</b></li> <li>• <b>Worst case and/or Likely scenarios</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>A continuing process</b></li> <li>• <b>Everyday vs. Crisis</b></li> <li>• <b>Minor emergency vs. Disaster</b></li> <li>• <b>Intra-organisational and Inter-organisational learning</b></li> <li>• <b>Activities and/or Part processes</b> <ul style="list-style-type: none"> <li>• Exercises, risk and vulnerability analyses</li> <li>• Seminars, meetings and networking</li> <li>• Recruitment</li> <li>• Revision</li> <li>• Research</li> </ul> </li> </ul>

Municipalities are vulnerable to different hazards and there are different conditions that influence their work. Conditions that have been identified as essential throughout the work with this thesis were the size of the municipality, earlier experience of crises and the general management of the municipality. It was thus not unexpected that the municipalities studied in this thesis shape their working processes in different ways.

The analysis presented in Paper IV did not identify one single factor that was the one to focus on. Instead of only choosing one or two of the factors when working

with preparedness planning, the work seems to be benefited if the organisation works with a broad range of different factors. Preparedness planning is about creating an entirety, which in the presented synthesis assumes that the process should be shaped on the basis of the “answers” to the three questions: Who should be involved?; What should these individuals learn? and How should the process be structured? In addition, I have also identified a couple of prerequisites that need to be managed. The need to work with all of the discussed factors is also in line with what the interviewed preparedness planners claimed. Even so, there were two factors that the preparedness planners and the research literature seem to focus on. These were intra-organisational cooperation (e.g. Quarantelli, 1998a; Tierney et al., 2001) and creating a continuing process (e.g. Alexander, 2005; Auf der Heide, 1989; Drabek, 1985; Kreps, 1991; Perry & Lindell, 2003). Especially working with different actors seems to be an activity that the preparedness planners spend most of their time doing (Paper IV).

Furthermore, the preparedness planners had different opinions of what was most central for preparedness planning. They started the description of their work in different ways. In connection to this, some of them had a clear opinion of what the overall issue was. For example one of the preparedness planners regarded safety in everyday work as the central issue. Another mentioned that one foundation for the work was to get people interested and committed.

Summing up, I have identified several factors that were emphasised as particularly important by researchers and practitioners. As mentioned, shaping a preparedness planning process is about capturing the broad range of factors and thus focusing on all of the areas of the synthesis of factors for preparedness planning. In brief there is a need to consider who should learn what, and how. In addition, the factors are not mutually exclusive; working with one also results in working with one or several of the others. For example when conducting an exercise one might also address the aspect of intra-organisational cooperation.

### Summing up research question 1

In research question 1, factors that were perceived as vital to consider when shaping the process of preparedness planning were studied. This was done from three different perspectives. The factors studied from the different perspectives were related, but not always expressed in the same way.

Comparing the factors identified in research questions 1b and 1c, both of which were inspired by learning, displays several similarities. The four factors discussed in research question 1b (mechanism, leadership, commitment and content, see Figure 5:1) can all be found in the synthesis of factors for preparedness planning (see Table 5:2). The factor labelled mechanism (concerning the importance of

transferring the work throughout the organisation) was closely related to intra-organisational learning, which was one of the factors within the area How should the work be structured? in the synthesis. The factor labelled leadership was closely related to a couple of the different factors under the heading Who should be involved? The factor labelled commitment can be found as a factor within the area Prerequisites for preparedness planning. The factor labelled content was closely related to some of the factors within the area What is to be learnt?

Comparing the factors identified in research questions 1a and 1c was much more difficult. The factors presented in 1a indicate different possible vulnerabilities in the planning, and the factors in 1c indicate what was seen as vital to consider in the planning. Still, they were not each other's opposites. Most of the factors can be seen as overlapping, but in both lists one can find factors that were not treated in the other. The factors in the list of possible vulnerabilities that not were presented in the synthesis were rather detailed, such as that an organisation has not prepared for a possible collapse of information, communication and technology. One strategy when choosing the factors for the synthesis was that too detailed factors were not included as specific factors. Still, those more detailed factors will be addressed by dealing with others. The synthesis (Table 5:2) can thus be seen as treating all of the factors, but sometimes at a higher level.

In this thesis the aim was to study how a local authority should shape their preparedness planning process. However, I have not presented and do not intend to present exactly how this process should be shaped. This is because I do not believe there is one simple model that fits every organisation. Depending on the context that the planning was done in, for example the specific organisation and risks that the organisation has, the organisation needs to shape their preparedness planning processes in different ways. For example if the organisation have newly initiated their work it might be wise for the preparedness planner to begin focusing more on structural factors. Thus the planning always needs to be adapted to the organisation's own conditions.

The aim of research question 1 was to discover which factors preparedness planners and researchers perceived as vital to consider when shaping the process of preparedness planning. One primary perspective to consider when working with preparedness planning is to acknowledge the organisation's internal vulnerabilities and not just focus on external threats, in order to better understand the organisation's embedded abilities, which was perceived as a vital input to planning. Another perspective to consider was that preparedness planning ought to be viewed as a learning process. To be able to enhance an organisation's ability to respond to crises, one needs to shape the process in a way

that supports learning throughout the organisation. In addition, when working with preparedness planning it was perceived as advantageous to grasp the broader context of planning and consider who should be involved, what is to be learnt as well as how the work should be structured.

### 5.3.2 Research question 2

Research question 2:

*What implications does crisis management have on the preparedness planning process?*

When discussing research question 1, it has more or less been implicitly assumed that preparedness planning leads to an enhanced ability to respond to crises and thus also, if a crisis occurs, an improved response and a “successful” outcome. In addition, what is defined as “successful” preparedness planning before a crisis occurs is not always the same planning that is seen as useful during and after an event. In Paper V, the link between successful preparedness planning (in the paper called contingency planning) and successful crisis management outcome was examined and questioned. As argued in the paper, this link is much looser than often assumed.

As mentioned, the aim of preparedness planning is seen in this thesis as to enhance an organisation’s (here a local authority’s) ability to respond to crises. But one can argue that planning also has other goals. One goal is that pre-crisis planning is a way to secure confidence in the authorities. The existence of a planning process (that in some way can be defined as good enough) assists the authority to remove concerns about their level of preparedness, and sends the message of “being in control”. Studying crises within the research literature illustrates that a plan or a planning process (even if it was seen as successful in the pre-stage) does not always lead to a successful crisis management outcome. Similarly, organisations with no planning might manage a crisis well. One reason for this is that there are several aspects other than planning that shape the crisis management outcomes. Some aspects that we bring up in Paper V are the following:

- Nature of the crisis - The crisis nature varies, for example in terms of level of complexity and uncertainty. This might affect the outcome of the crisis management. For example, familiar crises with a low level of uncertainty are easier to predict and thus easier to plan for than unfamiliar ones.
- Leadership, stress and decision-making - The capacities and constraints of the leaders can also affect the outcome of crisis management. For example how the

leaders' decision-making is affected by stress and interaction with other actors.

- Institutional/organisational setting for crisis management - The plans and the planning processes operate within institutional settings. Aspects such as goals, resources and structures of the organisation might affect the outcome of crisis management.
- Citizens, volunteers and extra-governmental organisations - Crisis management is to some degree affected by non-governmental factors. It is not possible to capture all resources in the whole society or the interest of every actor, and thus there will be a lot that is not included in the plan.
- External power - When a crisis occurs, it might cause conflicts of interest between different actors. These different powers might also produce concerns over the legitimacy of for example the governing party's credentials and leadership capabilities of the individuals involved in the response.

There are thus multiple influences on crisis response, and not all of them can be anticipated and planned for. Still, this does not necessarily mean that there are no connections between preparedness planning and successful crisis management outcome, although it is a complex and non-linear relationship. In the paper we find some analytical and policy implications for how we can understand the relationship between crisis management and planning as well as what we can expect from the planning. These are:

- Preparedness planning is still an essential role of public authorities - Even if the link between the planning and the possible outcome is complex we still argue that planning is essential.
- "Sticking to the plan" is not a guarantor of successful crisis management - When responding to a crisis there will often be a need to be flexible and improvise, which is not always possible when sticking to the plan.
- Preparedness planning processes are just as important as preparedness plans/programmes - As often claimed it is the process that is most important, and not the plan.
- Be cautious in viewing pre-crisis planning with post-crisis hindsight - Be sensitive when analysing planning with hindsight after a specific crisis. We need to ask ourselves what we can reasonably expect of the planning and the planners when predicting the future.

- Preparedness planning has political rationality - Planning for the future is only one aim of preparedness planning. Planning is also important as a political process and for managing public fears in the pre-stage of a crisis.
- Preparedness planning can mask internal contradictions - For example there is a conflict between the certainty and structure of planning that provides directions as well as the issue that the crisis does not follow the planning.

Summing up, to grasp preparedness planning it seems essential to study it in a broader context. The relationship between preparedness planning and crisis management is very complex, non-linear and at times unpredictable. A better understanding of this will hopefully give us a fairer and more realistic expectation of preparedness planning. In the paper we have identified some implications that crisis management has for preparedness planning.

### **5.4 Addressing the Overall Research Aim**

This thesis aims to study how local authorities should shape crisis preparedness planning processes in order to enhance their ability to respond to crises. My empirical studies display several ways that organisations compose their preparedness planning processes (Papers I, II and IV). In the research presented in Paper IV, I interviewed six preparedness planners about how their municipalities worked in this respect. They all described their work in different ways, and they emphasised different factors of preparedness planning. That organisations compose their preparedness processes in different ways is confirmed by other researchers (e.g. Quarantelli, 1993; Tierney et al., 2001; Wenger, Quarantelli, & Dynes, 1986). Organisations are structured in different ways and are vulnerable to different hazards. Since composing a preparedness planning process is dependent on the specific organisation, there is no single answer to how such a process should be structured. In fact, there are innumerable ways in which an organisation can compose its planning process (Perry & Lindell, 2003). When addressing how to shape crisis preparedness planning processes, I will thus not present exactly how the processes should be structured; instead I propose factors resulting from my analysis of researchers' and practitioners' perceptions. Within this thesis I have studied factors from three different perspectives.

The factors identified within the first perspective indicate vulnerabilities in an organisation's preparedness planning (Paper III). An organisation needs to acknowledge its internal vulnerabilities, and thus also weaknesses in its own ability. This is seen as an important step to improve plans and planning processes, since it makes the understanding of one's own ability realistic. Even so,

it is difficult due to several realities. The most obvious is that preparedness planners, politicians and organisations are reluctant to admit their own vulnerabilities. There is a need for a change in the culture to be more open and acceptable. This is a change that must be made simultaneously in the whole society. Nevertheless, another reality is that organisations are not aware of all their own vulnerabilities and weaknesses. It is not evident which abilities an organisation needs in the response to a crisis, nor is it evident which vulnerabilities an organisation will have in a crisis.

The factors identified as vital to consider within the second perspective focus on the learning aspects of preparedness planning (Papers I and II). In this research I have identified four essential factors to consider when it comes to creating learning. These are labelled mechanism (i.e. transfer the preparedness planning work throughout the entire organisation), leadership (i.e. identify organisationally significant individuals with leadership qualities to work with crisis preparedness planning), commitment (i.e. getting people interested in and committed to crisis management and preparedness work) and content (i.e. creating knowledge that is generic and thus can be used in a variety of different future crises). To shape preparedness as a learning process is both vital and challenging. The difficulty with creating learning is striking. It is an aspect that seems underdeveloped within the area of crisis management. The studied municipalities spend a lot of time on developing risk and vulnerability analyses and writing plans. Unfortunately, they seem to overlook the importance of also transferring and disseminating the knowledge gained from these activities throughout the organisation. I have for example studied exercises that were not used to their full potential, for example due to a deficient evaluation process. (For descriptions of an exercise method that focuses on learning see Borell & Eriksson, 2010; Eriksson & Borell, 2010). The same deficiency can be seen when organisations evaluate crisis responses. (For descriptions of an evaluation method that focuses on learning see Borell & Eriksson, 2008; Eriksson & Borell, 2008).

The last perspective contains factors that are perceived as vital to consider when developing a preparedness planning process in a municipality (Paper IV). The factors were presented as a synthesis of factors purported as important to consider when shaping preparedness planning (see Table 5:2). This synthesis is intended to be an input when an organisation works with shaping their preparedness processes. The goal is not that the municipality simply considers separate factors but instead grasps the broader context. For example, it is not enough to just perform a separate activity like a risk and vulnerability analysis. Instead I argue that planning could better be shaped based on the answer to the three questions:



Who should be involved in preparedness planning?; What is to be learnt from preparedness planning? as well as How should the planning be structured?

So far I have presented three perspectives of factors that are perceived as vital to consider when shaping the process of preparedness planning at an operational level. But to address the overall research aim and study how local authorities should shape crisis preparedness planning processes in order to enhance their ability to respond to crises, there is a need to study preparedness planning in a broader context. This will be done by considering some implications of the overall crisis management process for preparedness planning.

A “successful” preparedness planning process can be seen, as argued in this thesis, as planning that is shaped for a “successful” operational response. But what actually is regarded as successful preparedness planning in society is much more complex than that. Planning is a politicised process, and there are several explanations of what is defined as successful planning (Paper V). Especially in the pre-stage of a crisis, planning is an approach to demonstrate that you are “in control” and also an approach to manage public fears. Thus successful planning can also be planning that convinces others of preparedness. This is also discussed by Clarke (1999, p. 41), who claims, “plans are ... much more than blueprints for future actions; they are also rhetorical devices designed to convince others of something”. The existence of different aims of planning might also lead to internal contradictions within preparedness planning. For example, there is a conflict between the certainty and the structure of planning that provides directions, as well as the fact that the crisis does not follow the planning (Paper V). It is maybe not the same plan that is successful for political reassurance as the plan that will provide support in the operational response. What can be claimed to be a successful preparedness plan is thus complex. The implication of this when shaping preparedness planning is that one needs to understand the different aims of preparedness planning within the organisation as well as within society, and the possible internal contradictions between those aims. Planning is not just about creating an ability: it is much more, and it is essential to acknowledge this when shaping the preparedness planning process.

Returning to the operational level of preparedness planning. Working with preparedness does not automatically imply that an organisation enhances its ability. It is not sufficient to merely create a plan or to carry out an exercise. Preparedness is not a static condition. What is important is for the organisation to create a continuous preparedness planning process (e.g. Paper IV; Paper V; Auf der Heide, 1989; Perry & Lindell, 2007). In connection with this, it is the planning *process* that is most important, and not the *plan*. The implication for

this when shaping preparedness planning is that there is a need to create and support a continuous preparedness process.

Within this thesis I have been interested in how local authorities should shape crisis preparedness planning processes in order to enhance their ability to respond to crises. But even if it can be claimed that the organisation has enhanced its ability, it is still hard to prove in what way the enhanced ability will affect the outcome of a potential crisis. One reason for this is that, apart from preparedness planning, there are several other aspects that possibly shape the outcome of a crisis, for example the nature of the crisis and institutional/organisational settings for crisis management (Paper V). There is thus no easily measured relationship between preparedness planning and a “successful” outcome. Furthermore, improvisation is always an element in the managing of a disaster because the situation is dynamic (Tierney, 2002; Webb & Chevreau, 2006). Kendra and Wachtendorf (2003, p. 121) mention that while “planning and preparedness serve as the backbone of disaster response efforts, creativity enhances the ability to adapt to the demands imposed upon individuals and organizations during crises and bolsters capacities to improvise in new physical and social environments”. This is also discussed by Harrauld (2006), who argues for the need for both discipline (structure, doctrine and process) and agility (creativity, improvisation and adaptability). Thus even if it often is seen as good to “stick to the plan”, there will be a need to be flexible and improvise. One implication of this when shaping preparedness planning is that an organisation should plan to improvise and thus create planning that supports improvisation.

Preparedness plans are often examined in a new light, once a crisis has struck. The judgement is done with hindsight in terms of relevance to the crisis that actually happened. This is not unproblematic. It is sometimes claimed that one test of an organisation’s planning is the outcome of the response to a specific crisis. One can argue that if the response to a specific crisis was successful, the organisation had successful planning. In the same way, if the response to a specific crisis was unsuccessful, one can argue that the planning was unsuccessful. But is the result of the response to one specific crisis a good measure of whether planning is successful or unsuccessful? It may as well be that the planning would have been useful in all situations except the one that occurred. And vice versa: just because the planning was useful in one particular crisis situation does not mean that it is useful in any other situation. Furthermore, it is very hard to measure the level of “success” at the societal level, and what is a “successful” outcome is not self-evident. The dominant interpretation of the crisis outcome, that is was it a success or a failure, is usually not decided by a single organisation. Instead, there are several different interpretations of the outcome. What is a

“successful” and what is an “unsuccessful” outcome of a crisis is based on individuals’ and organisations’ perceptions, and will thus vary. In addition, one can discuss whether success is a fact or an interpretation. The implication for preparedness planning is that one needs to be cautious when viewing pre-crisis planning with hindsight after a specific crisis. Before claiming that the plan and planning were unsuccessful, there is a need to address the question: What can we reasonably expect of the planning and the planners when predicting the future?

Summing up, in the research that this thesis is based on I have contributed by addressing some vital areas for answering the overall research aim. While acknowledging that there is no “model planning” that will serve every municipality effectively, I have discussed four implications that are perceived as vital to consider when shaping the preparedness planning process. The first implication is that there are several aims of preparedness planning, and those aims might be in conflict with each other. The second implication, at the operational level of shaping a preparedness planning process, is that there is a need to create a continuous process. Furthermore, I have found three different perspectives relevant for shaping this process. These are to address the organisation’s internal vulnerabilities, to deal with aspects of learning and to consider who should learn what and how. The third implication is that it will never be possible to completely “stick to the plan”. There will always be a need for improvisation. It is thus wise to plan for improvisation. The fourth and final implication is that one needs to be cautious when evaluating a plan in hindsight.

## Chapter 6

# Discussion

*In this chapter, the research presented in this thesis will be discussed. The first part considers the overall research aim. Then methodological and quality issues will be discussed. Finally, suggestions for further research will be presented.*

### 6.1 Shaping Preparedness Planning Processes

In this thesis, the aim of preparedness planning was regarded as enhancing an organisation's ability to respond to future crises. The focus has been on Swedish municipal organisations and how they work with crisis management and in particular preparedness planning. But why does the municipal organisation need to have this ability? What is the aim of creating an ability? What is the aim of a "successful" outcome of a crisis? To answer these questions there is a need to see the municipality as an element in the overall societal crisis management process. Responding to a crisis for the municipality is about supporting and assisting the individuals affected. A major aim of preparedness planning is to improve this response. Thus, when planning, the municipality should prepare for supporting individuals in their own response by planning to meet the needs of the citizens (Buckle, 1998), and also provide effective support by handling the tasks that individuals are not able to deal with themselves. However, there are other reasons for planning than improving a future response, for example convincing others of the need for preparedness and of being in control (Paper V; Clarke, 1999). That there are several aims of preparedness planning and that those aims might be in conflict with each other is an issue that is described as one of the implications for preparedness planning in this thesis.

Even so, what I have been interested in within the research behind this thesis has been to study how local authorities should shape crisis preparedness planning processes in order to enhance their ability to respond to crises. Enhancing the ability is thus vital. But what this ability consists of is not easy to define. Ability

should be connected to something: you need to discuss the ability to accomplish something. It is not very useful to simply discuss ability in general. Ability can deal with managing a quite specific task, a task that is performed more or less the same way each time. Ability can also be more reflective and analytic, such as the ability to understand a phenomenon, judge and choose between different alternatives or adjust the response to a situation based on new observations. One difficulty when it comes to preparedness planning is that we do not know what will happen in the future. This will in turn make it difficult to specify what exact abilities will be needed. For example, the ability to cut down trees is very useful after a storm, but not after many other events. Even if it were possible to identify all possible future scenarios, the result would be an endless number of very specific abilities that could be seen as useful. It thus seems necessary to focus on reflective and analytic abilities that are more about solving problems, since they will more probably be useful in future crises. Furthermore, different individuals need different abilities: because they will have dissimilar tasks during the crisis it is necessary to decide who needs what abilities (Eriksson, 2008).

As argued in this thesis, it is not beneficial to create a uniform detailed model or a checklist that all organisations can use in their preparedness planning. Nevertheless, we must acknowledge that if municipalities organise their preparedness planning processes in different ways and their plans look different, it becomes harder for national agencies to compare planning among municipalities and to use the results in their own analysis. It also makes it more difficult to assess the quality of the work. (For a discussion of challenges with intra-organisational risk and vulnerability information flow in public organisations, see Borell & Eriksson, 2009). It can be argued that there should be some level that has the power to determine what constitutes acceptable planning. Alexander (2005), for example, argues for the need of standards in emergency planning. Introducing a standard is one approach for indicating the minimum requirements when creating preparedness planning.

However, an overly detailed model or checklist would probably curtail planning efforts and thus also the learning process provided by these efforts. For example, in one of the studied municipalities they discovered that the formulaic plan document, where the administrations more or less just needed to fill in their names, did not incite the administrations to create preparedness. So today they instead have a document presenting issues to consider when the administrations create their own planning and plans. In line with this I am more interested in factors or issues to consider. Thus, instead of just creating a detailed model, I have studied three different perspectives of factors that an organisation should consider when shaping their own preparedness planning processes. These are

factors that support, the organisation when shaping their preparedness planning process, to acknowledge its own internal vulnerabilities, consider aspects of learning and finally consider who should learn what and how. In connection with this, one of the implications for preparedness planning presented in this thesis is that shaping a preparedness planning process requires creating and supporting a continuous, ongoing preparedness process.

But how do we know that considering these perspectives of factors actually support an organisation to create “successful” preparedness planning and thus enhanced ability to manage crises? Even more interesting is how do we know that “successful” preparedness planning actually leads to a “successful” response and a “successful” outcome? Within the research literature it is commonly claimed that there is a connection between planning and response. For example, Clarke (1999, p. 48) states, “planning and response are causally connected. If you don’t have an emergency response plan then emergency response is bound to fail”. Wachtendorf (2004, p. 207) also argues for the importance of planning while saying that: “planning is critical. Not only do good plans save lives when disasters strike, but formal planning processes and widely-held normative expectations regarding action can also protect property, mitigate post-disaster disruption, and speed recovery”. My interviewees also argue for the usefulness of preparedness planning. For example, one of the preparedness planners interviewed claims that, “even if the thing you train for never occurs, even if what you practice on the organisational level is never carried out that way, it doesn’t matter because we have learnt”. Still, it will almost never be possible to completely “stick to the plan”, and it is claimed that when a crisis strikes improvisation will be needed (Kreps, 1991; Tierney, 2002). Thus it seems beneficial to plan to improvise, which is one of the presented implications for preparedness planning.

One aspect that makes it hard to understand the connection between preparedness and response is the differences between the two. Quarantelli (1993, p. 30) claims, “it is ... possible to have a good overall strategic approach or emergency preparedness, but when the disaster occurs, it may not be handled very well”. The reason for this is that preparedness planning deals with the general, while managing deals with the specifics. Similar thoughts are expressed by Clarke (1999, p. 57), who mentions that “planning and success *do not* coincide but are loosely connected or even decoupled entirely”. It is thus difficult to prove that considering the identified factors an organisation enhances its ability to respond to crises (i.e. fulfil the aim of “successful” preparedness planning), and it is even harder to determine if the enhanced ability actually improves the outcome of a crisis. In line with this discussion one needs to be cautious when evaluating

planning with hindsight. This is one of the implications presented that crisis management has on preparedness planning.

The focus in this thesis has been to study how preparedness planning should be shaped at the local authority level. But it is essential to recall that when a crisis strikes there will be a need for a multi-organisational response. An organisation's planning should thus be integrated with other actors' planning's (Boin & McConnell, 2007; Tierney et al., 2001). In addition to organisations, citizens and different citizens' groups are important actors in crisis management (Guldåker, Nieminen Kristofersson, & Eriksson, 2010). The affected individuals as well as other citizens have a very important part in the response (Lagadec, 2006; McEntire, 2006) and are sometimes described as the "real first responders". For example, most victims are saved by fellow citizens (Helsloot & Ruitenberg, 2004). Thus it seems to be vital to involve citizens in the planning.

Cooperating with other actors is especially important for municipal organisations, such as those in Sweden, that according to the legislation have the responsibilities to coordinate the preparedness work at the local level. This is something to which several of the studied municipalities devote much attention, and many of them have for example a crisis council where they regularly meet other actors at the local level. This need is also discussed as one of the factors for preparedness planning in the synthesis presented in Paper IV. There is a need to coordinate the preparedness planning both with other actors at the local level and with actors at regional and national levels. To have coordinated the planning with regional and national levels is especially important when a major crisis strikes and the municipalities do not have enough resources of their own.

## **6.2 Research Process and the Quality of the Work**

There is a need to discuss issues concerning the research process and the quality of the work. This is a vital part of creating good research. There is no general agreement on how to measure the quality of research, because the criteria for good research depend on perspective and philosophical framework (Patton, 2002). Within this thesis I have relied on the traditional scientific research criteria validity and reliability to ensure the quality of my research. These criteria are often associated with more quantitatively orientated research, but can also be applicable to more qualitatively orientated research (Bergström & Boréus, 2005) such as this thesis is based on.

Validity within qualitative research deals with whether the questions raised have been answered (Bergström & Boréus, 2005). I have followed this criterion for validity by explicitly formulating an overall research aim and two specific research

questions (presented in Chapter 2) that I have explicitly addressed in Chapter 5. Reliability within qualitative research concerns the need to be careful in all steps. It is also an ambition to be transparent and use a well-founded argumentation (Bergström & Boréus, 2005). For transparency, and also to demonstrate that my research process has been carefully designed, I have presented the different steps of the process in Chapter 4. Furthermore, I will also discuss the research process in the next section of this chapter.

Within qualitative research the researcher is the instrument and the skills and competence of the person doing the research are thus important (Patton, 2002). That the research is subjective and influenced by the researcher is a common criticism of qualitative research. But this is not unique for qualitative research, it is unavoidable for all types of research.

### **6.2.1 Discussing the research process**

There are no rigid rules for exactly what empirical data to collect and what methods to use. Designing a study is as much art as science (Patton, 2002). All methods and all ways to design research can be criticized. As Feyerabend (1993, p. 23) claims, “all methodologies, even the most obvious ones, have their limits”.

This thesis consists of both papers that are mainly based on empirical studies and papers that are based on theoretical discussions and argumentation. It was seen as advantageous to use empirical studies when studying both the response to the storm Gudrun (Paper I) and preparedness planning processes (Paper I, II and IV), because empirical studies gave the possibility to gather detailed and deep information about the issue of interest. Still, some of the issues of interest for the aim of this thesis were hard to study empirically. To address these issues, Papers III and V are based on theoretical discussions and argumentation.

When creating empirical studies, the selection of cases is very important for the result. The ideal case to study in crisis management requires an examination not only of the response in real time but also of the preparedness work prior to the response and the subsequent follow-up activities. But this is often impossible since it is not known beforehand where and when a crisis will strike. This makes studies of preparedness planning and responses difficult. To create an actual “planned” research with several studies is more or less impossible. In addition, it is hard for a researcher to actually be able to study the response, and studies are thus therefore often done after the actual event (Dynes, 2006). The empirical study of the response to the storm Gudrun in this thesis was carried out five months after the municipality experienced the crisis. This obviously influenced the data, for example the answers from the interviewees. How experience is



reconstructed is a research area in itself, and further considerations are given in, for example, Myers (2002).

Most of the studies in this thesis have been focusing on how different municipalities work with preparedness planning. The objective in selecting these municipalities has been broad representation. For example in research presented in Paper IV it was seen as purposeful to study municipalities of different sizes. In addition, the selection of municipalities also made it possible to interview preparedness planners with different education, experience and gender. The “traditional” Swedish preparedness planner is a male with a military background. Today the number of preparedness planners of different backgrounds and different genders has increased. It was thus seen as advantageous to study a wide range of different preparedness planners. For practical reasons two other selection criteria were that the interviewee (primarily the preparedness planner) was willing to participate in the study and that the municipality was easily accessible for the researcher.

Within the research on which the present thesis is based I have used different sources of data: interviews and documentation. The primary way to collect data within this thesis has been with interviews. One aspect to consider when conducting and analysing interviews is the selection of the interviewees. In my study of crisis response, the first selection was based on a discussion with the individual most directly involved in the response to the crisis, and in the second selection, persons that had been mentioned during the interviews of those first selected. Within the studies of crisis preparedness planning processes, the primary interviewee has been the preparedness planner. In addition, in some studies also other municipal actors have been interviewed.

The selection of informants for the studies of preparedness planning was mainly preparedness planners. This might be seen as a problem since other actors’ perspectives will be overlooked. An adjacent problem is that these individuals have been used as representatives of the municipalities and thus their thoughts and claims have been seen as those of the organisations. This is of course not always the case. This issue is for example revealed in the study behind Paper I, where different actors involved in preparedness planning or crisis response have been interviewed. This study, as well as my licentiate dissertation (Eriksson, 2008), reveals that individuals not directly involved in preparedness planning might have different opinions than the preparedness planner. But since the work in this thesis was mostly focused on factors that were claimed to be important for preparedness, the delimitation has been to above all study those mainly involved and knowledgeable within the area: the preparedness planners. In addition, in

some of my studies other municipal employees than the preparedness planner have been interviewed, and municipal documents that at least are meant to represent the whole municipality have been studied. Another issue to point out is that most of the interviewees are managers, and this thesis thus presents the managers' view of preparedness planning.

When conducting interviews, what questions to ask and how they are perceived and understood are essential. The quality of the information one obtains from an interview is dependent on the interviewer (Patton, 2002). To understand how others perceive the questions, I have discussed them with colleagues before using them, and in one case even conducted a test interview with a preparedness planner in another organisation than those I intended to study. This has helped me to improve the interview questions. Another rather similar problem is that interviewees sometimes answer what they think the interviewer wants or what might be considered an appropriate answer. In addition, the choice of using semi-structured interviews allowed flexibility and avoided too strong guidance from the interviewer.

An unavoidable problem with the interviews behind Paper I (and very generally when investigating past crises) was that they were carried out after the event. Since I started the study after the crises had occurred, this problem is embedded and unavoidable. With time peoples' memories change — they forget and mix up things. Time also influences the collective memory. When participants talk among themselves, a collective truth may be the result.

Besides interviews I have also used documentations as a source of data. To acquire as many relevant documents as possible, I asked all my interviewees for documents about the crisis and/or the preparedness planning, and personally searched for documentation from other sources such as the Internet.

My focus in this thesis has been to study Swedish municipal organisations and their work with shaping the process of preparedness planning, in particular the work done by a central core of these municipalities. The studies are based on a restricted number of municipalities, and this might be argued to affect the generalizability of the result. Still, in my own studies and in the research literature I have not found any obstacles that display that the result is not also valid in other municipalities. Moreover, the empirical studies are done in a Swedish context, and aspects of preparedness planning that might affect the work in other countries are thus not studied. There will always be a need to consider the local context, such as culture and legislation, but I have not found any indicators that the results of this thesis will not also be valid in other countries, at least in the Western world.

## 6.3 Suggestions for Further Research

Based on the results and the discussion within this thesis, some areas relevant for further studies have been discerned as especially interesting. These are:

- Preparedness planning in multi-organisational networks - When a crisis strikes, several actors, such as public authorities and private companies, will be involved in the response and therefore forced to cooperate. One way to support such a response is that the actors work together already during the preparedness planning. It is thus interesting to study what factors are important to consider when planning takes place in multi-organisational networks.
- Involving the citizen in the authorities' preparedness planning - The individual citizen living in the area will be involved in the response to a crisis. In addition, the response from the authorities aims at supporting the citizens in their own response. Today citizens seldom participate in the municipalities preparedness planning. It would be interesting to study the citizen role in the authorities' planning processes.
- Further examination of how different perspectives of factors affect preparedness planning - In the research on which this thesis is based the focus has been on what factors to consider and why these areas of factors are important. But there is still a need to study how these factors could be implemented in an organisation and how they actually affect preparedness planning.
- Implications of the relationship between preparedness planning and crisis management outcome - If the aim of preparedness planning for an organisation is regarded as enhancing the organisation's ability to respond to crises, an interesting discussion is in what way this ability affects the response to and the outcome of a crisis. What is the connection between preparedness planning, the ability to respond to a crisis and the possible outcome of a crisis?
- Study the effect of the magnitude or scale of event for preparedness planning and whether this should be considered - In the research on which the present thesis is based I have studied planning for situations that are exceptional but perhaps cannot be called catastrophes (according to Quarantelli's (2000) definition). Interesting questions are what are the similarities and differences in planning for different scales of events?

## Chapter 7

# Conclusions

The research on which the present thesis is based focuses on how Swedish authorities at the municipal level should work with shaping preparedness planning processes. The overall research aim was:

*To study how local authorities should shape crisis preparedness planning processes in order to enhance their ability to respond to crises.*

The main contributions from the research described in this thesis are:

- When shaping the preparedness planning process, an organisation should acknowledge external threats but also its own internal vulnerabilities to achieve a realistic perspective of the organisation's abilities.
- When shaping the preparedness planning process, there is a need to focus on creating learning. The process ought to be viewed as a learning process aimed to enhance an organisation's ability to respond to crisis. Addressing the four factors mechanism, leadership, commitment and content can support this.
- When shaping preparedness planning an organisation should grasp the broader context of planning. Addressing the three questions: How should the work be structured?; Who should be involved? and What is to be learnt?
- The connection between preparedness planning and the outcome of a crisis is complex. Some implications for preparedness planning are: There are several aims with preparedness planning that might be in conflict with each other. At the operational level of shaping preparedness there is a need to create a continuous preparedness planning process. It will almost never be possible to completely "stick to the plan"; there will always be a need for improvisation. In general, one needs to be cautious when evaluating a plan with hindsight.



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# Appendix: Appended Papers

- Paper I** Eriksson, Kerstin (2009). Knowledge transfer between preparedness and emergency response: A case study. *Disaster Prevention and Management: An International Journal*, 18(2), 162-169.
- Paper II** Nilsson, Jerry, & Eriksson, Kerstin (2008). The role of the individual – A key to learning in preparedness organisations. *Journal of Contingencies and Crisis Management*, 16(3), 135-142.
- Paper III** Brown, Christer, & Eriksson, Kerstin (2008). A plan for (certain) failure: Possibilities for and challenges of more realistic emergency plans. *International Journal of Emergency Management*, 5(3/4), 292–310.
- Paper IV** Eriksson, Kerstin (forthcoming). Crisis preparedness planning – Relevant factors when shaping the process. Under review in an international scientific journal.
- Paper V** Eriksson, Kerstin, & McConnell, Allan (forthcoming). Contingency planning for crisis management: Recipe for success or political fantasy? Under review in an international scientific journal.