Can we be prepared for the next accident or catastrophe?

—Potential contributions of emergency collaboration exercises

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Catastrophes and accidents (natural, technological, or man-made) have been subjected to scientific research from different disciplines and perspectives for a long time. Examples of these perspectives include community risk and vulnerability, human behaviour during crisis, fire behaviour and eco-system management, decision-making, communication, and collaboration issues. This paper deals with different perspectives of preparation and prevention in terms of accidents and catastrophes. The overall aim is to present an overview of different aspects on the possibility for organisations and societies to be prepared for the next incident and to highlight emergency exercises as a part of crisis management. In the second part of the paper the project "Collaboration exercises—from parallel to synchronous", is introduced. The project is carried out in Sweden, and aims to explore how collaboration between police, ambulance and rescue services is practiced and developed during exercises. Of particular interest is inter-organisational collaboration and learning during exercises. To develop an understanding of these processes, a range of different types of emergency collaboration exercises was observed and participants were interviewed about their experiences. Tentative findings from the studies so far are briefly introduced. Some challenges of using exercises to increase the preparedness for managing the uncertainty and the unexpected are further discussed.

INTRODUCTION

Should we simply accept the uncertainty and chaos in catastrophes and accidents, or can we reduce our vulnerability? Managing uncertainty in accidents and crisis is not a new challenge for emergency services or society, although the context in which it takes place has become more complex during the past few decades (Borodzicz, 2005). Incidents have, to a larger extent, become an interdisciplinary concern and exceed organisational, social, and physical boundaries (Boin *et al.*, 2005; Borodzicz, 2005). One effect of this development is the requirement for a combination of proper planning and organisational flexibility in the case of crises as well as at accident scenes (Kendra & Wachtendorf, 2003; Boin *et al.*, 2005). Achieving a balance between innovation and routine under pressure is crucial for emergency services (Moynihan, 2008). During daily work, police, ambulance, and fire departments remain working within their own organisations and professions, handling the specific responsibilities for which they are trained. However, at larger accidents and in major crises, there is a need for broad collaboration in terms of involving different professions, performing unknown tasks, and adjusting to rules and procedures other than those applied during daily work. In addition to medical, logistical, and technical resource issues, inter-organisational communication and collaboration have repeatedly been pointed out as recurrent challenges during crises and accidents (Kendra & Wachtendorf, 2003; Berlin & Carlström, 2008). Some even argue that you can predict these to be the major challenges even before an actual incident occurred. Collaboration issues are described as the results of the different tasks that are undertaken, limited and/or inaccurate information, resource allocation, and an embedded interdependency among actors who have different primary tasks, laws, and organisational cultures (Chen *et al.*, 2010).

The management of large-scale crises, such as the tsunami in South East Asia (2004), the earthquake in Haiti (2010), and the attacks at the Oslo government district and Utøja island (2011) has raised questions about the societies' crisis preparedness on different levels. These are low-probability events, but they place large resources and demands on the crisis management and emergency services (McConnell & Drennan, 2006). The need for better and joint emergency exercises is often quickly addressed after a catastrophe as a way to strengthen overall resilience and the capability to collaborate across organisational boundaries. However, in the case of frequent and everyday events, such as car crashes, it is also vital that the organisations involved are skilled in executing a joint response. Exercises play a significant role in emergency planning as well as in retaining and developing skills in rescue services personnel (Borodzicz & van Haperen, 2002; Boin *et al.*, 2005). The value of exercises has also been questioned and need to be further explored. Even though exercises are promoted as an important tool for crisis management, the actual possibilities of conducting exercise and learning from training sessions are paid less attention in the literature. So far, research and incident reports have mainly focused on real-life crisis and how different agencies have managed specific events. This paper aims to discuss some of the theoretical perspectives on the possibility to strengthen the preparedness for various events, some of the organisational challenges in crisis management and to specifically highlight exercises as a preparedness strategy.

ACCIDENT, DISASTER, CATASTROPHE – A CONTINUUM OF LOST CONTROL

According to Quarantelli (2006), the social science study of natural and technological disasters has been undertaken for about a half century. One of the first problems that was addressed was how disasters differed from everyday incidents. There are a range of different approaches and sub-group definitions in the literature, but this will only be shortly mentioned in this paper. "Uncertainty", "unexpected", and "undesired" are typical words in the context of different types of events. There seems to be no distinctive quantitative definition for what makes an accident, a disaster, or a catastrophe "major" (Ward, 2009). What is a crisis is contextual and usually defined in relation to the extent and experiences of previous events (van Laere, 2013). Therefore, what typically is considered to be major can be due to the extent of property damage, the impact of infrastructure, the duration or intensity of the event, the number of injured, or a small organisational error, which could have severe consequences. Quarantelli (2006) has described that both qualitative and quantitative differences exist in a catastrophe, a disaster, and a routine everyday incident at the organisational level. A catastrophe is not simply a large-scale traffic accident. The lack of adequate facilities to respond to the incident, such as infrastructure and technical communication systems, are some of the aspects he refers to as characterizing a catastrophe. Organisations have to face a loss of autonomy and collaborate with more (public and private) organisations, and usual work roles during a catastrophe change as compared with an everyday incident. Quarantelli (2006) also points out differences between a catastrophe and a disaster; in a catastrophe, the community-built infrastructure (including the emergency organisations) is heavily impacted, and help from nearby communities cannot be provided because they are also impacted. In a disaster, such infrastructures are partly affected.

Various events also have different scope and impact on society. Perrow (2007) claims that terrorism, unlike industrial and natural catastrophes, intentionally strike at concentrations of populations and critical parts of the infrastructure. The scope of terrorism is also not limited to a specific region. An earthquake can destroy an airport, but without threaten all other airports around the world (Perrow, 2007). A terrorist attack on an airport would, on the other hand, lead to immediate and drastic operations at all large airports. A recent example was the marathon bombings in Boston, with effects on the safety approaches and preparations for e.g. the London marathon and the half-marathon in Gothenburg.

However, despite the background and extent of the occurrence, some similar challenges exist for the management systems and emergency services organisations, e.g. communication across organisational cultural and administrative boundaries. Also, even though a catastrophe is not a large-scale traffic accident, they are also similar in that they will continue to happen and cannot simply be prevented or solved with innovations or technology.

IS IT POSSIBLE TO INCREASE THE PREPAREDNESS?

The disaster management cycle is typically described by four phases: mitigation, preparedness, response, and recovery (Hiltz, van de Walle & Turoff, 2010). The mitigation involves assessment and the reduction of risks. Preparedness is the actions taken prior to an incident, e.g. exercises or simulations for the emergency personnel. The response phase refers to the (acute) actions taken during an incident with the aim of reducing harms in human, property, and environment. Recovery refers to the process of returning to "normal" procedures and activities as well as of learning from the experiences. These phases are all important aspects of resilience. Resilience and resilient organisations have become a key topic, both for different academic fields and in practice (Weick & Sutcliffe, 2007; Boin & van Eeten, 2013). The idea of resilience is based on the belief that it is possible to prepare for and handle various types of sudden events as well as to recover quickly without much effort (Wildavsky, 1988). This is quite in conflict with the organisational literature that usually points out unexpected events and shocks as potential threats to an organisation. Wildavsky (1988) introduces two diverging definitions or recovery: either to return to prior order or to arise stronger after an event. The latter interpretation implies that learning from experiences is a part of resilience (Boin & van Eeten, 2013).

However, the literature on resilience is mostly descriptive and normative, and we do not actually know how resilience is achieved, how to recognize it beforehand, or how it can be built into an organisation in practice (Boin & van Eeten, 2013). We especially lack knowledge about how this process works under pressure. Weick (2002) argues that it is relatively easy to identify mistakes in standard routines because it is possible to compare and evaluate the response in relation to plans or goals. However, in the case of unexpected incidents, the routines are, to some extent, constructed at the same time as the individual and organisation act. Mistakes are sometimes not observable until long after the catastrophe, when the consequences are mapped.

One could say that the development of crisis management is dependent on prevention strategies and organisational learning. However, previous studies have found that organisational learning within disaster management, in terms of organisational, technical, and cultural aspects, is both difficult and rather rare (Corbacioglu & Kapucu, 2006). The reasons are typically described in terms of the difficulty of learning and adaption in an unpredictable and dynamic environment. In line with this, many agree that no matter how good crisis management might be, it is not possible to prevent all incidents (van Wart & Kapucu, 2011). Lagadec (1997) has pointed out that the ability to handle a crisis largely is dependent on the structures that have been developed before the event. However, determining the parts of such structures that can actually be planned is difficult. Emergency plans have sometimes been described as creating false security for organisations and community members (Boin *et al.*, 2005). In a recent study of the management of the Victoria bushfires in Australia, it was concluded that "plans never go according to plan", partly due to the

fact that they primarily focus on reacting and responding to specific relief needs (Oloruntoba, 2013).

COLLABORATION EXERCISES AS PART OF THE PREPARATION

Safety practices and drills are widely used in organisations that handle complex issues (Lagadec, 1997). Besides risk analysis and plans, collaboration exercises are also a part of a crisis preventive structure. Such exercises are undertaken for different reasons but principally to expose individuals and organisations to scenarios that are likely to occur in the region and to increase the joint preparedness for what crisis may require (Borodzicz & van Haperen, 2002). Exercises may also be aimed at testing crisis management plans and point out difficulties when a variety of organisations work together in a joint action (Borodzicz, 2005). Exercises can vary largely in extent (e.g. number of injured, number of involved organisations, and administrative levels) and involve scenarios that are intended to imitate the demands in real events concerning skills and collaboration capacities. Common ways to train emergency services include table-top discussions, gaming technologies, small-scale simulations to practice a well-defined task or full-scale exercises in the field involving a range of organisations practicing a complete scenario (Perry, 2004). Simulations and full-scale exercises are usually presented as the only experiential way to train individuals for a yet unknown event in a realistic environment (Borodzicz & van Haperen, 2002).

A question posed as far as exercises are concerned is to what extent we can prevent or prepare for the unexpected, and further, what parts of emergency management can actually be trained. The teams that are trained together during an exercise will probably not be used in the exact same format in a real life event. There are two major ways (or probably two sides of a scale) of reasoning about preparation for catastrophes. Firstly, the nature-made, industrial, and terrorist disasters could be perceived as natural consequences of systems complexity (Perrow, 2007). These are all existing hazards that mean disaster when they are activated. In tightly coupled systems, there will always be accidents. This also indicates the possibility of preventing and preparing for coming events. Secondly, one could argue that every accident or catastrophe is unique, and we can never predict when or where it will occur, how many will suffer, or what resources will be available to handle it. The latter pathway of reasoning leads to a more limited view of the possibility of preventing and preparing.

THE PREDOMINANT RETROSPECTIVE APPROACH

Based on the thought that accidents and catastrophes will continue to occur, there are mainly two approaches for increasing preparedness and resilience: 1) to analyse risks and the management of previous incidents and what parts that failed respectively succeeded as well as 2) to exercise, either by having desk-top discussions or actually conducting simulations in the field. Identifying inadequate responses is a well-established evaluation method in emergency services. However, it is often concluded that the communities and organisations that do not learn from

their mistakes and that lack the capacity for self-adaption will fail in future catastrophe management (Corbacioglu & Kapucu, 2006). These conclusions imply that the same failures will be repeated. Crisis management is characterised by a retrospective approach rather than a proactive one (Boin *et al.*, 2005). With a post-incident and learning-from-mistakes approach, the involved organisations try to make sense of what happened and how to handle a similar situation the next time. Collaboration challenges usually receive attention during and after major events. The post-incident reports are often tactical and operational, and they are seldom focused on strategic dimensions and prospective ideas (Donahue & Tuohy, 2006; van Laere, 2013).

One of the repeated and similar failures is the focus on the specific scenario rather than on collaborative issues. The question after (large-scale and minor) incidents usually concerns how can we handle a similar event the next time? After the Oslo/Utoja disaster, there were discussions in Sweden about difficulties for managing a similar disaster. Disaster plans are, to a great extent, based on the history of disasters in a particular region (Oloruntoba, 2013). It can be argued that such a narrow focus on specific types of threats and incidents can limit the resilience. Overall, the same logic goes for identifying the resilient organisation; we cannot consider an organisation to be resilient before we have seen how an event was managed and how fast the organisation recovered (Boin & van Eeten, 2013). Weick and Sutcliffe (2007) argue that resilience is a combination of keeping errors small and of improvising ways to keep the systems functioning during unexpected events. Furthermore, they point out that recognizing an event as something that has happened before and is well understood could be a source of concern rather than of comfort (Weick & Sutcliffe, 2007). The concern is that initial similarities can mask differences and complexity, which can lead to simplification and misestimating.

PUBLIC EMERGENCY SERVICES IN SWEDEN

A wide range of organisations are involved in handling crisis situations. However, our studies are focused on the police, ambulance, and rescue services because these are the most frequent collaborators at the accident scene. The public emergency organisations (the police, ambulance and rescue service) in Sweden are regulated by different governing laws, professional educations and cultures, primary responsibilities, and financing authorities. Primary responsibility for the ambulance service is to give care and to save lives, for the fire departments to save and to protect lives and property, and for the police to provide a safe infrastructure, investigate the cause of the accident and start a criminal investigation. The different laws overlap, to some extent, pointing out shared responsibilities. In addition, the police, ambulance, and fire departments are parts of different public authorities. The state governs the police force. The ambulance services are usually run by the county councils. Though, some of the ambulance service activities have been contracted out through procurement to private companies. The fire departments are administered by the municipality or even by the state in exceptional cases (e.g. at the airports). According to Swedish law, the three organisations are equal actors at the accident

scene, which means that none of the organisations decide how the other organisations should act or prioritise.

These separating factors contribute to challenges for a joint operation at the accident scene or at larger crises. In addition, Appelbaum and Wohl (2000) argue that organisations are not designed for change; rather, they strive for stability. Even organisations that are expected to be proactive and adaptive tend to follow well-established routines and traditions. These behaviours can constitute an obstacle to development and effectiveness in emergency responses (Boin *et al.*, 2005).

The three emergency organisations are all High Reliability Organisations (HROs) that typically value training, value personnel with long and varied experience, and are capable of handling whatever is at hand (Weick & Sutcliffe, 2007). These are characteristics not far from the theoretical foundation of the previously mentioned resilient organisation. Furthermore, high technical competence, treating failures as a threat to the system that needs to be prevented or minimized in future events, and having formal structures of roles and responsibility characterise HROs. These are valuable resources in crisis management but can contribute to stronger autonomy and fragmentation, with their primary focus being on their specific individual responsibilities. This can specifically challenge complex events (or phases of an event) where integration and synergy across different sectors is needed (McConnell & Drennan, 2006).

EMERGENCY COLLABORATION EXERCISES – A PARTICIPATORY PERSPECTIVE

As noted before, the need for better inter-organisational collaboration and for better joint exercises is realized after every event, almost regardless of the type and extent of the incident. Collaboration has been a repeated answer to the question on how specialised and defragmented organisations should solve "wicked issues" (that cross organisational borders)—in our case, an accident scene. Others argue that collaboration may evoke problems in organising and come with a high cost (Mandell & Steelman, 2003), especially during pressing situations such as crises or accidents. In our studies, we use a definition of collaboration that is based on three theoretical concepts: sequential, parallel, and synchronous collaboration (Thompson, 1967; Berlin & Carlström, 2008, 2011). *Sequential* collaboration is where the working process is similar to a relay, where the organisations perform their own tasks one-by-one; *parallel* means working side-by-side but within your own responsibilities; and *synchronous* means that organisational boundaries are crossed when needed and that professionals help one another depending on the development of the incident. The effectiveness or otherwise of such cross-agency working has been debated. Sequential or parallel work may be preferred when all organisations have arrived at the accident scene, but before that or, e.g., in the case of a resource imbalance (staff or material), it could be necessary to work across boundaries. A vital issue for the staff is to identify when and how a certain type of collaboration is useful in emergency events.

It has been proposed that to simply rely on strict regulations and specific instructions on how to collaborate could be counterproductive (Boin *et al*., 2005), which is why hands-on exercises are promoted as a strategy for develop collaboration capacity. However, the planning and conducting of exercises are challenged by a number of factors. Some of the recurring challenges are the lack of incitement as well as unclear roles and responsibilities when it comes to initiating and planning. Furthermore, in societies where extraordinary events rarely occur, it is difficult to gain support for prevention investments, such as exercises (Smith, 2004).

The empirical findings presented here is are a part of a research project aimed at understanding and problematizing how collaboration is practiced in emergency exercises involving police, ambulance, and rescue services. The project, "Collaboration Exercises—from Parallel to Synchronous" runs for three years (2011–2014) in two regions in Sweden. Data is collected through both qualitative and quantitative methods. Overall research questions included what the participants' experienced were taught during exercises, how different types of collaboration are practiced, and what challenges exist with regard to learning during exercises. Learning is interpreted as identifying and correcting the imbalance between expectations and outcomes (Argyris & Schön, 1996) as well as developing collaboration capacities. During 2011 and 2012, we conducted field observations of full-scale collaboration exercises and interviews with participants. The scenarios varied, both in terms of extent and content; e.g., car accidents, liner fire, prison fire, and terrorist threat at a naval base. So far, empirical findings show that the exercises:
   1) primarily focused on intra-organisational routines and standard procedures, where parallel collaboration was predominant
   2) repeated certain paradoxical exercise behaviours that related to, e.g., scenario planning and content, the extent of exercises, and their relation to real-life events

The participants understood that the exercises played an important part in increasing preparedness, especially meeting the other organisations in a non-crisis situation, practicing communication, and drilling specific routines. Respect for one another's responsibilities and skills was obvious at the exercises. Even though the exercises were quite different in extent and scenarios, some similar patterns were repeated. The results indicated that the exercises could still be counterproductive as a phenomenon in existing forms: this occurs as a result of promoting each organisation to focus on specific responsibilities and on a narrow perspective in the scenario rather than on how to organise a joint operation regardless of the type of event. The findings could partly be explained by a loosely coupled system in emergency management training. Another plausible explanation is that some exercises scenarios and learning objectives are too complex to get an understanding of the performance and outcome. The exercises tended to fail to rehearse the organisations' flexibility and collaborative approach to problem-solving. The lessons learned were primarily intra-organisational, but there is a need for inter-organisational learning in order to have an impact on the resilience and management of future events. However, repeatedly exercising sequential and

parallel forms of collaboration can have practical implications on real-life accidents in terms of delayed action and lack of elasticity when tackling changes during an operation.

Our project further consists of a field intervention where we, in an explorative way, develop an exercise model to promote inter-organisational collaboration, including repetitive moments and an immediate and joint evaluation.

CHALLENGING THE (UN)KNOWN

A challenge in crisis management is the link between exercises and real-life events. Learning outcomes may overall be difficult to address when it comes to exercises, as there is a possibility that a certain exercise behaviour takes place that does not correspond with actual accident actions. McConnell and Drennan (2006) argue in the same direction; exercises may primarily produce symbolic readiness and limit learning by making adjustments in practices and behaviours. The symbolic readiness refers to the danger for the individuals to leave the exercise thinking they know exactly how they will handle a future real life event. Emergency plans and exercises have a common challenge: A crisis, or a larger accident, cannot be packaged in a predictable way. According to Lonka and Wybo (2005), the key factors for learning from exercises depend on the planning before and after the practical moments. In other words, the hands-on moments are not the most crucial for learning. Initial cooperation between authorities to ensure a realistic scenario and the possibility for the participants to share their perceptions afterwards makes an exercise successful in terms of learning. Similar expressions have been found to be important among the participants in our empirical analyses. This certainly is a challenge for exercise leaders.

Along a related dimension, Bharosa *et al*. (2010) studied how information sharing is practiced during exercise. Participants were found to be more concerned with obtaining than sharing information with other organisations. They were also afraid of becoming distracted by, or of distracting others with, irrelevant or too much information. These findings are examples of what Moynihan (2008) (based on Koppenjan & Klijn, 2004) identifies as two uncertainties in the management of an event (and probably a range of other organisations): the institutional and the structural uncertainties. The *institutional* is defined as problems that exist due to diverse organisational cultures, norms, and routines that make it difficult for the participants in different organisations and professions to identify when or how to collaborate. The *structural* relates to the complex issue of autonomous organisations' making joint decisions. These uncertainties are probably two of the key issues for emergency services, which also, to some extent, are ignored during exercises. Crichton *et al*. (2009) argue that learning outside of one's own sector is particularly vital (after real-life events and exercises) to increasing preparedness for future events.

In this case, the link between individual and organisational learning is another challenge. It is often argued that individual learning is needed before organisational

learning will occur. Self-examination and the identification of successful and failing parts of an action are vital parts on every level in the crisis management system (Corbacioglu & Kapucu, 2006). However, research literature and internal evaluations point out similar mistakes and future needs, which indicates that just being aware of the mistakes (single-loop learning) is not sufficient. Organisational learning occurs when the individuals and teams can identify and correct mistakes—when they can reconstruct the "theory in use" in the organisation. It has been pointed out that individuals and organisations lack an incentive for and interest in learning from and about one another; they expect one another to be experts and to solve their respective responsibilities (Moynihan, 2008). One plausible explanation for why multi-agency work does not become inter-agency work is the lack of experience with collaborative work (Charman, 2013). Critical cultural features, such as inter-organisational communication and a balance between separate and joint skills have been mentioned, and found in our empirical analyses, as key challenges in joint operations (Bharosa *et al.*, 2010; Berlin & Carlstrom, 2011; Charman, 2013). Crisis management would probably benefit from highlighting these aspects to a larger extent in exercises.

Organising at the accident scene could be described as an action net (Czarniawska, 2009), where sets of institutions act together at a given place and at a given time but without actually creating a new organisation. The capability of identifying how to knot this net, when to cross organisational boundaries, and when to return to sequential or parallel work is a key challenge that should be promoted during exercises. One aspect of this is improvising, which Boin & van Eeten (2013) point out is only used as an exception in HROs, when all other options have failed. This was explained by the fact that too robust of a safety system does not allow one to identify doubts; there is tension between structure and sense-making. In light of this, exercises can be used as non-crisis opportunities to identify doubts and to test various collaboration types and response models. In a way, these findings point out the need to challenge both the unknown and the known.

CONCLUSIONS

This paper aimed to present and problematize different aspects of the possibility to increase the preparedness for future emergency events, and to highlight exercises as a widely used tool in crisis management. Emergency services are prepared for accidents and crisis because they expect them to happen. Still, similar collaboration and communication issues have repeatedly been pointed out after crises and accidents. Given that emergency events will continue to occur, there is a need for continuous preparation based on what is identified as truly being possible to control and prepare for. Crisis both overlap with everyday routines and change management. One of the key challenges in managing the unexpected is to achieve a balance between improvising and routines. Emergency plans and regular exercises are core aspects of the proactive preparation part of the disaster management cycle. However, plans are discussed as neither sufficient nor always applicable in events that go beyond an everyday accident. Assessing the usefulness of exercises and their potential for learning and contribution to management of real life crisis is a complex

issue. Collaboration exercises could both produce a symbolic readiness and serve as an important part of crisis management. Exercises could benefit from not restricting the learning process to individual events or standard routines but rather using these details to question and to probe the challenges via a joint emergency response.

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